

The Bilingual Mind

Aneta Pavlenko

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The Bilingual Mind

If languages influence the way we think, do bilinguals think differently in their respective languages? And if languages do not affect thought, why do bilinguals often perceive such influence? For many years these questions remained unanswered because the research on language and thought had focused solely on the monolingual mind. Bilinguals were either excluded from this research as 'unusual' or 'messy' subjects, or treated as representative speakers of their first languages. Only recently did bi- and multilinguals become research participants in their own right.

Pavlenko considers the socio-political circumstances that led to the monolingual status quo and shows how the invisibility of bilingual participants compromised the validity and reliability of findings in the study of language and cognition. She then shifts attention to the bilingual turn in the field and examines its contributions to the understanding of the human mind.

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The Bilingual Mind

and what it tells us about language and thought

Aneta Pavlenko



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Preface

Let me begin this book by confessing that its title is a misnomer and a misrepresentation. In reality, there is no such thing as *the* bilingual mind: bilinguals vary greatly in linguistic repertoires, histories, and abilities, and *the bilingual mind* appears here as an umbrella term to refer to a variety of speakers, including multilinguals. The modifier *bilingual* is also a problem because languages are not easily identifiable, discrete, and countable entities. A popular source of information on world languages, *Ethnologue*, states upfront that the boundaries between them are blurry and that languages are best seen as continua of features that change across time and geographic space.¹ These continua are nevertheless psychologically real to their speakers and we would be remiss if we did not try to understand their functioning in contexts where speakers see themselves as learning another ‘language’ or speaking more than one ‘language’. Respectful of this psychological and social reality, throughout this book, I will unapologetically use the terms ‘language’, ‘bilingualism’, and ‘multilingualism,’ all the while recognizing their discursively constructed, approximate, and interpretive nature.

Yet the biggest oversimplification in the title is arguably the *mind* – we will see that the mind/body dichotomy is illusory and embodiment is central to understanding the bilingual mind. The *mind* also leads the reader to expect an overview of linguistic and cognitive processing in bilingual speakers but this is not my aim. De Groot (2011) and Grosjean and Ping Li (2013) have authored superb introductions to the psycholinguistics of bilingualism and I see no need to cover the same ground. This book will focus exclusively on the interaction between language and cognition or thought² and its genre could be defined as an academic quest that seeks answers to four questions: Are we justified in treating ‘language’ and ‘cognition’ as independent entities? If so, what do we mean by linguistic thought, that is, what, if any, aspects of cognition are mediated by language? Is linguistic thought affected by cross-linguistic differences?

¹ www.ethnologue.com/about/problem-language-identification

² The two terms will be used interchangeably in order to avoid reifying a distinction encoded in English.

And if so, how do speakers of more than one language resolve ambiguities and accommodate such differences? A decade or two ago, such a project would have been impossible, because the first question had already been answered in the positive, the second and third were – and by some still are – answered in the negative, and the last was – and by many still is – deemed irrelevant. The purpose of this book is to justify its relevance and to capture a passing moment in the ongoing change of scientific paradigms, *the bilingual turn* in the study of language and cognition.

One cannot speak about language and cognition from ‘nowhere in particular’ – my own approach is shaped by my North American context (in Europe, I would have written a very different book), my history of multilingualism and my professional training in linguistics. Now, I have to tell you immediately that I am not ‘a *linguist* linguist’. As perceptively noted by John McWhorter (2001), “regardless of the caliber of his work in another subfield, the linguist who does not display at least token interest in the Chomskian endeavor is not considered ‘a *linguist* linguist’ in the back of the minds of a great many in the field” (p. 282). I, for one, have never had any interest in the shape-shifting theory that dissociates language from human behavior. My academic home is in the fields of bilingualism and applied linguistics and I treat language not as Chomskyans do, with the focus on abstract structures, but as psycholinguists and sociolinguists do, with the focus on people. My treatment is further affected by my idiosyncratic linguistic repertoire that includes English, Russian, Ukrainian, Polish, French, Spanish, and Italian, but, alas, not ancient Greek, Latin, or German, nor any non-Indo-European languages, which means that at times I will be forced to rely on translations and interpretations by others.

I also would like to make transparent the criteria that guided my decisions in the writing process. To begin with the areas of research selected for review, I am fully aware that traditional research on linguistic relativity is limited to the subject matter of [Chapters 2](#) (categorization of colors, objects and substances), 3 (encoding of time, number, and space), and 4 (event construal) but does not extend to the topics of [Chapters 5](#) (autobiographical memory and narrative thought), 6 (inner speech, interpretive frames, and accomplishment of intersubjectivity) and 7 (emotions). I am also aware that I have omitted some areas that come under the purview of mainstream linguistic relativity research, such as the effects of gender as a grammatical category.

My decision-making in this case was guided by three criteria. The first was the *relevance* of the research area to the understanding of the *bilingual* mind and it functioned as an inclusion criterion leading me to consider topics, such as inner speech, that are not commonly treated in discussions of language and cognition but are extremely relevant to bilingual experience. The exclusion criteria involved *interdisciplinarity*, that is availability of findings from more than one discipline that would allow for triangulation of evidence, and *ecological*

validity, that is availability of ethnographic studies and speaker's own testimonies that would link the scholarly issues to everyday lives. The research on gender has failed to pass the second and third test – for now, it is limited to a handful of psycholinguistic studies documenting effects (or lack thereof) in artificial tasks and it is not clear what, if any, implications these findings have for habitual thought. In contrast, studies of autobiographical memory and language emotionality pass all three criteria and reveal aspects of the interaction between language and cognition in the bilingual mind that are invisible in studies with monolingual speakers.

The second instance of decision-making involves the selection of studies reviewed in each chapter. While a reader new to a particular topic may be overwhelmed by the sheer number of studies and references (which is why I included tables summarizing the key studies), a reader familiar with language and cognition research will undoubtedly notice the absence of some personal favorites. Let me assure you that I am fully aware of and very familiar with many more studies than have made their way into this book, yet, like every writer, I face constraints on what is realistic to include and am forced to be selective. My choices have been guided by the following five principles. The first is *impact*, with priority given to studies that made the highest impact as seen in citation records. The second is *replication*: whenever possible, I favored studies whose findings have been replicated by other researchers (but see [Chapters 2 and 3](#) for discussion of prominent cases of non-replication). The third, already discussed above, is *relevance*: despite what the reader may conclude, I do not cite everything I know (really!) and favor studies that move the narrative and the argument forward.

My fourth principle involves *rigor*: in discussion of empirical studies, I have prioritized more rigorous studies and thus studies that appeared in peer-reviewed journals over unpublished manuscripts, dissertations, and studies published as book chapters or conference proceedings. While I do not assume that peer-reviewed journals publish only the strongest work, having spent more than a decade on editorial boards, I have gained great respect for the unsung – and unpaid – heroes of the anonymous peer-review process, which serves to eliminate the weakest work, make mediocre studies stronger and, most importantly, to ensure a degree of transparency with regard to research design and participants. In my experience, empirical studies published in volumes where acceptance is commonly close to 100% (after all, the editors have invited the contributors) do not always pass the rigor standard and may display a variety of shortcomings, from extremely weak design (which prevented the authors from publishing the paper as a peer-reviewed article to begin with) to the lack of transparency with regard to research design and data analysis (which may conceal design weaknesses and threats to validity and generalizability). This is not to say that all studies cited here pass the rigor standard – in many cases

I chose to include studies that, in my view, are biased or flawed, because their biases and flaws also offer us important lessons.

My last principle is *accessibility*: throughout, I have favored journal articles, books, and chapters that are likely to be most accessible to the reader. I have also made three exceptions to this rule. The first involves historic sources, which I deem necessary for proper documentation of the genesis of research problems – in North America every source included here, including Epstein's (1915) dissertation, can be located through the interlibrary loan system. The second involves three recent conference papers, which by the time of the publication of this book will hopefully be available in an article format. The third involves sources in other languages: their use has been limited in the interests of transparency, yet since this is, after all, a book about multilingualism, I felt justified in referring to books and articles in languages other than English.

Now, a few words about my citation practice. My first principle is to avoid second-hand citation. In the case of this book, I have personally read every source and study cited, with the exception of German-language references from the Nazi era – there I go on the authority of Weinreich (1953) and of my German-speaking colleagues who translated some of these articles for me. My second principle is to use direct quotes whenever possible. I rely on direct citation much more than is common in academic literature but not because I lack words of my own. As a fan of Bakhtin's *raznoiazychie* [heteroglossia], I see great value in acknowledging the many voices we are in a dialog with and in giving authors a chance to speak in their own words and the reader an opportunity to see what people actually said, rather than what I think they said. In the spirit of ecological validity, I also appeal to comments by bi- and multilingual speakers and writers, including responses to the Bilingualism and Emotions Questionnaire (BEQ) Jean-Marc Dewaele and I administered through the web to more than 1,800 bi- and multilinguals around the world (Dewaele & Pavlenko, 2001–2003; Dewaele, 2010; Pavlenko, 2005).

My own writing is also characterized by heteroglossia, shaped by my dual citizenship in psycholinguistics and sociolinguistics. Conducting experimental research has taught me healthy respect for the challenges of empirical science, while discourse analysis and postmodernist theories provided the tools necessary for critical evaluation of the scientific enterprise. So here is a fair warning to the unsuspecting reader: in violation of conventions of respectable scholarly writing, I will shift mid-chapter, mid-paragraph, and sometimes even mid-sentence between the 'objective' tone of a positivist who believes in 'validity' and 'reliability' and the 'subjective' tone of a postmodernist who privileges bi- and multilinguals' own accounts and 'discursively constructed selves'. And if I do not treat either epistemological tradition with the deference and respect they undoubtedly deserve, it is because I am irreverent by nature and do not think that a single academic discipline – not even one as revered as North American

psychology – is capable of telling a full story of what being bilingual means to real people like you and me.

Only stories can make things real and so, taking a break from the tedious minutiae of research design and participant selection, we will walk down memory lane with Nabokov, place our hands in the water with Helen Keller, steal pears with Saint Augustine, and read poetry written by Chagall. At times, I will point out serendipitous connections between people or phenomena and at other times I will leave traces in the text for the readers to make their own connections. I will also leave you with questions to which I do not have any answers. In this, I follow the advice of my favorite expert on academic writing, Bill Germano, who encourages us to write scholarly books as unfinished quests, for which the reader alone can provide the unwritten chapters. It is all yours now.

Acknowledgments

I have always wanted to write this book. In fact, I sent a proposal for a similarly titled book to Andrew Winnard at Cambridge University Press when I was still finishing my dissertation. Fortunately, he never responded. I want to thank Andrew for the wisdom of ignoring that proposal (as a novice writer I was not ready to write this or any other book), for taking the book on, ten years later (when it seemed I was ready), and for his patience, when the writing process took years longer than it was supposed to (it turned out I was not as ready as I thought I was). The key to the transformation of a hesitant writer into a confident one was the quality of the interactions I had, over the years, with many wonderful colleagues, some of whom became close personal friends, and with many books, essays, and articles, some of which also became dear friends.

My favorite books will become obvious when you start reading this one and so I turn to people. For their generous friendship, productive collaboration, inspiration, ongoing dialog and, in some cases, feedback on parts of this book, I am deeply indebted to Panos Athanasopoulos, Ewa Badowska (who introduced me to Eva Hoffman's work), Emanuel Bylund, Jean-Marc Dewaele, Alexandre Duchêne, Marianne Gullberg, Catherine Harris, Scott Jarvis, Michèle Koven, Barbara Malt, Viorica Marian, Alexia Panayiotou, Ingrid Piller, Monika Schmid, Robert Schrauf, and Li Wei. For their constructive feedback and criticism, I am very grateful to the anonymous readers, to students in my Bilingual Mind class, and to two graduate students, Rafał Jończyk (the first reader of this book) and Elizabeth Ann Hepford, for the time and effort they put into reading the manuscript and helping me make it more accessible to novice scholars. I am very thankful to Barbara Schmiedtová and Guillaume Thierry, who opened their labs for me and allowed me to take part in their experiments, and to Andrew Pawley and Caleb Everett, who promptly responded to my inquiries. I have also greatly benefitted from sometimes brief, sometimes long but always memorable conversations with Colin Baker, Mary Besemeres, Vivian Cook, Susan Ervin-Tripp, Cliff Goddard, John Gumperz, Steven Kellman, Claire Kramsch, William Labov, John Lucy, Michel Paradis, Gustavo Pérez Firmat, Klaus Scherer, Dan Slobin, Tzvetan Todorov, and Anna Wierzbicka. Special thanks to François Grosjean, whose *Life with Two Languages* inspired

me to study bilingualism, whose insistence led to my first publication in the field, and whose friendship and support over the years meant more to me than I can ever say in any language.

At Temple University, I have the privilege to work in a very supportive academic environment, with wonderful colleagues, great students, and that wonder of the modern academic world, unfailingly supportive administration. For being there when I needed them most and for letting me be myself, I am deeply grateful to Dean James Earl Davis, Associate Dean James Byrnes, and outstanding department chairs Michael Smith and Thomas Walker.

Ten-hour-long writing days would have been impossible without daily visits to my favorite gym, Balance Chestnut Hill, and Kathy Murphy, a kindred spirit and trainer *extraordinaire*. At home, I owe a debt of gratitude to two wonderful men who long ago came to terms with the fact that my writing sometimes comes first: Nik, who never ceases to amaze me and make me proud, and Doug, who still takes my breath away after almost two decades together. My greatest debt, however, is to my guardian angels, Julia, Liza, Kevin, and DJ, without whom there would be no book – this one is for you.

1 The Sapir-Whorf hypothesis and the bilingual turn in the study of language and cognition

In science ... novelty emerges only with difficulty, manifested by resistance, against a background provided by expectation. Initially, only the anticipated and usual are experienced even under circumstances where anomaly is later to be observed. Further acquaintance, however, does result in awareness of something wrong or does relate the effect to something that has gone wrong before. That awareness of anomaly opens a period in which conceptual categories are adjusted until the initially anomalous has become the anticipated.

Kuhn, [1962] 2012: 64

My approach to writing is also informed by my fascination with history, or rather with our ongoing dialog with the past, where we continuously ask new questions about where we have been and receive new answers that have a bearing on where we go next. The preference for the diachronic over the synchronic also informs this introductory chapter, whose aim is to examine why, until recently, bilingualism played no role in discussions of language and thought and to understand what brought about the change. Yet, despite my love of history, I am not a historian of science – readers interested in the history of ideas about language diversity and thought should consult Allan (2007), Joseph (2002), Koerner (2002), Lucy (1992a), and Leavitt (2011). My own goal is to draw on these and other sources to discuss two lesser-known aspects of the history of what we know as the Sapir-Whorf hypothesis (SWH). To explain what happened to Humboldt's idea of second-language (L2) learning as a way to transcend the boundaries of the first language (L1), I will depart from the traditional preoccupation of English-language academia with its own history and compare the treatment of Humboldt's ideas in the US with that in Western Europe, Russia and the USSR. Then I will consider the invention of the SWH tradition in the US and ask how likely is it that Humboldt, Sapir, and Whorf, all of them multilingual and fascinated by language learning and change, believed that language determines thought? And if they did not, who did?

1.1 The Sapir-Whorf hypothesis: a story of manufactured consent

1.1.1 Humboldt: *Weltansicht* vs *Weltanschauung*

Historiographies of linguistic relativity commonly trace the idea that languages are linked to the worldviews of their speakers to the eighteenth-century Romantic movement that spread from Étienne Bonnot de Condillac (1715–1780) and Jean-Jacques Rousseau (1712–1778) in France to Johann Georg Hamann (1730–1788) and Johann Gottfried von Herder (1744–1803) in Germany.

Critics of rationalist and universalist assumptions of the Enlightenment, Hamann and Herder viewed language as the organ of thought and argued that each nation or people (*Volk*) has a unique national spirit (*Volksgeist*) and a distinct way of thinking, reflected in their language:

If it is true that we cannot think without thoughts, and that we learn to think through words, then language gives to the whole of knowledge its limits and contours ... We think in language ... and in ordinary life it is indeed apparent that thinking is almost nothing more than speaking. (Herder, translated in Leavitt, 2011: 78)

While Herder did extol the superiority of German, with its flexible word order, he also opposed those who saw some languages as more evolved than others. The fact that some languages had few, if any, number words, for instance,¹ was interpreted by Herder as indicative of people's needs and lifestyles, rather than any deficiency of language or thought:

How few do most savages have, however rich, excellent, and developed their languages may be! Never more than they needed. (translated by Forster in Herder, 2002: 120)

The implications of these pluralist ideas for cognition and perception were further developed by Prussian diplomat, philosopher, and philologist Wilhelm von Humboldt (1767–1835). An avid language learner, whose languages ranged from Sanskrit to Basque, Humboldt viewed languages as self-contained systems that encoded unique worldviews: “each language draws a circle around the people to whom it adheres” (1836: LXXV, translated in Humboldt, 1963: 294). His notion of *worldview* was not, however, unitary: Humboldt differentiated between *Weltansicht*, the fundamental capacity of the mind to process the world through language and to organize it into concepts, and *Weltanschauung*, an interpretive system or ideology that is subjective and not language-bound. Underhill (2009) emphasizes that the cornerstone of his linguistic philosophy was *Weltansicht*, the largely unconscious way in which we follow the patterns of our language in negotiating daily reality. For Humboldt, these patterns were

¹ For an in-depth discussion of number, see [Chapter 3](#).

neither predetermined nor arbitrary, rather they reflected the ongoing mental activity, in which language, an interactive tool of human cognition, accommodated our evolving needs, and the relationship between the mind, the language, and the world was dynamic and mutually constitutive:

the persistent *work of the mind* in using language has a definite and continuing influence even on the true structure of the language and the actual pattern of its forms; but it is a subtle influence, and sometimes escapes notice at first sight. (translated by Heath in Humboldt, [1836] 1999: 148)

Humboldt was also preoccupied with the ways in which we transcend language boundaries, be it via language refinement and reinvention in literature and especially poetry (which he saw as a major mechanism of language development and change) or via learning of foreign languages:

it is possible for the individual to escape [the language circle] only by stepping into a different one. The learning of a foreign language should therefore mean the gaining of a new standpoint toward one's world-view, and it does this in fact to a considerable degree, because each language contains the entire conceptual web and mental images of a part of humanity. If it is not always purely felt as such, the reason is only that one so frequently projects one's own world-view, in fact one's own speech habits, onto a foreign language. (Humboldt, 1836: LXXV; translated by Cowan in Humboldt, 1963: 294)

This last sentence identifies the phenomenon that in the next century would become one of the cornerstones in the study of bilingualism, the influence of the L1 on the L2. Ironically, Humboldt himself fell victim to this influence – in translation, his distinction between *Weltansicht* and *Weltanschauung* disappeared and language was linked to the all-encompassing *Weltanschauung* or *worldview* (Underhill, 2009). But it was not just *Weltansicht* that was ‘lost in translation’ – so was Humboldt’s interest in L2 learning effects.

1.1.2 The many readings of Humboldt: from Moscow to the Hudson

1.1.2.1 *Humboldt in Geneva: la polyglossie est une plaie sociale* The first scholarly study of multilingualism and thought inspired by Humboldt’s ideas was Izhac Epstein’s (1862–1943) doctoral dissertation *La pensée et la polyglossie* [Thought and multilingualism] (1915), carried out at the University of Lausanne in Switzerland. Following Herder and Humboldt, Epstein (1915) posited that “chaque peuple a une façon particulière et caractéristique de grouper, afin de les nommer, les choses et leurs propriétés, les actes et les rapports” [every nation has a particular and characteristic manner of grouping things and their properties, actions and relations, in order to name them] (p. 115). To examine the implications of this variation for thought – operationalized as different types of mental operations, including inner speech,

mental translation, and calculation – he conducted a study of school students' perception and memory for foreign language words. Epstein (1915) also collected questionnaire data from 23 multilinguals, with questions addressing perceptions of translation (non-) equivalence in the respondents' languages, cross-linguistic influence, verbal imagery invoked by particular languages, the language of mental calculations, and the language of participants' dreams. The questionnaire also asked: "Pensez-vous quelquefois en langue étrangère et à quelle occasion?" [Do you ever think in a foreign language and when (on what occasion)?] (p. 11).

Based on this data, supplemented with his own introspections and observations of multilingual children and adults, Epstein (1915) concluded that multilinguals associate languages with people, contexts, and domains and spontaneously adjust inner speech, depending on the topic and imagined settings and interlocutors. Mental calculations, he found, are commonly conducted in the L1 or in the language in which mathematical instruction took place. He also pointed to the effects of learning contexts, where languages learned in communicative settings may be linked directly to thought, while languages learned through the grammar-translation method may be linked to translation equivalents and require mental translation.

While Epstein's (1915) view of linguistic thought was not particularly sophisticated, some of his ideas about bilingualism appear quite modern and in sync with our own. His views of the relationship between the L1, the L2 and the conceptual store are reminiscent of later distinctions between coordinate and subordinate bilingualism, his ideas about *une influence négative ou inhibitrice* of the previous language of conversation in the case of an abrupt language change pre-date by almost a century our notions of language activation and inhibition, while his reflections about *l'interférence* and *l'intercalation* invoke our own ideas about language transfer, code-switching, and lexical borrowing. These parallels make the ending of his monumental thesis all the more striking to the present-day reader. Arguing that bilingualism slows down the thought process through activation of alternative options in other languages, Epstein (1915) concludes: "La polyglossie est une plaie sociale" [Multilingualism is a social ill] (p. 210). Since bilingualism could be particularly harmful for young children whose thought processes were still developing, his recommendation was to begin foreign-language instruction in later childhood and to limit it to reading and basic everyday expressions, the only two skills an educated person really needed.

Yet debates about 'language effects' are rarely about language only and sometimes not about language at all: at their core are concerns about political power, nationhood, citizenship, immigrant assimilation, and distribution of economic resources. Epstein's (1915) conclusions need to be understood within the historical context of early-twentieth-century Europe, where Herderian and

Humboldtian romantic nationalism inspired the emergence of monolingual nation-states from the ashes of multilingual empires. State attempts to ‘manage’ linguistic diversity fueled anxieties in multilingual settings torn by ethnolinguistic conflicts, such as Belgium, Catalonia, Czechoslovakia, Luxembourg, Switzerland, and Wales, giving rise to arguments about the negative consequences of bilingualism (Weinreich, 1953).

In multilingual Switzerland, divisions along ethnolinguistic lines were intensified by World War I: many German speakers sympathized with Germany, while the bulk of French and Italian speakers sided with the allies (Watts, 1999; Widmer, 2004). The demographic balance, however, was quite uneven: in 1910, German speakers represented 73% of the Swiss population, French speakers 22%, Italian speakers 4% and Romansch speakers 1% (Anderson, 1991). Thus, it should not be surprising that a dissertation written in 1915 in a French-medium university would take a strong stance against a perceived threat of potential Germanification.

In Wales, Welsh–English bilinguals (especially in rural areas) were shown to perform worse than monolingual children on a variety of tasks (Saer, 1924; Saer, Smith & Hughes, 1924; Smith, 1923). These findings were explained by the superior “accuracy of thought” of monolingual children (Smith, 1923: 282). What is particularly interesting about this case is that the negative consequences of bilingualism – as an intellectual impediment and a site of a cognitive, linguistic and emotional conflict – were used in defense of both official (English) language instruction and minority (Welsh) language education.

An unfavorable view of bilingualism – at least that of the lower classes – was also expressed by one of the best-known European linguists of the era, Otto Jespersen (1922):

It is, of course, an advantage for a child to be familiar with two languages: but without doubt the advantage may be, and generally is, purchased too dear. First of all the child in question hardly learns either of the two languages as perfectly as he would have done if he had limited himself to one. It may seem, on the surface, as if he talked just like a native, but he does not really command the fine points of the language. Has any bilingual child ever developed into a great artist in speech, a poet, or orator? (p. 148)

This negative view was further developed in Nazi Germany, where bilingualism – associated with Jews, Poles, and other minorities – was regarded as a cause of ‘mercenary relativism’, intellectual deterioration and mental inferiority, and the only exception was made for German children who learned a dialect at home and the standard at school (Henss, 1931; Müller, 1934; Sander, 1934; Schmidt-Rohr, 1933; Weisgerber, 1933). The view of bilingualism as a site of inner conflict was often grounded in the notion of *Weltanschauung*, adopted for a variety of purposes by Neohumboldtian linguists of the Third Reich (Hutton, 1999; Leavitt, 2011; Underhill, 2009). Sander (1934), for instance, argued:

Bilingualism leads not only to harmless speech errors, but it goes deeper, especially when it is imposed by force in early childhood, and endangers the closed and self-centered wholeness of the developing structure ... Every language establishes, as an articulated system, a very definite, relatively uniform and closed orientation of perception, feeling, and thinking in those who speak it. The consequence [of bilingualism in children] is that the inner attitudes which are conditioned by language will not stand unconnectedly beside one another, but will enter into conflicting tensions in the child's soul ... This functional opposition of two language formations can lead to shake-ups of the structure. (Sander, 1934, translated by Weinreich, 1953: 119–120)

Only after the collapse of the Third Reich would the United Nations (UN) and other international organizations articulate new conceptions of bilingualism and linguistic rights.

1.1.2.2 *Humboldt in Moscow: “the right to think, feel, speak and learn in the native language”* Duchêne's (2008) study of the legal construction of linguistic minorities in the UN shows that the impetus for recognition of linguistic rights came from the representatives of the USSR who criticized Western policies as assimilationist and were opposed by the representatives of ideologically monolingual nation-states, such as France. The Soviet critique was grounded in the distinct reading Humboldt's ideas got in Russia and then in the USSR.

Translated into Russian in 1858, Humboldt's work reached the wider educated public through the book *Mysl' i iazyk* [Thought and language] (1862) authored by a prominent linguist Aleksandr Potebnya (1835–1891). His romantic nationalism found a warm reception among Russian intelligentsia who, in the 1860s, tried to create a new educational system for Russia's emancipated serfs and for its vast non-Russian population. Herder's and Humboldt's ideas inspired Russian linguists – including Polish-Russian linguist Baudouin de Courtenay, the founder of the Petersburg school of linguistics, and Fortunatov, the founder of the Moscow school – to prioritize populist goals, such as spelling reforms, language and education policies and documentation of Russia's languages and dialects (Alpatov, 2005; Dowler, 2001; Hirsch, 2005; Smith, 1998).

Russia's leading educator, Konstantin Ushinskii (1824–1870), also echoed Humboldt when he argued that all children need to begin education in their native tongues because “when a native language disappears, a people is no more!” (Dowler, 2001: 52). His arguments were aimed at Russia's elite, who privileged French over Russian even in the nursery, but they were also taken seriously by educators working with non-Russian speakers. One of them was Nikolai Il'minskii (1822–1891), who pioneered transitional bilingual education for Russia's *inorodtsy* [non-Russians] and documented and standardized several languages (Dowler, 2001). In the era of liberalization and linguistic

tolerance that followed the Russian revolution of 1905, Il'minskii's approach inspired an expansion of native-language schooling (Dowler, 2001) and education conferences affirmed the right of every Russian citizen – with the exception of Belarussians and Ukrainians, who were seen as speakers of Russian dialects – “to think, feel, speak, and learn in the native language” (Smith, 1998: 30–31).

The love of Humboldt and a deep belief in language rights were then inherited by Soviet linguists, who codified more than 40 languages, standardized established languages, transferred written languages from Arabic script (associated with Islam) to the Latin alphabet (associated with internationalization and modernity), and created an unparalleled system of bi- and multilingual education in more than 70 languages (Hirsch, 2005; Pavlenko, 2013; Smith, 1998).

Humboldt's and Potebnia's views on language and thought also influenced Soviet academics, most notably developmental psychologist Lev Vygotsky (e.g., Luria, 2001: 26; Vygotsky, 1986: 240) and literary critic Mikhail Bakhtin (e.g., Bakhtin, 1986: 67, 101), who further developed their ideas about inner speech and language as an activity and a form of thought.²

Vygotsky (1935) also reviewed the arguments about the negative consequences of bilingualism made by Epstein (1915), Saer, Smith & Hughes (1924), and others, and juxtaposed their findings with those of Ronjat (1913) and Pavlovitch (1920), whose case studies highlighted the advantages of bilingual development. He then concluded that the key to positive effects of multilingualism was the proper pedagogical approach and that the complex issue of the relationship between multilingualism and thought required an extensive program of empirical study, which should not be affected by overreliance on standardized testing and assumptions of racial and social inferiority common in Western research. He also pointed out that the non-verbal nature of certain tests should not be seen as evidence of their non-linguistic nature.

Vygotsky's early death precluded him from undertaking such studies and, after his passing, they were not a priority in the country that had already embraced multilingualism and was focused, first, on raising levels of education and literacy and then on recovery from the devastation and damage inflicted by World War II. Yet the interest in the relationship between language and worldview shared by Humboldt, Potebnia, and Vygotsky, and their focus on the word, were maintained in Soviet and post-Soviet linguistics that continued to explore – albeit in an essentialized form – cross-linguistic variation in *kartiny mira* [worldviews] through the prism of lexical categories (e.g., Frumkina, 2001; Karasik et al., 2005; Zaluzniak et al., 2005).

² For further discussion of Bakhtin and Vygotsky, see [Chapter 6](#).

1.1.2.3 *Humboldt on the Hudson: “We have room for but one language here”* In the United States, Herder’s and Humboldt’s views, transmitted via Heymann Steinthal (1823–1899) and William Whitney (1827–1894), found a new life in the work of a German immigrant³ Franz Boas (1858–1942). Distancing himself from Herderian and Humboldtian essentialism and the affinity between languages and people’s ‘genius’, Boas adopted their pluralism and – like Potebnya and Baudouin de Courtenay – argued that all languages should be systematically investigated and explained on their own terms, without preconceptions about their structure or inferiority, for they offer an important window into the human mind and culture:

In various cultures these classifications may be founded on fundamentally distinct principles ... For instance: it has been observed that colors are classified in quite distinct groups according to their similarities, without any accompanying difference in the ability to distinguish shades of color. What we call green and blue is often combined under a term like “gall-color”, or yellow and green are combined into one concept which may be named “color of young leaves.” (Boas, [1911, 1938] 1965: 190)

Boas’ chief interest was in cross-linguistic variation in obligatory categories – that is, in what the different languages require you to encode – and its implications for mental activities. Yet his comments on color categorization – a subject of heated debate in his time, as we will see in [Chapter 2](#) – show that, in his view, differences in color lexicons did not imply differences in the ability to distinguish colors, just as limited number encoding was not indicative of limited cognitive capacities. Rather, he was intrigued by the ways in which the automatic nature of language use placed these differences below the threshold of awareness, making the categories of one’s native language appear ‘objective’:

the categories of language compel us to see the world arranged in certain definite conceptual groups which, on account of our lack of knowledge of linguistic processes, are taken as objective categories, and which, therefore, impose themselves upon the form of our thoughts. (Boas, [1920] 1966: 289)

Boas’ student at Columbia, Edward Sapir (1884 – 1939), developed these ideas further and argued that “such categories as number, gender, case, tense, mode, voice, ‘aspect’ ... are not so much discovered in experience as imposed upon it because of the tyrannical hold that linguistic form has upon our orientation in the world” ([1931] 1964: 128). His paper *The status of linguistics as a science* put forth what came to be seen as a manifesto of linguistic relativity:

³ The common treatment of Boas and Sapir as German immigrants is, in fact, oversimplified. Boas, who came in the United States at the age of 29, was a German-speaking Jew who left Germany with its rising anti-semitism, and Sapir, whose family settled in the United States when he was 6, was a child of Yiddish-speaking Lithuanian Jews from Lauenberg, an area of Prussia that now belongs to Poland (Darnell, 1990).

Language is a guide to ‘social reality’. Though language is not ordinarily thought of as of essential interest to the students of social science, it powerfully conditions all our thinking about social problems and processes. Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society. It is quite an illusion to imagine that one adjusts to reality essentially without the use of language and that language is merely an incidental means of solving specific problems of communication or reflection. The fact of the matter is that the ‘real world’ is to a large extent unconsciously built up on the language habits of the group. No two languages are ever sufficiently similar to be considered as representing the same social reality. The worlds in which different societies live are distinct worlds, not merely the same world with different labels attached ... We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation. (Sapir, [1929] 1949: 162)

This passage is commonly used to attribute linguistic determinism to Sapir, yet, as Leavitt (2011) justly points out, the standard quotes usually end with “labels attached” or skip a part of the text, between “labels attached” and “We see”, replacing it with the three dots. In the original text, Sapir illustrates his argument with an example of a simple poem, whose understanding requires “a full comprehension of the whole life of the community as it is mirrored in words, or as it is suggested by overtones” ([1929] 1949: 162). This argument, reminiscent of Bakhtinian *heteroglossia*, emphasizes shared perspective, or intersubjectivity, with other speakers of the language in question, and it escapes the attention of those who favor simplistic interpretations. Even Sapir’s hyperbole, “the tyrannical hold”, does not imply an actual constraint on thought – language patterns, for Sapir, are akin to grooves which may be easier to follow automatically yet may be overcome, through poetic expression, linguistic study, or the process of learning a foreign language. His description is reminiscent of that offered earlier by Humboldt:

To pass from one language to another is psychologically parallel to passing from one geometrical system of reference to another. The environing world which is referred to is the same for either language; the world of points is the same in either frame of reference.

But the formal method of approach to the expressed item of experience, as to the given point of space, is so different that the resulting feeling of orientation can be the same neither in the two languages nor in the two frames of reference. Entirely distinct, or at least measurably distinct, formal adjustments have to be made and these differences have their psychological correlates. (Sapir, [1924] 1949: 153)

The preoccupation with what is required to speak a foreign language in a target-like manner was shared by Benjamin Lee Whorf (1897–1941), a chemical engineer and amateur linguist who studied with Sapir at Yale. Whorf, too, saw the learning of another language as a way to transcend the categories of one’s own:

the best approach is through an exotic language, for in its study we are at long last pushed willy-nilly out of our ruts. Then we find that the exotic language is a mirror held up to our own. (Whorf, [1941a] 2012: 178)

Whorf's own research on 'exotic' languages such as Hopi – which he studied with an informant in New York City and then, in 1938, on the Hopi reservation in Arizona – revealed categories unfamiliar to speakers of English and led to his linguistic relativity principle:

users of markedly different grammars are pointed by their grammars towards different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world. (Whorf, [1940] 2012: 282–283)

This paragraph – arguably one of the most cited in the history of linguistics – is usually interpreted as a deterministic statement, yet in the context of Whorf's other work it becomes an argument “about the seductive force of habit” (Leavitt, 2011: 146). Like Humboldt and Sapir before him, Whorf, too, believed in the plasticity of the human mind and its ability to go beyond the categories of the mother tongue. This belief permeates the poignant plea for ‘multilingual awareness’ made by the terminally ill Whorf to the world on the brink of World War II:

I believe that those who envision a world speaking only one tongue, whether English, German, Russian, or any other, hold a misguided ideal and would do the evolution of the human mind the greatest disservice. Western culture has made, through language, a provisional analysis of reality and, without correctives, holds resolutely to that analysis as final. The only correctives lie in all those other tongues which by aeons of independent evolution have arrived at different, but equally logical, provisional analyses. ([1941b] 2012: 313)

Whorf's arguments fell on deaf ears, because they were made in a climate significantly less tolerant of linguistic diversity than that of the late imperial Russia and the USSR. In the nineteenth century, large immigrant communities in the US (in particular German speakers) enjoyed access to native-language education, press and theater. The situation began to change during the period often termed the Great Migration (1880–1924), when approximately 24 million new immigrants entered the country (US Bureau of the Census, 1975). The overwhelming influx raised concerns about national unity and the capacity of American society to assimilate such a large body of newcomers. In 1917, when the US entered the European conflict declaring war on Germany, the anti-immigrant sentiments found an outlet in a strong movement against ‘the language of the enemy’: German books were removed from libraries and destroyed, German-language theaters and publications closed, and German speakers became subject to intimidation and threats (Luebke, 1980; Pavlenko, 2002a; Wiley, 1998).

The advisability of German – and other foreign-language-medium – instruction also came into question, in a truly Humboldtian fashion that linked the learning of foreign languages with adoption of ‘foreign’ world-views (e.g., Gordy, 1918). The National Education Association went as far as to declare “the practice of giving instruction ... in a foreign tongue to be un-American and unpatriotic” (Fitz-Gerald, 1918: 62). And while many prominent intellectuals stood up in defense of foreign languages (e.g., Barnes, 1918), bilingual education gave way and so did foreign-language instruction at the elementary level, where children were judged most vulnerable and where 80% of them ended their education. Between 1917 and 1922, Alabama, Colorado, Delaware, Iowa, Nebraska, Oklahoma, and South Dakota issued laws that prohibited foreign-language instruction in grades I through VIII, while Wisconsin and Minnesota restricted it to one hour a day. Louisiana, Indiana, and Ohio made the teaching of German illegal at the elementary level, and so did several cities with large German-speaking populations, including Baltimore, New York City, and Philadelphia (Luebke, 1980; Pavlenko, 2002a). The double standard that made bilingualism an upper-class privilege reserved for ‘real’ Americans is seen in the address given by a Vassar professor at the Modern Language Teachers conference in 1918:

In so far as teaching foreign languages in our elementary schools has been a means of keeping a child of foreign birth in the language and ideals of his family and tradition, I think it a bad thing; but to teach young Americans French, German, or Spanish at an age when their oral and verbal memory is keen and when languages come easily, is a good thing. (Whitney, 1918: 11–12)

The intolerance reached its apogee in Roosevelt’s 1919 address to the American Defense Society that equated English monolingualism with loyalty to the US:

We have room for but one language here, and that is the English language, for we intend to see that the crucible turns our people out as Americans, of American nationality, and not as dwellers in a polyglot boardinghouse; and we have room for but one sole loyalty, and that is the loyalty to the American people. (cited in Brumberg, 1986: 7)

Reprinted in countless Board of Education brochures, this speech fortified the pressure not only to learn English but to abandon native languages. This pressure precipitated a rapid shift to English in many immigrant communities, further facilitated by the drastic reduction in immigrant influx, due to the quotas established by the 1924 National Origins Act (Pavlenko, 2002a). Assimilation efforts also extended to Native Americans, who were no longer treated as sovereign nations – many Native American children were sent to English-language boarding schools, where they lost their native languages (Morgan, 2009; Spack, 2002).

The endangerment of Native American languages was of great concern to Boas, Sapir, and Whorf, yet their support for linguistic diversity and multilingualism never translated into reforms and policies: in the world outside of academia, Americanization laws and efforts were making US citizenry unapologetically monolingual and the disappearance of ‘multilingual awareness’ was applauded by academics who viewed bilingualism as detrimental to children’s cognitive, linguistic and emotional development (Anastasi & Cordova, 1953; Bossard, 1945; Smith, 1931, 1939; Spoerl, 1943; Yoshioka, 1929; for discussion, see Weinreich, 1953: 115–118). It was only in the 1950s that Arsenian (1945), Haugen (1953, 1956), and Weinreich (1953) succeeded in promoting a more positive view of bilingualism, yet part of their success resided in the fact that by then bilingualism no longer mattered – it was regarded, as we will see, as an “unusual” characteristic, pervasive at the margins but hardly relevant for the society at large.

In the USSR, on the other hand, linguists’ romantic belief in linguistic rights and politicians’ desire to institutionalize nations as fundamental constituents of the state gave rise to the policy of *korenizatsia* [nativization] and a unique educational system that promoted the development of multilingual competence (Hirsch, 2005; Pavlenko, 2013; Smith, 1998). It is a little-known and underappreciated irony that throughout the twentieth century, language policies in the ‘totalitarian’ Soviet Union were significantly more liberal – even during the period of the so-called ‘russification’ – than those in the ‘liberal’ United States.

1.1.2.4 *The real authors of the Sapir-Whorf hypothesis and the invisibility of scientific revolutions* The invisibility of bilingualism in the United States also accounts for the disappearance of multilingual awareness from discussions of Sapir’s and Whorf’s work, which occurred when the two scholars passed away – both at a relatively young age – and their ideas landed in the hands of others. The posthumous collections brought Sapir’s (1949) and Whorf’s (1956) insights to the attention of the wider public (including, *inter alia*, young Thomas Kuhn) and inspired the emergence of the field of psycholinguistics. But the newly minted psycholinguists faced a major problem: it had never occurred to Sapir and Whorf to put forth testable hypotheses. Whorf showed how linguistic patterns could be systematically investigated through the use of *overt categories* marked systematically (e.g., number in English or gender in Russian) and *covert categories* marked only in certain contexts (e.g., gender in English), yet neither he nor Sapir ever elaborated the meaning of ‘different observations’ or ‘psychological correlates’.

Throughout the 1950s and 1960s, scholarly debates at conferences, summer seminars and in academic journals attempted to correct this ‘oversight’ and to ‘systematize’ their ideas (Black, 1959; Brown & Lenneberg, 1954;

Fishman, 1960; Hoijer, 1954a; Lenneberg, 1953; Osgood & Sebeok, 1954; Trager, 1959). The term ‘the Sapir-Whorf hypothesis’ was first used by linguistic anthropologist Harry Hoijer (1954b) to refer to the idea “that language functions, not simply as a device for reporting experience, but also, and more significantly, as a way of defining experience for its speakers” (p. 93). The study of SWH, in Hoijer’s view, was supposed to focus on structural and semantic patterns active in a given language. This version, probably closest to Whorf’s own interest in linguistic classification, was soon replaced by an alternative, developed by psychologists Roger Brown and Eric Lenneberg, who translated Sapir’s and Whorf’s ideas into two ‘testable’ hypotheses (Brown & Lenneberg, 1954; Lenneberg, 1953). The definitive form of the dichotomy was articulated in Brown’s (1958) book *Words and Things*:

linguistic relativity holds that where there are differences of language there will also be differences of thought, that language and thought covary. Determinism goes beyond this to require that the prior existence of some language pattern is either necessary or sufficient to produce some thought pattern. (p. 260)

In what follows, I will draw on Kuhn’s ([1962] 2012) insights to discuss four aspects of this radical transformation of Sapir’s and Whorf’s ideas into the SWH: (a) it was a major change of *paradigm*, that is, of shared assumptions, research foci, and methods, (b) it erased multilingual awareness, (c) it created a false dichotomy, and (d) it proceeded unacknowledged.

The change of paradigm was necessitated by the desire to make complex notions, articulated by linguistic anthropologists, fit experimental paradigms in psychology. Yet ideas don’t travel easily across disciplines: Kuhn ([1962] 2012) compares a dialog between scientific communities to intercultural communication, which requires skillful translation if it is to avoid communication breakdowns. Brown and Lenneberg’s translation was not skillful and while their ideas moved the study of language and cognition forward, they departed from the original arguments in several ways (for discussion, see also Levinson, 2012; Lucy, 1992a; Lee, 1996).

First, they shifted the focus of the inquiry from the effects of obligatory grammatical categories, such as tense, to lexical domains, such as color, that had a rather tenuous relationship to linguistic thought (color differentiation was, in fact, discussed by Boas and Whorf as an ability *not* influenced by language). Secondly, they shifted from concepts as interpretive categories to cognitive processes, such as perception or memory, that were of little interest to Sapir and Whorf, and proposed to investigate them with artificial stimuli, such as Munsell chips, that hardly reflect habitual thought. Third, they privileged the idea of thought potential (and, by implication, what *can* be said) over Sapir’s and Whorf’s concerns with obligatory categories and habitual thought (and, by

definition, with what *is* said). Fourth, they missed the insights about the illusory objectivity of one's own language and replaced the interest in *linguistic thought* with independent 'language' and 'cognition'. Last, they substituted Humboldt's, Sapir's and Whorf's interest in multilingual awareness with a hypothesis articulated in monolingual terms.

A closer look at Brown's (1958) book shows that he was fully aware of the existence of bilingualism and of the claims made by bilingual speakers of Native American languages that "thinking is different in the Indian language" (p. 232). His recommendation in this case was to distrust those who have the "unusual" characteristic of being bilingual:

There are few bilinguals, after all, and the testimony of those few cannot be uncritically accepted. There is a familiar inclination on the part of those who possess unusual and arduously obtained experience to exaggerate its remoteness from anything the rest of us know. This must be taken into account when evaluating the impressions of students of Indian languages. In fact, it might be best to translate freely with the Indian languages, assimilating their minds to our own. (Brown, 1958: 233)

The testimony of German-English bilinguals – akin to his own collaborator Eric Heinz Lenneberg – was apparently another matter: the existence of "numerous bilingual persons and countless translated documents" was, for Brown (1958: 232), compelling evidence that the German mind is "very like our own". Alas, Brown's (1958) contradictory treatment of bilingualism and the monolingual arrogance of the recommendations 'to translate freely' and 'to assimilate Indian minds to our own' went unnoticed by his colleagues. The result was the transformation of a fluid and dynamic account of language into a rigid, static false dichotomy.

When we look back, the attribution of the idea of linguistic determinism to multilinguals interested in language evolution and the evolution of the human mind makes little sense. Yet the replacement of the open-ended questions about implications of linguistic diversity with two 'testable' hypotheses had a major advantage – it was easier to argue about and to digest. And it was welcomed by scholars who, like Kay and Kempton (1984), applauded the translation of Sapir's and Whorf's convoluted passages into direct prose and felt that Brown and Lenneberg "really said all that was necessary" (p. 66) and that the question of what Sapir and Whorf actually thought was interesting but "after all less important than the issue of what is the case" (p. 77). In fact, by the 1980s, Kay and Kempton were among the few who could still trace the transformation to the two psychologists. Their colleagues were largely unaware of it because Brown and Lenneberg concealed the radical nature of their reformulation by giving Sapir and Whorf 'credit' for what should have been the Brown-Lenneberg hypothesis.

We might never know what prompted this unusual scholarly modesty – a sincere belief that they were simply ‘improving’ Sapir and Whorf or the desire to distance themselves from the hypothesis articulated only to be ‘disproved’. For Kuhn ([1962] 2012), this is science as usual: “it is just this sort of change in the formulation of questions and answers that accounts, far more than novel empirical discoveries, for the transition from Aristotelian to Galilean and from Galilean to Newtonian dynamics” (p. 139). He also points to the hidden nature of many scientific revolutions concealed by textbooks that provide the substitute for what they had eliminated and make scientific development look linear, truncating the scientists’ knowledge of the history of their discipline. This is precisely what happened with the SWH: the newly minted hypothesis took on a life of its own, multiplying and reproducing itself in myriads of textbooks, articles, lectures, and popular media, and moving the discussion further and further away from Sapir’s primary interest in ‘social reality’ and Whorf’s central concern with ‘habitual thought’.

The transformation was facilitated by four common academic practices that allow us to manage the ever-increasing amount of literature in the ever-decreasing amount of time: (a) simplification of complex arguments (which often results in misinterpretation); (b) reduction of original texts to standard quotes; (c) reliance on other people’s exegeses; and (d) uncritical reproduction of received knowledge. The very frequency of this reproduction made the SWH a ‘fact on the ground’, accepted as a valid substitution for the original ideas. The new terms of engagement became part of habitual thought in the Ivory Tower and to this day are considered obligatory by many academics who begin their disquisitions on linguistic relativity with a nod towards the sound-bite version of the ‘strong’ determinism and ‘weak’ relativity. In Kuhn’s ([1962] 2012) view, this perpetuation of a new set of shared assumptions is a key marker of a successful paradigm change: “When the individual scientist can take a paradigm for granted, he need no longer, in his major works, attempt to build his field anew, starting from first principles and justifying the use of each concept introduced” (p. 20).

Yet the false dichotomy reified in the SWH – and the affective framing of one hypothesis as *strong* and the other as *weak* – moved the goalposts and reset the target and the standards needed to achieve it, giving scholars a clear indication of which hypothesis they should address. This preference, too, was perpetuated by countless researchers who, like Langacker (1976: 308), dismissed the ‘weak’ version as obviously true but uninteresting and extolled ‘the strongest’ as “the most interesting version of the LRH” but also as “obviously false”. And indeed, the research conducted on Brown’s and Lenneberg’s terms failed to ‘prove’ linguistic determinism and instead revealed ‘minor’ language effects on cognition (e.g., Brown & Lenneberg, 1954; Lenneberg, 1953) or no

effects at all (Heider, 1972). The studies by Gipper (1976)⁴ and Malotki (1983) showed that even Whorf's core claims, about the concept of time in Hopi, may have been misguided.⁵ This 'failure' too became part of the SWH lore, with textbooks firmly stating that "a strong version of the Whorfian hypothesis cannot be true" (Foss & Hakes, 1978: 393).

By the 1980s, there emerged an implicit consensus in US academia that Whorfianism was "a *bête noire*, identified with scholarly irresponsibility, fuzzy thinking, lack of rigor, and even immorality" (Lakoff, 1987: 304). This consensus was shaped by the political climate supportive of the notion of 'free thought' yet hostile to linguistic diversity, by educational policies that reinforced monolingualism, and by the rise of cognitive science and meaning-free linguistics that replaced the study of meaning with the focus on structures and universals. Yet the implications of Sapir's and Whorf's ideas continued to be debated (e.g., Fishman, 1980, 1982; Kay & Kempton, 1984; Lakoff, 1987; Lucy & Shweder, 1979; McCormack & Wurm, 1977; Pinxten, 1976) and in the early 1990s the inimitable Pinker decided to put the specter of the SWH to bed once and for all. Performing a feat reminiscent of Humpty Dumpty, Pinker (1994) made the SWH 'mean' what he wanted it to mean, namely "the idea that thought is the same thing as language" (p. 57). Leaving behind Brown's (1958) articulation with its modest co-variation, he replaced it in the minds of countless undergraduates with

the famous Sapir-Whorf hypothesis of linguistic determinism, stating that people's thoughts are determined by the categories made available by their language, and its weaker version, linguistic relativity, stating that differences among languages cause differences in the thoughts of their speakers. (Pinker, 1994: 57)

And lest they still thought that there is something to it, Pinker (1994) told them that it is "an example of what can be called a conventional absurdity" (p. 57) and "it is wrong, all wrong" (p. 57). Ironically, this 'obituary' for the SWH coincided with the neo-Whorfian revival, through the efforts of several linguists, psychologists, and anthropologists – most notably Gumperz and Levinson (1996), Lakoff (1987), Lee (1996), Lucy (1992a, b), and Slobin (1991, 1996a) – who were willing to buck the tide, to engage with the original texts, and to devise new methods of inquiry. This work will form the core of the chapters to come but for now I want to emphasize that the received belief in the validity of the terms of engagement articulated by Brown and Lenneberg and their attribution to Sapir and Whorf is still pervasive in many academic circles and evident in the numerous books and articles

⁴ Interestingly, Gipper inherited his interest in linguistic relativity from his supervisor, Weisgerber, one of the leading linguists of the Third Reich and, after the war, the founder of the Neohumboldtian school (Leavitt, 2011).

⁵ For an in-depth discussion of color and time studies, see, respectively, Chapters 2 and 3.

that regurgitate the SWH as the strong/weak dichotomy. The vulgarization of Whorf's views bemoaned by Fishman (1982) also continues in popular accounts, and I fully agree with Pullum (1991) who, in his own critique of Whorf, noted:

Once the public has decided to accept something as an interesting fact, it becomes almost impossible to get the acceptance rescinded. The persistent interestingness and symbolic usefulness overrides any lack of factuality. (p. 159)

Popularizers of academic work continue to stigmatize Whorf through comments such as “anyone can estimate the time of day, even the Hopi Indians; these people were once attributed with a lack of any conception of time by a book-bound scholar, who had never met them” (Richards, 1998: 44). Even respectable linguists perpetuate the strawman version of “extreme relativism – the idea that there are no facts common to all cultures and languages” (Everett, 2012: 201) or make cheap shots at “the most notorious of the con men, Benjamin Lee Whorf, who seduced a whole generation into believing, without a shred of evidence, that American Indian languages lead their speakers to an entirely different conception of reality from ours” (Deutscher, 2010: 21). This assertion is then followed by a statement that while the link between language, culture, and cognition “seems perfectly kosher in theory, in practice the mere whiff of the subject today makes most linguists, psychologists, and anthropologists recoil” because the topic “carries with it a baggage of intellectual history which is so disgraceful that the mere suspicion of association with it can immediately brand anyone a fraud” (Deutscher, 2010: 21).

Such comments are not just an innocent rhetorical strategy aimed at selling more copies: the uses of hyperbole (*most linguists, psychologists, and anthropologists; mere suspicion of association*), affect (*disgraceful, fraud, recoil, embarrassment*), misrepresentation (*disgraceful baggage of intellectual history*), strawman's arguments and reduction ad absurdum as a means of persuasion have played a major role in manufacturing the false consent in the history of ideas that Deutscher (2010) finds so ‘disgraceful’ (readers interested in the dirty tricks used by scholars should read the expert description by Pinker, 2007: 89–90). What is particularly interesting is that both Deutscher (2010) and Everett (2012) actually marshal evidence in support of Whorf's original arguments. Their attempt to do so while distancing themselves from Whorf would have fascinated Whorf, for it reveals two patterns of habitual thought common in English-language academia: the uncritical adoption of the received version of the SWH and the reliance on the metaphor of ‘argument as war’ (Tannen, 1998), i.e., an assumption that each argument has ‘two sides’ (not one or three), that these sides should be polarized in either/or terms, and that in order to present oneself as a ‘reasonable’ author,

one should exaggerate the alternatives and then occupy the ‘rational’ position in between. Add to this the reductionism common for trade books and the knowledge that criticism sells better than praise, and you get Whorf as a ‘con man’.

1.2 The bilingual turn in the study of language and cognition

1.2.1 Bilingualism and the SWH

The purpose of the discussion above was to show that the monolingual (mis-)reading of Humboldt, Sapir and Whorf in American academia was not ‘accidentally misguided’ – it arose at a particular point in history in a society where monolingualism was the norm. It does not mean, however, that Brown and Lenneberg’s contemporaries did not make any efforts to understand the relationship between linguistic diversity, bilingualism, and thought. Whorf’s pupil and editor John Carroll (1963: 2), for instance, considered three options and rejected extreme linguistic determinism, according to which “the acquisition of a second language could be only partial and superficial, and ... true bilingualism would be impossible” as well as linguistic neutrality, where “the new language would provide merely a new vehicle for expressing the ideas and emotions already expressible in the learner’s native language”. Echoing Whorf, he argued that “an individual learning a second language must be taught to observe and codify experience as nearly as possible in the same way as native speakers of that language” (Carroll, 1963: 17).

It was precisely this kind of individual that young Harvard scholar Susan Ervin(-Tripp) had in mind when she convinced her colleagues that bilinguals constitute “an exceptionally favorable ground for testing this [Whorfian] hypothesis” (Walker et al., 1954: 201). Her interest in bilingualism was sparked by a comment made by a college friend, French–English bilingual poet Jacqueline Bourignon Frank, that she felt like a different person in her two languages (Ervin-Tripp, 2011) and her approach was inspired by Weinreich’s (1953) distinction between three types of conceptual representations in bilingual memory – co-existent, merged, and subordinative – posited to differ across individuals and across words in the individual lexicon. Ervin and Osgood (1954) changed Weinreich’s terms to ‘coordinate’, ‘compound’, and ‘subordinate’, and linked them to language-learning histories. *Coordinate bilinguals*, in this view, are speakers who learned their languages in distinct environments and have two conceptual systems associated with their two lexicons. *Compound bilinguals* learned their languages in a single environment and, consequently, have a single underlying and undifferentiated conceptual system linked to the two lexicons. *Subordinate bilinguals*, typically classroom learners who learned the second language via the means of the first, have a

single system where the second-language lexicon is linked to conceptual representations through first-language words.

Ervin and Osgood (1954) argued that only coordinate bilinguals can provide truly cross-cultural translation yet the translation process would be marred by difficulties, because translation equivalents may have contextual or connotational differences and non-equivalents may have only partially adequate translations. Ervin(-Tripp) then carried out empirical studies with coordinate Japanese–English (Ervin, [1954] 1973; Ervin-Tripp, 1967) and French–English bilinguals (Ervin-Tripp, 1964), testing participants twice on the same set of materials, with the sessions in respective languages taking place six weeks apart. The results showed that the content of responses shifted with the change in language (for further discussion see Chapter 6).

Similar findings came from Canada, where Lambert and associates (Jacobovits & Lambert, 1961; Lambert, Havelka, & Crosby, 1958; Lambert & Rawlings, 1969) found that coordinate bilinguals made more semantic distinctions between translation equivalents, had relatively independent association networks linked to translation equivalents, and experienced greater difficulty with translation than compound and subordinate bilinguals. Other studies, however, did not find any differences between compound and coordinate bilinguals (e.g., Kolers, 1963) and, as time went by, the focus of psycholinguistic inquiry shifted from conceptual categories to lexical processing because bilingualism researchers, too, wanted to take part in the search for universals of human cognition (for a historical overview, see Keatley, 1992).

From then on, bilingualism appeared in discussions of linguistic relativity as support for anti-Whorfian arguments. Thus, Macnamara (1970, 1991) argued that if the Whorfian hypothesis were true, bilinguals would be doomed, having to conform to one of the three patterns: (a) ‘think’ in language A when speaking either A or B, and, as a result, fail to understand or be understood by speakers of language B; (b) ‘think’ in a ‘hybrid’ manner appropriate to neither language, and risk understanding no one and being understood by no one; (c) ‘think’ differently depending on the language used and as a result have difficulties in communicating with themselves and in translating into one language what was said in another. He also argued that these implications ran afoul of the guiding principles of natural language semantics: whatever can be expressed in one language can be translated into another. More recently, a similar view was put forth by Gleitman and Papafragou (2005: 653), who stated that bilinguals’ code-switching should be treated as evidence of cognitive organization independent of language.

Only in the past decade have bilinguals been transformed from what Kuhn ([1962] 2012) calls ‘the anomaly’ to the focus of systematic explorations of language and cognition. Future historians of science may have a better sense of the factors that shaped this turn. In my own view, the bilingual turn in

academia is a natural consequence of globalization, transnational migration, and increased ethnolinguistic diversity in the Western world. The dramatic increase of linguistic diversity outside of academia made multilingualism impossible to ignore, while the rise in the number of bi- and multilingual academics – many of whom, myself included, live and work in languages other than ‘our own’ – created a cohort that saw multilingualism as relevant to their daily lives and was ready to take it on.

Consolidation of bilingualism as a field of research began in the 1980s and 1990s with publication of several foundational texts (Baker, 1993; Baker & Prys-Jones, 1998; Grosjean, 1982; Romaine, 1989). In 1997, scholars interested in bilingualism gathered, for the first time, at two international symposia, in Vigo, Spain, and in Newcastle, UK, with the latter becoming a regular bi-annual event known as the International Symposium on Bilingualism (ISB). In 1998, the field witnessed simultaneous appearance of three journals dedicated to bilingualism: *Bilingualism: Language and Cognition* (edited by François Grosjean, Judith Kroll, Jürgen Meisel, and Pieter Muysken), *International Journal of Bilingualism* (edited by Li Wei), and *International Journal of Bilingual Education and Bilingualism* (edited by Colin Baker).

The new professional forums facilitated discussion and collaboration between linguists and psychologists interested in applying the theories and methods developed in the neo-Whorfian inquiry to the study of the bilingual mind and resulted in several volumes and special issues on bilingualism and cognition (Cook & Bassetti, 2011; Han & Cadierno, 2010; Jarvis, 2011; Jarvis & Pavlenko, 2008; Pavlenko, 2011a). This work, in turn, led to the growing realization that ‘monolingual’ theories are of limited use in explaining linguistic and cognitive processing in bi- and multilinguals – the bi- and multilingual mind requires its own theory. The purpose of this book is to advance this theory-building and to show that the disregard of the complexity of bilingualism and ensuing adoption of bi- and multilingual subjects as speakers of their L1 have exerted a high cost on the field of language and cognition, compromising the validity and reliability of the findings across all areas of research. To promote a more up-to-date and fine-grained understanding of bilingualism and to facilitate the reading for readers new to bilingualism research, in what follows I will offer a brief overview of the key terms, abbreviations, and constructs used in present-day studies of bilingualism and second-language acquisition (SLA).

1.2.2 *Bilingualism: key terms and constructs*

Who is a ‘bilingual speaker’? Laypeople commonly view bilinguals as people with similar levels of proficiency in two languages learned from birth. In contrast, bilingualism researchers define *bilinguals* as speakers who use two or

more languages in their everyday lives, be it simultaneously (e.g., in bilingual families) or sequentially (e.g., in the context of immigration or study abroad). This distinction is an important one, as the latter involves a much larger group of people, including researchers and research participants who are not commonly viewed as bilinguals. Another convention, which I will also follow in this book, is to use the term *bilingualism* in references to studies that focus on two languages of the speakers who may, in fact, be multilingual and the term *multilingualism* in references to studies that explicitly focus on three or more languages of the participants. The downside of such broad definitions is the need to distinguish between different populations in terms of order, age, and context of language acquisition, language dominance, and levels of language proficiency (for a summary see [Table 1.1](#), for in-depth discussions see [De Groot, 2011](#); [Grosjean, 2008](#); [Grosjean & Ping Li, 2013](#)).

To describe the order of language acquisition, researchers usually adopt a chronological approach and refer to the first (L1), second (L2), third (L3) language and so on (on advantages and disadvantages of such classification, see [Dewaele, 2010](#)). The term *second language* or L2 may refer to any language learned late in life, as does the term *additional language* or LX. The term *age of acquisition* (AoA) refers to the age at which the L2 learning began, regardless of its context. Based on the AoA, bilinguals can be subdivided into *simultaneous*, i.e., those who acquired two or more languages from birth, *childhood*, i.e., those who acquired the L2 in early or middle childhood, and *late*, i.e., those who acquired the L2 post-puberty, commonly after the age of 12. The age of acquisition is not always the same as the age of arrival in the target-language (TL) context (also abbreviated as AoA or as AoAr). The two may coincide or differ, with some speakers, for instance, starting the learning process in the classroom before they arrive in the TL context, and others relying on the L1 for a while in the TL context, before they start learning the L2. In the case of such dissociation, the influence of the two variables is examined separately.

The term *context of acquisition* (CoA) refers to the context in which the language was learned, with a three-way distinction made between foreign language (FL) or instructed contexts, L2 or naturalistic contexts, and mixed contexts. L2 learners are commonly learning the language of their environment (e.g., L2 learners of English in the US or Japanese in Japan) and FL learners the language spoken in another country (e.g., FL learners of Japanese in the US or English in Japan). This distinction is not always clear-cut: Spanish, for instance, is taught in the US as a foreign language, yet it is also the language of the country's largest linguistic minority and in many American cities it is used in a variety of everyday contexts. Bi- and multilinguals may also be subdivided into learners and users: L2 users, following [Cook \(2002\)](#), are speakers who use a language learned later in life for real-life purposes, regardless of their proficiency in it, while FL and L2 learners are speakers who are actively studying

Table 1.1 *Bi- and multilingualism: key terms and definitions*

Key terms and abbreviations	Definitions
Bi- and multilinguals	Speakers who use two or more languages or dialects in their everyday lives, regardless of their levels of proficiency in the respective languages
Order of language acquisition	
First language (L1)	A language or languages learned from birth, regardless of the speaker's current proficiency
Second language (L2) or additional language (LX)	A language learned after early childhood (ages 1–3 years) following the L1
Target language (TL)	L2 which the speakers are learning or aim to learn
Age of acquisition	
Age of acquisition (AoA)	Age at which the L2 learning began
Simultaneous bilinguals	Speakers who acquired two or more languages from birth
Early or childhood bilinguals	Speakers who acquired the L2 in early or middle childhood, prior to age 12
Late or adult bilinguals	Speakers who acquired the L2 after the age of 12 or post-puberty
Age of arrival	
Age of arrival in the L2 environment (AoAr)	Age at which speakers arrived in the L2 context
Early arrivals	Speakers who arrived in the L2 context as children, prior to age 12
Late arrivals	Speakers who arrived in the L2 context after the age of 12 or post-puberty
Context of language acquisition	
Context of language acquisition (CoA)	Context in which the L2 was acquired
Foreign language (FL) or instructed context	Foreign-language classroom
L2 or naturalistic context	Environment where the language is spoken
Mixed context	Classroom learning supplemented by learning the language in the environment where it is used as a native language by the majority of the speakers
Foreign language (FL) learners	L2 speakers who are learning the L2 in the classroom, outside of the environment where it is used as a native language by the majority of the speakers (e.g., Japanese studying English in Japan)
Second language (L2) learners	L2 speakers who are learning the L2 in the environment where it is used as a native language by the majority of the speakers (e.g., Japanese studying English in the US)
Length of exposure (LoE)	Length of residence in the L2 context
Length of residence (LoR)	
Length of instruction (LoI)	Length of classroom instruction

Table 1.1 (cont.)

Key terms and abbreviations	Definitions
Language proficiency	
Language proficiency	Overall level of language achievement
Language dominance	Overall level of language activation that creates the impression of fluency and ease of lexical retrieval and syntactic processing (may vary by domain)
Balanced bilinguals	Bilinguals who have relatively similar skills in their respective languages across different areas
Dominant bilinguals	Bilinguals who display greater ease in one of the languages (overall or in the domain in question)
Language attrition	Decreased level of language activation (due to disuse), manifested in dysfluency, lexicon reduction, and structural simplification
Modes of engagement with language	
FL or L2 learners	Speakers who are actively studying the L2
FL or L2 users	Speakers who are using the L2 in everyday life

the language in question but do not use it outside the learning context. An important variable that mediates CoA effects is the *length of exposure to the L2* (LoE) also known as the *length of residence* (LoR) in the TL context.

The term *language proficiency* refers to the overall level of achievement in a particular language and to achievement in discrete skills, such as speaking or writing; it is commonly assessed through standardized proficiency tests and self-reports. Due to the *complementarity principle*, i.e., the fact that their languages are often acquired and used in different contexts, with different people, and for different purposes (Grosjean, 2008), most bilinguals rarely exhibit equal skills in all language areas. The term *balanced bilinguals* commonly refers to those who have relatively similar skills in their respective languages and the term *dominant bilinguals* to those who display greater ease in one of the languages. The dominant language may also be more proficient but, as we will see, it is not always the case; dominance and proficiency may also vary across areas of language use. For instance, a late Russian–French bilingual living in France may display overall dominance in L1 Russian and L2 French dominance in their professional field, while a childhood Spanish–English bilingual in the US may be dominant in L2 English as the language of schooling and the environment. Dominance, in other words, reflects perception of greater ease of use and lexical access, which comes from daily usage and higher levels

of activation of the language in question. The shift in dominance from L1 to L2, accompanied by declining use and inhibition of the L1, may result in *L1 attrition*, manifested in dysfluency, lexicon reduction, structural simplification, and even L2 accent in L1 (Schmid, 2011).

To theorize the interaction between two or more languages, Cook (1991) proposed the notion of *multicompetence*, which is not equivalent to two monolingual states. A similar argument has been advanced by Grosjean (1982, 2008), who repeatedly pointed out that a bilingual is not the sum of two complete or incomplete monolinguals in one body but rather a specific speaker-hearer with a unique – but nevertheless complete – linguistic system, whose competencies are developed to the extent required by his or her needs and those of the environment. This view, widely adopted in the fields of bilingualism and SLA (e.g., De Groot, 2011; Grosjean, 2008; Grosjean & Ping Li, 2013; Ortega, 2009; Schmid, 2011), emphasizes that we cannot make a priori assumptions about a particular group of bi- or multilinguals and suggests that speakers with different learning trajectories will differ from each other in their judgments, perceptions and performance, including in the knowledge of their L1.

Undoubtedly, a brief overview cannot do justice to the complex phenomenon of multilingualism: in the world of transcultural migration, people often make multiple transitions that affect their linguistic repertoires. A Russian Jew born in Ukraine, for instance, may grow up speaking Russian and have some knowledge of Ukrainian, Yiddish, and a foreign language, most commonly English, French, or German. Upon emigration to Israel, she may learn Hebrew, improve her English, and pick up some Arabic. If she continues her immigrant journey to the US, her repertoire may change again – she may work in English and speak Russian with friends and family, while Hebrew, Ukrainian, Yiddish, and Arabic may undergo the process of attrition. What happens then, in the lives of many individuals, is the ongoing change in dominance and proficiency in all languages in question.

There is also a significant amount of interaction between bilinguals' languages, referred to as *bidirectional transfer* or *cross-linguistic influence* (Pavlenko & Jarvis, 2002; Jarvis & Pavlenko, 2008). As a result of this cross-linguistic influence, even the most fluent bi- and multilinguals' meta-linguistic judgments, conceptual representations, word associations, and language processing rates may be distinct from those of monolingual speakers. This interaction and the possibility of L2 influence on L1 have not yet been fully acknowledged in research outside of the field of bilingualism. In cognitive psychology, for instance, the L1 of bilingual speakers is often treated as immutable and discussions of AoA effects may rely on outdated references to Lenneberg's (1967) critical period hypothesis (CPH), Schumann's (1975)

and Krashen's (1982) L2 learning theories and Johnson and Newport's (1989) study of the CPH.⁶

1.3 The evolutionary turn in the study of language and cognition

Bilingualism is not the only phenomenon that research on language and cognition has not engaged with. Another issue of great interest to Humboldt, Sapir, and Whorf was language change and "the long evolution of thousands of very different systems of discerning, selecting, organizing, and operating with relationships" (Whorf, [1936] 2012: 107). Yet "in the several-decades'-deep literature on the Sapir-Whorf hypothesis," notes McWhorter (2008), "I am aware of no address of what its implications would be for how a language has changed over time" (pp. 148–149). This is not to say that studies of language and cognition have completely eschewed language change: in fact, as we will see in Chapter 2, one of the inspirations for SWH research came from Berlin and Kay's (1969) study of the evolution of color terms. The problem with this research and its imitations (e.g., Hupka et al., 1999) is not that it ignores language change: rather it ignores the vast body of knowledge about language evolution and change.

This is not surprising – if language is viewed as an 'instinct' or 'faculty' and as an innate property of the human mind (Hauser et al., 2002; Pinker, 1994), its change is hardly an important object of study for cognitive science. In the past decade, however, we have witnessed an explosion of alternative theories of language evolution (e.g., Arbib, 2011; Bickerton, 2009; Botha & Knight, 2009; Damasio, 2010; Donald, 2001; McNeill, 2012; Renfrew, 2009) and new vigor in studies of language diversity, contact and change (e.g., Hickey, 2010; Hock & Joseph, 2009; for lively popular introductions see Deutscher, 2005; McWhorter, 2001, 2008), leading Evans and Levinson (2009) to argue that evolutionary approaches are transforming the theoretical terrain in cognitive science. Let us now survey what we know about the evolution of language and cognition, consider how we know what we know, and decide whether we are justified in treating *language* and *cognition* as distinct interpretive categories.

1.3.1 The evolution of language

1.3.1.1 *Language origins: how we know what we know* Let us begin by asking ourselves: how can we presume to know anything about language

⁶ For a recent example of such reliance, see Munnich and Landau (2010); for an informative critique of Johnson and Newport's (1989) study, see Bialystok and Hakuta (1994); for up-to-date overviews of research on age effects in L2 learning, see Ellis (2008) and Ortega (2009), and for cutting-edge studies of AoA effects and the CPH, see Abrahamsson (2012), Abrahamsson and Hyltenstam (2009), and Bylund et al. (2012).

origins? In the study of SLA, we talk about language fossilization – alas, the term refers to second languages of unsuccessful learners. No other language fossils are available to us, which is pretty unfortunate for the study of language origins because by the time humans invented writing they already had full-blown linguistic systems. The absence of direct evidence does not, of course, prevent speculation, hypothesizing, and inferencing, and in the ever-growing literature on language evolution we see all of the above. I do not aim to review this literature – it would be impossible to do so in a single section and unnecessary given the focus of this book. Rather, my purpose is to consider the evidence used in this debate and to decide what is possible and plausible in the evolution of language and cognition.

So, how do we decide what is plausible? Linguistic evidence comes from studies of language disorders, development and use that help us understand what is involved in our ability to learn and use language, and studies of language contact, pidgins and creoles that help us identify key linguistic structures and trace the trajectories of language diffusion, diversification, and convergence across time and space. Studies of animal communication systems and tool use reveal commonalities and differences between humans and other animals, in particular primates.⁷ Inferences are also drawn on the basis of experimental studies that examine the creation and use of various tools and on the basis of ethnographic studies with present-day societies that rely (or did, until recently) on Stone Age tools. This evidence, informative in many respects, is nevertheless secondary in understanding the development of the prehistoric mind: our primary evidence involves archeological remains. Analyses of fossils provide us with information about the anatomic and genetic make-up of prehistoric individuals, their dietary patterns, activities, injuries, as well as brain size, shape, and volume relative to body weight. Paleo-environmental analyses clarify climatic and environmental conditions in the areas inhabited by prehistoric humans and studies of material remains and residential sites enable inferences about our ancestors' social behaviors, cognitive abilities, and communicative needs.

Table 1.2 lists some of the documented evidence and its interpretation but its discussion requires several caveats. To begin with, the absence of evidence is not the evidence of absence. Materials disintegrate and wood and other organic materials survive only in exceptional circumstances, such as extremely dry or waterlogged conditions or permafrost. This disintegration makes it impossible to determine when our ancestors started producing wooden tools, weaving baskets, or creating portable art. The existing record is further affected by what McBrearty and Brooks (2000) call a Eurocentric bias in sampling, namely the fact that the most intensively explored sites cluster in Europe. Recent studies by archeologists working in Africa show that almost all cultural innovations documented in Europe

⁷ For a spirited critique of the primate-centric bias, see Bickerton (2009).

Table 1.2 *The evolution of symbolic cognition*

Dates and (current) species name	Material evidence and geographic location	Interpretation in terms of cognitive and social abilities
3.4–3 million yrs ago <i>Australopithecus</i>	Unmodified stone tools, transported from other locations (East Africa) Cut-marked animal bones (Dikikia, Ethiopia)	Episodic memory, procedural memory, event perception, basic understanding of spatial relations, pattern recognition, food sharing
2.6 million yrs ago <i>Australopithecus garhi</i> <i>Homo habilis</i>	Stone knapping: manufactured (flaked) stone tools (Omo and Kada Gona, Ethiopia) Cut-marked animal bones (Bouri, Ethiopia)	Multifocal working memory, intentionality, cooperative activities, knowledge transmission, way-finding ability, categorical perception
1.8–1.7 million yrs ago <i>Homo ergaster</i>	Marked encephalization Dispersion out of Africa (Dmanisi, Georgia)	Enhanced planning ability
1.6 million yrs ago	Patches of discolored baked sediment indicating controlled fire (Koobi Fora, Kenya)	
790,000–780,000 yrs ago	Widely accepted evidence of controlled fire (Gesher Benot Ya'aqov, Israel)	
1.4 million yrs ago <i>Homo ergaster</i>	Bifacial technology, i.e., manufacturing of stone tools with three-dimensional symmetry (Acheulean hand axes) (Turkana, Kenya) Increase in distances of raw-material transfer (maximum 15 km)	Enhanced spatial memory, imagination, allocentric perception, i.e., the ability to imagine alternative viewpoints, necessary for mental rotation in production of bifacial Acheulean hand axes (Wynn & Coolidge, 2012)
900,000–800,000 yrs ago	Wood residue on stones (linked to spear-making, Peninj, Tanzania) Cave occupation (South Africa)	
500,000–300,000 yrs ago <i>Homo heidelbergensis</i>	Marked encephalization Colonization of Europe Cooking hearths (China, France) Stone points indicating composite tools (Kathu Pan 1, South Africa) Wooden spears next to animal bones (Schöningen, Germany)	Expanded working memory, necessary for animal hunting, short-term planning and colonization of challenging environments

Table 1.2 (*cont.*)

Dates and (current) species name	Material evidence and geographic location	Interpretation in terms of cognitive and social abilities
250,000–200,000 yrs ago <i>Homo neanderthalensis</i>	<p>Levallois technique (preparation of the stone core that allowed for production of standardized flakes and blades)</p> <p>Grindstones and composite hunting tools, with stone points hafted onto wooden shafts with bitumen or pitch, made from birch bark</p> <p>Increased pigment occurrence and processing</p> <p>Skeletal evidence indicative of selective and tactical hunting and stampeding</p>	<p>Domain-specific intelligence, expert cognition and embodied social cognition; autonoesis, i.e., a subjective sense of time and the ability to plan hunts by placing oneself in the past and future; ability to communicate tactical information; larger working memory and long-term memory, necessary for invention of hafting and successful planning of hunting and stampeding (Wynn & Coolidge, 2012)</p>
190,000–130,000 yrs ago <i>Homo sapiens</i>	<p>Intentional post-mortem alteration of skulls, possibly carried around (Herto, Ethiopia)</p> <p>Heat treated stone tools (Pinnacle Point, South Africa)</p> <p>Increased long-distance exchange</p> <p>Shellfishing</p>	<p>Abstract thinking, with mortuary practices interpreted as recognition of the afterlife</p> <p>Planning depth, i.e., the ability to formulate more successful strategies based on past experience, resulting in fewer serious traumatic injuries than on Neanderthal skeletons (McBrearty & Brooks, 2000)</p>
125,000 yrs ago <i>Homo sapiens sapiens</i>	<p>Blade manufacture</p> <p>Cooking hearths</p> <p>Intentional human burials</p>	<p>Autonoetic thinking, which involves conscious mental time travel, autobiographical memory; imagination; recognition of afterlife; cognitive flexibility, greater working memory capacity and enhanced executive control which enable novel problem solving, invention, innovation, creativity, long-term planning, and ability to manage complex social networks</p>
90,000–60,000 yrs ago	<p>Second dispersal from Africa</p> <p>Manufacture of compound adhesives for attachment of stone segments to hafts (Rose Cottage Cave and Sibudu Cave, South Africa)</p>	

Table 1.2 (*cont.*)

Dates and (current) species name	Material evidence and geographic location	Interpretation in terms of cognitive and social abilities
77,000 yrs ago	Perforated shells, geometrically engraved pieces of ochre (Blombos Cave, South Africa) Insect-repellent bedding (Sibudu Cave, South Africa) Incised (notational) pieces (Africa)	The adoption of personal ornamentation interpreted as symbolic behavior indicative of self-awareness, social stratification, the Theory of Mind (ability to understand how others perceive you) and perspective-shifting ability
67,000 – 30,000 yrs ago	Colonization of Europe Standardization of stone blades and expansion of specialized tools Pigment mining (Australia, South Africa) Musical instruments (flutes) (Geissenklösterle Cave, Germany; Balkans) Representational art: cave paintings, carvings (France, Spain, Germany, Russia)	Symbolic behavior, i.e., the ability to represent objects, people, and abstractions with symbols Aesthetic appreciation and creativity
17,000–14,000 BC	Antler spearthrowers showing a young ibex with an emerging turd (France) Drawings (engravings) of human portraits interpreted as caricatures (La Marche, France)	Sense of humor
3,500 BC	Writing (Mesopotamia)	Paradigmatic thought, theory construction, reliance on external memory

Based on Bahn, 1998; Botha & Knight, 2009; Fagan, 2004; McBrearty & Brooks, 2000; Scarre, 2005; Wadley, 2010; Wynn & Coolidge, 2012.

are also present – at much earlier dates – in African sites (Botha & Knight, 2009; McBrearty & Brooks, 2000).

Dating technologies are not always reliable: remains of controlled fire, for instance, are often indistinguishable from remains of natural fires and archaeological estimates of the time period in which humans began to control fire are based on repeated and extensive fires that left distinctive traces (Fagan, 2004;

Scarre, 2005). Evidence can also be contaminated by intrusions from more recent layers. As a consequence, the dates here tend to be on the conservative side, with the recognition that new scientific technologies and new discoveries continuously push back the dates for particular technological innovations.

Another important caveat involves interpretation of material remains. In the case of human fossils, well-articulated skeletal remains are rare and it is difficult to tell the species apart using only bone fragments – it is not always clear if the differences in form and size reflect different sexes, ages, species, or natural variation within the same species. New discoveries and technologies continuously give rise to new dates and terms and to competing classifications and taxonomies of human speciation (Gamble, 2007; Gräslund, 2005; McBrearty & Brooks, 2000; Renfrew, 2009; Scarre, 2005). Scholars also disagree on interpretation of other material remains: the presence of ochre, for instance, is frequently linked to color symbolism and art, yet ochre can also be used as an antiseptic treatment for wounds, a means of skin protection, and a component of resin-based cements used for hafting composite tools (Bahn, 1998; Watts, 2009, 2010; Wadley, 2010). Perforated beads are also problematic as a hallmark of language and modernity: after their initial appearance in African sites, beads disappear for tens of thousands of years and when they reappear in Africa, the Near East, and Europe, they are also documented in Neanderthal sites, possibly as a result of contact or trade (Botha, 2010; D’Errico & Vanhaeren, 2009).

To interpret archeological evidence in cognitive and linguistic terms one needs expertise in archeology, linguistics, and cognitive science, yet, with the notable exception of Wynn and Coolidge (2012), few possess the necessary breadth and depth. As a result, linguists and psychologists often misinterpret the archeological record, while archeologists make claims about language that seem suspicious to linguists (e.g., Botha, 2009, 2010). To avoid misinterpretation as much as possible, I have limited this summary to the evidence whose existence, approximate dating, and (conservative) interpretations in terms of cognitive abilities enjoy some degree of consensus among the scholars whose opinions I have come to respect.

1.3.1.2 *The development of the prehistoric mind* The development of the prehistoric mind is commonly described through a variety of stages. The terms I personally find most compelling have been proposed by cognitive psychologist Merlin Donald (1991, 2001) and adopted, in a modified form, by archeologist Colin Renfrew (2009). In what follows, I will describe the evidence in Table 1.2 in terms of Donald’s (1991, 2001) four stages – episodic, mimetic, mythic, and theoretic – distinguished by different types of engagements with the material world and modes of mental activity. These terms will be used with the full recognition of their interpretive, metaphoric, and provisional nature and the tangential relationship they bear to the process

that was undoubtedly much more complex, likely gradual and possibly cyclic or chaotic.

Donald's (1991, 2001) sequence begins with the *episodic stage*, where our Australopithecine ancestors displayed cognitive skills common for all primates: basic episodic and procedural memory and spatial representation. These skills enabled basic event perception, pattern recognition, situation analysis, imitation, and recall limited to the here and now. Their behavior was largely reactive to stimulus and the use of stones as tools opportunistic. The appearance of manufactured stone tools signals a new mode of engagement with the material world, which requires intentionality, the ability to shift attention away from the external world towards one's own actions, focus maintenance, categorical perception (e.g., types of stone), improvements in way-finding (e.g., carrying meat back to camp), knowledge transmission (e.g., stone-cutting) and social coordination required for scavenging (inferred from the appearance of stone-made cuts over traces of animal teeth on animal bones).

In Donald's (1991, 2001) view, the emergence of stone knapping marks the transition to the *mimetic stage*, where our ancestors communicated via gestures, vocal sounds, body language, and reenactments. The pressure to develop *iconic signs* that invoked the entities they referred to may have been created by the involvement in scavenging, which required communication of the location of food sources (i.e., dead carcasses) outside of the sensory range of message recipients and planning on how to get to them before other predators did (Bickerton, 2009). To be successful, *mimesis* would have involved conscious, intentional, self-initiated (auto-cued) embodied representational acts and would have required some self-awareness and the ability to control voluntary actions, regulate emotions, and imagine bodies in action (kinematic imagination). Donald (2001) hypothesizes that the transition to the mimetic stage was facilitated by the gradual improvement of executive control that allowed for better awareness and monitoring of one's own body or physical self.

While the debate about causes and consequences (e.g., tool vs language) goes on, it is more conservative to see the process as a gradual co-evolution, where material practices and communicative needs created natural selection pressures for particular cognitive abilities, while enhanced abilities facilitated more successful engagement in material practices. This process has been linked to the marked encephalization (brain expansion) and enlargement of the pre-frontal cortex observed in the remains of *Homo habilis* dated to 1.8–17 million years ago and followed by innovations in stone knapping, such as preparation of core and production of bifacial axes, other technological advances, such as hafting and control of fire, and the first dispersion out of Africa, taken as evidence of enhanced planning skills. Yet extrapolation from encephalization to cognitive abilities should be practiced with caution: not all changes lead to

encephalization of the brain; reorganization of the brain and the working memory may have been equally important.

The next point at which we see rapid encephalization is the speciation of *Homo sapiens* and a gradual transition to what Donald (1991, 2001) calls the *mythic stage*, distinguished by narrative thought, complex linguistic skills, and the ability to create new symbolic systems. McBrearty and Brooks (2000) outline four types of changes that signal this transition and its accelerated pace of cultural development: (a) *technological*, where the replacement of the Acheulian industry by diverse blade technologies and hafted tools suggests new versatility, inventiveness, and capacity for logical thinking, (b) *ecological*, where successful expansion and colonization of previously uninhabited environments suggest planning depth and the ability to adapt and innovate; (c) *economic* and *social*, where intensification in resource use, including selective and tactical hunting and fishing, suggest greater planning depth, and the use of raw materials from far-away locations indicate scheduling, trading, and complex networks, and (d) *symbolic*, seen in adoption of symbolic objects in everyday life.

This change, often termed the Human Revolution or the Great Leap Forward, has been traditionally linked to the ‘symbolic explosion’ observed in Upper Paleolithic Europe of 50,000–40,000 years ago. New evidence suggests, however, that the Upper Paleolithic revolution is an artifact of the archeological record and that the changes in question – bone tools, blade and microlithic technology, specialized hunting, long-distance trade, and the uses of pigments and aquatic resources – are also found at earlier African sites. These findings show that cultural change, while cumulative, was neither linear nor straightforward: rather, it represents a complex mosaic and a discontinuous pattern of innovations appearing and disappearing only to be reinvented (Botha & Knight, 2009; Marean, 2010; McBrearty & Brooks, 2000).

The new African evidence allowed scholars to resolve the debate about multi-regional versus single-origins hypotheses of modern human origins. According to the currently dominant Out-of-Africa theory, *Homo sapiens* evolved in Africa between 300,000 and 150,000 years ago and dispersed from Africa between 90,000 and 60,000 years ago, eventually replacing the older regional populations (Botha & Knight, 2009; Gamble, 2007; McBrearty & Brooks, 2000; Renfrew, 2009; Scarre, 2005; Weaver, 2012). This theory, however, raises new questions: when and where in Africa did this transformation occur? Was the transformation discrete or gradual? What prompted it, mutation or genetic drift? And did the change involve linguistic abilities proper or a more general cognitive capacity, such as working memory?

The similarities between world languages suggest that the emergence of complex language must have pre-dated the dispersal and that it may have arisen in just one group, rather than in several independent sites. The existing evidence does not tell us, however, how and when it emerged: was the process

gradual or was it triggered by a mysterious gene mutation or rewiring of the brain? In the 1990s, innatist approaches to language (e.g., Hauser et al., 2002; Pinker, 1994) got a boost from the discovery that a mutation of the FOXP2 gene could be linked to speech and language disorders, or Specific Language Impairment (SLI), in the three-generational British family known as the KE family. Sensation-seekers immediately dubbed FOXP2 ‘the language gene’, yet further studies showed that other individuals with SLI did not display the same mutation or the classic Mendelian pattern of inheritance. More importantly, neuroscientists found that individual genes cannot explain the substantial variance in cognitive traits or disorders: complex human traits, including the ability to acquire language, literacy and numeracy, and disorders, such as SLI or dyslexia, are influenced by numerous genes that interact with one another, and with the environment, to produce a specific phenotype (Bishop, 2009).

The present archeological record also does not support the mutation theory. As argued by McBrearty and Brooks (2000), if the entire human species experienced a discrete genetically encoded event, such as an emergence of language capacities, one might expect the transition to modern human behavior to be short and abrupt. If, however, the process was gradual and continuous, one might expect incremental accumulation of modern behaviors, which is precisely what is found in the African archeological record over a period of more than 200,000 years. To account for this transition, several scholars have put forth continuity theories, where natural selection led to the evolution of the language-ready brain and co-evolution of linguistic and cognitive skills, transmitted via cultural, rather than genetic, processes (e.g., Arbib, 2011; Bickerton, 2009; Botha & Knight, 2009; McNeill, 2012; Renfrew, 2009; Tomasello, 1999).

In the view proposed by Donald (1991, 2001) and Coolidge and Wynn (2005) this change was facilitated by the transformation of working memory, which may have included: (a) the enhancement of the central executive capacity for multifocal attention, parallel processing, and suppression of irrelevant external and internal stimuli (*inhibitory function*); (b) an extended phonological storage (*the phonological loop*), which would have enabled speakers to process longer and more complex sequences, (c) increased plasticity, required for learning, (d) an expansion of long-term memory, necessary for storing linguistic categories and their multi-modal representations in an instantly retrievable form (for an up-to-date discussion of the working memory hypothesis, see *Cognitive Anthropology*, 2010, volume 51, supplement 1).

The current *theoretic stage* is linked by Donald (1991, 2001) to the emergence of symbolic technologies of numeracy and literacy, which enabled paradigmatic thought and external memory storage, critical for development of theory and science. While the invention of writing is commonly dated to 3500 BC, its precursors are located much earlier in prehistory, when humans began

using marks and notches on bones, stones, and wood for representational purposes (see also [Chapter 3](#)). Danziger (2008) argues that such “externally archived material is useful only to the extent that its organization is reflected in individual memory” (p. 4). In this view, memory development involves the co-evolution of external memory devices, such as numbers or writing, shaped by the processing constraints of the human brain, and of new cognitive skills and functions, such as numeracy or literacy, necessitated by new mnemonic practices. This co-evolution can be traced from reliance on visual and sound cues, such as carved notches or rhythmic strumming of musical instruments, to mnemonic devices, such as rhyming, alliteration, repetitive phrasing and common scripts built into Homeric epics and other oral texts by preliterate cultures, to the emergence of literacy and numeracy, which allowed for more efficient preservation and manipulation of memory, to the invention of the alphabetic principle, which allowed for wider spread of literacy skills, and, finally, to development of printing and technology, which allowed for tremendous expansion of external memory, changing, once again, the demands on individual memory and its organizational principles.

1.3.1.3 *Language, cognition, and linguistic thought* Now, what does all this mean for the purposes of our inquiry? While we may never settle on the definitive theory of language origins, both archeological and primate evidence suggest that symbolic cognition pre-dates language. If by ‘cognition’ we mean the processes of attention, perception and memory we share with other animals, we are undoubtedly justified in using ‘cognition’ as a discrete discursive construct, independent from ‘language’. But what about the other side – can we see ‘language’ as independent from ‘cognition’?

The answer, undoubtedly, depends on one’s definition of language. If one adopts the nativist view of language as a formal system, the answer is affirmative and it is the independence of the two entities that allows scholars to examine the interaction between them. Yet the success of this inquiry is undermined by the very terms of engagement that, *pace* Brown and Lenneberg, require the winner of the SWH race to demonstrate language effects on ‘non-linguistic cognition’ or, to follow Pinker’s (2007) most recent formulation, to show that “the language we speak makes it difficult or impossible to think certain thoughts, or alters the way we think in surprising or consequential ways” (p. 125). The very way in which the question is articulated contains, within it, the appropriate answer – the languages we speak cannot make thoughts impossible nor can they alter the way we think in ways Pinker would find ‘surprising’ or ‘consequential’.

If, however, one follows in the footsteps of Herder, Humboldt, Vygotsky, Sapir, and Whorf, one may arrive at a view of language as a form of cognition (Tomasello, 1999), a semiotic tool that co-evolved with cognition to

facilitate everyday problem solving, complex reasoning, and communication in the mind that is embodied, extended, and distributed (Donald, 1991, 2001; Gamble, 2007; Renfrew, 2009). This view is at odds with the disembodied brain approach commonly adopted in today's linguistics and cognitive science. Yet both context and embodiment play a central role in symbolic cognition and in the emergence of new symbolic systems. In [Chapter 3](#), for instance, we will see that to create and codify systems of spatial or weight measurement, we first had to perceive weight or space as a physical reality that involved our hands, arms, and feet, which became our first measurement units (Renfrew, 2009). The adoption of body parts – as well as external objects – as counting devices also illustrates the second important property of the mind, its extended nature, where tools, such as choppers, digging sticks, or pottery wheels, become useful extensions of the body. Furthermore, the mind does not always function as an individual property – time and again, we engage in collective joint actions and thus distributed cognition, which results in cumulative cultural evolution or the ratchet effect (Tomasello, 1999).

Now, to say that 'language' functions as a form of cognition does not imply that so do individual languages – it is precisely the dissociation of linguistic forms in languages learned later in life from the cognitive and discursive categories they are linked to in the monolingual mind that makes the study of linguistic thought in bi- and multilinguals a fascinating enterprise. But what, exactly, do we mean by linguistic thought? In what follows, the notion of *linguistic thought* will refer to cognitive processes fully or partially mediated by language: categorical perception ([Chapter 2](#)), numerical, temporal, and spatial cognition ([Chapter 3](#)), segmentation and construal of events ([Chapter 4](#)), narration, recall, and autobiographical memory ([Chapter 5](#)), interpretive framing and self-mediation (inner speech) ([Chapter 6](#)), and affective processing and interpretation of emotional experience ([Chapter 7](#)). Let me immediately acknowledge that I have no doubt that some cognitive and perceptual processes are non-linguistic and that linguistic thought can be highly idiosyncratic. What matters for the purposes of Whorfan inquiry is the way we use linguistic processes, and in particular the obligatory categories of our languages, to reach agreement on the interpretation of a temporarily shared social reality, the notion now known as *intersubjectivity* (Rommetveit, 1979a, b) (for in-depth discussion see [Chapter 6](#)).

To accomplish intersubjectivity, we need to agree that entities have agreed-upon names. The famous incident where Annie Sullivan pours water on Helen Keller's hand is important precisely because, for Helen, it is the first occurrence of true intersubjectivity:

my teacher placed my hand under the spout. As the cool stream gushed over one hand she spelled into the other the word *water*, first slowly, then rapidly. I stood still, my whole attention fixed upon the motions of her fingers. Suddenly I felt a misty consciousness as of something forgotten – a thrill of returning thought; and somehow the mystery

of language was revealed to me. I knew then that “w-a-t-e-r” meant the wonderful cool something that was flowing over my hand. (Keller [1903] 1996: 12)

A century later, the same breakthrough was accomplished by a 27-year-old man we now know as Ildefonso. Born deaf, Ildefonso grew up in a poor family in a rural area of Mexico, where he helped to herd sheep and goats and plant and harvest sugar cane. His family never sent him to school and his communication, including with his deaf brother Mario, involved miming, gestures, and home-made iconic signs. In the 1980s, Ildefonso arrived in California as an illegal migrant worker, joining an uncle who already resided there. The uncle signed him up for a sign language class, yet Ildefonso could not follow the instruction for he had no idea what the signs meant. It was at that point that he met a sign language interpreter, Susan Schaller, who decided to teach him how to use American Sign Language (ASL). First, however, she had to break through. Schaller began with pictographic signs, such as ‘book’ and ‘tree’, yet Ildefonso either interpreted these signs as commands (e.g., open the book) or simply copied them to the best of his ability. Schaller ([1991] 2012) recalls that only after many days of frustrating attempts to convey the link between the sign for ‘cat’ and its pictorial and live referents that Ildefonso finally realized that signs play a symbolic function and that all objects around him have agreed-upon names:

And the cat-meaning in one head can join the cat-meaning in another’s head just by tossing out a *cat*. Ildefonso’s face opened in excitement as he slowly pondered this revelation. His head turned to his left and very gradually back to his right. Slowly at first, then hungrily, he took in everything as though he had never seen anything before: the door, the bulletin board, the chairs, tables, students, the clock, the green blackboard and me. He slapped both hands flat on the table and looked up at me, demanding a response. “Table,” I signed. He slapped his book. “Book,” I replied. My face was wet with tears, but I obediently followed his pointing fingers and hands, signing: “door,” “clock,” “chair.” But as suddenly as he had asked for names, he turned pale, collapsed, and wept. Folding his arms like a cradle on the table, he lay down his head. My fingers were white as I clutched the metal rim of the table, which squeaked under his grief more loudly than his sobbing. He had entered the universe of humanity, discovered the communion of minds. (Schaller, [1991] 2012: 44–45)

Ildefonso’s mind clearly wasn’t a *tabula rasa* – he was a human being, with memory, intentionality, and thought, and as he continued to acquire language, he linked it to his previous experiences and to puzzles he had never hoped to solve, like the meaning of waving hands, mouth movements or scribbles on paper. Yet he also changed, and in the chapters that follow I will return, time and again, to Ildefonso and examine what his transformation can tell us about the interaction between language and thought. But there is one more question we need to ask before we proceed on this journey. If we do indeed reach agreement with others by following linguistic categories made obligatory by our languages, why, how, and when do these languages change?

1.3.2 Linguistic diversity and language change

This question is answered in studies of language history, variation, contact, and change that treat linguistic diversity as the phenomenon to be explained and examine how and why languages diverge and why the speech of every generation is slightly different from that of the preceding one. Their findings show that languages are inherently variable and that, in the context of synchronic variation, people favor certain options over others and sometimes simply innovate, leading to changes at all levels: phonological, morphological, syntactic, semantic, and pragmatic (Haugen, 1953, 1956; Heine & Kuteva, 2008; Hock & Joseph, 2009; Labov, 1994, 2001; Thomason & Kaufman, 1988; Thomason, 2001; Weinreich, 1953).

These changes are commonly subdivided into language-internal and language-external processes. Language-internal processes include sound change (e.g., vowel shift, epenthesis, erosion of case endings, or consonant weakening, such as $p > f$), semantic change (e.g., change in the meanings or connotations of words), reinterpretation (e.g., creation of a single word from two or more words), and morphosyntactic changes, such as extension (e.g., generalization of a single plural marking pattern across all noun classes) and grammaticalization (transformation of open-class or content words into closed-class or function words or inflections, e.g., numerals into indefinite articles, such as the English *one* > *a(n)*). These processes may operate jointly: inflections, for instance, begin as free words in grammars with no inflections and become compressed in the process of grammaticalization and sound erosion.

Language-external processes take place in the context of language contact and include *borrowing* (e.g., adoption of new lexical items), *interference* (e.g., adoption of new verbal morphology), *reanalysis* (e.g., reinterpretation of grammatical categories), *simplification* and *loss* (English, for instance, lost both gender and case in the process of being learned by Vikings and Celts). In her overview of the field, Thomason (2001) emphasizes that “there are no discernible linguistic limits to the possibilities for transferring any linguistic feature from one language to another” (p. 11): over time, languages may replace their core lexicons and shift stress patterns, gender assignment, verbal morphology, and even word order, under the influence of other languages. Studies of language contact in borderland areas and in the contexts of colonization, migration, and trade show that contact outcomes vary depending on the context and languages involved: they may include stable bi- and multilingualism, seen in Papua New Guinea, a shift to a more ‘powerful’ or ‘prestigious’ language, such as English in the US, divergence, seen in the transformation of the Latin learned by local populations into Romance languages, convergence, observed in the Caucasus and the Balkan peninsula, and disappearance of languages spoken by small groups of people, commonly referred to as ‘language death’

(Austin & Sallabank, 2011; Haugen, 1953, 1956; Thomason & Kaufman, 1988; Thomason, 2001; Weinreich, 1953).

Both internal and external processes are explained by two types of factors, cognitive and social. Cognitive factors include (a) economy, i.e., the tendency to save effort, which may cause sound erosion, (b) analogy, i.e., the tendency to draw links between domains, which may give rise to new metaphors and eliminate paradigmatic alternation in favor of a single regular pattern, (c) expressiveness, i.e., the tendency to favor novel expressions in order to achieve greater effects, and (d) the need to reduce cognitive load, which, in bilingual speakers, may lead to regularization or convergence of two distinct categories or patterns (Silva-Corvalan, 2008). Social factors include but are not limited to discursive practices (e.g., vocabulary-related taboos necessitating lexical replacements), evolving social realities (e.g., technological changes leading to coinage and neologisms), and language ideologies and symbolic capital associated with particular languages or forms, which may lead speakers in language-contact situations to accentuate similarities (convergence) or deliberately foster differences (divergence) via new rules (e.g., flipping the gender of all masculine nouns to feminine and vice versa) (Evans, 2010).

Three findings in the study of language change are of particular importance for our discussion. The first is *grammaticalization*, a dynamic process in which lexical items (those present in the language or borrowed from another language) are reanalyzed as grammatical elements: for instance, in Sorbian, a Slavic language spoken in East Germany, the proximal demonstrative ('this') became a definite article under the influence of German (Heine & Kuteva, 2008). This process may take place slowly, over hundreds of years, or quickly, as seen in the creation of new auxiliary forms in Light Warlpiri in one generation (Austin & Sallabank, 2011). Grammaticalization contradicts assertions about 'deterministic' influences of language on thought: if the grammatical categories of our languages did determine the way we think, we would have ended up in an evolutionary cul-de-sac, where we would continuously reproduce them, and any further language change would have been all but impossible. This contradiction would have been obvious to Humboldt, Boas, Sapir, and Whorf, who were actively engaged in the study of language change and would have hardly believed in the kind of 'determinism' attributed to them by Brown, Lenneberg, Pinker and Co. In fact, for historical linguists, the most famous Boas-Sapir controversy is not the SWH but the discussion of the possibility of distinguishing – for purposes of genetic classification – inherited linguistic similarities from similarities that result from language contact (Thomason & Kaufman, 1988).

The second finding – already evident to Whorf – is that the old adage 'all languages are equally complex' is unfounded at best and meaningless at worst (Deutscher, 2005; McWhorter, 2001). Geopolitically dominant languages,

spoken in contemporary industrialized societies, are learned by many L2 speakers – as a result, they tend to undergo simplification, e.g., encoding fewer grammaticalized deictic distinctions (Perkins, 1992). In contrast, languages spoken by small economically self-sufficient groups in relatively isolated areas are more likely to display greater morphosyntactic complexity and numerous exceptions learned by rote: speakers of Luo in Kenya, for instance, have to learn by rote the plural marker for each noun, using only very broad rules of thumb (McWhorter, 2001).

The third important finding is that bi- and multilingualism is never ‘perfect’ and in the context of language contact it is this ‘imperfect’ bilingualism that leads to language change (McWhorter, 2001; Thomason & Kaufman, 1988; Thomason, 2001). This finding, too, contains a germ of a contradiction: how can we reconcile the fact that languages do change – in human minds no less – with the fact that in language-contact situations such change is often motivated by linguistic habits engendered by other languages of the speakers? What is stable and what is changeable about our linguistic habits? How does restructuring proceed? What factors affect restructuring in the bilingual mind? Until recently, these questions have focused on linguistic structures, yet they are equally pertinent to our conceptual categories and to the ways in which we ‘mean’, and the key purpose of this book is to address the tension between the presumably stable nature of habitual thought and the visibly dynamic nature of language change.

2 Material worlds: Linguistic categorization of the ‘kaleidoscopic flux of impressions’

We dissect nature along lines laid down by our native languages. The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented in a kaleidoscopic flux of impressions which has to be organized by our minds – and this means largely by the linguistic systems in our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way – an agreement that holds throughout our speech community and is codified in the patterns of our language. The agreement is, of course, an implicit and unstated one, BUT ITS TERMS ARE ABSOLUTELY OBLIGATORY; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees.

Whorf, 1940, in 1956: 213–214

What do we see when we see the world around us? Given that our vision relies on the same neurobiological mechanisms, be it in Aboriginal Australia or in Western Europe, surely we all see the same thing? Maybe and maybe not. Research shows that, in the process of adaptation to the environment, our perception undergoes long-lasting changes that enhance our ability to process and respond to environmental stimuli (Goldstone, 1998; Seger & Miller, 2010). In this chapter, we will consider the effects of this perceptual learning in the domain of greatest interest to Whorf, namely categorical perception. Grounded in basic cognitive abilities, such as memory and pattern recognition, *categorical perception* enables us to organize the ‘kaleidoscopic flux of impressions’ via rapid discrimination between stimuli, identification of individual stimuli as members of larger categories of objects, properties, relations, and phenomena, and activation of a large amount of information about these categories that, *inter alia*, allows us to judge typicality of individual members and instances (Brosch et al., 2010; Harnad, 1987; Rosch, 1977, 1978).

The process of categorical perception is shaped by our ages and histories, our physical states (e.g., how tired or hungry we are), and our goals and needs (e.g., whether we are trying to accomplish a work-related task, find something to eat, or determine if it will rain). The key issue addressed here is whether it

is also affected by classification systems encoded in our languages. This issue requires us to raise three questions. To begin with, to what degree are categories encoded by individual languages universal, with universality determined either by the properties of the human mind or by the structure of the environment? If they are not universal, are linguistic categories relevant only when we engage in communicative practices or do they also affect the way in which we process the material world more generally? And if they do, what happens when we learn a new language that requires us to impose different categories on the same world?

I will begin by introducing methodologies commonly used in research on the process of *linguistic categorization*, also known as naming or *word-to-referent mapping*. Then, I will examine the findings of studies of naming and categorization patterns in two material domains that have been central in debates on language and cognition: colors and objects. To give the reader a sense of the historical progression of these debates and of the key findings with (relatively) monolingual populations, each section will first address the following questions: (1) What cross-linguistic differences have been established in the domain in question? and (2) What are their implications for verbal and non-verbal cognition? Then, I will ask questions central to the understanding of the bilingual mind: (3) How and when do bilinguals restructure their patterns of naming and categorization? and (4) Does the process of category restructuring affect perception and cognition in bilingual speakers? In conclusions, I will return to the question asked above and discuss the implications of the findings across domains for our understanding of language effects in categorical perception.

2.1 Methodological approaches to the study of linguistic categorization

The studies of linguistic categorization are divided into two methodological paradigms. The first paradigm focuses on *words out of context* and builds on the ground-breaking research on cognitive categories by Eleanor (Heider) Rosch (Heider, 1972; Rosch, 1973a,b, 1975, 1977, 1978). To examine the structure of linguistic categories and their effects on cognition, this approach usually adopts one or more of the following tasks:

- (1) *listing task*: to establish the salience of particular terms in memory, participants may be asked to list all the terms within a particular semantic domain they can think of in a limited amount of time;
- (2) *naming task*: to determine category membership and boundaries, participants are asked to name objects, pictures of objects or a set of color chips;

- (3) *mapping task*: in the case of color, they may be additionally asked to indicate the range of particular terms on a Munsell color chart;
- (4) *best exemplar choice task*: to determine prototypes, participants are asked to indicate the best examples of the category (e.g., the best *red* or the most prototypical *cup*);
- (5) *typicality judgment task*: to determine category prototypes and borderline exemplars, participants are asked to judge the typicality of particular referents with regard to the category (e.g., rating a drinking container as a member of the category *cup* or an individual color chip as a member of the category *red*);
- (6) *familiarity judgment task*: to determine the effects of familiarity on lexical choice, participants are asked to rate their familiarity with particular objects on a Likert scale;
- (7) *confidence judgment task*: they may also be asked to use the Likert scale to evaluate their confidence in the name they had given to a particular object or color.

Once category prototypes and boundaries have been established, participants may be asked to perform one or more tasks that examine the effects of linguistic categories on cognition. These tasks aim to determine whether linguistic categories facilitate recall and recognition and whether they trigger a *categorical perception effect* (Harnad, 1987), namely whether they enhance perceived between-category differences while reducing perceived differences within categories:

- (8) *recognition task* requires participants to distinguish a previously shown object or color chip among an array of similar objects or chips;
- (9) *similarity judgment task* requires participants to judge the similarity of particular pictures, objects, substances, or color chips, often presented in triads (*triad categorization task*);
- (10) *sorting task* requires participants to sort an array of pictures, objects, or color chips into ‘similar groups’.

The second paradigm focuses on *words in context* and examines lexical choice in the context of elicited narratives. This research relies on the *narrative elicitation task*, which asks participants to retell a story they inferred from a series of pictures or a film clip. Their lexical choices with regard to particular referents are then compared within and across groups in order to determine lexical preferences. This work draws on two foundational studies. In the study known as Pear stories (Chafe, 1980), the researchers created their own silent film, called the Pear film, in order to examine how speakers of Western and non-Western languages verbalize the same experience. In the studies known as Frog stories, scholars, following Bamberg (1987), used a picture-book by

Mayer (1969) *Frog, Where Are You?* to examine verbalizations in both children and adults (e.g., Berman & Slobin, 1994; Strömquist & Verhoeven, 2004). Later research has also used a variety of other visual stimuli (Jarvis, 1998, 2000; Pavlenko, 2002a,b, 2003, 2008).

Both approaches have their advantages and disadvantages. The study of words out of context furnishes detailed information on the category structure, prototypes, and boundaries, yet we do not know whether this data faithfully reflects speakers' actual verbal behavior in context. In contrast, elicited narratives provide important information on how individual referents are named in context but offer no information on the category structure. Future studies of word-to-referent mapping may benefit from a staged approach, where in the first stage words are studied out of context, in the second stage references to prototypes and borderline category members are examined in elicited narratives, and in the third stage theories are tested in the context of everyday conversations, with the focus on code-switching, loan translation, and lexical borrowing. To date, however, studies of code-switching and lexical choice in individual interaction have not linked their findings to the work on group tendencies in lexical choice; consequently, their findings will be mentioned only peripherally.

2.2 Referential indeterminacy and factors affecting lexical choice

The studies to date show that the mapping of words onto external referents is a complex cognitive process that involves selective attention to particular features, functions, or properties of the object, event, or phenomenon to be named, matching of those properties with internal representations, and retrieval of words linked to these representations, which in turn involves selection between lexical alternatives (Berman & Slobin, 1994; Chafe, 1980; Kempton, 1981; Kronenfeld, 1996; Labov, 1973; for a summary see Murphy, 2002; Pavlenko, 2011c). Even in one's native language, the mapping of words to external referents can be a perplexing process of trial and approximation, fraught with difficulties and imperfections. Novice writers trying to describe everyday reality are well aware of this phenomenon: words elude and fail them as they try to capture the precise shape, the right shade of color, or the exact olfactory sensation. Malcolm Gladwell (2009) conveys this feeling of helplessness in describing the first writing days of Ben Fountain, future award-winning author of *Brief encounters with Che Guevara*:

The first day that Ben Fountain sat down to write at his kitchen table went well. He knew how the story about the stockbroker was supposed to start. But the second day, he says, he "completely freaked out". He didn't know how to describe things. He felt as if he were back in first grade. He didn't have a fully formed vision, waiting to be emptied onto the page. "I had to create a mental image of a building, a room, a façade,

haircut, clothes – just really basic things,” he says. “I realized I didn’t have the facility to put those into words. I started going out and buying visual dictionaries, architectural dictionaries, and going to school on those.” (p. 300)

Lexical choice difficulties are further compounded by the fact that even the most common objects may be named differently by different speakers (*inter-speaker variation*) or by the same speaker on different occasions (*intra-speaker variation*). Some objects, actions, events or phenomena may have no name at all and others may elicit an array of competing alternatives, none of which seem particularly fitting. This lack of agreement on names, or *referential indeterminacy*, is well illustrated in Labov’s (1973) famous study where native English speakers were asked to name pictures of cups, bowls, and vases that differed in measurements, shape, material, and function. Labov’s findings revealed that inter-speaker naming agreement was affected by the properties of the containers in question, such as shape (e.g., the presence of a handle), material, width, and depth, with agreement being lower for borderline category members. Most importantly, the agreement was affected by the perceived function of the container, so that the same container would be named *cup* with high agreement if it contained coffee and given a variety of other names if it contained food or flowers.

The phenomenon of referential indeterminacy did not escape the attention of the pioneers of language and cognition research. In their reformulations of linguistic relativity principles, Brown and Lenneberg (1954) put forth the idea of *codability*, or the efficiency with which a referent can be named in a given language. Highly codable entities, in this view, have one standardized monolexic (i.e., single-word) label used with high agreement (e.g., *cup*, *green*). In contrast, entities with low codability may elicit a variety of multi-word descriptions and lexical alternatives (e.g., *a kind of cup*, *chalice*, *color of sea grass*, *turquoise*). Less standardized and lower-frequency terms, such as *chalice* or *turquoise*, may also be linked to somewhat different referents by different speakers. Both types of variation indicate weaker links between words and referents than in the case of highly codable entities.

Lantz and Steffle (1964) expanded the idea of codability to include *communication accuracy*, i.e., the accuracy with which the referent named by one participant is then selected by another. Developed and tested on the color spectrum (Brown & Lenneberg, 1954; Lantz & Steffle, 1964; Lenneberg & Roberts, 1956; Steffle et al., 1966), the notion of codability was eventually adopted with regard to other entities. For instance, in Downing’s (1980) study of Pear stories told in English, labels used with high agreement included *ladder*, *moustache*, *face*, *leg*, *hand*, and *eye*. Other entities, such as *apron*, *paddleball*, and *basket*, were referred to with a number of different labels, oftentimes accompanied by lengthy pauses, false starts, and a high number of modifiers, all of which were interpreted as indicators of low codability.

Studies of word-to-referent mapping have identified four types of factors that affect inter- and intra-speaker variation in lexical selection: (a) linguistic (i.e., word properties), (b) referent-specific (i.e., referent properties), (c) individual (i.e., speaker properties), and (d) text- and context-specific (i.e., text and context properties) (Pavlenko, 2011c). *Linguistic factors* include the codability of the referent, the availability of the basic-level word (e.g., *dog* as opposed to *animal* [superordinate level] or *poodle* [subordinate level]), the structure of the lexical category in question, lexical differentiation in the domain in question, and the existence of lexical alternatives. The naming agreement appears to be higher for highly codable basic-level words.

Referent-specific factors include referent properties and perceived function of the referent, both of which contribute to its perceived typicality in terms of a particular linguistic category. Highly typical referents appear to be named with higher agreement. *Individual factors* include the richness of the individual lexicon (which may, in turn, be linked to education and literacy levels), familiarity with the referent (i.e., the ability to rely on previously seen exemplars), as well as the speaker's goals, perspective (including the level of specificity in narration), and the attitude toward the referent. Of these, familiarity is particularly likely to lead to higher intra-group agreement. *Text- and context-specific factors* include the nature of the speech situation, stylistic level or register, identity of the addressee, and the word's position in the text (i.e., referent introduction vs reference continuation), with introductory references displaying higher levels of naming agreement. These factors were shown to affect all speakers alike, regardless of whether they knew one language or several. In what follows, I will identify additional factors that affect the naming process in bilingual speakers and provide intriguing insights into cognitive restructuring in the bilingual mind. I will begin the discussion with the domain of color, the area where linguistic relativity was tested first and where it continues to be debated decades later.

2.3 Colors

2.3.1 *The puzzle of the color lexicon in Homeric Greek*

Color is arguably one of the most enigmatic dimensions of the material world, its mystery beginning with its very nature. Is color a 'property' of physical entities or an interpretation of the wavelengths of light manufactured by our neural responses? Scientists commonly link the two, explaining that "color has a high perceptual salience" (Poortinga & van de Vijver, 1997: 205) because we are wired to perceive it and it stands out to us as an objective physical property that can be abstracted from other dimensions and described in common terms, which reflect the "presumed universals of color experience" (Kay, 2005: 52).

It is all the more surprising then to encounter color references that depart from our own way of perceiving and describing the world.

Nowhere is this departure more apparent to the Western eye than in the very foundation of Western literature, the *Iliad* and the *Odyssey*. “Not even the most casual reader can fail to observe that Homer uses expressions of color in a very strange way ... That dark hair should always be *kvavo*- and never *mélas*, that the sea should never be blue, that the color of the sky and vegetation should never be mentioned at all, that cattle should be wine-colored, and that blood should oftenest be black cannot fail to arouse our curiosity as to why the early Greek bard used color-words in this way” (Wallace, 1927: 4). This opening of a treatise on color terms in Homer captures the sense of puzzlement over the paucity and vagueness of ancient Greek color vocabulary that has prevailed in Western humanities ever since William Gladstone, British statesman and amateur classicist, first drew attention to it in his *Studies on Homer and the Homeric Age* (1858). The scarcity of Homer’s color terms and the lack of fixity in their use led Gladstone (1858) to conclude “that the organ of color and its impressions were but partially developed among the Greeks of the heroic age” (p. 488).

Gladstone’s theory sparked a protracted debate.¹ To resolve the puzzle of the Greeks’ “most annoying disregard of true color” (Kober, 1934: 190), many scholars were ready to accept the idea of perceptual deficiencies among the Greeks and other ancient and ‘primitive’ peoples (e.g., Geiger, 1880; Kober, 1934; Platnauer, 1921). Studies conducted by Magnus (1880) and Rivers (1901, 1903, 1905) established that the vision acuity of hunter-gatherer tribes and peasants in Egypt, India, and the Torres Straits was no different from that of Westerners, yet the scarcity of their color vocabularies led both researchers to argue that ‘the primitive peoples’ had low sensitivity to colors their languages did not encode, in particular blue. Other scholars maintained that all people’s vision was identical (Allen, 1879) and argued that the fluid use of color terms by Homer may reflect the vagueness of the vocabulary itself, rather than the limitations of the color vision (e.g., Ellis, 1896; Wallace, 1927; Woodworth, 1910). Magnus (1880) and Rivers (1901, 1903, 1905) also put forth the idea of a staged development of color vocabulary, whereby separate terms for ‘blue’ and ‘green’ appear only in the later stages. Woodworth (1910) linked these stages with the frequency and fixity of usage suggesting that “where the need for designating a certain color, or range of colors, is infrequent, the fluid condition of color designation will be adequate, and no occasion will arise for stereotyping the name or for dissociating its color meaning from its reference to a particular object” (p. 328).

¹ For an early summary see Woodworth (1910); for a lively recent rendering see Deutscher (2010).

This foray into history reminds us that even the most learned scholars may experience deep discomfort when faced with patterns of language use different from their own. By the mid twentieth century, however, the idea of color vision deficiencies was out of favor – following Bloomfield (1933), many scholars came to see the linguistic divisions of the color spectrum as arbitrary. When Whorfian ideas began to be tested experimentally, this physical continuum arbitrarily ‘cut up’ by languages was put forth as an ideal testing ground. Using naming and recognition tasks, early studies of color vocabulary revealed that both measures of codability – communication accuracy and naming agreement – served as strong predictors for memory for colors among the speakers of English, Spanish, and Yucatec Maya (Brown & Lenneberg, 1954; Lantz & Steffire, 1964; Steffire et al., 1966).

Yet the discomfort elicited by the discrepancy between the apparent ‘naturalness’ of color and cross-linguistic variation in the color lexicons continued to linger. Eventually, Berlin and Kay (1969) revitalized Geiger’s (1880) and Magnus’s (1880) idea that color lexicons evolve in a predictable sequence, from two terms, for dark and light, to eleven terms. Using experimental data from speakers of 20 languages and lexicographic data from another 78 languages, the researchers argued that languages do not divide the color spectrum in a random fashion – rather, the color spectrum itself is perceptually irregular, with focal colors more salient than non-focals. These focal colors serve as prototypes for *basic color terms* (BCTs), monolexic or single-word items, psychologically salient to informants, whose meaning is not included in other terms and whose use is not restricted to a narrow class of objects. The BCT theory proposed that BCTs evolve around the same foci and in the same order. The idea of perceptual universals found support in experiments by (Rosch) Heider (1972; Heider & Olivier, 1972), who compared memory for colors in speakers of English and Dani (a New Guinean language with two basic terms, *mili* [dark/cold] and *mola* [light/warm]). Heider found that both groups remembered focal colors better than non-focals (even though the Dani performed significantly worse than the speakers of English) and argued that the memory for colors was influenced by their perceptual salience rather than by linguistic encoding.

Berlin, Kay, and Heider’s notions of perceptual universals elicited a major debate, with critics pointing to several methodological errors: the reliance on better remembered focal colors, artificial tasks, restrictive stimuli (i.e., Munsell color chips), interpretive procedures which eliminated non-color meanings of color terms, and bilingual informants; in Heider’s work they also noted the discrepancy between graphics and statistical results, and in Berlin and Kay (1969) unreliable lexicographic data (Caskey-Sirmons & Hickerson, 1977; Levinson, 2001; Lucy, 1997a; Lucy & Shweder, 1979; Ratner, 1989; Roberson et al., 2000; Saunders & van Brakel, 1997; Wierzbicka, 1990, 2005). In response to the charges regarding validity and reliability, in 1976, Berlin, Kay, and

Merrifield set up the World Color Survey (WCS), designed to provide empirical data from a variety of languages. These data led to some modifications in the Berlin-Kay theory, yet its main tenet remained the same – visual physiology constrains color categories to a small number of those theoretically possible (Kay & McDaniell, 1978; Kay et al., 1991; Kay & Regier, 2006, 2007; Webster & Kay, 2007).

This conclusion too has been questioned on a variety of grounds. Recent finding of a great amount of variation in foci placement across and within language groups (e.g., Davidoff et al., 1999; Jameson & Alvarado, 2003; Webster et al., 2002; Webster & Kay, 2007) challenged the idea of the perceptual salience of ‘universal foci’ and led Webster and Kay (2007) to acknowledge that color judgments are inherently subjective and “can be biased by individually experienced linguistic or cultural contexts” (p. 37).

Another challenge to the eleven-term theory comes from languages with two basic terms for blue, such as Greek or Russian. Dismissing this twelfth-term challenge, Berlin and Kay (1969: 36) argued that in Russian only one term, *sinij* [dark blue], must be dominant, while *goluboj* [light blue] must be recessive. A similar argument was made by MacLaury (1997) on the basis of color mappings by four unspecified Russian speakers (at least one of whom was likely bilingual) using the Munsell color array, which reduces the difference between the two to lightness (Paramei, 2007). Studies using larger groups of participants and a variety of stimuli, including the Munsell color array, Color-Aid samples, and the Swedish Natural Color System, reveal that the two colors differ in foci, lightness and saturation and confirm their basic status on the basis of perceptual distinctiveness, high frequency of occurrence, high salience in elicited lists of color terms, high naming agreement, short naming times, and derivational productivity, including the use of modifiers *svetlo-* [light] and *temno-* [dark] with each term (Andrews, 1994; Corbett & Morgan, 1988; Morgan & Corbett, 1989; Moss et al., 1990; Paramei, 2005, 2007; Pavlenko, 2012a; Vasilevich et al., 2008).

The third challenge involves the linguistic criteria of basicness: several studies showed that morphological simplicity and frequency of use do not always co-vary and that speakers of some languages may favor polylexemic terms over monolexemic ones (e.g., Alvarado & Jameson, 2002; Bricker, 1999; Jernudd & White, 1983). In fact, Jernudd and White (1983) found that if they were to apply the basic term criteria to the language For, they would have to throw out 98 percent of their data; consequently, they argued that “the notion of a basic color lexicon is a fiction which cannot be applied consistently to the analysis of unconstrained color naming” (pp. 67–68). These criticisms were linked to larger concerns about Berlin and Kay’s (1969) lack of attention to structure and distribution of color words and to their use in context (e.g., Lucy, 1997a).

Most importantly, the critics of ‘color universals’ object to the ‘epistemological chauvinism’ reflected in the assumption that the abstract Western category of ‘color’ is ‘natural’ and in reliance on color terms of American English, which miraculously coincide with universal categories, and on the dimensions of hue, brightness and saturation, associated with the English terms (Lucy, 1992a, 1997a; Ratner, 1989; Saunders & van Brakel, 1997; Wierzbicka, 1990). They also point to ethnocentric biases in research design, such as the assumption that participants respond in a ‘natural’ way to the presentation of small color chips, and in data collection procedures, such as artificial transformation of field glosses into ‘color terms’, e.g., ‘kind of tree’ > *purple*, ‘unripe’ > *green*, or ‘blood-blood’ > *white/red/yellow* (Henselmans, 2002; Roberson & Hanley, 2010; Saunders & van Brakel, 1995, 1997; Wierzbicka, 2005, 2006, 2008).

To sum up, while everyone acknowledges cross-linguistic variation in the color lexicon, the origins and implications of this variation have remained disputed. Language evolution debates involve the existence – and potential nature – of universal constraints, and language and cognition arguments concern the influence of language on color memory and discrimination. Since answers to these questions have great bearing on our understanding of the acquisition of color categories in the bilingual mind (are we learning new terms for old foci or do we actually construct new categories with new foci and/or boundaries?), let us examine what we know about cross-linguistic differences in the color lexicons and their effects on cognition, starting with the question of whether it makes sense to talk about ‘color’ as a universal category.

2.3.2 *We call them as we see them: an alternative view of the evolution of color terms*

Berlin and Kay (1969) argued that ‘color’ was an ontological domain that expanded in a predictable – albeit never logically explained – sequence, from a two-word system associated “with simple cultural and technological development” (p. 25) to the English-like eleven-term system. Yet, in doing so, they offered us “a view of the world’s languages through the lens of our own category” (Lucy, 1997a: 331). Contrary to the Western view of ‘color’ as a natural property of the material world, many languages, including Bellonese (Polynesia), Mursi (Ethiopia), Pirahã (Brazil), Warlpiri (Australia) and Kalam and Yélî Dnye (New Guinea), do not encode color as an abstract dimension independent of other properties of material objects (Bricker, 1999; Bulmer, 1968; Conklin, 1955; Everett, 2005, 2012; Jacobson-Widding, 1979; Kuschel & Monberg, 1974; Landar et al., 1960; Levinson, 2001; Turton, 1980; Wierzbicka, 2006, 2008). These languages do not possess a superordinate term for ‘color’, have few if any ‘basic’ monolexemic terms, lack hyponyms (i.e., *scarlet* as a kind of *red*), and rely on analogies with similarly colored objects

or materials, such as Kalam *ɬɲak* [blue clay] or Pirahã *biĩsai* [it is (like) blood], and polylexemic terms, such as Warlpiri *yukuri-yukuri* [grass-grass]. The use of these terms displays high variability and referential indeterminacy (e.g., Bulmer, 1968; Everett, 2012; Levinson, 2001).

‘Color’ as an abstract entity also has low communicative importance in these speech communities. Kalam speakers, for instance, do not spontaneously discuss ‘abstract’ colors (Bulmer, 1968), while Bellonese and Warlpiri speakers attend to patterns and visual contrasts rather than colors, and use ‘color’ descriptors with a limited number of objects (Kuschel & Monberg, 1974; Levinson, 2001; Wierzbicka, 2008). To ask speakers of such languages about ‘color’, anthropologists have to situate the questions within local systems of reference (e.g., “Its body, what is it like?”) and to interpret responses along the same lines (Bulmer, 1968; Conklin, 1955; Landar et al., 1960; Levinson, 2001). Thus, Mursi speakers unsure about names of particular color chips do not say “I don’t know the name of that color” but rather “There’s no such beast,” because their color lexicon consists of cattle-color terms (Turton, 1980: 322).

It is a mistake, however, to interpret these findings as evidence of ‘primitive’ systems. What is rendered invisible by the hue-based Western lens is the complexity of systems of visual description that combine references to hue with other locally salient distinctions, such as patterns, ripeness, texture, brightness, translucence, discreteness, humidity, shape, or location (Bricker, 1999; Bulmer, 1968; Conklin, 1955; Turton, 1980). This lens also conceals the significance of distinctions made in terms other than hue. This significance can be seen in an example from Australia, where in 1860 the government constrained the access of the Warlpiri tribe to the source of the ‘sacred’ red ochre and substituted it with red ochre from another mine. For English speakers, both ochres were *red*. For the tribe – whose language did not encode the category of ‘color’ – there was a principled distinction between the ‘sacred’ ochre which had the much-coveted shiny appearance and the substandard one. To defend their rights, the tribe engaged in what became known as the ‘ochre wars’ (Finlay, 2002).

Archeological explorations in Europe and Africa show that our prehistoric ancestors were also fond of red ochre and often just as picky as the Warlpiri: in some sites, they ignored locally available types of ochre in favor of more distant hematite-enriched material. A close analysis of patterns of ochre use in the Blombos Cave (South Africa), inhabited 77,000 years ago, revealed that its inhabitants had a marked preference for darker saturated ‘blood’ reds, which they ground more frequently and more intensively (Watts, 2009). Our ancestors’ sensitivity to visual aesthetics is also seen in the use of personal decorations, in Ice Age art and in the high status of polished jade axes, transported from the Italian Alps all the way to Britain and Scandinavia to be admired but never used (Fagan, 2010; MacGregor, 2010). Yet they would have had little use for an abstract system that groups jade axes with snakes and apples as

green – instead they required linguistic classification systems useful for daily practices, such as pigment use or production of stone tools. In the 1960s, one such rock categorization system, based on texture, hue, locality, hardness, and use, was still in use by the Kalam, who also animatedly argued about classification of plants or animals, but never about ‘color’ (Bulmer, 1968; Evans, 2010).

The recognition of distinct systems of visual description allowed scholars to resolve the puzzle of Homer’s color vocabulary. As Gladstone (1858: 489) suspected, Homeric Greek lacked a hue-based ‘color’ category (it did emerge in later centuries, as seen in Aristotle’s and Plato’s color theories) and relied on terms that emphasized the dark/light contrast, privileged luminosity, brightness, temporality, and movement, and were context dependent and imbued with ‘non-color’ meanings (e.g., *khlōros* [fresh, green foliage] describing honey or twigs as *fresh, unripe, moist* or *full of sap*) (Irwin, 1974; Lyons, 1995, 1999; Maxwell-Stuart, 1981). Translations that reduce Homer’s *oinops* [wine-looking] to the color reference, *wine-dark sea*, miss out on the other senses of the term that portray the sea as wine-eyed, drunk, rolling about, made choppy by strong winds, violent, dangerous, and ‘bloody’ in the sense of lethal (Maxwell-Stuart, 1981).

Studies of other ancient languages similarly suggest that an abstract hue-based category of ‘color’ evolved from systems that relied on analogies with natural dyes and concrete objects and privileged brightness and luminosity over hue; and in some cases, it was simply borrowed in the process of language contact (Biggam, 2007, 2012; Casson, 1997; Lyons, 1999; Warburton, 2007). Thus, the evolution of ‘color’ does not necessarily proceed from a simpler to a more complex system. Rather, as Woodworth (1910) suspected a long time ago, it may change from a more complex, elaborate, context-dependent, and variable system that requires speakers to pay simultaneous attention to a variety of features to a simpler abstract system that generalizes across a variety of entities, displays high naming agreement and relies on the combination of hue, brightness, and saturation, and sometimes just on hue. But before we make any definitive judgments about cognitive complexity, let us examine whether we can link color categories to cognitive processes, such as selective attention, categorical perception, and memory.

2.3.3 *We see them as we call them: language effects on perception*

Heider (1972) argued that memory for colors is influenced by their perceptual salience rather than their linguistic encoding. This argument was first challenged when studies with speakers of English, Russian, Setswana and Tarahumara revealed categorical perception at language-specific boundaries (Davies & Corbett, 1997; Kay & Kempton, 1984). Then, Roberson and associates (2000)

failed to replicate Heider's (1972) findings with speakers of Berinmo, a New Guinean language with five basic color terms. A comparison of performance by Berinmo and English speakers revealed no recognition advantage for focal colors and showed that language facilitates both memory and categorical perception: each group performed better on the contrast encoded in their own language: *blue-green* in English and *nol-wor* in Berinmo (see also Davidoff et al., 1999). These results were then replicated with speakers of another language with five basic terms, Himba (Namibia), who showed advantage for their own categories but not those of English or Berinmo (Roberson et al., 2005) and with speakers of Korean who showed categorical perception at a boundary unique to Korean (Roberson et al., 2008).

Thierry and associates (2009) used event-related brain potentials (ERPs) to examine whether language also affects pre-attentive (i.e., unconscious) perception. To see if color terms made a difference in a task that did not require categorization of color, the researchers used an *oddball detection task*, where participants, native speakers of English and Greek, had to press a button every time they saw a square-shaped stimulus amidst a stream of circles. These squares and circles differed in color and luminance (light blue–dark blue, light green–dark green), and as someone who had the privilege to perform the task in Thierry's lab, I can attest that these differences were equally perceptible in both blue and green (albeit irrelevant to the task). The analysis of the ERPs showed that in English speakers the *visual mismatch negativity* (an index of automatic pre-attentive detection of change in luminance) was the same for blue and green stimuli. In contrast, in Greek speakers, the visual mismatch negativity was significantly larger for the blue stimuli – the result attributed to the fact that Greek encodes an obligatory distinction between *ble* [dark blue] and *ghalazio* [light blue]. These results demonstrated that even in the context where Greek speakers did not have to discuss – or even pay attention to! – the colors, the obligatory linguistic distinction affected the early (pre-attentive) stages of perceptual integration and made the light/dark blue contrast more perceptually salient than the light/dark green one.

Together, these findings suggest that color lexicons draw attention to the categories encoded in the language in question and make them more perceptually salient, facilitating color memory, learning, and categorical perception. But are these effects Whorfian? If Whorf was interested in how we impose meaning on “a kaleidoscopic flux of impressions”, where colors compete for our attention with other colors, textures, and shapes, the applicability of these findings is restricted by the focus on decontextualized stimuli in artificial tasks and ‘the Munsell constraint’ (Henselmans, 2002), i.e., the fact that the language in question is ‘Munsell color language’ or terms used in reference to Munsell chips and not the actual usage in context.

To see if we could detect salience effects in context, I asked native speakers of three languages, English (with one basic term *blue*), Russian (with two basic terms, *sinij* [dark blue] and *goluboj* [light blue]) and Ukrainian (with three terms, *synij* [dark blue], *blakytnyj* [saturated blue] and *golubyj* [light blue]) to describe four paintings with a variety of blue contrasts: two by Matisse, one by Magritte, and one by Van Gogh (Pavlenko, 2012a). The analysis of these descriptions revealed that English speakers commonly referred to a single *blue*, with only a few speakers mentioning *dark* and *light blue* or *different shades of blue*. In contrast, Russian speakers systematically differentiated between *sinij* [dark blue] and *goluboj* [light blue], using both terms with modifiers, such as *temno-* [dark] and *svetlo-* [light]. Ukrainian speakers patterned with Russian speakers in differentiating systematically between dark and light blue. They did not, however, make a three-way distinction – rather the terms *blakytnyj* and *golubyj* appeared in complementary distribution to refer to light blue, with speakers of western varieties of Ukrainian favoring the former, borrowed from Polish, and speakers of eastern varieties favoring the latter, borrowed from Russian. These findings revealed that the perceptual salience of color referents is increased by obligatory distinctions but not by the mere presence of alternatives. The differences between English speakers on the one hand and Russian and Ukrainian speakers on the other further suggested that speakers of languages with an obligatory light/dark blue distinction not only register this contrast more acutely, as demonstrated by Thierry and associates (2009), but also ‘ascribe’ more ‘significance’ to it in communicative contexts. In turn, English speakers – who undoubtedly can see and describe the distinctions in shades of blue – do not ‘ascribe’ the same significance to these distinctions and do not find them worthy of mentioning.

The studies conducted in the past decade and in particular the findings of Roberson, Davidoff, and colleagues (Davidoff et al., 1999, 2008; Goldstein & Davidoff, 2008; Roberson et al., 2005, 2008) have led to a reconsideration of the interaction between language and perception. Even Kay acknowledged that language plays an important role as an attention-directing mechanism in the cognitive processing of color (with the focus on category boundaries) (Kay & Regier, 2006, 2007; Regier et al., 2009, 2010; Webster & Kay, 2007). And if language functions as an attention-directing mechanism, what happens when someone starts learning a language where color foci and boundaries differ from those in the first or previously learned languages?

2.3.4 *Now you see it, now you don’t: bilinguals’ color categories*

Studies with languages that encode ‘color’ as an abstract category reveal cross-linguistic variation in the number of basic color terms, in category foci and boundaries, in the range and meanings of secondary color terms, and in

the morphosyntactic categories used to encode ‘color’, with Mayan language Tzotzil, for instance, using suffixation to mark colors of objects located in the distance, such as a far-away house or cliff (Bricker, 1999; Lucy, 1997a; Wierzbicka, 2005). In traditional color research, this variation was treated as unimportant and bilinguals were commonly recruited as speakers of their L1s whose bilingualism could not possibly influence the results. Thus, Berlin and Kay (1969) stated that they find it “hard to believe that bilingualism in English could so consistently influence the placement of the foci in these diverse languages” (p. 12) and that their own work with Tzeltal–Spanish bilinguals indicated that their results were “not skewed as a result of bilingualism” (p. 12) (for similar treatment of bilinguals as speakers of their L1 in other color studies see Heider, 1972; Laws et al., 1995; Winawer et al., 2007). A few researchers, however, did attempt to investigate the influence of bilingualism on categorization and naming of colors. These studies, summarized in Table 2.1, reveal several processes that occur when two or more languages interact in the bilingual mind.

L1 influence on L2 naming patterns. Ervin (1961) found that Navajo–English bilinguals favored the term *yellow* in the context where monolingual Navajos agreed on its translation equivalent *Litso* [yellow] and monolingual English speakers were split between *yellow* and *brown*. Bilinguals also displayed a preference for *yellow* in the context of the yellow/green boundary, where Navajo monolinguals used *Litso* [yellow] and English monolinguals favored *green*, and a preference for *gray* in the context where monolingual Navajos used the term *Liba*, commonly linked to *gray*, and English monolinguals varied between *blue* and *purple*. L1 influence was particularly visible in speakers with minimal English competence, and five decades later, Ervin-Tripp (2011) still recalled the unforgettable experience of hearing “a purple chip called *green*” (p. 222), based on the association with the term *DotLqizh* [green/turquoise/purple]. Her findings suggested that the L1 influence on L2 may be particularly salient in contexts where the target language displays referential indeterminacy or variability in color naming patterns.

Internalization of L2 categories. Ervin (1961) also found that adults can form new color categories and learn to make more fine-grained distinctions: English-dominant Navajos in her study, for instance, learned how to split a single category *DotLqizh* into *blue*, *green*, and *purple*. Lenneberg and Roberts (1956) similarly found that speakers of L1 Zuni, which collapses English *yellow* and *orange*, learned to differentiate systematically between the two under the influence of L2 English. Jernudd and White (1983) revealed that, under the influence of L2 Arabic, L1 speakers of For acquired categories of ‘blue’ and ‘brown’, and, to a lesser degree, ‘purple’. Caskey-Sirmons and Hickerson (1977) established that speakers of L1 Hindi, Cantonese, and Mandarin formed new categories under the influence of L2 English. To give but one example, in

Table 2.1 *Bilinguals' color categories*

Studies	Languages	Participants ^a	Tasks & stimuli	Findings
Lenneberg & Roberts (1956)	L1 English L1 Zuni L2 English	36 participants: 24 English monolinguals, students at Harvard and Radcliffe 4 Zuni monolinguals (elderly) 8 L1 Zuni–English bilinguals with different levels of proficiency in L2 English	<i>Tasks</i> : listing task (including translation from Zuni to English), mapping task <i>Stimuli</i> : Munsell collec- tion, with saturation held constant	Internalization of L2 categor- ies, in-between perform- ance, L2 influence on L1
Ervin (1961)	L1 English L1 Navajo L2 English	103 participants (ages 17–70 yrs): 41 English monolinguals 28 Navajo monolinguals 21 English-dominant bilinguals 13 Navajo-dominant bilinguals	<i>Tasks</i> : naming task in two languages <i>Stimuli</i> : Farnsworth Munsell 100 Hue test	L1 influence, internalization of L2 categories, L2 influ- ence on L1, incomplete L1 acquisition, dominance effects
Caskey-Sirmons & Hickerson (1977)	L1 Korean L1 Japanese L1 Hindi L1 Cantonese L1 Mandarin L2 English	50 participants (ages 18–48 yrs): 5 monolinguals and 5 bilinguals in each language, with L2 English learned in the US LoE 5–25 yrs (L1 Korean) LoE 2–10 yrs (other L1s)	<i>Tasks</i> : listing task (limited to 12 terms), mapping task in the L1 <i>Stimuli</i> : Munsell color chart	Internalization of L2 categor- ies, L2 influence on L1 and category restructuring, L1 attrition, greater variability of foci and boundaries
Iijima et al. (1982)	L1 Japanese L2 English L3 German	150 participants (ages 12–15 yrs): Yonezawa, Japan n = 50 Tokyo, Japan n = 53 Dusseldorf, Germany n = 47 (school language L1 Japanese; L2 English is the 1st foreign lan- guage; L3 German optional)	<i>Tasks</i> : listing task in the L1, naming task in the L1 <i>Stimuli</i> : 117 samples from Munsell Color System	L2 and L3 influence or category restructuring, lexical borrowing

Table 2.1 (*cont.*)

Studies	Languages	Participantsa	Tasks & stimuli	Findings
Jernudd & White (1983)	L1 For L2 Arabic	173 participants (ages 10–16 yrs, all primary school students) prior to starting school in L2 Arabic, 36% were monolingual in L1 For; 18% were intermediate in L2 Arabic; 44% were fluent in L2 Arabic	<i>Tasks</i> : naming task in two languages <i>Stimuli</i> : 18 color pencils by Caran d'Ache	Internalization of L2 categories, lexical borrowing, co-existence of L1 and L2 patterns
Andrews (1994)	L1 English L1 Russian L2 English	45 participants (ages 18–68 yrs): 10 English monolinguals (ages 32–68 yrs) 10 Russian monolinguals (ages 20–63 yrs) 8 adult Russian–English bilinguals (ages 24–50 yrs, LoE 3–15 yrs) 17 childhood Russian–English bilinguals (ages 18–29 yrs)	<i>Tasks</i> : mapping task in the L1 <i>Stimuli</i> : 91 blue chips made by a commercial paint company	L1 maintenance, L2 influence on L1 and category restructuring, incomplete L1 acquisition
Alvarado & Jameson (2002)	L1 English L1 Vietnamese	125 participants: Study 1	<i>Tasks</i> : unconstrained naming task in the L1, monolexic naming task, listing task, confidence rating	In-between naming pattern, category restructuring, L2 influence on L1, L1 attrition
Jameson & Alvarado (2003)	L2 English	31 English monolinguals 29 Vietnamese–English bilinguals 32 Vietnamese monolinguals Study 2 16 English monolinguals 17 Vietnamese–English bilinguals	<i>Stimuli</i> : 110 color tiles from the Optical Society of America (OSA) Uniform Color Scale	

Athanasopoulos (2009)	L1 English L1 Greek L2 English	<p>72 participants (ages 19–32 yrs): Study 1 10 Greek–English bilinguals with advanced L2 proficiency, tested in the UK (ages 21–31 yrs, AoA 5–13 yrs, LoE 9 – 48 mos)</p> <p>10 Greek–English bilinguals with intermediate L2 proficiency, tested in Greece (ages 19–26 yrs, AoA 5–13 yrs)</p> <p>Study 2 22 English monolinguals (ages 19–28 yrs) 30 Greek–English bilinguals (ages 19–32 yrs, AoA 1–13 yrs, LoE 2–96 mos)</p>	<p><i>Tasks:</i> naming task in the L1, foci placement task, listing task, similarity judgment task</p> <p><i>Stimuli:</i> 160 Munsell color chips</p>	L2 influence on L1, category restructuring
Athanasopoulos et al. (2010)	L1 English L1 Greek L2 English	<p>40 participants (ages 20–23 yrs): 20 English monolinguals 20 Greek–English bilinguals AoA 4–15 yrs short-stay group (n = 10) LoE 5–12 mos long-stay group (n = 10) LoE 18–60 mos</p>	<p><i>Tasks:</i> color oddball detection task, naming task (in L1 Greek), similarity judgment task (in L2 English)</p> <p><i>Stimuli:</i> 4 blocks of 540 stimuli: 432 filled circle shapes, 108 filled square shapes in dark and light green and blue 17 Munsell stimuli</p>	L2 influence on L1, L1 attrition

Table 2.1 (*cont.*)

Studies	Languages	Participantsa	Tasks & stimuli	Findings
Athanasopoulos et al. (2011)	L1 English L1 Japanese L2 English	54 participants: 12 Japanese monolinguals (mean age = 26 yrs) 15 English monolinguals (mean age = 24 yrs) 27 Japanese–English bilinguals (mean age = 27 yrs; AoA 10–13 yrs; LoE 2–114 mos)	<i>Tasks:</i> similarity judgment task (in the L1 for monolinguals; in L1 Japanese for 11 bilinguals; in L2 English for 16 bilinguals) <i>Stimuli:</i> 10 Color-Aid stimuli	L2 influence on L1, in-between performance
Pavlenko (2012a)	L1/L2Russian L1/L2Ukrainian L2/L3English	106 participants: (1) 31 Russian monolinguals (ages 18–21 yrs) (2) 25 English monolinguals (ages 18–27 yrs) (3) 28 Russian–English bilinguals: 10 early bilinguals (mean age = 19.7 yrs, range 18–24 yrs; mean AoA = 3.7 yrs, range 1–6 yrs; mean LoE = 16 yrs, range 11–18.5 yrs) 10 childhood bilinguals (mean age = 19.9 yrs, range 18–24 yrs; mean AoA = 11 yrs, range 8–15 yrs; mean LoE = 8.9 yrs, range 5–13 yrs)	<i>Tasks:</i> elicited oral narratives (verbal description) in the L1 <i>Stimuli:</i> four paintings by Van Gogh (1), Magritte (1), and Matisse (2)	L2 influence on L1 (seen in the frequency of encoding of the light/dark blue contrast), L1 attrition, incomplete acquisition of the L1

8 late bilinguals (mean age = 27 yrs,
range 21–37 yrs; mean AoA = 22
yrs, range 19–25 yrs; mean LoE
= 5, range 1–13 yrs)
(4) 22 Ukrainian-Russian–English
trilinguals (ages 18–22 yrs)
L1 Russian or Ukrainian
L2 Ukrainian or Russian
L3 English learned as a FL

a Throughout this book, I have done my best to include the key predictors of bilingual performance, such as age at testing (Age), age of L2 acquisition (AoA), context of acquisition (CoA) and length of L2 exposure (LoE). However, the standards of reporting vary across time periods and disciplines and several studies in the present corpus have not reported these variables. Secondly, to avoid differentiation between ‘native speakers’ and ‘bilinguals’ (who are also native speakers of their L1), in most cases I have adopted the term ‘monolinguals’, with the proviso that true monolinguals are difficult to find outside of the English-speaking world. Consequently, the label refers to functional monolinguals, that is individuals with minimal levels of proficiency in other languages (for discussion of this issue, see also Athanasopoulos et al., 2011: 12). In cases where the participants may not be functional monolinguals, I use the term ‘L1 speakers’. The terms ‘bilinguals’, ‘L2 learners’, and ‘L2 users’ will be used interchangeably depending on the scope of the study.

Hindi there is no word for *gray*, consequently, in the achromatic series monolingual Hindi speakers did not map the gray area. In contrast, three of five Hindi–English bilinguals did map such an area, showing sensitivity to the new category acquired in L2 English.

These conclusions are also borne out in two studies that did not provide sufficient details about bilingual participants to merit inclusion in Table 2.1. MacLaury's (1997) extensive survey shows that speakers of Mesoamerican languages which encode a single category of blue/green, such as Nahuatl, can learn to distinguish between the L2 Spanish *verde* [green] and *azul* [blue] (see also Bricker, 1999). An even greater challenge faces L1 Vietnamese learners of L2 Russian – their L1 encodes a single blue/green category *xanh*, while their L2 differentiates systematically between *sinij* [dark blue], *goluboj* [light blue] and *zelenyj* [green]. Nevertheless, Vartanov and Nguyen (1995) found that with an increase in L2 Russian proficiency, Vietnamese–Russian bilinguals may approximate native Russian speakers' mappings of the three categories.

Co-existence of language-specific naming patterns. The consequences of internalization of new categories for everyday usage have not been sufficiently explored but it appears that in some contexts bilinguals who use both languages on an everyday basis may be able to maintain distinct categories associated with their respective languages. Thus, Jernudd and White (1983) found that on the same naming task For–Arabic bilinguals used five to eight terms in L1 For and six to nine in L2 Arabic, where they singled out discrete categories for 'blue', 'brown', 'purple' and 'orange'. Saunders and Van Brakel (1997) observed that bilingual speakers of Kwakw'ala (spoken on Vancouver Island) and English differentiate between *yellow* and *green* when speaking English but in Kwakw'ala stick to the term *lhenxa* [yellow-with-green].

Language contact may also trigger modifications of color lexicons that make fewer distinctions via lexical borrowing, as seen in the adoption of English terms *orange*, *pink*, and *gray* in Japanese (Iijima et al., 1982; Uchikawa & Boynton, 1987), Arabic *samawi* [blue, sky-like] and *asfar* [yellow] in For (Jernudd & White, 1983), Afrikaans *pers* [purple] and English *pink* and *orange* in Damara (Davies et al., 1997), German *blau* [blue] in Herero and Himba (Roberson & Hanley, 2010), and a wide range of lexical borrowings from Spanish, such as *naranja* [orange] or *azul* [blue], in Mesoamerican languages (Bricker, 1999; MacLaury, 1997). Speakers of languages that do not encode 'color' as an abstract category may also adopt a loan word for 'color', such as *kala* in Bellonese (Kuschel & Monberg, 1974) or *color* in Australian languages (Wierzbicka, 2005). In turn, speakers of languages that make more fine-grained distinctions than the L2 may be able to maintain these contrasts: thus, Andrews (1994) found that Russian immigrants who arrived in the US as adults maintained the obligatory distinction between *sinij* and *goluboj* in L1 Russian (for similar findings see also Winawer et al., 2007).

L2 influence on L1 naming and categorization patterns. With prolonged exposure, however, the L2 may exert its influence on the L1 naming and categorization patterns. Thus, Lenneberg and Roberts (1956) found that Zuni–English bilinguals structured the color space in L1 Zuni differently from monolingual speakers, mapping the same terms onto different referents. Caskey-Sirmons and Hickerson (1977) found that bilinguals' color foci and boundaries had shifted towards those of the L2 English. Iijima and associates (1982) found that under the influence of L2 English and L3 German, Japanese children shifted the L1 category *midori* [green] towards yellow and *ao-iro* [blue] in the opposite direction, towards violet, thus displaying greater differentiation between the two categories traditionally encoded by a single common term *ao-iro*. MacLaury (1997) found that the L2 Spanish distinction between *verde* [green] and *azul* [blue] led Nahuatl–Spanish bilinguals to map multiple foci into a single blue/green category *šiutik* in L1 Nahuatl. In another study of blue/green, Jameson and Alvarado (2003) found that Vietnamese–English bilinguals assigned significantly more stimuli to the category *xanh* [blue/green] than Vietnamese monolinguals or than English monolinguals to the categories *green* and *blue*, suggesting that bilinguals may be restructuring and enlarging the category.

L2 influence was also identified in the use of L1 color terms. Vietnamese–English bilinguals were shown to use more monolexic terms and fewer modifiers in L1 Vietnamese than Vietnamese monolinguals, thus approximating L2 English naming patterns (Alvarado & Jameson, 2002; Jameson & Alvarado, 2003). This influence was particularly pronounced in the case of 'orange', treated in Vietnamese as a subset of 'yellow'. To refer to 'orange', bilinguals overused the L1 Vietnamese term *cam* (the name of the fruit 'orange') and underused a modified term for 'yellow' favored by Vietnamese monolinguals. This usage suggests that Vietnamese–English bilinguals restructured not only the word-to-referent mappings but also the underlying mental representations or categories.

The L2 may also affect the frequency of use of particular terms. Vietnamese–English bilinguals, for instance, use modifiers more frequently than English speakers but less frequently than speakers of Vietnamese (Alvarado & Jameson, 2002). Japanese children in Germany used terms such as *cha-iro* [brown or tea-colored] or *midori* [green] more frequently than their counterparts in Japan (Iijima et al., 1982). They also replaced Japanese terms *daidai* [orange] and *momo-iro* [peach] with the L2 English terms *orange* and *pink*. Such borrowing is widespread in Japan, yet what was interesting about the trilingual children was the pattern of cross-linguistic influence: the frequency of the term *orange* achieved the L3 German level but the frequency of *pink* did not, likely because the L2 English word does not have a counterpart in L3 German.

L1 attrition and incomplete acquisition of the L1. In some contexts, L2 influence may also result in L1 attrition of the word-to-referent mappings. Alvarado

and Jameson (2002) documented general attrition of L1 Vietnamese color terms among Vietnamese–English bilinguals, which began with modifiers and specific object glosses. Caskey-Sirmons and Hickerson (1977) identified category attrition in L1 Hindi, where monolingual speakers of Hindi differentiated between *gulabi* [rose] and *lal* [red], while Hindi–English bilinguals incorporated a secondary category ‘rose’ into the primary category ‘red’.

The weakening of the obligatory contrast between dark and light blue under the influence of the L2 English has been documented in L1 Russian (Andrews, 1994; Pavlenko, 2012a), L1 Greek (Athanasopoulos, 2009; Athanasopoulos et al., 2010), and L1 Japanese (Athanasopoulos et al., 2011). Athanasopoulos (2009) examined the maintenance of the L1 Greek distinction between *ble* [dark blue] and *ghalazio* [light blue] in Greek–English bilinguals with different levels of L2 proficiency and found that the majority of advanced bilinguals had shifted their foci of *ble* towards the prototype for the English *blue*. To maintain the perceptual distance between *ble* and *ghalazio*, they shifted the prototype for *ghalazio* away from *blue*, which resulted in a prototype that was lighter than that of Greek monolinguals. In a reanalysis of the ERP data from the study by Thierry and associates (2009), Athanasopoulos and associates (2010) found that Greek–English bilinguals who had stayed longer in the L2 English environment displayed less pre-attentive sensitivity (as measured by ERPs) to the *ble/ghalazio* contrast and less naming agreement at the boundary of the two colors. In my own study of painting descriptions, Russian–English bilinguals encoded the light blue/dark blue contrast significantly less frequently than Russian monolinguals – instead, they favored a single term, *goluboj* [light blue], even in contexts that required *sinij* [dark blue] (Pavlenko, 2012a).

The replacement of the two terms with one was particularly evident in early bilinguals, raising the possibility that what we see is incomplete acquisition of L1 color categories. Such incomplete acquisition was also documented by Andrews (1994), who found that monolingual speakers of Russian and Russian–English bilinguals who had arrived in the US as adults consistently differentiated between *sinij* [dark blue] and *goluboj* [light blue], while childhood bilinguals did not: their performance revealed the divergence of the foci of *sinij* and *goluboj* and an expansion of the category *sinij* into the territory reserved for *goluboj* by adult bilinguals. In Ervin’s (1961) study, older Navajo–English bilinguals had a richer color lexicon in L1 Navajo, while younger speakers – who were presumably more proficient in L2 English – either did not know some of the L1 terms or used them differently from the monolingual standard.

Factors affecting cognitive restructuring in the domain of color. To date, only a few studies have examined factors that affect cognitive restructuring of bilinguals’ color categories. Studies of the maintenance of the L1 contrast (light/dark blue) in the context of the single L2 English category *blue* found

that the degree of L2 influence on L1 was affected by the age of L2 acquisition (Andrews, 1994; Pavlenko, 2012a) and the length of stay in the L2 environment (Athanasopoulos, 2009; Athanasopoulos et al., 2010). Thus, Athanasopoulos (2009) found that the longer Greek–English bilinguals had stayed in the UK, the less they distinguished between light and dark blue in L1 Greek. In the analysis of the ERP results, Athanasopoulos and associates (2010) found that short-stay Greek–English bilinguals were sensitive to the light/dark blue contrast, while long-stay bilinguals began approximating English monolinguals. Athanasopoulos and associates (2011) found that the maintenance of the L1 contrast is also affected by the frequency of L2 use: Japanese–English bilinguals who used the L2 English more frequently resembled L1 English speakers in their judgments of perceptual similarity of *ao* [dark blue] and *mizu-iro* [light blue]. These findings show that the maintenance of L1 categories is shaped by the interplay between the age of acquisition (and thus maturational effects) and the length of residence in the L2 environment (and thus different frequencies of L1 and L2 use).

Frequency, proficiency, and dominance also affect the use of L2 color categories. Ervin's (1961) study documented the effects of language dominance, tested through the speed of naming test: English-dominant bilinguals displayed more agreement on the yellow/green and blue/green category boundaries than bilinguals dominant in Navajo. In turn, Vartanov and Nguyen (1995) found that increases in L2 proficiency correlate positively with increased elaboration of the L2 Russian color domain in Vietnamese–Russian bilinguals.

2.3.5 *Color: a category in the eye/mind of the beholder?*

While scholars continue to disagree on the 'naturalness' of 'color', in the view adopted here, 'color' is a category in the eye, mind and language of the beholder: animal species differ greatly in their ability to perceive and discriminate hues and ultraviolet light, while in humans, subjective experience alters both direct color perception and memory (Goldstone, 1998). Following Goldstone's (1998) perceptual learning theory, the process by which speakers of 'color' languages develop the ability to focus on hue, to suppress irrelevant information, and to generalize across dissimilar entities, such as apples and emeralds, is viewed here as *imprinting*, whereby perception adapts to environment by developing specialized detectors (receptors) for particular stimuli. Studies with monolingual and bi- and multilingual speakers further suggest that acquisition of L1 color categories relies on the *attention weighting* mechanism (Goldstone, 1998), which increases selective attention paid to features relevant for everyday practice. In communicative contexts, this sensitivity translates into 'ascribing significance' to the categories in question, seen in their more frequent occurrence (Pavlenko, 2012a); it can also be identified in non-verbal

tasks, such as the oddball detection task used by Thierry and associates (2009). The sensitivity to L1 categories may persist in the L2 context and affect the use of L2 color terms, especially if the L2 displays referential indeterminacy or variability in the naming patterns. Wierzbicka (2011) identifies such L1 influence in the English text of Nabokov's *Lolita*, which she compares with the author's translation into his native Russian. She argues that Nabokov's overuse of low-frequency English terms *russet*, *auburn*, and *apricot-colored* reflects the much higher frequency and contexts of use of their Russian counterparts *ryzhij* [red (hair)], *rozovyyj* [pink], *rusyj* [light brown (hair)], and *abrikosovyj* [apricot-colored].

This influence, however, is very subtle and readers may not notice anything out of the ordinary in Nabokov's lexical choices, because his word-to-referent mapping follows the constraints of English. Such apt use of L2 terms often requires linguistic and cognitive category restructuring, i.e., modifications in category foci, structure, and boundaries. This restructuring, in turn, may lead to re-weighting of attention, seen in increased salience of L2 contrasts and categories and – in the context of decreased L1 use – in decreased salience of the contrasts and categories relevant in the L1 but not in the L2. The key question to ask now is whether these effects are limited to the domain of color and, more generally, to lexical categories, or whether they can also be detected in grammatical categories and other domains of the material world.

2.4 Objects and substances

2.4.1 *One candle and one long thin wax: number marking and cognition*

The studies of object and substance categorization exploit a structural difference in number marking between noun-class and classifier languages. *Noun-class languages*, such as English or French, encode the count/mass distinction grammatically. Count nouns in such languages refer to discrete entities and are obligatorily marked as singular or plural (e.g., *candle* – *candles*), while mass nouns refer to substances (e.g., *coffee*, *water*) and cannot be pluralized but may be preceded by indefinite quantifiers (e.g., *much*, *little*). At times, the distinction may be arbitrary, with different languages assigning the same entities to different categories: in English, for instance, *furniture* and *jewelry* are mass nouns and in Spanish *muebles* and *joyas* are count nouns (Sera & Goodrich, 2010). Even in the same language, the distinction is not monolithic: in certain contexts nouns may shift categories, as in “The waiter is bringing one coffee and two beers” (Corbett, 2000). Linguistic conventions may also require the use of a mass noun for a clearly individuated entity, as in “Would you like more toast?”, and the use of a count noun for a non-individuated entity, as in “How about some scrambled eggs?” (Wisniewski et al., 2003).

Classifier languages, such as Japanese or Yucatec Maya, do not encode the count/mass distinction grammatically. Nouns in these languages commonly function like English mass nouns – they refer to substances, unbounded and non-discrete, and are accompanied by numeral classifiers, so that the Yucatec equivalent of the English *candle* is *un-tz'it kib* ‘one long thin wax’ (Lucy, 1992b). Differences also exist among classifier languages. In Yucatec, a noun referring to a substance is often extended to different objects made out of that substance; a single noun can also be used to refer to different parts of an entity, such as the fruit of the banana plant, the leaf, or the plant itself (Lucy, 1992b). In contrast, in Japanese – as in English – the name of the object is not usually related to the name of the material it is made of and different parts of an entity usually have independent and morphologically unrelated names (Imai & Mazuka, 2003).

Lucy (1992b) found the structural differences between noun-class and classifier languages a more appropriate and meaningful arena for the study of the relationship between language and cognition than the lexicalized domain of color. He hypothesized that noun-class languages draw speakers’ attention to the discreteness of entities, leading to greater sensitivity to shape (as a useful indicator of individuation), while classifier languages draw attention to substance, leading to greater sensitivity to material. To test this hypothesis, he compared the performance of adult speakers of English and Yucatec on similarity judgments of a set of original or *pivot objects* (e.g., a wooden stick) and their *shape alternates* (e.g., a candle stick) and *material alternates* (e.g., a block of wood). The results confirmed his predictions, showing that English speakers consistently favored shape alternates and Yucatec speakers favored material ones.

Lucy (1992b) also examined whether English and Yucatec speakers differ in how much attention they pay to the number of objects, the domain where the two languages diverge most in number marking. He developed a picture set that contained nine pictures of Yucatecan village life. Each picture had five alternates which differed from the original in: (1) the number of target animals (e.g., dog), (2–3) the number of target implements, such as containers (e.g., large water jar) or tools (e.g., shovel), (4) the number of target substance representations (e.g., lumps of corn dough), and (5) the amount of target substance (e.g., the size of lumps of corn dough). The tasks involved picture description, similarity judgments, recall, and recognition.

The analysis revealed that in picture descriptions and recalls English and Yucatec speakers were similar in mentioning the number of animals (high) and substances (low). In similarity judgments and recognition tasks, both groups treated alternate pictures containing changes in the number of animals as significantly different and pictures with changes in the number of substances as similar to the originals. They differed, however, in the treatment of implements.

In description and recall tasks, English speakers mentioned implements significantly more frequently and in picture similarity judgment and recognition tasks, they treated the changes in the number of implements as significant, while Yucatec speakers did not.

Similar to Berlin and Kay (1969), Lucy's (1992b) study elicited an array of theoretical and methodological criticisms. Theory-wise, critics argued that the notion of mass is abstract and cannot be linked directly to the categories of substance or material; they also identified the lexical encoding of substance in Yucatec as a source of a possible bias; methodology-wise, they noted the small sample size, differences in the educational and cultural backgrounds of American and Yucatec subjects, task simplicity and directness, and the choice of stimuli, which left open the possibility of unintended influences (e.g., object function, color, size, and the use of covert naming strategies) (Bloom & Keil, 2001; Mazuka & Friedman, 2000; Papafragou, 2005).

To address these methodological criticisms, follow-up studies controlled for participants' educational background and for color, size, and function of the stimuli (e.g., Athanasopoulos & Kasai, 2008; Lucy & Gaskins, 2001, 2003). They also employed larger numbers of participants (up to 288 in Subrahmanyam & Chen, 2006) and examined classifier languages, like Japanese, that do not encode substance lexically (e.g., Imai & Gentner, 1997). Athanasopoulos (2006) adopted Lucy's (1992b) stimuli and replicated his findings with native speakers of English and Japanese. In the picture similarity judgment task, English monolinguals differentiated between changes in the number of implements and substances and favored alternates with substances as most similar, while Japanese monolinguals treated both types of changes as similar and favored alternates with implements as most similar.

Other studies modified the design, asking participants to judge the similarity of *substances* (e.g., sand in an S-shape), *simple objects* (e.g., cork pyramid) and (in a few studies) *complex objects* (e.g., lemon squeezer) to shape and material alternates: a cork pyramid, for instance, could have a white plastic pyramid as a shape alternate and a chunk of cork as a material alternate. The stimuli were presented in two types of tasks. The first was a *word-extension task* (e.g., "Look at this *dax*. Point to the tray that also has the *dax* on it"). The second task, designed to avoid the influence of a syntactic frame (i.e., the *dax* interpreted as a count noun), was a *no-word classification task* (e.g., "Is this the same as this?"). Participants included English-speaking children and adults, as well as children and adults who spoke Yucatec (Lucy & Gaskins, 2001, 2003), Japanese (Athanasopoulos, 2007; Athanasopoulos & Kasai, 2008; Imai & Gentner, 1997; Imai & Mazuka, 2003, 2007), Chinese (Li et al., 2009; Subrahmanyam & Chen, 2006), Korean (Gathercole & Min, 1997), and Spanish (Gathercole & Min, 1997; Sera & Goodrich, 2010).

Replicating the original findings with both children and adults, these studies found that in the case of simple objects, English and Spanish speakers favor shape-based alternatives and speakers of classifier languages Japanese, Korean, Chinese, and Yucatec favor material ones, whereas in the case of complex objects, all speakers display a strong shape bias (Gathercole & Min, 1997; Imai & Gentner, 1997; Imai & Mazuka, 2003, 2007; Li et al., 2009; Lucy & Gaskins, 2001, 2003; Sera & Goodrich, 2010; Subrahmanyam & Chen, 2006). The starting date of this attentional bias is still unclear and has been variably located at the ages of two (Imai & Gentner, 1997), four (Gathercole & Min, 1997; Subrahmanyam & Chen, 2006), four to five (Li et al., 2009), seven to nine (Sera & Goodrich, 2010), and nine (Lucy & Gaskins, 2001, 2003).

A somewhat different approach was adopted by Li and associates (Barner et al., 2009; Li et al., 2009), who examined categorization preferences of speakers of English, Japanese, and Mandarin Chinese. The researchers found that cross-linguistic differences identified in word-extension tasks disappeared in tasks that asked participants to (a) assign stimuli to the categories of ‘object’, ‘substance’, or ‘neither’, (b) rate words as mass or count nouns, and (c) make quantity judgments involving mass and count nouns (e.g., “Who has more eggs? Who has more coffee?”). The analysis of quantity judgments revealed, however, that English speakers were more likely to pay attention to number than Japanese speakers in the case of count nouns, and less likely in the case of mass nouns, which suggested to the authors that “the presence of explicit mass-count syntax in English sharpened quantity judgments for English speakers” (Barner et al., 2009: 335). The authors interpreted their results as demonstrating no ‘Whorfian effects’, although it is not clear what ‘Whorfian effects’ – outside of the sensitivity to number – could be found in tasks that examined semantic knowledge and experiential knowledge of the world.

A few studies have examined the influence of classifiers on attention and memory. Zhang and Schmitt (1998) and Schmitt and Zhang (1998) asked speakers of English and Chinese to rate the similarity of concrete nouns referring to objects, to recall lists of object words, and to judge a series of object pictures. Shared classifiers affected the performance of Chinese speakers on all tasks. On linguistic tasks, they were more likely to perceive object words sharing a common classifier as similar and to recall them in clusters. On the picture evaluation task, they evaluated more positively pictures of objects sharing a classifier *ba* (used for graspable objects) when such pictures included a hand that grasped the object. Saalbach and Imai (2007) found that similarities underlying Chinese classifier categories can also be detected and exploited by German speakers. The effects were magnified in Chinese speakers in the similarity judgment task and inductive inference task, leading the researchers to suggest that habitual use of classifiers leads to heightened sensitivity to features underlying classifier relations. In an eye-tracking study, Huettig and

associates (2010) found that when Chinese speakers heard a classifier, they directed eye-gaze significantly more towards objects matching that class, but when classifiers were not present, they paid equal attention to classifier-match and distractor objects. These findings led them to argue that classifier effects influence only linguistic processing. Gao and Malt's (2009) study with Chinese and English speakers limited these effects to particular types of classifiers.

There have also been a few studies that revealed no differences between speakers of noun-class and classifier languages: Japanese and English speakers were shown to display similar shape preferences on a non-verbal similarity judgment task (Mazuka & Friedman, 2000) and similar sensitivity to the English count/mass distinction on a picture naming task and a semantic similarity judgment task (Iwasaki et al., 2010). Kuo and Sera (2009) replaced material alternatives by taxonomic or functional alternatives and found that both Mandarin and English speakers favored taxonomic or functional choices. Moreover, when it came to shape, Mandarin speakers made shape-based choices somewhat more frequently than English speakers.

These studies, however, have a common problem we have already encountered in the studies of color categorization – the use of bilingual participants as speakers of their L1 (an approach also adopted by Gao & Malt, 2009; Huettig et al., 2010, and Sera & Goodrich, 2010). In Mazuka and Friedman's (2000) study, all of the Japanese participants had been exposed to English, with the only difference being that 'native speakers' of Japanese tested in Japan were students and Japanese–English 'bilinguals' tested in the US were housewives. Their actual levels of proficiency were not examined by the researchers, thus leaving open the possibility that the 'monolinguals' may have had higher L2 English proficiency levels than the 'bilinguals'. Gao and Malt (2009) and Kuo and Sera (2009) used Mandarin speakers who resided in the US and were engaged in graduate study in English, while Iwasaki and associates (2010) used Japanese speakers who had resided in the UK for an average of 2.3 years (range 6 months to 6 years). Having discussed the potential effects of this exposure, Iwasaki and associates (2010) concluded, in a manner reminiscent of Berlin and Kay (1969), that "it is unlikely that their knowledge of English would affect their performance" (p. 205). I will return to this likelihood in the section on bilinguals' object categorization and show that it is actually quite likely that participants' exposure to L2 English had affected the results.

Another common problem in studies of object/substance categorization is interpretation of the results in the light of one's own hypotheses. Thus, a difference in the degree of shape bias in English- and Japanese-speaking participants was interpreted by Athanasopoulos (2007) and Athanasopoulos and Kasai (2008) as a 'Whorfian' result, even though one would expect to see material bias in Japanese speakers. In contrast, Li and associates (Barner et al., 2009; Li et al., 2009) interpreted the 'Whorfian' preference for material in Mandarin

speakers in the word-extension task as support for a ‘non-Whorfian’ account. Following Papafragou (2005), they explained performance differences in verbal tasks though lexical statistics (i.e., high frequency of count nouns in the case of English), acknowledging that this explanation does not account for distinct patterns of preference in non-verbal tasks (e.g., Imai & Mazuka, 2003, 2007).

While the primary thrust behind the studies of object categorization has been the search for ‘Whorfian effects’, they received additional impetus from the debate about the ontological status of the object/substance distinction: some scholars see it as a fundamental universal dichotomy, innate in all children, and others maintain that it is a form of linguistic categorization (for a summary, see Imai & Mazuka, 2003). The ontological status of objects and substances is outside of the scope of this discussion, but even if the distinction is universal, systematic performance differences between speakers of noun-class and classifier languages suggest that language mediates sensory-perceptual reality, focusing speakers’ attention on different perceptual aspects of discrete inanimate entities, such as simple objects. Speakers of noun-class languages who categorize most entities as count or mass develop higher sensitivity to shape as a useful indicator of individuation, and, consequently, construct solid bounded entities as individuated objects. In turn, speakers of classifier languages who pay attention to the perceptual properties encoded by specific classifiers develop higher sensitivity to material and group the same solid bounded entities with other instances of the same material. But are the effects of grammatical categories fundamentally different from the effects of lexical categories?

2.4.2 *Plastic cups and paper glasses: cross-linguistic differences in artifact categories*

To answer this question, I turn to the study of naming and categorization of artifacts, inspired by Labov’s (1973) experiment with container drawings. This area of research is not controversial like that on color, nor ground-breaking like that on the count/mass distinction, but it is novel in its finding of pervasive cross-linguistic variation in linguistic categorization of concrete referents, which have traditionally been treated as ‘translation equivalents’ in foreign-language teaching and in the study of bilingualism and models of the bilingual lexicon.

The most interesting finding coming out of this research involves cross-linguistic differences in the salient attributes of linguistic categories linked to common containers, such as drinking vessels. Kronenfeld and associates (1985; see also Kronenfeld, 1996) asked speakers of English, Japanese, and Hebrew to name eleven drinking containers and found that different languages divide these containers in somewhat different ways. In English, the overriding

determinant of glassness was material, consequently, English speakers separated glass containers (*glasses*) from paper, styrofoam, and metal containers (*cups*). In contrast, in Hebrew, the determinant of glassness was shape; consequently, Hebrew speakers grouped together handleless glass, paper and styrofoam containers (*cosot* [glasses]), separating them from china and metal containers with handles (*sefalim* [cups]). Hebrew and Japanese differed in the shape associated with prototypical glassness: in Hebrew a prototypical *cos* [glass] had cylindrical shape without handles, while in Japanese *gurasu* [glasses] were non-cylindrical stemmed objects made of glass, best exemplified by what English speakers would call a *brandy snifter*.

Similar differences were revealed by Pavlenko and Malt (2011) in a study that examined naming and categorization of a much larger array of objects by native speakers of English and Russian. The 60 pictures used in the study were divided into three lexical categories by English speakers (*cup*, *glass*, *mug*) and into ten categories by Russian speakers, suggesting that Russian makes finer distinctions in this domain. The analysis also showed that the naming patterns and typicality distributions for *cup/chashka* and *glass/stakan* did not correlate significantly and that the categories had some shared members but different prototypes. *Cup* in English was a broad category, encompassing containers with or without handles, made out of a variety of materials, and used for hot and cold drinks, as well as for measuring purposes. Prototypical *cups* were tapered containers without handles, made out of paper, styrofoam, plastic, metal or ceramic, and intended for cold drinks. In Russian, the category *chashka* [cup] was constrained by shape and centered on shorter porcelain or ceramic containers with handles intended for hot drinks (called *tea cup* or *coffee cup* in English). Similarly constrained – this time by material – was the English category *glass* which centered on tapered containers without handles, made of glass, which varied in height and in whether they had stems. The Russian *stakan* [glass], on the other hand, was a broad category, constrained only by shape, that included handleless containers without stems made out of a variety of materials and used for cold and hot drinks.

Malt and associates (Ameel et al., 2005; Malt et al., 1999, 2003) identified cross-linguistic variation in the naming of common containers in English, Spanish, Chinese, French, and Dutch. These studies provided further evidence that languages may differ in the level of abstraction at which distinctions are made, in the level of differentiation within the domain, in category prototypes, and in category boundaries and the naming of peripheral items. As a result, the set of things called *bottle* in English only partially overlaps with the sets called *botella* in Spanish, *bouteille* in French, *fles* in Dutch, and *ping* in Chinese. Malt and associates (1999) also found a dissociation between the naming of containers in English, Spanish, and Chinese (which varied greatly) and similarity judgments of the same containers: the overall similarity perceptions were

very similar across the three language groups. These results were replicated by Ameel and associates (2005) who found substantial differences in naming patterns of French and Dutch monolinguals and a high correlation between their similarity sorts. These findings showed that common nouns do not always refer to obvious groupings of objects with interrelated properties. As a result, perceptions of their similarity could also be affected by linguistic categories, as seen in the finding of small but statistically significant differences in perceptions of physical and functional similarity of containers by speakers of different languages (Malt et al., 1999).

Studies of language and cognition have traditionally treated artifact categories as less interesting than color categories because they refer to easily perceptible ‘cultural’ phenomena. Recent studies show, however, that naming patterns and category structures in this domain are as complex as those in other lexical domains: the names of artifacts are affected by historic, social, cultural, and linguistic factors, including globalization and histories of language contact, as well as by features and functions of particular entities, and, sometimes, simply by chance; as a result, some categories may have vague boundaries and unconventional peripheral members (Malt & Ameel, 2011; Malt et al., 1999, 2003). The learning of naming patterns then involves “something more than, or different from, learning prototypes of universally perceived groupings and the names associated with them” (Malt & Sloman, 2003: 48). Studies of L1 development show that acquisition of lexical categories for common containers is a time-consuming process which begins with an over-extension of a single category, such as *cup*, and only with time shifts to category features attended to by adults; English speakers fully acquire the categories *cup*, *mug*, and *glass* only by the age of 12 (Andersen, 1975) and speakers of Dutch acquire the naming pattern for dishes by the age of 10 and for bottles by the age of 14 (Ameel et al., 2008).

2.4.3 *Old wine in new – bigger? – bottles: bilinguals’ object categories*

To approximate these patterns of naming and categorization, L2 learners may have to develop sensitivity to new features, shift prototypes, adjust category boundaries, and, in some cases, acquire entirely new categories organized around distinct perceptual properties. Let us now compare the cognitive restructuring in bilinguals’ lexical and grammatical categories in terms of processes and outcomes.

L1 influence on L2 categorization and naming patterns. Cook and associates (2006) used a word-extension task to examine object/substance categorization in bilingual speakers and found that Japanese–English bilinguals displayed L1 Japanese-influenced material bias for categorization of simple objects and substances. For example, when extending a novel word, English speakers grouped

together a C-shape made out of Nivea and a C-shape made out of hair-gel (same shape), while bilinguals – just like monolingual Japanese speakers – grouped together a C-shape made out of Nivea and a pile of Nivea (same material). These effects, however, were mediated by the length of stay in the UK: long-stay bilinguals (3–8 yrs) displayed more attention to shape and less attention to material than the short-stay group (6 months – 3 yrs).

Graham and Belnap (1986) adopted Labov's (1973) approach to examine artifact categorization and presented their participants with ten sets of object drawings of common containers, furniture items, and shoes, which differed along a particular dimension. In cases where boundary differences in English did not correspond to those in Spanish (e.g., *chair*, *stool*, and *bench* vs *silla* [chair] and *banco* [bench]), L1 Spanish learners of L2 English followed the L1 naming patterns and did not make the distinctions in terms required by English.

Internalization of L2 categories. Other studies show that with time L2 users may internalize new categories and patterns of preference. Athanasopoulos (2006) asked monolingual English and Japanese speakers and two groups of Japanese–English bilinguals to judge similarities and differences between pictures created by Lucy (1992b). The analysis revealed that Japanese monolinguals and speakers with intermediate L2 proficiency were sensitive only to the change in the number of animals, treating changes in the number of implements and the number or amount of substances as less significant. In contrast, English monolinguals and speakers with advanced L2 proficiency regarded changes in the number of animals and implements as more significant than changes in the number or amount of substances. On the grammaticality judgment task, advanced L2 English speakers scored significantly higher than intermediate ones on supplying articles and plural *-s*, which suggested that their increased sensitivity to number is linked to internalization of grammatical number marking.

Athanasopoulos and Kasai (2008) modified the object categorization task by offering native speakers of English and Japanese and Japanese–English bilinguals shape and color alternates. They found that native speakers of English and advanced Japanese users of L2 English selected the shape alternate significantly more often than native speakers of Japanese and intermediate users of L2 English. The degree of shape preference correlated with participants' plural marking on a picture description task, revealing – similar to Athanasopoulos (2006) – a link between increase in linguistic competence in the number-marking domain and similarity judgments.

Malt and Sloman (2003) compared naming patterns of native speakers of English and three groups of L2 users of English on tasks involving common household containers familiar to all participants. Their findings showed that L2 users with the least amount of exposure to English differed significantly from

native speakers of English on both naming patterns and typicality judgments. The most experienced group showed numerical improvement over the other two groups, thus offering evidence of partial internalization of new linguistic categories and their prototypes. Yet even these L2 users, who had been in the US for 8 or more years and had 10 or more years of formal instruction in English, had not fully acquired native norms for what belongs, for instance, in the highly variable ‘dishes’ category, which includes among others a butter dish, soap dish, casserole dish, baking dish, serving dish, and petri dish. These results suggest that naming patterns are not necessarily easier to acquire than grammatical categories.

In-between performance and bidirectional influence. Studies that investigated bilinguals’ performance in both languages show that even partial internalization of new categories may lead to category restructuring that places bilinguals’ categorization and naming patterns between those of monolingual speakers. Evidence of such categorization pattern comes from a study by Athanasopoulos (2007) that investigated object and substance categorization with Japanese–English bilinguals. This study differed from that by Cook and associates (2006) in three areas: (a) inclusion of monolingual controls, (b) the choice of a non-word task, and (c) exclusion of complex objects. The results demonstrated that native speakers of English and Japanese favored shape in the simple object condition and material in the substance condition, but differed in the degree of preference. Bilingual participants displayed an in-between pattern in the simple object condition: their shape preferences were higher than those of monolingual Japanese speakers and lower than those of native speakers of English. In the substance condition, bilinguals’ choices patterned with those of native speakers of English.

In a study with household containers, Ameel and associates (2005, 2009) found convergence of Dutch and French naming patterns in simultaneous Dutch–French bilinguals, with more influence from Dutch on French (likely due to Dutch language dominance). The analysis of object naming and typicality ratings revealed that the convergence occurred both in category centers (more similar to each other than those of monolingual speakers) and category boundaries, resulting in less complex categories (Ameel et al., 2009; Malt & Ameel, 2011). To give but one example, objects named *fles* [bottle] by monolingual Dutch speakers were divided between the categories *bouteille* [larger bottle] and *flacon* [smaller bottle] in French. Bilinguals assigned most of these objects to the category *bouteille* and only a few to the category *flacon*, displaying a larger combined category. This category is reminiscent of the larger color categories found in bilingual speakers (Caskey-Sirmons & Hickerson, 1977; Jameson & Alvarado, 2003).

Co-existence of language-specific naming patterns. The converging pattern is not the only possible outcome. Barner and colleagues (2009) found that

the preferences of Mandarin–English bilinguals with advanced levels of L2 English varied depending on the language of the task: in L1 Mandarin they patterned with Mandarin monolinguals and extended novel words on the basis of material, while in L2 English they patterned with native speakers of English and extended novel words on the basis of shape. These findings suggest that bilinguals may be able to maintain different attention foci in their respective languages.

L2 influence on L1. L2 influence on L1 performance was documented in Pavlenko and Malt's (2011) study of Russian–English bilinguals' linguistic categorization of drinking containers. The researchers found that the correlation between bilinguals' naming patterns and those of native speakers of Russian varied as a function of the age of arrival in the L2 context. Early bilinguals diverged most from (relatively) monolingual Russian speakers: their category *chashka* [cup] expanded to include, in accordance with English usage, objects Russian speakers named *stakan* [glass], while the category *stakan* [glass] was narrowed down to incorporate constraint on material. Even late bilinguals displayed some deviations from L1 Russian naming patterns: the category *riumka* [shot glass], for instance, lost members to the larger categories *stakan* [glass] and *chashka* [cup] under the influence of L2 English.

L1 attrition. Bilinguals whose L2 becomes dominant may also experience deactivation of the L1 lexicon, often interpreted as L1 attrition. Such attrition has been documented in studies of word use in the context of elicited narratives. These studies are not included in Table 2.2 because they do not systematically examine naming patterns but they deserve to be mentioned because they offer intriguing insights into performance in context. Olshtain and Barzilay (1991) used Mayer's (1969) book to collect Frog story narratives from English–Hebrew bilinguals, all of them Americans who learned their L2 Hebrew as teenagers or adults and had spent between 8 and 25 years in Israel. Their L1 English performance was compared to that of monolingual speakers of English living in the US. The researchers found that there was high agreement among the monolinguals on the names for the animate and inanimate entities in the story: *jar*, *cliff*, *pond*, *gopher*, and *deer*. In contrast, bilinguals displayed word-finding difficulties and low levels of naming agreement in their L1 English, using circumlocution and semantically related alternatives (e.g., *bottle*, *bowl*, or *jug* for *jar*; *tag*, *antelope*, *elk*, or *little animal* for *deer*).

Similar findings come from Kaufman's (2001) study of Frog stories elicited from Hebrew–English bilingual children (ages 6–14) who were born or had spent between 2 and 10 years in the US. The children used a variety of substitutions when dealing with lexical gaps in L1 Hebrew. In the case of basic-level animate entities (e.g., *cvi* [deer], *yanshuf* [owl]), they resorted to superordinate categories (e.g., *xaya* [animal], *gdola* [bird]), circumlocutions or extended descriptions, requests for help and code-switches to L2 English (e.g.,

Table 2.2 *Bilinguals' object categories*

Studies	Languages	Participants	Tasks & stimuli	Findings
Graham & Belnap (1986)	L1 English L1 Spanish L2 English	173 participants: 133 English monolinguals 40 L1 Spanish L2 learners of English, with intermediate and advanced proficiency mean LoI = 3.85 yrs LoE less than a year	<i>Tasks:</i> forced-choice naming task in the L1 and L2 <i>Stimuli:</i> 10 sets of object pictures	L1 influence
Malt & Sloman (2003)	L1 English L1 Chinese L1 Spanish L1 Korean L1 Thai other L1s L2 English	148 participants: 80 English monolinguals 68 L2 users of English divided into 3 groups: (1) least experienced: n=22 LoI ≤ 8 yrs (mean = 6.1 yrs) LoE ≤ 5 yrs (mean = 2.3 yrs) (2) intermediate: n = 32 mean LoI = 10.5 yrs mean LoE = 4.5 yrs (3) most experienced: n = 14 LoI ≥ 10 yrs (mean = 12.8 yrs) LoE ≥ 8yrs (mean = 13.5 yrs)	<i>Tasks:</i> naming task in the L1 and the L2, familiarity judgment task, typicality judgment task <i>Stimuli:</i> 60 pictures of storage containers (bottles set), 60 pictures of housewares (dishes set)	Partial acquisition of L2 category prototypes and naming patterns
Ameel et al. (2005)	L1/L2 Dutch L1/L2 French	86 participants: 32 Dutch monolinguals 29 French monolinguals 25 simultaneous Dutch-French bilinguals	<i>Tasks:</i> naming task in L1 and L2, sorting task (by similarity) <i>Stimuli:</i> 73 pictures of storage containers (bottles set), 67 pictures of housewares (dishes set)	In-between performance or converging naming patterns

Table 2.2 (*cont.*)

Studies	Languages	Participantsa	Tasks & stimuli	Findings
Cook et al. (2006)	L1 Japanese L2 English	36 L1 Japanese L2 users of English (ages 22 – 42 yrs): short-stay group n = 18 LoE 0.5 – 2 yrs 11 mos long-stay group n = 18 LoE 3 – 8 yrs	<i>Tasks:</i> word-extension task (performed either in L1 or in L2) <i>Stimuli:</i> object triads with complex and simple objects and substances as pivots	L1 influence
Athanasopoulos (2006)	L1 English L1 Japanese L2 English	80 participants (ages 18–60 yrs): 14 English monolinguals 28 Japanese monolinguals 38 Japanese–English bilinguals: intermediate L2 proficiency, n = 17 AoA > 12 yrs, LoE 3–24 mos advanced L2 proficiency, n = 21 AoA > 12 yrs, LoE 3–24 mos	<i>Tasks:</i> picture similarity judgments <i>Stimuli:</i> 5 sets of pictures developed by Lucy (1992b)	Shift to L2–English pattern with rise in proficiency
Athanasopoulos (2007)	L1 English L1 Japanese L2 English	94 participants (ages 18–51 yrs): 25 English monolinguals 25 Japanese monolinguals 26 Japanese–English bilinguals LoE 3–24 mos (mean = 9 mos) 18 Japanese–English bilinguals LoE 3–24 mos (mean = 10 mos)	<i>Tasks:</i> non-word similarity judgment task (“Show me which is the same as this”) <i>Stimuli:</i> object triads with simple objects and substances as pivots	In-between performance, internalization of L2 categories

Athanasopoulos & Kasai (2008)	L1 English L1 Japanese L2 English	<p>96 participants (ages 18–43 yrs):</p> <p>16 English monolinguals</p> <p>16 Japanese monolinguals</p> <p>64 Japanese–English bilinguals:</p> <p>32 advanced L2 proficiency:</p> <p>(1) n = 16, residing in the UK LoE 3 – 20 mos (mean = 7 mos), tested in L2 English</p> <p>(2) n = 16, residing in Japan tested in L1 Japanese</p> <p>32 intermediate L2 proficiency:</p> <p>(1) n = 16, residing in the UK, LoE 3–24 mos (mean = 6 mos), tested in L2 English</p> <p>(2) n = 16, residing in Japan tested in L1 Japanese</p>	<p><i>Tasks:</i> non-word similarity judgment task, picture description task (in either L1 or L2)</p> <p><i>Stimuli:</i> picture triads with alternates differing in shape or color</p>	Internalization of L2 categories
Ameel et al. (2009)	L1/L2 Dutch L1/L2 French	<p>Study 1</p> <p>73 participants:</p> <p>28 Dutch monolinguals</p> <p>24 French monolinguals</p> <p>21 simultaneous Dutch–French bilinguals</p> <p>Studies 2–4</p> <p>86 participants, same as in Ameel et al. (2005)</p>	<p><i>Tasks:</i> naming task in L1 and L2, sorting task, typicality judgment task in both languages</p> <p><i>Stimuli:</i> 73 pictures of storage containers (bottles set), 67 pictures of housewares (dishes set)</p>	Convergence of category centers and boundaries
Barner et al. (2009)	L1 Mandarin L2 English	<p>80 participants:</p> <p>48 English monolinguals</p> <p>32 Mandarin–English bilinguals</p>	<p><i>Tasks:</i> word-extension task (16 bilinguals tested in L1 and 16 in L2)</p> <p><i>Stimuli:</i> object triads with simple objects as pivots</p>	language-appropriate performance

Table 2.2 (*cont.*)

Studies	Languages	Participants ^a	Tasks & stimuli	Findings
Pavlenko & Malt (2011)	L1 Russian L2 English	69 participants (ages 18–37 yrs): 20 English monolinguals 20 Russian monolinguals 29 Russian–English bilinguals: (1) 9 early bilinguals (mean AoAr = 3.4 yrs, range 1–6 yrs; mean LoR = 16.5 yrs, range 13–18.5 yrs) (2) 9 childhood bilinguals (mean AoAr = 11.7 yrs, range 8 – 15 yrs; mean LoR = 9 yrs, range 6 – 12 yrs) (3) 11 late bilinguals (mean AoAr = 22.8 yrs, range 19 – 27 yrs; mean LoR = 5.2 yrs, range 0.5 – 15 yrs)	<i>Tasks:</i> open-ended naming task in L1, confidence judgment, familiarity judgment, typicality judgment with regard to the categories chashka [cup], stakan [glass], kruzhka [mug] <i>Stimuli:</i> 60 pictures of common drinking containers, named in English as cup, glass, or mug	L2 influence on L1, L1 attrition, incomplete L1 acquisition

deer, owl). In the case of basic-level inanimate entities (e.g., *cincenet* [jar]), they used basic-level approximations (e.g., *bakbuk* [bottle], *kufsa* [box], *keara* [bowl]) or superordinate terms (e.g., *kli* [container]).

While these two studies illuminate attrition – or deactivation – of lexical items proper, they are less informative with regard to the nature of linguistic categories in the bilingual mind. The speakers may be well aware that the approximations they use are not a particularly good fit for the referents in question. Furthermore, while the findings of Olshtain and Barzilay (1991) are commonly interpreted as lexical attrition, the results of Kaufman's (2001) study – similar to Andrews' (1994) and Pavlenko's (2012a) studies of color categories of Russian–English bilinguals – may be alternatively interpreted as incomplete acquisition of the words in question.

Factors affecting cognitive restructuring in the object domain. The studies to date identify two main predictors of L2 influence on L1 object and substance categorization patterns: age of arrival in the L2 environment (Pavlenko & Malt, 2011) and L2 proficiency and linguistic competence in the domain of number marking (Athanasopoulos, 2007; Athanasopoulos & Kasai, 2008). Barner and associates (2009) also found that participants' patterns of preference are influenced by the language of the task.

The factors affecting L2 categorization patterns include the AoA (Malt & Sloman, 2003), the LoE (Cook et al., 2006) and the L2 proficiency (Athanasopoulos, 2006; Athanasopoulos & Kasai, 2008; Graham & Belnap, 1986; Malt & Sloman, 2003). Malt and Sloman (2003) also found that the AoA had no predictive value for matching L2 naming patterns once the effects of years of immersion and years of formal instruction were removed. Years of formal instruction also did not have predictive value once the effect of years of immersion was removed. Athanasopoulos and Kasai (2008) found that, given advanced levels of proficiency, two years of L2 immersion or exposure may be sufficient for L1 Japanese speakers to adapt to L2 English categorization patterns. These results suggest that the no-difference results obtained by Mazuka and Friedman (2000), Kuo and Sera (2009), and Iwasaki and associates (2010) may be due to the bilingualism of their participants. Lastly, the comparison of findings across lexical (artifacts) and grammatical (number marking) categories shows that these categories may perform similar functions (i.e., draw attention to relevant contrasts) and display similar restructuring effects.

Once again, however, it appears that the studies to date have not yet asked the really interesting questions regarding the count/mass distinction. Recent cross-linguistic studies show that some Native American languages, such as Blackfoot (Algonquian) or Halkomelem (Salish), do not grammaticalize count and mass, while in other languages the encoding and meaning of count and mass may be more complex than the traditional Indo-European dichotomy: in Dagaare (Niger-Congo), for instance, the distinction appears to be scalar,

rather than binary, while Niuean and Ojibwe pluralize nouns corresponding to English mass nouns (e.g., *mikomiig* [ices, i.e., pieces of ice], Ojibwe) (Massam, 2012). These findings raise new questions for research on the count/mass distinction: what happens when speakers of a noun-class language like English learn Blackfoot or Ojibwe? Do entities previously categorized as ‘count’ or ‘mass’ become more similar to each other as a result of the reorganization of the grammatical system?

2.5 Language effects in categorical perception: color, cups, and cattle

For more than a century now, many Western scholars have made three assumptions about color lexicons. First, they assumed that ‘color’ was a ‘natural’ category that resided in the material world and had a high perceptual salience. Second, they agreed that color lexicons evolve from the two words used by ‘primitive’ tribes to that pinnacle of complexity, the English eleven-term system (or could it be the Russian twelve-term system?). Third, they assumed that color lexicons offer a privileged window into the relationship between language and cognition. More recently, they also concurred that in the search for ‘Whorfian effects’ the relationship between language and cognition can be meaningfully elucidated by looking at the effects of high-frequency adjectives, such as *blue* and *green*, or *sinij* [dark blue] and *goluboj* [light blue].

The studies discussed here suggest that all four assumptions may be wrong and that to understand the organization of the ‘kaleidoscopic flux of impressions’ we need to extricate ourselves from these terms of engagement. To begin with, the treatment of ‘color’ as a ‘natural’ category by speakers of ‘color’ languages – including academics – is, arguably, the most prominent Whorfian effect to date. The *naturalization* of ‘color’ obscures the fact that this category is an abstraction and that to assign it to material entities we need to inhibit other features, such as pattern, texture, or freshness, to focus on hue, brightness, and saturation (and sometimes just on hue), and to make broad generalizations across distinct entities, such as jade and emeralds, grass and snakes, apples and peas (all *green*). The salience of ‘color’ and of individual color categories is in the eye/mind of the beholder, with changes in linguistic input affecting sensitivity to particular categories, boundaries, and foci – and to the category itself.

The artificial Western lens has also distorted our understanding of the evolution of the linguistic category of ‘color’. With visual descriptors as the point of departure, we see a different evolution trajectory, from more elaborate, complex and locally contingent systems to a simpler, more abstract category (e.g., Levinson, 2001; Lyons, 1995, 1999). This trajectory fits well with the emerging consensus that the highest linguistic complexity is found not in languages of

technologically advanced societies but in languages spoken by small groups of hunter-gatherers in remote areas (Deutscher, 2005; McWhorter, 2001; Perkins, 1992). Nor is there a simple correlation between color terms and color practices: while our ancestors steadily expanded their visual repertoire from red ochre to other types of pigments, in ancient Egypt, for instance, an expansion in available pigments did not motivate the development of new color terms, likely because painting was a highly specialized domain, where the knowledge of pigments was jealously guarded by artists and craftsmen (Baines, 2007).

If, however, we treat ‘color’ as an abstract linguistic category it ceases to be a privileged window into human cognition and becomes one of many lexical domains, small and large, specialized and generic, that reflect language-specific distinctions, akin to drinking containers or the proverbial Eskimo words for snow.² Now, surely I do not mean to say that the studies with cups and glasses are comparable to research on color and also ‘prove’ or ‘disprove’ some version of linguistic relativity? Yes and no. Yes, in the sense that the mechanisms that increase perceptual salience of color category boundaries are the same mechanisms that increase the salience of material constraints in the category *glass*. And no, in the sense that neither cups nor color studies reveal ‘language effects on cognition’. What they do provide us with is the insights into the nature of ‘language effects’.

Let us take as an example systems of visual descriptions that favor patterns. Children of Tuvan nomads, for instance, learn words for colors not as abstract labels but as concrete categories that subsume both color and pattern of specific types of animals, such as yaks or horses (e.g., ‘forehead spot brown stripe’) (Harrison, 2010). To examine the effects of one such system, Davidoff and associates (2008) presented pictures of cattle to English-speaking undergraduates and to speakers of Himba, semi-nomadic animal herders who use a rich system of cattle pattern descriptors. The researchers found that the Himba perceived animals from different categories as more distinct from each other and interpreted these effects as support for the ‘Whorfian view’ (Goldstein & Davidoff, 2008). But are these ‘language effects’ or the effects of practice mediated by language?

The studies discussed in this chapter suggest that lexical categorization systems shape ‘language effects’ only in the context of practice where such distinctions are obligatory: Afghan miners, for instance, use three terms for ‘blue’ to make categorical distinctions between three types of lapis lazuli, in contrast, Ukrainian speakers – who also have three terms for ‘blue’ – use both *golubyj* and *blakytnyj* to refer to ‘light blue’, because their communicative practices require

² For an up-to-date discussion of studies of snow and ice terminology in Arctic languages that vindicate Whorf’s account see Harrison (2010); for a study of Yupik classification of weather phenomena, see Oozeva et al. (2004).

only a two-way distinction (Pavlenko, 2012a). In turn, L1 English speakers learning L2 Russian in the FL classroom, where words are used in the absence of their referents, fail to acquire the distinction between *sinij* and *goluboj*; it is also lost on Russian children raised in the English-speaking environment where all material referents in this range are categorized as ‘blue’ (Andrews, 1994; Pavlenko, 2012a). In contrast, Russian-speaking immigrant artists, such as Chagall or Kandinsky, differentiate between many shades of blue, even when the shift from Russian to languages, such as French or German, that encode a single basic term for ‘blue’ (for an example of Chagall’s use of *sinij* see the poem opening Chapter 7).

These distinct outcomes suggest that categorical perception of colors, cups, and cattle – and, for that matter, snow and ice – is shaped by our engagement with the material world, with lexical categories serving as a means of focusing selective attention on the relevant distinctions. In the context of high naming agreement, repeated use of lexical categories, *in the presence of their referents*, results in distributed multi-modal representations shared by members of the group. Later on, similar referents trigger these representations, as well as perceptual inferences that go beyond perceived stimuli (Barsalou, 2008). What we see as *language effects*, then, are stabilized patterns of selective attention and co-activation of linguistic forms and their multi-modal representations, acquired in interactions with the material world. This argument finds support in studies of FL learning, where words are activated in the absence of their referents: classroom FL learners follow L1 categorization patterns because these are the only co-activation patterns they have available. As a result, American learners of L2 Russian, for instance, do not distinguish between *sinij* and *goluboj* in a spontaneous and consistent manner characteristic of L1 Russian speakers, because the two referents trigger a single category, *blue*.

Now, to say that categorical perception of colors, cups, and cattle is driven by practice is not to say that systems of visual description do not offer us an opportunity to examine language effects on perception. Rather, we have not yet asked the truly interesting questions about what it means not to encode an abstract category of ‘color’ or to acquire it later in life. What features of the environment are salient to speakers of languages that do not encode the category of ‘color’, such as Kalam, Warlpiri, or Yéli Dnye? What happens when they internalize this category? Does it make hues more salient? Does it make distinct entities appear more similar, just because they can be described as *red* or *brown*? Schaller’s ([1991] 2012) case study of Ildefonso offers us a glimpse into the world that becomes reorganized around the concept of ‘color’:

One morning I thought of colors as an introduction to descriptive words. I lined up different books and signed, “Book blue, book red, book orange, book brown, table brown, wall orange.” Ildefonso looked confused when he saw two names for one item. I used

the crayons, pointed to clothing and pictures and as many different things of the same color as possible. This red, that red, that red, I repeated, until the redness became separate from what was red. After seeing colors used with many unrelated objects about eight different times, he understood. We both regained some of the enthusiasm of the previous week. Ildefonso double checked, “Book blue, table brown?” (pp. 63–64)

We can see that it was the teacher’s repeated use of color words in the presence of their referents that triggered the general pattern recognition mechanism and allowed Ildefonso to deduce the feature common to the items in question. The internalization of the ‘color’ category allowed Ildefonso to make new generalizations (about similarly colored entities), to ask new questions (about the shades of human skin and their implications), and to give new meaning to his own memories, which linked the color ‘green’ to uniforms of border patrol units on the lookout for illegal immigrants (Schaller, [1991] 2012).

Notably, Ildefonso required exposure to just a few exemplars to internalize a category that abstracts hue as a defining feature, but what about systems that require us to pay simultaneous attention to multiple features? Can English speakers become native-like in automatically using descriptors that fuse hue and texture or luminance and distance? How might differences in grammatical encoding affect our perception of colors – what are the effects of encoding colors as verbs or as suffixes that mark colors of objects located in the distance? And how do concrete categories, such as blood-blood or grass-grass, transform into abstract categories, such as ‘color’? To examine how humans make a transition from concrete to abstract categories and how speakers of different languages impose these abstract categories on ‘a kaleidoscopic flux of impressions’ I will now turn to the discussion of number, time, and space.

3 Multidimensional worlds: Number, time, and space as linguistic systems of symbolic relationships

Numbers were a mystery to me. I was so far behind. It was only in Nairobi, at age ten, that I figured out anything at all about the way time is calculated: minutes, hours, years. In Saudi Arabia the calendar had been Islamic, based on lunar months; Ethiopia maintained an ancient solar calendar. The year was written 1399 in Saudi Arabia, 1972 in Ethiopia, and 1980 in Kenya and everywhere else. In Ethiopia we even had a different clock: sunrise was called one o'clock and noon was called six. (Even within Kenya, people used two systems for telling time, the British and the Swahili). The months, the days – everything was conceived differently. Only in Juja Road Primary School did I begin to figure out what people meant when they referred to precise dates and times.

Ali, 2007: 63

Born in Somalia, Ayaan Hirsi Ali (2007) grew up with a grandmother who “never learned to tell time at all. All her life, noon was when shadows were short, and your age was measured by rainy seasons. She got by perfectly well with her system” (p. 63). Ali’s (2007) poignant memoir *Infidel: My Life* traces the transformation of a girl from Mogadishu into a member of the Dutch Parliament, a writer, a political activist, and a spokesperson for the rights of women against militant Islam. Her transition from the world of shadows and rainy seasons to the world we live in, where every second is measured and imbued with significance, is only a small part of the overall account but I find it very touching. It reminds me of my own significantly less dramatic yet still destabilizing transition from the metric system and the Celsius scale to the ever-confusing inches, miles, pounds, gallons, and degrees in Fahrenheit. Today, I know exactly how many pounds I need to lose but I still don’t automatically convert miles into mental distances nor do I use the weather forecast to decide if I should put my coat on to go out. Instead of letting Fahrenheit degrees speak to me, I still look out the window.

Ali’s (2007) discussion of numbers and time raises profoundly Whorfian questions. Are these concepts innate and universal or do they differ across cultures? If they are not innate, as Ali’s (2007) own experience seems to suggest, how did we orient ourselves in the world without time and numbers? How did

we come to encode them? That is, how did we move beyond encoding common sets of perceivable properties, such as shape, texture, or hue, and use language to create complex systems of symbolic, abstract, and at times arbitrary, relationships, such as cardinality, equivalence, serial order, place value, cyclicity, or hierarchy? And how do we make a transition from one symbolic system to another?

Cognitive archeologists Renfrew and Morley (2010) argue that “to measure – whether in the dimensionality of weight, or of distance or of time – is to develop a new kind of material engagement with the world that is at once practical and conceptual” (p. 1) because it transcends the limitations of the here and now and makes possible astronomy and cosmology, architecture and design, mathematics and science, setting the foundation for all urban civilization. To understand the emergence of linguistic systems of symbolic relationships and their implications for cognition in monolingual and bilingual speakers, I will consider evidence from studies of ancient and living languages, both sign and spoken, conducted by archeologists and classical historians, linguists and anthropologists, cognitive psychologists and neuroscientists. Since these fields display little methodological unity, I have decided against a separate section on methodology. Instead, I will discuss research design in conjunction with specific studies. I will begin each section with a brief overview of what we know about the emergence of the category in question and cross-linguistic variation in its encoding. Next I will discuss the implications of this variation for cognition, and then I will examine what we know about numerical, temporal, and spatial cognition in bi- and multilingual speakers.

3.1 Numbers

3.1.1 *What’s in a number? One-two-many versus one thousand thirty-two*

So, how do we orient ourselves in the world without the concept of number? Fans of Jean Auel’s (1980) charming saga of Ayla, a Cro-Magnon girl adopted by the Clan of the Cave Bear, may remember her imaginative description of the Clan:

Numbers were a difficult abstraction for people of the Clan to comprehend. Most could not think beyond three: you, me, and another. It was not a matter of intelligence; for example, Brun knew immediately when one of the twenty-two members of his clan was missing. He had only to think of each individual, and he could do it quickly without being conscious of it. (p. 126)

In December of 1977, when Auel was still working on her book and trying to imagine the world without numbers, Daniel Everett, a linguist and a missionary with the Summer Institute of Linguistics, landed in the middle of the

Amazon rainforest and encountered such a world face-to-face. The purpose of Everett's visit was to spend some time with a monolingual hunter-gatherer tribe called Pirahã (pee-da-HAN), to learn more about their language and to convert them to Christianity. Contrary to initial expectations, the intended short visit turned into three decades of living, on and off, with the Pirahã (for a first-hand account see Everett, 2008). This prolonged sojourn did not create any new converts – instead, it challenged Everett's own faith, just as the rules of Pirahã described by Everett challenged the very foundation of contemporary theoretical linguistics, Chomsky's theory of Universal Grammar (see e.g., Everett, 2005 and responses in the same issue; Everett, 2009, 2012; Nevins et al., 2009).

Among the unique properties of Pirahã uncovered by Everett (2005) is the lack of the concept of number. The few existing Pirahã 'number' words display referential indeterminacy and variability in usage: *hói* [small size or amount] may refer to quantities from 1 to 6, *hoí* [somewhat larger size or amount] may refer to 2 and also to quantities between 3 and 10, and *baagi* or *baágiso* [many/cause to come together] to quantities between 4 and 10 (Everett, 2005; Frank et al., 2008; Gordon, 2004, 2010). Outside of this one-two-many distinction, the Pirahã do not appear to possess any other quantification words, grammatical number marking, nor the very concept of counting. The lack of cardinal and ordinal numbers does not affect the Pirahãs' ability to order things (e.g., what to do first, who arrived in what order, what is the order of villages on the Maici river) but it severely affects their ability to barter with Portuguese-speaking traders. Yet after eight months of classes where Everett and his wife attempted to teach the concept of numeracy through Portuguese number words, no adult in the class had learned to add or even to count to ten (Everett, 2005, 2008, 2012; Everett & Madora, 2012).

Everett's discovery led scholars to re-examine their understanding of number. Empirical studies show that preverbal infants and many animal species share the ability to approximately discriminate large quantities and distinguish at a glance between one, two, and three objects (*subitizing*) (Carey, 2004; Dehaene, 2011; Feigenson et al., 2004; Wiese, 2003, 2007). Some scholars, most notably Butterworth and associates (Butterworth, 2000; Gelman & Butterworth, 2005), view these findings as evidence that number is an innate category with a neural basis independent of language (*number module*) but acknowledge that in order to categorize more than four or five entities we need conceptual tools provided by our cultures. Others, most prominently Dehaene (2011), make an explicit distinction between language-independent *number sense*, i.e., the ability to approximately discriminate large numerosities and to accurately code sets with up to three entities, and the language-mediated concept of *exact number*, which enables us to count exact quantities beyond three or four and to expand

the counting procedure from tangible objects into an abstract domain (Carey, 2004; Spelke & Tsivkin, 2001; Wiese, 2007).

The differentiated position is supported by linguistic evidence that reveals more than a hundred languages, clustered predominantly in Australia and South America, that do not encode numbers beyond 2, 3, or 4 (Epps et al., 2012). Studies of languages with expanded numeral systems also reveal traces of earlier systems, preserved in distinctions between singular, dual, and plural, or between the first three or four numbers and the rest (Avelino, 2006; Donohue, 2008; Epps, 2006; Epps et al., 2012). In Russian, for instance, cardinal numerals 1 through 4 have archaic declension shapes and distinct collocations: in references to age, they are followed by nouns *god* [year] and *goda* [years], while 5 and up are followed by *let* [summers]. This differential treatment can be traced all the way to Proto-Indo-European, where 1–4 behaved like adjectives in terms of declension and gender marking, and the rest of the cardinal numerals were indeclinable (Fortson, 2010). Historical reconstructions also suggest that the meaning of the Proto-Indo-European term **tri-* or **tréies* [three] may have included piles, heaps, crowds, and other forms of plurality, as seen in later derivatives, such as *throng* or *troupe* (Ifrah, 2000).

So, how did we move beyond the limits of ‘three’ or ‘four’? Was there, as Butterworth (2000) ironically quips, “one ancient Einstein who invented numbers” (p. 3)? In Auel’s (1980) book, Creb, the powerful magician of the Clan, teaches young Ayla how to count using fingers and slash marks. This depiction of counting as an embodied and mediated practice is consistent with archeological evidence which shows that 30,000 years ago our Cro-Magnon ancestors used external counters, such as pebbles, notches carved on sticks and bones, and paintings of fingers and dots, to perform basic counting tasks of tallying and matching (Dehaene, 2011; Hayden & Villeneuve, 2011; Ifrah, 2000; Schmandt-Besserat, 1992; Wiese, 2003).

Grounded in the understanding of analogy and equivalence, these counters functioned as semiotic means of symbolic mediation, enabling one-to-one mapping and iconic representations of cardinality and serial order and eliminating the need for ‘an invention’. The most important and easily accessible counters were our own bodies and some indigenous communities still rely on body-based counting systems (Donohue, 2008; Epps, 2006; Evans, 2009, 2010; Ifrah, 2000; Lancy, 1983; Saxe, 1981; Wassmann & Dasen, 1994; Wiese, 2003). The adoption of body part names as numerals and the reliance on bases 5 or 10, which reflect finger-counting, base 6, which involves fingers and wrists, and base 8, which involves knuckles of closed fists, suggest that the uses of body-based systems may have preceded the emergence of number words beyond ‘three’ or ‘four’ (Avelino, 2006; Lancy, 1983; Saxe, 1981; Wassmann & Dasen, 1994; Wiese, 2003).

As in the case of ‘color’, the meanings of the early ‘number words’ may have been vague, approximate, context-specific, and variable, as seen in the early Mesopotamian ‘numerical tablets’ (Brown, 2010), in languages with restricted number encoding, where in order to pick the proper form you need to consider whether the entities in question are male or female, numerous or scarce (Harrison, 2010: 171–174; Donohue, 2008; Epps et al., 2012), and in supplementary counting systems, restricted to particular social situations or entities: in Tongan, for instance, *teau* may refer to 100 ordinary things, 200 pieces of sugar cane thatch, or 2,000 yams, fish or coconuts (Bender & Beller, 2006, 2007, 2011; Beller & Bender, 2008). The need for more elaborate counting systems increased during the transition from a hunter-gatherer lifestyle to agriculture. The study of 193 languages of contemporary hunter-gatherers by Epps and associates (2012) suggests that there is a meaningful correlation between numerical complexity and subsistence. At the same time, languages of some hunter-gatherers encode elaborate numeral systems, while languages of some agricultural communities do not. The presence of agriculture per se is not a sufficient condition for numerical complexity – other related factors involve mobility and the extent of trading and exchange (Epps et al., 2012).

Historical reconstructions suggest that by 5000–4500 BC both Proto-Austronesian and Proto-Indo-European encoded standardized decimal number systems (Bender & Beller, 2006; Fortson, 2010). The invention of writing around 3500 BC allows us to examine the development of number more closely. Schmandt-Besserat (1992, 2010) traces the emergence of abstract number from the *one-to-one correspondence* between concrete number-symbols, such as clay tokens, and concrete entities, such as jars of oil, to *symbolic equivalence* or *indexicality*, where two-dimensional markings on clay envelopes come to represent the tokens stored inside, to *iconicity* of pictographic images of tokens on tablets dated to 3200 BC which separated the concept of number from that of the item counted. An alternative interpretation is offered by Brown (2010), who argues that the move from the one-to-one correspondence to symbolic equivalence reflected a local change in administrative practice rather than the state of numerical cognition. In his view, what we see throughout the 3rd millennium BC is the application of the arithmetic developed for counting humans, animals, and containers to a variety of other areas.

Together, archeological, historic, and linguistic studies suggest that the expansion of market economy, trade, and construction required tighter control of exchanges of goods, collection of taxes, and distribution of resources, and more exact measurements, leading to dissociation between number words and concrete referents, emergence of an abstract ‘number’ category that could function as a multi-purpose tool for cardinal, ordinal and nominal assignments, the development of generative number systems, standardization of number references, and invention of counting technologies, such as the counting board or

the abacus. Arising in individual communities, these innovations then spread through linguistic and cultural diffusion, seen in the adoption of the Chinese numeral system in Japanese and Korean or contact-induced borrowing and restructuring in Amazonian languages (Epps, 2006).

3.1.2 *Born to count? Language and numerical cognition*

The increased pace of cultural diffusion in the globalized world suggests that we have a limited window of opportunity to study numerical cognition of speakers of anumeric languages and languages with restricted numerical systems. This research could help us decide whether we are indeed born to count, as suggested by Butterworth (2000), or whether we have to rely on symbolic mediation to proceed beyond the number sense, as argued by Dehaene (2011).

To address this issue directly, Gordon (2004) conducted a study with Pirahã speakers, presenting them with arrays of objects (e.g., AA batteries, nuts, spools) and asking them to place the same number of different objects (e.g., balloons) in a matching line, in a cluster, or orthogonally to the display. In some conditions, participants were required to remember the number of objects which were subsequently hidden in a can or behind an opaque folder. The results revealed that Pirahã speakers produced systematically more errors as the quantities increased, suggesting that the lack of number category constrained their ability to remember and match exact quantities when set sizes exceeded three items (Gordon, 2004, 2010).

The initial publications by Gordon (2004) and Everett (2005) unleashed a flurry of debate, similar to and perhaps even more intense than that following the publication of Berlin and Kay's (1969) and Lucy's (1992b) work. Opponents argued that the limited encoding of number should not affect numerical cognition and the limitations of Pirahã numerical cognition should be attributed to cultural origins (Gelman & Butterworth, 2005; Pinker, 2007). Butterworth and associates (2008, 2011) then tested numerical cognition in 4–7-year-old speakers of two Australian languages with limited number encoding, Warlpiri and Anindilyakwa. Warlpiri has three generic types of number words, singular, dual plural, and greater than dual plural, and Anindilyakwa has singular, dual, trial, and plural (more than three) and a base-5 number system reserved for cultural enumeration events. The researchers compared the performance of Aboriginal children and their urban English-speaking peers on four tasks: memory for number of counters, cross-modal matching (similar to that in Gordon, 2004), non-verbal addition, and sharing play-dough disks that could be partitioned by the child. The analyses revealed a similarly high level of performance across the three groups, leading the researchers to argue that the concept of exact number was available to all children, regardless of their language.

Dehaene (2009a) noted that these conclusions may have been too hasty because the data from indigenous children indicated approximate performance, with a sharp drop for numbers above three. Not surprisingly, the follow-up analysis by Butterworth and associates (2011) revealed a strategy difference between English-speaking and indigenous children. In the addition task, where the children were required to place the same amount of tokens on their mat as there was on the interviewer's mat, English-speaking children relied on the enumeration strategy (counting tokens out loud) and indigenous children on a spatial pattern-recognition strategy.

The researchers also did not take into consideration the bilingualism of their participants. They acknowledged that from the age of five, indigenous children are schooled in English and mentioned that both languages have English loan words, used as number names for 1 through 20. Yet they did not test the children's English proficiency nor their knowledge of loan words. Instead, they stated in the supporting materials on the web that not all of the children attended English-language schools and even fewer went regularly. As to the loan words, they simply said that the "children do not know them" (Butterworth et al., 2008: 13179) and supported this argument with references to ethnographic studies conducted three decades earlier.

Other studies provided additional evidence that speakers of anumeric languages perform differently from speakers of languages with elaborated numerical systems. Frank and associates (2008) replicated Gordon's (2004) findings on tasks with additional cognitive demands (e.g., orthogonal matching of the objects) but found better performance on a simple one-to-one matching task that did not require recall or transposition. Their matching tasks were, in turn, adopted by Caleb Everett and Keren Madora (2012), Everett's son and former wife, who had lived with him among the Pirahã and also spoke the language. The results of their study, conducted in Pirahã, revealed that on all matching tasks, including one-to-one matching, the proportion of correct responses dropped significantly for numbers exceeding three. The researchers also documented poor performance on the similarity judgment task, where participants had to compare a line of balloons and a line of spools that differed either in length (but not in number) or in number (but not in length). These findings suggested that in tasks involving quantities beyond three the Pirahã employ analog strategies. The discrepancy between their own (and Gordon's) findings and those of Frank and associates (2008) were explained by the fact that the latter study was conducted in the village with the greatest history of contact with outsiders and one where Keren Madora had previously offered number training that combined matching tasks and novel number words, based on Pirahã.

Similar findings come from studies by Dehaene and associates (2008; Izard et al., 2008; Pica et al., 2004), who examined another Amazonian language, Mundurucú, that has five terms for small approximate numbers and, similar to

Pirahã, lacks a counting routine and a singular/plural distinction. The researchers found that speakers of Mundurucú performed far above chance and, in some cases, similar to French controls on tasks that required approximate comparisons of large numbers presented by dots. In contrast, on tasks that required manipulation of exact numbers (e.g., $6 - 4$ is (a) 0, (b) 1, (c) 2 objects left), their performance decreased with the increase in the size of initial number (for discussion, see also Dehaene, 2011).

To disentangle the influences of language and culture, Spaepen and associates (2011) examined number representation in four deaf adults who live and work in a numerate culture (Nicaragua) but – like Ildefonso – rely on home-made gestures (home signs), because they did not have access to conventional sign language. The tasks included identification and comparison of bills and coins, reporting of the number of objects in a box (using fingers), object matching, and retelling of short animated stories (where numbers were critical to the plot) to a relative or friend familiar with the homesigner's language. The participants displayed 100 percent accuracy with target sets of up to three objects; three of them also performed with greater than chance accuracy on monetary tasks. On sets that included more than three objects they performed similarly to the Pirahã (for direct comparison, see Everett, 2013) and significantly worse than unschooled hearing and signing deaf control participants. Furthermore, despite the fact that they use fingers to communicate about number, they did not consistently produce gestures that accurately represented cardinal values of sets with more than three items. These findings led the authors to conclude that, in the absence of conventional number language, the integration into a numerate society is not sufficient for spontaneous development of large exact numerosities.

The interpretation of these results divides the scholarly community: some see them as Whorfian (e.g., Gordon, 2004, 2010) and others, echoing Pinker's version of the SWH, state that they “do not provide support for the Whorfian view that language determines thought” (Dehaene, 2011: 263) or that “concepts of exact number are impossible without counting words” (Butterworth et al., 2011: 631) (it is not clear, however, what such a concept would look like without words). Dehaene (2011: 264) also makes a very Whorfian point when he states that even adults integrated into Western societies – like the deaf Nicaraguans – may be unable to grasp the number concept and perform exact calculations when deprived of a symbolic counting system.

3.1.3 *The effects of number encoding: ten-one versus eleven*

Today, most languages known to linguists encode an abstract concept of exact number, with a base of 10 or 20; a few have more unusual bases, such as base 6 in New Guinean languages Kanum and Nen, or base 8 in Northern

Pame in Mesoamerica (Avelino, 2006; Donohue, 2008; Epps et al., 2012; Evans, 2009).¹ English is a base 10 language, where 21 could be expressed as ‘two tens and one’. Yet even languages with a common decimal base display cross-linguistic variation in number names and structure. Breton, Danish, French, and Welsh retain the remnants of the base 20 system seen in French encoding of 80 as *quatre-vingts* (four-twenty), while German uses inverse digit order, e.g., *siebenhundert vierundfünfzig* (seven hundred four and fifty). The most transparent reflection of the decimal structure is found in Asian languages with roots in ancient Chinese, such as Mandarin, Japanese, and Korean. Their number names are fully congruent with the base 10 numeration system. When their speakers learn numeracy, all they have to learn are the digits from 0 to 9 and the notion of place value; then they can generate numbers without any further memorization (e.g., 11 is encoded as *eleven* in English but as ‘ten-one’ in Chinese, Korean, and Japanese) (for a detailed discussion, see Miller & Zhu, 1991). In contrast, children learning English or French have to learn by rote not just the numerals from 0 to 10, but also those from 11 to 19, and the tens numbers from 20 to 90 (Miura et al., 1993).

Miura and associates (Miura, 1987; Miura et al., 1988, 1993; Miura & Okamoto, 1989) examined the implications of these differences by asking English-, French-, Swedish-, Chinese-, Japanese-, and Korean-speaking first graders to construct various numbers with two types of rods, short ones that represented one unit, and longer ones that represented ten units. They found that Chinese, Japanese, and Korean children preferred a combination of ten-unit and one-unit rods (which suggested understanding of place value), while speakers of English, French, and Swedish viewed number as a grouping of counted objects and preferred to use one-unit rods. This developmental delay was linked to cross-linguistic differences in number encoding.

Similar results were obtained by Miller and associates (Miller & Stigler, 1987; Miller et al., 1995; Miller et al., 2000), who found that between the ages of four and six, Chinese-speaking children outperform English-speaking children on abstract counting and on counting sets of objects varying in size and arrangement. The ‘teens’ create a particular stumbling block for English-speaking children: they are more likely to skip numbers and produce non-standard numbers such as *forty-twelve*. The difficulties displayed with cardinal numbers also extended to ordinal numbers, another area where Chinese-speaking children face a much simpler inductive task (Miller et al., 2000). Geary and associates (1996) found that linguistic advantage persists

¹ Readers interested in numeral systems are encouraged to consult Mark Rosenfelder’s website, which offers information on numbers in more than 5,000 languages at www.zompist.com/numbers.shtml.

into early schooling: Chinese-speaking first-, second- and third-graders were shown to use decomposition strategies earlier than English-speaking children.

Shorter digit word length and shorter articulation time may also provide speakers with advantages on the digit span memory task (with *digit span* operationalized as the length of the last correctly recalled number sequence). In English–Welsh comparisons, the shorter length of English number words was linked to superior performance of English-speaking children in terms of speed and accuracy of mental calculations (Ellis, 1992) and to superior memory for digits (Ellis & Hennelly, 1980). A similar advantage is conferred by the short number words of Chinese, whose speakers remember more digits than speakers of English, Finnish, Greek, Spanish, and Swedish (Chincotta & Underwood, 1997; Stigler et al., 1986). The longer digit length of English was linked to longer reliance on finger-counting among English-speaking elementary school children as compared to their Chinese peers (Geary et al., 1996). Together, these findings led Dehaene (2011) to conclude that “Western numeration systems are inferior to Asian languages in many respects – they are harder to keep in short-term memory, slow down calculation, and make the acquisition of counting and of base ten more difficult” (p. 92).

Some scholars argue that the impact of number encoding on number processing constitutes a ‘Whorfian effect’ (e.g., Brysbaert et al., 1998; Ellis, 1992). Others link it to verbal processing and show that it can be eliminated by the *articulatory suppression task* that requires participants to repeat random sounds in order to disrupt the phonological loop rehearsal in working memory (Chincotta & Hoosain, 1995; Chincotta & Underwood, 1997; Ellis, 1992). This disruption reminds us that number is a system rooted in language and that the view of mental calculation tasks as ‘language-free’ may in itself represent a Whorfian effect. As to encoding effects, even if they are far removed from Whorf’s habitual thought, they are interesting from the point of view of bilingualism because they suggest that some languages may be more advantageous than others for the processing of numbers.

3.1.4 Raz, dva, tri, *I mean*, one, two, three: *number processing and representation in bilinguals*

So, what languages do bilinguals count in? Given that research on bilingualism and number processing spans more than a century (for an early example see Epstein, 1915), a comprehensive review of this research is all but impossible. Earlier studies have been reviewed in Noël and Fias (1998), consequently, Table 3.1 and the overview below favor more recent work and include only the key studies from the period before 1998.

Table 3.1 *Bilinguals' number processing*

Studies	Languages	Participants	Tasks & stimuli	Findings
Marsh & Maki (1976)	L1/L2 English L1/L2 Spanish	40 participants (adults): 20 English monolinguals 10 English-Spanish bilinguals (FL teachers), LoE > 1 yr 10 Spanish-English bilinguals (foreign students), LoE > 1 yr	<i>Tasks</i> : problem solving <i>Stimuli</i> : 72 problems, 36 in each language, presented visually	Advantage of preferred language (defined as language of early schooling) for problem solving
Hoosain (1979)	L1 Chinese L2 English	50 Chinese-English bilinguals: Grade 7 students n = 25 Undergraduates n = 25	<i>Tasks</i> : forward and backward digit span memory task <i>Stimuli</i> : lists of random numbers (1–9) in both languages, presented auditorily	Advantage of L1 Chinese for digit span memory (in particular in the forward condition)
Ellis & Hennelly (1980)	L1 Welsh L2 English	20 participants (ages 20–30 yrs): Experiments 1 and 2: 12 Welsh-English bilinguals (8 Welsh-dominant) Experiment 3: 8 Welsh-English bilinguals	<i>Tasks</i> : digit reading, digit span memory task, digit translation <i>Stimuli</i> : lists of random numbers (0–9), presented visually and auditorily in both languages	Advantage of English for digit span memory
McClain & Huang (1982)	L1 Chinese L1 Spanish L2 English	80 participants (young adults): Experiment 1 10 Chinese-English bilinguals, born in China, residing in the US, LoE < 1 yr 10 English-Chinese bilinguals, born in Chinese families in the US	<i>Tasks</i> : problem solving <i>Stimuli</i> : 120 problems, 60 in each language, presented auditorily	Advantage of preferred language (the language of early schooling)

		Experiment 2		
		20 English monolinguals		
		40 Spanish–English bilinguals: 20 dominant in English and 20 in Spanish		
da Costa Pinto (1991)	L1 French	72 participants (ages 23–31 yrs)	<i>Tasks:</i> digit reading in both languages, digit span memory <i>Stimuli:</i> digit lists presented visually and auditorily	Advantage of L1 for digit reading and in Portuguese–English bilinguals for digit span memory
	L1 German	Experiment 1		
	L1 Italian	10 English monolinguals		
	L1 Portuguese	50 speakers of other L1s with L2 English (10 for each L1)		
	L1 Spanish	Experiment 2:		
Miller & Zhu (1991)	L1 English	12 Portuguese–English bilinguals	<i>Tasks:</i> number reversing task in both languages <i>Stimuli:</i> digit lists presented visually	Advantage of L1 Chinese
	L2 English	Experiment 1		
	L1 Chinese	51 English monolinguals		
	L2 English	Experiment 2		
		38 English monolinguals		
		Experiment 3		
		20 Chinese–English bilinguals (ages 19–25 yrs; mean AoA=16.3 yrs, range 11–23 yrs; mean LoI = 8.5 yrs, range 2–16 yrs)		
		Experiment 4		
		20 Chinese–English bilinguals (ages 20–35 yrs, mean AoA = 19.6 yrs, range 11 – 23 yrs; mean LoI = 10 yrs, range 4–15 yrs)		

Table 3.1 (cont.)

Studies	Languages	Participants	Tasks & stimuli	Findings
Ellis (1992)	L1/L2 Welsh L1/L2 English	623 participants: Experiment 1 50 Welsh–English bilinguals (ages 9–12 yrs) Experiment 2 25 English monolinguals 50 Welsh–English and English- Welsh bilinguals (ages 17–67 yrs) Experiment 3 249 Welsh-speaking children 249 English-speaking children (ages 9–11 yrs)	<i>Tasks</i> : problem solving, digit reading <i>Stimuli</i> : written problems (sums)	Advantage of English
Frenck-Mestre & Vaid (1993)	L1 English L2 French	30 English–French bilinguals: ages 19–22 yrs, mean LoE = 6 mos, mean LoI = 5.5 yrs	<i>Tasks</i> : arithmetic verification task <i>Stimuli</i> : problems with correct and false solutions in two languages presented visu- ally and auditorily	Advantage of L1 English for retrieval of numerical knowledge
Tamamaki (1993)	L1 Japanese L2 English	32 Japanese–English bilinguals (ages 19–58 yrs): Short-stay group: LoE < 3 yrs (mean = 1.2 yrs) Long-stay group: LoE > 3 yrs (mean = 11.4 yrs)	<i>Tasks</i> : problem solving <i>Stimuli</i> : 120 problems, 60 in each language, presented auditorily	Advantage of L1 Japanese, mediated by length of residence in the L2 context

Chincotta & Hoosain (1995)	L1/L2 English L1 Chinese L2 Spanish	Experiment 1 26 balanced English-Spanish bilinguals (ages 15–18 yrs) Experiment 2 32 Chinese–English bilinguals dominant in L1 Chinese (ages 19–25 yrs)	<i>Tasks:</i> digit reading, digit span memory task <i>Stimuli:</i> digit lists in both lan- guages presented visually and auditorily	Advantage of English (L1 or L2) Advantage of L1 Chinese
Campbell et al. (1999)	L1 Chinese L2 English	26 Chinese–English bilinguals (ages 20 – 39 yrs)	<i>Tasks:</i> number naming, prob- lem solving, magnitude selection in both languages <i>Stimuli:</i> lists with Arabic and Mandarin numerals (2–9)	Advantage of L1 Chinese and Arabic numerals
Vaid & Menon (2000)	L1 Spanish L2 English	552 Spanish–English bilinguals: 438 English-dominant 82 Spanish-dominant 32 balanced	<i>Tasks:</i> survey	Preference for the language of early instruction
Spelke & Tsivkin (2001)	L1 Russian L2 English	24 Russian–English bilinguals (ages 18–33 yrs) Experiment 1 8 bilinguals (mean AoA = 15.4 yrs, range 13 – 19 yrs; mean LoE = 3.8 yrs, range 3–5 yrs) Experiment 2: 8 bilinguals (mean AoA = 15.3 yrs, range 12 – 18 yrs; mean LoE = 4.9 yrs, range 3.5 – 6.5 yrs) Experiment 3 8 bilinguals (mean AoA = 16 yrs, range 13 – 18 yrs; mean LoE = 5 yrs, range 3 – 7 yrs)	<i>Tasks:</i> training followed by information retrieval/ problem solving (choice between two answers) <i>Stimuli:</i> problems in two lan- guages, presented visually	Advantage of the language of training for informa- tion retrieval (for exact numbers)

Table 3.1 (cont.)

Studies	Languages	Participants	Tasks & stimuli	Findings
Dehaene et al. (2008)	L1Mundurucú L2 Portuguese	33 Mundurucú speakers, children and adults, with various degrees of proficiency in Portuguese	<i>Tasks:</i> number-space mapping <i>Stimuli:</i> numbers presented in various formats (sets of dots, sequences of tones, spoken Mundurucú and Portuguese words)	L1 influence, L2 internalization seen in the shift to linear mapping Portuguese
Dowker et al. (2008)	L1/L2 English L1/L2 Welsh L1 Tamil	116 participants (ages 6–8 yrs) Study 1 60 participants divided into English monolinguals Welsh–English bilinguals English–Welsh bilinguals Study 2 27 English monolinguals 29 Tamil–English bilinguals	<i>Tasks:</i> Basic Number Skills test, Wechsler Intelligence Scale for Children, number comparison task <i>Stimuli:</i> 24 pairs of two digit number pairs	Advantage of the language with more transparent number encoding (Welsh)

L1 advantage. Many bilinguals acknowledge that, regardless of their current language dominance and environment, they still use their L1 for simple arithmetic operations:

I came to the US when I was eleven and I am now fifty-three; I've been here fundamentally continuously with the exception of one year – I even dream in English. The only thing that I still do in Spanish, occasionally, is my multiplication tables. (Luis Proenza, President of the University of Akron, L1 Spanish – L2 English, born in Mexico, arrived in the US at the age of 11; in Belcher & Connor, 2001: 193)

When I do sums in my head, or count wine glasses set out on the sideboard for a cocktail party we are about to give, I begin in Polish, and switch to English only after I have become conscious of the absurdity of what I am doing. (Louis Begley, an American writer, L1 Polish – L2 English, born in 1933 in Stryi (then Poland and now Ukraine), left Poland at the age of 13; in Lesser, 2004: 164)

[E]ven if I use English numbers, they have to be processed and remembered first in my Shanghainese. I simply cannot perform any numeral tasks in any other tongues. I still always remember telephone numbers and count and perform all calculations solely in my Shanghainese. (Veronica Zhengdao Ye, Chinese–English bilingual in Zhengdao Ye, 2007: 64)

The present author is not an exception to this phenomenon – after two decades of living in the US, I am still as likely to balance my checkbook or to count the number of reps at the gym in Russian as I am in English. Several surveys and experimental studies show that sequential bilinguals favor their L1 for mental computations (Dewaele, 2004a, 2009; Spelke & Tsivkin, 2001), retrieve numerical knowledge and solve mathematical problems faster in the L1 (Campbell et al., 1999; Frenck-Mestre & Vaid, 1993; Marsh & Maki, 1976; Tamamaki, 1993; see also Noël & Fias, 1998) and display L1 advantage in digit reading and digit span memory (da Costa Pinto, 1991; Hoosain, 1979). Yet some of these studies confound important variables.

Language of instruction advantage. To begin with, several of the studies have focused on sequential bilinguals whose L1 was also the language of early schooling, yet in many contexts children are schooled in languages different from those of the home. In that case, as noted by Epstein (1915) almost a century ago, the language favored for mental calculations may be the language of early instruction. This preference is confirmed by speakers whose elementary schooling was in a language other than that used at home:

Italian – my childhood language, the language with which I still add and subtract. (M. J. Fitzgerald, an American writer, Professor of English, L1 English – L2 Italian, spent part of her childhood in Italy, in Lesser, 2004: 141)

The language of the multiplication table and of doing sums used to be another classic test for linguistic dominance, until it was made obsolete by the pocket calculator. I used to do mine in Swedish, the language of my primary school. (Nils Erik Enkvist, a Finnish linguist who grew up as a simultaneous Finnish–Swedish bilingual in Finland, in Belcher & Connor, 2001: 54)

A study by McClain and Huang (1982) provides empirical evidence that in the context of divergence between the language of the home and the language of the school, the latter is preferred for mental calculation: some of their bilingual participants grew up with L1 Chinese or Spanish yet favored L2 English, the language of early formal instruction. Similar findings come from a survey administered by Vaid and Menon (2000) to 552 Spanish–English bilinguals in the US. The researchers asked about participants' language preferences for such everyday numerical activities as object counting, calculator use, telling time, memorizing telephone numbers, and figuring out discounts. They found that 520 of the participants had a language preference and that 84 percent of these favored L2 English as a language of mental arithmetic. The strongest predictor of this preference was the use of English in early formal instruction, followed by the AoA (before age 8), LoR in the US (longer than 6 yrs), and self-reported proficiency. The effects of the AoA on language choice for mental calculation were also identified by Dewaele (2009). Dehaene (2011: 204) argues that even the most fluent bilinguals will favor the language of instruction, because the laborious process of learning and reciting arithmetic tables imprinted them as word sequences in the brain structures and it is more efficient to automatically activate these sequences than to relearn arithmetic in a new language.

Language dominance. Yet these conclusions may be a little too hasty. The findings of Vaid and Menon (2000) and Tamamaki (1993) suggest that L1 dominance for mental computation decreases with the length of residence in the L2 context. Further evidence of dominance effects comes from Dewaele's (2004a) study of the BEQ responses to the question about language choice for mental calculation. The analysis revealed a significant effect of self-reported language dominance: L1 was chosen most frequently by L1-dominant participants, somewhat less frequently by those who reported dominance in L1 and another language (LX) and significantly less frequently by those who reported dominance in LX.

Language advantage. Another potential confounding variable is the advantage conferred by the language itself. Several studies report the advantage for L1 Chinese (Campbell et al., 1999; Chincotta & Hoosain, 1995; Hoosain, 1979; McClain & Huang, 1982; Miller & Zhu, 1991) but it is not clear if this advantage is conferred by the transparency of number encoding, by short digit length or by the primacy as L1 and the language of early instruction. Only a few studies to date differentiated between dominance and language effects. Thus, Chincotta and Hoosain (1995) found that in English–Spanish bilinguals, English digit span memory was always greater, regardless of self-rated proficiency. Similarly, Ellis (1992) found that children and adult bilinguals performing in English were faster and more accurate on mental calculations than those performing in Welsh, even when they claimed higher proficiency in Welsh. The

English advantage was attributed to shorter digit length and thus shorter articulation time. In contrast, Dowker and associates (2008) found that 6–8-yr-old monolingual and bilingual children using Welsh perform better on reading and comparisons of 2-digit numbers and attributed this performance to the transparency of number encoding in Welsh. It is up to future studies to disentangle the effects of digit length and encoding transparency on mental computation.

Language of encoding advantage. Mental computation is not the only area where we deal with numbers – we also have to retrieve numbers from memory, as dates, pin codes, or phone numbers. In my own case, the number of my old apartment in Kiev may pop out in Russian, while my social security number comes out in English. A similar language dependence was observed by an American psychologist Elizabeth Spelke, who

discovered that she could readily provide American friends with her summer address in France but not with her telephone number. Retrieving the number required that she say it in (non-native) French, visualize the numerals, and then mentally read them off in English. (Spelke & Tsivkin, 2001: 69)

Spelke and Tsivkin (2001) examined the effects of training in Russian–English bilinguals all of whom reported the preference for L1 Russian for elementary arithmetic. Their results revealed that on tasks involving exact number representations, participants were faster when performing in the language of the training, regardless of whether that language was the L1 Russian or the L2 English. On tasks involving approximate number representations and non-numerical facts, participants performed with equal speed and accuracy in both languages, regardless of the language of the training. These findings suggested that representations of numerical information may be language dependent, with *language congruency* (i.e., the use of the same language for encoding and retrieval of information) facilitating number retrieval.

Together, studies with bilingual speakers show that the L1 advantage in number processing is mediated by the AoA, L2 use in early instruction, shifting language dominance, encoding transparency, and language congruency in encoding and retrieval. What these studies don't explain is how adults acquire 'number' as a category, how this acquisition affects numerical cognition, and why the Pirahã have not acquired numbers through Portuguese.

3.1.5 So, what about the Pirahã?

Studies in New Guinea show that speakers of indigenous languages successfully acquire the decimal system encoded in English and Tok Pisin through mediated practice in schooling and currency exchanges (e.g., Saxe & Esmonde, 2005), even though at times they may need to recruit their body-based systems for some extra help:

A few decades ago, in a school in New Guinea, teachers were puzzled to see their aboriginal pupils wriggling during mathematics lessons, as if calculations made them itch. As a matter of fact, by rapidly pointing to parts of their bodies, the children were translating into their native body language the numbers and calculations being taught to them in English. (Dehaene, 2011: 81)

Schaller's ([1991] 2012) experience with Ildefonso was equally positive – he easily learned to add and multiply and, with a little difficulty, to divide, and then proceeded to apply his counting skills to coins and bills. The Pirahã, on the other hand, failed to understand the concept of number – or was it Everett who failed to understand the Pirahã?

To examine to what degree the Pirahã understand and use Portuguese, Sakel (2012) conducted fieldwork and interviews with the few tribe members who had some knowledge of Portuguese. All of the informants were middle-aged men who functioned as gatekeepers to what remains a monolingual community of approximately 450 members. She found that while the informants' speech was lexically Portuguese, it showed significant influence of the L1. The use of Portuguese numerals *doi* [two] and *tree* [three] and quantifiers *muito* [much] and *mais* [more] differed from Brazilian Portuguese usage and reflected the one-two-many system of the Pirahã. This use was also restricted to discussions of distance (e.g., two days by boat, three days to Humaita) and appeared to reflect the comments by outsiders visiting the area.

Izard and associates (2008) found that monolingual Mundurucú speakers pattern with the Pirahã in interpreting Portuguese number words as referring to approximate quantities, in accordance with L1 usage. When asked to compare words larger than 'five', they performed at chance, showing no understanding of the rule ordering the counting list. In contrast, Mundurucú speakers proficient in L2 Portuguese interpreted Portuguese number words as referring to exact quantities. These findings suggest that the concept of exact number is not innate and cannot be triggered by the mere appropriation of number words. Rather, as argued a long time ago by Herder, it emerges – or is borrowed – only when the community in question begins to 'ascribe significance' to quantification practices, which has not yet happened among the Pirahã.

Yet even communities that have numeral systems may not assign much significance to quantification practices. In New Guinea, after the introduction of money-based economy, many communities remained indifferent to the quantitative aspects of things, continuing to exchange goods in piles and heaps (Lancy, 1983). In the 1990s, the Yupno, who have an elaborate body-based counting system, still did not count days, people, or potatoes, because counting had no practical applications – in the only market in the area individual entities were always grouped into heaps and evaluated by size; the only occasions to use either body-based or Tok Pisin numbers were exchanges of the bride price and transactions in the local trade store (Wassmann & Dasen, 1994). In the absence of frequent quantification, the unschooled Yupno display understanding of the

concept of cardinal number but not of mapping of number onto space (*number line*), suggesting that the number line is neither innate nor universal and that initially exact numbers may be represented as an adjectival property of collections of entities (Nuñez et al., 2012a).

These intriguing findings underscore the urgent need to examine numeracy learning by speakers of the remaining anumeric languages and languages with restricted number systems. What facilitates and constrains acquisition of number as a category? What are the effects of its internalization? Does it increase the salience of number in the speaker's habitual context? Will Mundurucú–Portuguese bilinguals display more attention to number and better memory for entities in picture tasks like the ones developed by Lucy (1992b) than monolingual Mundurucú? It would also be interesting to see how English- or French-speaking missionaries and ‘new speakers’ of heritage languages (e.g., Ahlers, 2012) learn and use languages with alternative bases (e.g., 6 or 8) and languages where references to number are restricted, approximate or variable. Would the use of languages with restricted numeral systems decrease the salience of number for L2 users or would they still rely on the L1 system when engaging in local quantification practices, struggling against the limits of the language to name the unnamable?

3.2 Time

One missionary's experience suggests that we tend to adhere to symbolic systems to which we ‘ascribe significance’. In the sixteenth century, a Franciscan friar, Jerónimo de Aguilar, was shipwrecked near the Yucatán peninsula and captured and enslaved by the Maya. When Cortés invaded Mexico in 1519, he heard of bearded men living among the Maya. One of these men was de Aguilar and his first question upon encountering fellow Christians was about the day of the week. When his rescuers said it was Wednesday he burst into tears, because they confirmed the correctness of his own time-keeping that allowed him to maintain his schedule of prayer and thus retain the chance of salvation (Crosby, 1997). De Aguilar's adherence to the Julian calendar reminds us that time systems are part of larger systems of relationships, binding people by social, religious, and emotional ties and compelling commitment even in the presence of dominant alternative systems, such as the Maya's own elaborate calendars. But are these systems simply a variation on the foundational notion of ‘time’, structured through metaphoric mappings from the domain of space, or do they reflect different concepts of ‘time’?

3.2.1 *Since the dawn of time: tracking time through history*

From the earliest prehistory, people closely observed the patterns of change in the weather and the sky, the natural cycles of seasons, and the life cycles of

plants and animals. In a manner reminiscent of Ali's grandmother, they used these patterns to ensure their survival, to plan hunting trips, to arrange planting and gathering activities, and to schedule religious and civil events, such as the solstice ceremonies. To keep track of time, hunter-gatherers developed a variety of time-keeping systems, grounded in natural cycles. Ethnographic and archeological evidence, from Paleolithic carvings on rocks and bones to Neolithic megaliths like Stonehenge, suggests that early time-keeping systems relied on celestial patterns, such as day and night and the waning and waxing of the moon, and on earthly cues, such as bird migration or leaves turning yellow in the fall (Aveni, 2002; Hayden & Villeneuve, 2011; Morley & Renfrew, 2010; Munn, 1992; Richards, 1998; Rüsen, 2007). Today, such time-keeping systems are still in use among some hunter-gatherers and semi-nomadic herders (Aveni, 2002; Harrison, 2007).

Traditional time-keeping systems are commonly lunar and environmental (ecological) and based on highly predictable events: the Chukchee of Siberia, for instance, started each new cycle based on the birthing time of reindeer calves (Harrison, 2007). Such systems display a concrete and cyclical conception of time, which combines relatively fixed units, such as days or solar years, with relatively flexible units, such as the four seasons, which come in predictable cycles but vary in timing and duration both within and between years. The ecological calendars do not encode units larger than a year, nor do they number the years sequentially, which results in a very different conception of the past (with the focus on major memorable events, rather than dates) and of individual histories and ages (Harrison, 2007). The question how many years have elapsed since he was born would not make sense to a traditional Mursi (Ethiopia), but he would be very sensitive to relative age differences between himself and others because they shape his place in the local social hierarchy (Aveni, 2002). The Amondawa of the Brazilian Amazon also do not quantify ages – instead, they require individuals to periodically change names, with changes reflecting different stages of the lifespan (Sinha et al., 2011).

The 'yearly' cycles may be subdivided into rainy and dry seasons, as among the Amondawa (Sinha et al., 2011) or into cycles of 13 lunar 'months', named after important events and activities, such as 'good birch bark collecting month', 'rounding up male deer month', 'preparing skins month' or 'move autumn campsite month' (Harrison, 2007). The sensitivity to natural events means that traditional 'months' and 'seasons' bear little resemblance to our own standardized and arbitrary units – instead, they are of flexible length, which is adjusted based on whether the wild lilies are blooming early or the reindeer giving birth later than usual. One 'month cycle' could last six weeks and another only two or three. Traces of the lunar calendar also persist in 'modern' languages, such as Russian and English, whose words *miesiats/month* and *miesiats/moon* stem from the Proto-Indo-European *mēn-s* [moon] (Fortson, 2010).

Lunar months can be subdivided into mobile units of four to ten days, centered on today. Harrison (2007) argues that a seven-day ‘week’ is essentially meaningless to hunter-gatherers and herders, because nothing ever needs doing on a Monday that cannot just as easily happen on Saturday. To ask a Tuvan yak-herder about the day of the week, one asks “Today how many?” and receives an answer in a future-tense verb in terms of lunar phases, such as “It’s four-teening” [today is the 13th day of the lunar cycle]. The hunter-gatherer communities also do not have much use for abstract hours, minutes, and seconds. Instead, their smaller time units are linked to physical processes: the Yukaghir of Siberia, for instance, have a unit called ‘the kettle boiled’, which refers to the amount of time it takes a kettle of water to boil over a campfire.

The administration of the first cities and empires required more sophisticated time-keeping, leading to development of astronomical calendars with abstract standardized divisions of time, new time-measurement technologies, such as sundials, shadow clocks, and water clocks, and linearization of time and chronology. The new calendars and technologies emerged independently in several civilizations, including China, Mesopotamia, and South America. De Aguilar’s captors, the Maya, displayed particular interest in time-keeping and maintained three calendars. Their main time-keeping system, used for seasonal and agricultural events, was the 365-day solar calendar, divided into 18 months of 20 days, plus 5 liminal days. The 260-day calendar, consisting of 13 units of 20 days, was used for ritual and divination purposes. The Long Count calendar functioned as a linear count of time: it began on the day we know as August 11, 3113 BC, and was divided into abstract units: *kin* (day), *uinal* (20 days), *tun* (360 days, a civic year), *k’atun* (20×360 days), and *baktun* (400×360 days) (Aveni, 2002).

Our own calendar is based on the 365-day calendar developed by ancient Egyptians, which so impressed Julius Caesar. Frustrated by the drifting Roman 355-day year, which got out of sync with the seasons, Caesar and his advisor, Alexandrian astronomer Sosigenes, adopted the Egyptian approach to reform the Roman calendar. The Julian calendar was then inherited by Christendom and lasted well until 1582, when Pope Gregory reformed it further by adjusting the mean length of the year and skipping the 10 extra days accumulated as a result of the imprecise estimate of the solar year (Feeney, 2007).

Our *hour* also comes from ancient Egyptians. The division of days into standardized time units arose independently in Babylon (where day-night units were split into 12 hours) and in Egypt (where they were divided into 24 hours, albeit unequal and ‘seasonal’). In the fourth century BC, the Egyptian 24-hour division was adopted by the Greeks, and in the third century BC the Greek hour was adopted by the Romans (Hannah, 2009). These units were used for religious and administrative purposes. Thus, in the third century BC, the Ptolemaic postal system operated with ‘hour passes’ which recorded the hours at which

the couriers reached the stations, noting, for instance, that “at the eleventh hour Nikodemos delivered from lower (Egypt) to Alexandros ... rolls, from king Ptolemaios for Antiochos” (in Hannah, 2009: 141; Remijsen, 2007).

The evolution of time-keeping technology, from sand glasses and water clocks to portable sundials and astrolabes, culminated in the mid thirteenth century with the invention of the mechanical clock. These clocks then became progressively smaller and on New Year 1572, the Earl of Leicester gave Queen Elizabeth I a bejeweled bracelet with a tiny timepiece, starting the fashion for wristwatches that strapped time to our own bodies. The relentless spread of wall clocks, pocket watches and wristwatches ushered in the modern ‘clock-work universe’ and made time yet another form of commodity (Crosby, 1997; Hannah, 2009; Munn, 1992; Weir, 1998).

3.2.2 *Linguistic anchoring: do speakers of ‘timeless’ languages have a concept of time?*

Today, cultural artifacts, such as wristwatches and calendars, continue to function as semiotic means that mediate our engagement with time. But what is the role of language in temporal cognition? Research shows that human memory does not have an intrinsic time-tagging mechanism or a single, natural temporal code (Friedman, 2004). To anchor events in time, we rely on two interrelated linguistic systems: a lexical system which includes time units (e.g., *year*, *day*, *hour*), temporal adverbs (e.g., *earlier*, *later*), and spatiotemporal metaphors (e.g., *time flies*), and a grammatical system of temporality, encoded through morphosyntactic categories (e.g., aspect, tense). Cross-linguistic differences in the domain of time involve the mapping of time onto space, the manner of time encoding, and the degree of elaboration in the domain.

To begin with, languages vary in the ways they conceive of time (e.g., linear vs cyclical) and map time onto space. In English, as noted by Whorf (1956), time can flow to or from the future, while in American Sign Language (ASL) the *deictic* time line (now-future) is perpendicular to the speaker’s body, the *anaphoric* time line (not now) extends diagonally across the signing space, and the *sequence* time line is parallel to the body and extends from left to right (Emmorey, 2002). Studies to date suggest that spoken languages also differentiate between the deictic time, commonly located on the front/back axis and the sequence time, mapped on a different axis, e.g., from left to right (Núñez et al., 2012b). The actual mappings differ across languages: on the deictic timeline, speakers of English and Russian locate the future in front and the past behind, while speakers of Aymara (Bolivia, Chile, Peru) and Tuvan (Siberia) locate the past, which can be ‘seen’, in front and the unknowable future behind, and speakers of Yupno (New Guinea) rely on local topography to construe the past as downhill and the future as uphill (Harrison, 2007; Núñez & Sweetser, 2006;

Núñez et al., 2012b). Moreover, not all languages map time onto space – this feature is absent, for instance, in Amondawa, spoken in the Amazon (Sinha et al., 2011).

Cross-linguistic variation also affects the encoding of temporality, with the key distinction between tense languages that grammaticalize temporality (e.g., French, German, Polish) and tenseless languages that rely on lexical (e.g., temporal adverbials) and discursive (e.g., narrative structure) means of encoding temporality (e.g., Amondawa, Burmese, Yucatec) (Bohnemeyer, 2009; Comrie, 1985; Sinha et al., 2011). Cross-linguistic variation also involves the degree of elaboration and lexical precision in the time domain: speakers of Spanish, for instance, locate events on numerous points of the temporal continuum, while speakers of Bantu focus on how close or far events are from the present (Bender et al., 2010; Comrie, 1985). What are the implications of this variation for temporal cognition?

Throughout the twentieth century, this question occupied a prominent place in debates about linguistic relativity. Whorf (1956) argued that the English tense and aspect system leads English speakers to perceive ‘time’ as a smooth stream, subject to a three-fold division: it may flow from the future through the present and into the past, or, alternatively, it may carry the observer from the past through the present and into the future. In contrast, Hopi relies on aspect and mode, rather than tense, and combines time and space in a manner different from Standard Average European: “two events in the past occurred a long ‘time’ apart ... when many periodic physical motions have occurred between them in such a way as to traverse much distance or accumulate magnitude of physical display in other ways” (Whorf, 1956: 63).

These arguments have been frequently interpreted as a statement that speakers of Hopi did not have a concept of time, a misconception which then proliferated on the pages of scholarly and popular publications and continues to be reproduced to this day:

Anyone can estimate the time of day, even the Hopi Indians; these people were once attributed with a lack of any conception of time by a book-bound scholar, who had never met them. The Hopi can point to the sun in the sky and indicate the time of day like anyone else. (Richards, 1998: 44)

Some also argue that German scholars Gipper (1976) and Malotki (1983) ‘disproved’ or ‘discredited’ Whorf’s arguments (e.g., Deutscher, 2010). Gipper (1976) did indeed reanalyze Whorf’s own data, while Malotki (1983) conducted an ethnographic study among the Hopi. Both studies showed that Hopi had a rich and extended temporal system, with spatiotemporal metaphors, temporal particles, time words for ‘day’, ‘season’, and a (lunar) ‘month’, and time-keeping devices, such as knotted calendar strings, notched calendar sticks, sun holes’ alignments and shadow observations. These findings, however, would

not have been news to Whorf – by the time he made his claims, the existence of time-keeping practices among the Hopi was already well documented by Alexander Stephen, who had conducted fieldwork with the Hopi between 1891 and 1893 and observed their winter solstice ceremony (Hannah, 2009). The critics missed a crucial point in Whorf's argument: his actual claim, based on distinct structuration of time words in English and Hopi, was that Hopi does not have *our* concept of 'time' (Lucy, 1996).

The data in both Gipper's (1976) and Malotki's (1983) studies supports this argument and shows that Hopi had no terms for 'week', 'hour', 'minute', or 'second', and that the Hopi sense of time and the role time played in their lives and culture were more typical of traditional agricultural communities and did not correspond to Western notions. For instance, when it came to 'month', the informants were in agreement only on the names for the six lunar months from November to May, while summer and early autumn were treated as a single functional unit, dedicated to cultivation and harvesting. Malotki (1983) stated that "for a good many Hopi who are living on their ancestral land and are clinging to what is left of their ancient traditions, time is basically an organic experience which unfolds in harmony with the cyclic rhythms of their social, agricultural, or religious events" (p. 633). He also argued that in the Hopi–Anglo encounter "the gaps in Hopi temporal orientation became readily apparent" (Malotki, 1983: 618) and were filled with lexical borrowings such as *santi* [week, from *Sunday*].

More recent studies vindicate Whorf and document other languages that do not encode abstract categories of time and tense, nor use numerals with designations of time intervals. One such language, not surprisingly, is Pirahã, which has a very restricted time domain, with no means to convey perfect tense and a vocabulary of 12 time words, such as *xahoakohoihio* [at fire inside eat go] (early morning, before sunrise), *hoa* [fire] (day), *xahoái* [be at fire] (night), *xahoapió* [other at fire] (another day) and *kahaixaí xogíiso* [moon big temporal] (full moon). Given that the Pirahã sleep, eat, hunt, fish, and gather every day, they do not require a more differentiated set of time units, nor a linear conception of time and history. Everett (2012) argues that one of their key cultural values is to talk only about the present – they do not talk about the hypotheticals, the far-off future, or the distant past, nor do they have creation myths. The only events discussed by the Pirahã are activities taking place at present or in the short-term past or future, and events that have been personally witnessed.

Another language that does not encode the abstract category of 'time' – or numerals above four – is Amondawa, also spoken in the Brazilian Amazon. Sinha and associates (2011) documented two time-interval systems in Amondawa: diurnal (e.g., *ara* [sunlight, i.e., daylight hours], *iputuna* [intense black, i.e., night]) and seasonal (*Kuaripe* [time of the sun, i.e., dry season], *Amana* [time of the rain, i.e., rainy season]). The Amondawa onomastic system

also maintains temporal intervals of the human life cycle by assigning and changing names according to the stages of life. Unlike the Pirahã, the Amondawa have cultural narratives of collective past and can use adverbial particles to mark future and past events. At the same time, in the absence of verbal tense, the Amondawa does not require its speakers to specify event time and time intervals are not used as reference-time markers relating events to other events; when they do appear in discourse, temporal references are interpreted according to context. The four-number numeral system also precludes time reckoning as a cognitive and linguistic practice.

Together, these findings suggest – as suspected long ago by Whorf – that neither linguistic mapping from space to time nor the domain of ‘time’ constitute linguistic and cognitive universals. Rather, the abstract category of ‘time’ and the methods of time reckoning are cultural and historical constructions that emerged and were elaborated independently in several different cultures and then spread via processes of linguistic and cultural diffusion. These processes reached the Amondawa (who are by now bilingual in Portuguese) and the Hopi, affecting the findings of Gipper (1976) and Malotki (1983) in ways that should not escape our attention. To begin with, Whorf focused on the Hopi of the Second Mesa, while Malotki (1983) worked in the Third Mesa. Yet the key difference between the community whose language was examined by Whorf in 1938 and that studied by Gipper and Malotki in the 1960s and 1970s involves the effects of bilingualism and assimilation of the Hopi informants. Gipper (1976), who had no first-hand knowledge of Hopi, carried out his interviews in the Hopi reservation in English, the L2 for both the researcher and his bilingual informants, and used the collected information to argue that Hopi expressions “can be reinterpreted by Indo-European grammatical categories” (p. 221). Malotki (1983) acknowledged that his participants were bilingual (p. ix) and that their Hopi bore traces of linguistic acculturation. He also produced a truly Whorfian statement regarding this acculturation: “a Hopi is not aware himself any more how deeply his thinking has been affected by English thought or ideational patterns” (Malotki, 1983: 620). But what do we actually know about representation of time in bilinguals?

3.2.3 *Where did the time go? Directionality of time in monolingual and bilingual speakers*

To date, studies of temporal cognition in monolingual and bilingual speakers have focused on a single dimension – directionality. Boroditsky (2001) used the spatial priming paradigm to examine the effects of English, where most spatio-temporal metaphors are horizontal (e.g., *behind* schedule, looking *forward*), and Mandarin, which employs both horizontal and vertical metaphors, the latter expressed through spatial morphemes *shàng* [up] and *xià* [down]. Two

groups of participants took part in the study: native speakers of English and Mandarin–English bilinguals, chosen over Mandarin monolinguals, in order to control for the language of the task, and to examine “language-independent thought such as thought for other languages” (Boroditsky, 2001: 3). The participants saw two pictures, each depicting two objects aligned horizontally or vertically, and accompanied by a sentence (e.g., The black worm is *ahead* of the white worm). Their task was to determine if the sentence was true or false. Next, they saw a statement about time, with a horizontal metaphor (e.g., March comes *before* April) or temporal terms (e.g., March comes *earlier* than April) and also had to make a true/false judgment.

The results of the first experiment revealed that both groups answered the *before/after* questions faster after horizontal primes than after vertical primes. They differed, however, on temporal statements (*earlier/later*): English speakers were faster after horizontal primes and Mandarin speakers (performing in L2 English) after vertical primes. These results were interpreted as evidence of L1 Mandarin influence on ‘thinking for English’. Experiment 2 examined the effects of the AoA and LoE on reaction times in 25 Mandarin–English bilinguals, aged between 18 and 28. The AoA varied between the ages of 3 and 13 (mean = 9.4) and their mean length of instruction was 14 years. The results demonstrated that the ‘vertical bias’ was greater for those who started learning L2 English later in life, regardless of the overall length of instruction. Experiment 3 found that English speakers trained on 90 ‘vertical sentences’ shifted to ‘vertical bias’. Together, the results of the three experiments were interpreted as showing the influence of language on cognition and thus providing evidence for linguistic relativity.

In the decade that followed, several scholars failed to replicate these findings. Chen (2007) and Tse and Altarriba (2008) found ‘vertical bias’ in both native speakers of English and Chinese–English bilinguals, while Bender and associates (2010) and January and Kako (2007) found no spatial priming effects, or, in some cases, a slight vertical bias in English speakers. Even Boroditsky’s own lab was unsuccessful at reproducing the results (Boroditsky et al., 2011).

To address these concerns, Boroditsky and associates (2011) have adopted a somewhat different design, where native speakers of English and Mandarin–English bilinguals were shown two pictures (e.g., young boy/old man) and asked to judge whether the second picture was taken earlier or later in life by pressing a black button for ‘earlier’ or a white button for ‘later’. Half of the participants were presented with the buttons arranged vertically and the other half with the buttons arranged horizontally. The researchers hypothesized that if people automatically access left-to-right or top-to-bottom representations of time, then asking them to make an incongruent space-time mapping should cause interference and delay in reaction times (i.e., a response should be faster when the ‘earlier’ button is on the left). The task was assumed to be implicit

and non-linguistic, because it relied on photographs and button presses. The results showed that in the horizontal condition, both groups were faster when the ‘earlier’ button was on the left and in the vertical condition only Mandarin speakers responded faster when the ‘earlier’ button was on top. These results were interpreted as evidence that Mandarin speakers represent time vertically as well as horizontally (their overall reaction times, however, were significantly longer than those of English speakers, a result at odds with Boroditsky, 2001).

This study may have addressed some methodological issues in spatial priming, but not the larger questions about the theoretical premises of the enterprise. To begin with, Boroditsky’s studies did not use any theoretical framework to link temporal language and cognition – instead, the assumptions about differences between English and Chinese were based on a few spatiotemporal metaphors. Chen (2007) argues that there is no solid linguistic rationale to assume that Chinese speakers ‘think about time vertically’ and shows that in Chinese-language news websites the number of expressions using horizontal terms exceeds that of expressions using vertical terms, with the vertical frame dominant only in references to weeks.

An even larger problem is the confusion between linguistic and non-linguistic cognition. Boroditsky (2001) first defined “language-independent thought” as somewhat oxymoronic “thought for other languages” (p. 3) and then claimed that this thought bears traces of L1 thinking for speaking in L2. Munnich and Landau (2003) pointed out that the study could not have revealed language effects on non-linguistic cognition, because it required participants to engage in linguistic processing and thus documented the influence of ‘language on language’.

The results of Experiment 3, where a training session ‘induced’ language effects, making English speakers behave like speakers of Chinese, also raised questions regarding assumptions made about cross-linguistic influence. If a short training with 90 sentences affected the performance of English speakers, why did Mandarin–English bilinguals who had spent a significant amount of time in the US and were performing in L2 English, still display the influence of the L1? Or, conversely, as January and Kako (2007) put it, “if Mandarin speakers persist in a default mental representation of temporal relations as vertically oriented after years of speaking English, why don’t English speakers persist in a default mental representation of time as horizontally oriented after only 90 examples of a different metaphor?” (p. 9).

In fact, the priming paradigm is rather ill-suited for the study of Whorfian effects: its purpose is to examine how external cues affect cognitive and linguistic processes, yet this external manipulation of responses is in direct opposition to the Whorfian interest in habitual thought, nor are reaction times on artificial tasks compelling evidence of ‘thinking about time’. The unavoidable conclusion is that the study failed to address not only Whorf’s concerns but even the

Brown-Lenneberg version of the SWH, because truth value judgments (e.g., *true/false*) and attribution of linguistic categories (e.g., *earlier/later*) require linguistic processing.

3.2.4 *What to study and not to study in the future: time, savings, and safe sex*

The failure to replicate Boroditsky's (2001) study was interpreted as a 'failure to support the Whorfian hypothesis' (January & Kako, 2007; Munnich & Landau, 2003; Tse & Altarriba, 2008) but, in fact, the studies in question examined whether visual and verbal spatial priming affect linguistic judgments and did not consider language use in habitual thought (Whorfian hypothesis) or language effects on non-linguistic cognition (Brown-Lenneberg hypothesis). Most importantly, all of these studies skipped important theoretical steps that need to be retraced.

The first step involves theoretical articulation of the relationship between temporal language and cognition, similar to the semantic typology proposed by Lucy (1992b) for the study of number or Levinson (1996a,b, 2003) for the study of space. One attempt to articulate such an approach has been made by Bender and associates (2010), who adapted Levinson's (1996a,b, 2003) framework for the study of space to the study of time. Studies of temporal cognition commonly ask participants to respond to questions such as "Next Wednesday's meeting has been moved forward two days. What day is the meeting now?" (McGlone & Harding, 1998). Bender and associates (2010) postulated that a response "Friday" reflects an *absolute frame* (where time flows from the past and carries observers forward) and "Monday" an *intrinsic frame* (where observers' positions are fixed and time flows by them from the future into the past). They found that Chinese and German speakers favored intrinsic temporal frames, speakers of English used absolute and intrinsic frames in a relatively equal proportion, and speakers of Tongan used absolute, intrinsic, and relative frames (focused on observers' viewpoints). They also identified the influence of L2 English on the L1 Tongan of their participants: younger people, schooled in English, displayed an English-like pattern of temporal frame preference, while older speakers, who used little English, preferred a relative frame, followed by an intrinsic one.

The next step involves the articulation of a mechanism by which temporal frameworks may affect temporal cognition. One highly publicized attempt to do so has been made by Chen (2013), an economist who claims that speakers of languages that require grammatical marking of future events, such as French or English, dissociate the future from the present and devalue future rewards, while speakers of languages that grammatically equate present and future, such as German, perceive the future as close and save more, retire with

more wealth, smoke less, practice safe sex, and are less obese. Alas, in the haste to link languages, savings, and sex, the study categorized bi- and multi-lingual respondents (e.g., in Belgium and Luxembourg) as speakers of single languages and correlated the use of these languages with health and wealth, while failing to establish any differences in perceptions of the future among their speakers.

To examine temporal cognition in everyday interaction, Núñez and Sweetser (2006) videotaped interviews with Aymara speakers and found a difference in directionality of time representations in Spanish (future-front/past-behind) and Aymara (past-front/future-behind). They also documented an L2-influenced shift in temporal perspective: Aymara–Spanish bilinguals fluent in L2 Spanish produced future-front/past-behind gestures common for Spanish, while L1 Aymara-dominant older speakers produced the opposite pattern, common for Aymara, even when speaking L2 Spanish (thus, displaying L1 influence on conceptualizing time in L2).

It would have also been interesting to see how acquisition of L2 Portuguese affects temporal cognition of the Amondawa, yet Sinha and associates (2011) do not discuss their bilingualism.

Once again, intriguing insights into the acquisition of ‘time’ as a category come from Schaller’s ([1991] 2012) work with Ildefonso. Schaller ([1991] 2012) recalls that while Ildefonso quickly acquired the category of ‘number’ and even arithmetic and the practice of counting coins and bills, he was stuck when it came to ‘time’. He could not fathom the relevance of the clock and the subtle movements of its hands. When the subject of clocks, days or months came up, Ildefonso yawned and rubbed his eyes and “the idea of counting time like counting stones or crayons seemed distasteful to him” (Schaller, [1991] 2012: 119–120). He also did not understand the notion of tense and for a while their conversations “were stuck in the present tense” (p. 62). To teach him the notion of equivalence, Schaller had Ildefonso measure everything in sight with a ruler and a tape measure. Eventually, he acquired the signs for ‘yesterday’ and ‘tomorrow’ but other time units still seemed confusing and irrelevant until Schaller taught him how to locate his birthday on the calendar. It was the emotion of counting days until his birthday that led Ildefonso to accept and adopt time-keeping practices and to proudly display his wristwatch, a birthday gift from his classmates.

To date, no other studies known to this researcher have considered the acquisition of ‘time’ as a conceptual category by adults. Several studies, however, examined the effects of cross-linguistic variation in temporality on event construal and I will return to this issue in Chapter 4. Meanwhile, I hope that future studies of time will follow Núñez and Sweetser (2006) to the world outside the experimental lab, similarly to the studies of space discussed next.

3.3 Space

In 1770, Captain Cook's ship had run aground on the Great Barrier Reef, forcing the crew to camp for several weeks in what is now Queensland, Australia, to repair the ship. In his diary, Cook mentioned that one of his seamen, out to collect edible greens, had lost his way and stumbled across a native camp. The natives understood that he did not know where his ship was and managed to direct him toward it. These natives, now known as speakers of Guugu Yimithirr, displayed superb directional awareness and great ability to use gestures in a precise manner that eliminated the need for a lingua franca (Haviland, 1993). These superior orientation skills, also observed among Mayan communities and southern African hunters-gatherers, have long mystified observers and eventually placed the linguistic and social practices of the local communities at the heart of the explorations of spatial language and cognition.

3.3.1 *There's an ant on your south leg: cross-linguistic variation in encoding of space*

Throughout history, humans had to orient themselves not only in time but also in space. To gather plants, hunt animals, create tools, and construct dwellings, they had to find their way around, estimate distances, and communicate about space. To mediate this communication, they used the key features of their environments and their own bodies, with fingers, feet and steps becoming standardized measurement units. The commonality of human needs has predisposed scholars to view spatial cognition as a universal domain, grounded in the egocentric perspective of an individual in space (Landau & Jackendoff, 1993; Miller & Johnson-Laird, 1976). This perspective gave rise to the evolutionary theory, according to which spatial terms based on human body projections (e.g., *front/back*, *left/right*) precede cardinal terms (e.g., *east/west*, 'sunrise location'/'sunset location') (Brown, 1983). It turned out, however, that some languages do not encode egocentric terms for 'right' and 'left' and rely exclusively on cardinal terms, such as south/north, uphill/downhill, or inland/seawards. To warn you about an insect crawling up your leg, a speaker of Guugu Yimithirr may say "There's an ant on your south leg", to get you to wash your face, a Tikopian may note "There is a spot of mud on your seaward cheek", and to get you to squeeze over two inches on the car seat, a speaker of Kayardild may ask "Move a bit to the north!" (Diamond, 2005: 286; Evans, 2010: 41; Everett, 2012; Haviland, 1993, 1998; Levinson, 1996a,b, 2003; Levinson & Wilkins, 2006a; Majid et al., 2004).

These findings attracted attention to cross-linguistic variation in the domain of space. The studies to date reveal cross-linguistic variation in the types of spatial relations encoded, in the manner of their encoding, and in preferred frames

of spatial reference. To begin with, languages may differ in the spatial parameters and relations they encode: Guugu Yimithirr, for instance, does not separate the meanings of 'above' and 'on', differentiated in English, while English does not encode inwards movement through a tubular space, grammaticalized in Karuk through a spatial prefix *vara-* (Levinson, 2003). Languages may also vary in the manner of encoding, with the same spatial relation described by a prepositional phrase in German and a postpositional construct in Turkish (Becker & Carroll, 1997; Jarvis & Odlin, 2000).

Furthermore, even when they do encode 'the same' dimensions, relationships covered by a single morpheme in one language may require several morphemes in another, leading to different groupings of 'the same' spatial situations. Spanish speakers, for instance, use a single preposition *en* to group together (a) 'cup on a table', (b) 'apple in a bowl', and (c) 'handle on a door', while English speakers differentiate between support (a,c) and containment (b), Finnish speakers between support (a) and containment/attachment (b,c), and Dutch speakers between support (a), containment (b), and attachment (c) (Bowerman, 1996a,b). Even terms that appear to be equivalents may differ in meanings: in the case of undifferentiated objects, for example, English speakers see the 'back' as the side furthest from view, while speakers of Hausa and Tongan see the 'back' as oriented towards the speaker, consequently, they describe a tree between the speaker and the house as 'behind the house' and a (visible) tree beyond the house as 'in front of the house' (Bennardo, 2000; Hill, 1982).

Languages also differ in the *frames of spatial reference*, "coordinate systems used to compute and specify the location of objects with respect to other objects" (Majid et al., 2004: 108). Levinson (1996a,b, 2003) differentiates between three types of spatial frame of reference: an *absolute* or *geocentric frame* focused on fixed coordinates, external to the figure-ground scene and the speech participants (e.g., *He is north of the house*), an *intrinsic frame* focused on object-centered coordinates (e.g., *He is in front of the house*), and a *relative* or *egocentric frame* focused on viewer-centered coordinates (e.g., *He is to the left of the house*).

To examine the uses of spatial frames of reference in everyday life, Levinson and associates (Bennardo, 2000; Brown & Levinson, 1993; Haviland, 1993, 1998; Levinson, 1997, 2003; Wassmann & Dasen, 1998; Widlok, 1997) conducted ethnographic fieldwork in a variety of languages, collecting information via observation, filmed interactions, interviews, and the study of verbal and gestural spatial reference in conversations and conversational narratives. They also used experimental verbal tasks, which included descriptions of visual stimuli (e.g., Topological Relations Picture Series, Frog stories, Pear stories), translation (e.g., New Testament passages of Jesus' trip across the Sea of Galilee), and information-gap activities (e.g., asking an informant (director)

to describe a picture so that the other player (matcher) could pick it out of a picture array or asking a director to describe a route through a model town so that the matcher could emulate it on an identical but screened-off model). The informants' sense of orientation was also examined in way-finding and direction-giving tasks (e.g., asking an informant to verbally guide a blindfolded participant around a flat open space).

Studies of more than forty languages revealed that most languages encode at least two and often all three frames of reference (Levinson, 1997, 2003; Levinson & Wilkins, 2006a; Majid et al., 2004). English encodes all three frames and we can mix them in offering driving directions, beginning with an absolute one (e.g., *turn west*), then shifting to an intrinsic one (e.g., *then turn at the second light*), and then to a relative one (e.g., *the hospital will be right in front of you*), and still be understood by our interlocutors. Yet the researchers also found three languages that appear to rely almost exclusively on a single frame: speakers of Guugu Yimithirr rely on an absolute frame (with cardinal terms equivalent to 'northern', 'southern', 'eastern', and 'western edge'), while speakers of Mopan (Belize, Guatemala) and Totonac (Mexico) rely on intrinsic frames of reference (Haviland, 1993, 1998; Levinson, 1997; Majid et al., 2004; Pederson et al., 1998). Haviland (1998) notes, however, that in the case of Guugu Yimithirr the term *absolute* may be somewhat misleading, because the language also encodes many locative expressions.

Yet even speakers of languages that encode two or three frames commonly favor one frame in way-finding, direction-giving, pointing, and other everyday activities: speakers of Arrernte (Australia), Balinese (Indonesia), Belhare (Nepal), Hai//om (Namibia), Longgu (Solomons), Tzeltal (Mexico), and Warwa (Australia) prefer absolute frames, and speakers of Dutch, English, and Japanese prefer relative frames (Brown & Levinson, 1993; Levinson, 2003; Levinson et al., 2002; Levinson & Wilkins, 2006a; Majid et al., 2004; Pederson et al., 1998; Wassmann & Dasen, 1998; Widlok, 1997). While undoubtedly influenced by geography and ecological conditions (e.g., Harrison, 2007, on Bantawa in Nepal), this cross-linguistic variation does not appear to be fully determined by external variables. An analysis of twenty languages demonstrated that the ecological zone, type of dwelling (rural or urban) and subsistence mode are not primary determinants of frame choice and neither was typological closeness (Majid et al., 2004). For instance, the three Mayan languages in the study differed in preferred frames – Mopan speakers rely exclusively on intrinsic frames, Tzeltal speakers use absolute and intrinsic ones (favoring the former), and Yucatec speakers use absolute, intrinsic, and relative frames. The key issue in the study of spatial frames of references involves the implications of these differences for verbal and non-verbal cognition, including navigation and 'mental maps'.

3.3.2 *Turning the tables: language and spatial cognition*

Language effects in spatial cognition have been investigated in a variety of areas, starting with acquisition of L1. Bowerman, Choi, and associates (Bowerman & Choi, 2001, 2003; Choi, 2006; Choi & Bowerman, 1991; Choi et al., 1999; McDonough et al., 2003) compared acquisition of spatial relations between interlocking objects in English and Korean. English makes an obligatory distinction between containment (e.g., apple *in* a bowl, videotape *in* a case) and encirclement/support (e.g., ring *on* a finger, cup *on* a table), regardless of the tightness of fit, while Korean differentiates between *kkita* ‘tight fit’ (e.g., ring on a finger, videotape in a case) and *nehta* ‘loose fit’ (e.g., apple in a bowl), regardless of whether the fit is achieved through insertion, encirclement, or surface attachment (Bowerman, 1996a, b; Choi, 2006).

Studies using a preferential-looking/habituation paradigm showed that 9- to 24-month-olds distinguished categorically between tight- and loose-fit containment relations, regardless of whether they were raised in English or Korean environments, suggesting that preverbal infants develop sensitivity to a wide range of spatial relations (McDonough et al., 2003). In contrast, 29- to 36-month-old English-speaking children no longer distinguished between tight and loose fit, and neither did English-speaking adults, while Korean-speaking children and adults continued to make a categorical distinction between the two relations (Choi, 2006). Investigations of spontaneous speech demonstrated that children begin to acquire spatial terms and to use them productively in their second year (16–23 months) (Bowerman & Choi, 2001; Choi & Bowerman, 1991; Choi et al., 1999). The fact that the divergence in performance followed this vocabulary growth led the researchers to argue that acquisition of language-specific constraints affects conceptual organization of the spatial domain, weakening irrelevant distinctions and increasing the salience of the relevant ones (Bowerman & Choi, 2003; Choi, 2006).

Studies of spatial reference frames show that speakers of languages that favor relative frames, such as English, may or may not know at any given point where ‘west’ is; in contrast, speakers of languages that favor absolute frames, such as Hai//om, or Tzeltal, are always aware of their orientation with regard to the main coordinates and display absolute sense of direction in navigation, communication, and recall; disorientation affects them negatively, eliciting tension, anxiety, even depression (Brown & Levinson, 1993; Evans, 2010; Farnell, 2009; Levinson, 1997, 2003; Wassmann & Dasen, 1998; Widlok, 1997). Differences have also been observed in gestures: in speakers of Tzeltal “our own loose gestures to places and directions, made in the English-speaking way with at best rough orientation, gave rise to puzzlement, confusion, and correction” (Brown & Levinson, 1993: 52), while English speakers may be confused by Tzeltal directions, such as: “You go out of here this way, turn this

way again and you'll come to the highway". Such directions, however, are accompanied by precise gestures that disambiguate them, or, in the case of a Siouan language Nakota, by the remnants of the Plains Indian Sign Language (formerly a lingua franca of the Plains tribes and now an auxiliary system) that orient the interlocutor within the local frame of reference grounded in "the four winds" (Farnell, 2009).

Interestingly, the acquisition of spatial frames of reference does not appear to be affected by their complexity: children acquiring languages with absolute systems of reference (judged to be more difficult) produce the relevant linguistic expressions at the same age as children acquiring relative systems and display absolute behavior on both linguistic and non-linguistic tasks (Brown, 2001; Majid et al., 2004). Preferred systems appear to be acquired first: thus, children acquiring Balinese, which encodes both absolute and relative frames, acquire the absolute first: 4–5-year-olds were found to use only the absolute system in memorization and speech (Wassmann & Dasen, 1998).

To examine spatial frame effects in non-verbal cognition, Levinson and his team developed several non-verbal tasks, such as route memorization, route completion (e.g., through a maze) and memorization of spatial layouts. The best-known of these is an *array reconstruction task* called 'animals-in-a-row'. Participants in this task are asked to view objects arranged on a tabletop and to memorize the array. Then they are asked to reproduce it on another table, turned 180 degrees. The rotation does not change fixed coordinates, such as 'north', but it does change the relative coordinates, such as 'left'. As a result, there are three possible solutions to the task. In the absolute or geocentric solution the pig would be positioned 'east' of the cow, in the object-centered solution, the pig would be positioned 'in front' of the cow, and in the relative solution, the pig would be placed to the right of the cow, with regard to the participant's body.

Studies with such non-verbal tasks demonstrated that participants' preferred frames of reference affect memory for small-scale spatial arrays. Speakers of English, Dutch, and Japanese favored relative frames, using their own bodies to position the animals, while speakers of Arrernte, Balinese, Belhare, Guugu Yimithirr, Hai//om, Longgu, and Tzeltal favored absolute frames, positioning the animals with regard to external coordinates (Haun et al., 2011; Levinson, 1997, 2003; Levinson et al., 2002; Majid et al., 2004; Pederson et al., 1998; Wassmann & Dasen, 1998). Some studies, however, failed to replicate 'language effects' and, consequently, argued against language influence on spatial cognition (Bloom & Keil, 2001; Gleitman & Papafragou, 2005; Li & Gleitman, 2002; Li et al., 2011; Munnich & Landau, 2003; Munnich et al., 2001).

Li and Gleitman (2002), for instance, used a simplified version of the 'animals-in-a-row' task and found that participants' coding strategies were affected by environmental conditions (e.g., the presence or absence of landmarks).

Levinson and associates (2002) argued that the study conflated two distinct frames of reference and that the reliance on landmarks should be considered an intrinsic, rather than an absolute, response. They also criticized the simplified design which made the focus on directionality transparent: in one condition, 70 percent of Li & Gleitman's (2002) participants asked clarification questions in order to disambiguate the directions to make 'the same' array. In a follow-up study, Levinson and associates (2002) incorporated environmental variables adopted by Li and Gleitman (2002) and replicated their own findings, while failing to replicate some of the findings of Li and Gleitman's (2002) study.

Li and associates (2011) conducted a study with speakers of Tzeltal, who, in previous work (e.g., Brown & Levinson, 1993), were shown to rely on an absolute system of coordinates, uphill/downhill/across. The researchers found that when tasks had a single correct solution, the participants appealed to the egocentric frame. These findings were treated as evidence against the deterministic version of linguistic relativity, articulated as "the effect of language [that] should persist under these unambiguous conditions" (Li et al., 2011: 35). At the same time, Li and associates (2011) acknowledged that in ambiguous situations and in communicative contexts, interpretations of speech and stimuli are guided by linguistic influences: "people are responsive to probabilities in language use just as they are responsive to plausibilities in the world" (p. 52).

Together, the studies to date show that frame selection in open-ended non-verbal tasks is affected by language and also by other factors, such as the type and complexity of the task ('animals-in-a-row' vs mazes), scale (small-scale vs large-scale spaces), object visibility, participants' levels of education and literacy, and residence in urban vs rural settings (Bennardo, 2000; Levinson, 2003; Li et al., 2011; Pederson, 1995; Wassmann & Dasen, 1998). For instance, Pederson (1995) found that on three problem-solving tasks (memory for spatial layouts, route completion, and object placement) rural Tamil speakers preferred absolute frames and urban speakers (and rural speakers with some education and urban exposure) favored intrinsic ones.

General spatial cognition is also affected by factors other than language. For instance, Istomin and Dwyer (2009) show that despite a similarly nomadic style and reliance on relative and intrinsic frames, Komi and Nenets reindeer herders in Siberia developed distinct methods of orientation, largely because, in seasonal migration, the Komi use established linear paths, while the Nenets move in a circular pattern and often change territory (for a detailed discussion of language and spatial orientation skills among Siberian herders, see also Harrison, 2007).

Today, anthropologists and psychologists continue to debate linguistic, cognitive, and physiological bases of spatial representation and cognition. One attempt to address this issue was undertaken by Munnich and associates (2001), who investigated differences between English, which makes an obligatory

distinction between immediate support through gravity or adhesion (typically expressed with the preposition *on*) and non-support (typically expressed with prepositions *above*, *over*, *below*, etc.) and Japanese and Korean, which use the same terms for locations along the axis, regardless of whether the two objects are in actual contact. The researchers hypothesized that, as a result of these differences, speakers of Japanese or Korean may differ from English speakers in remembering contact information in spatial arrangements. The results, however, revealed no differences among the groups on the spatial memory task, even though in verbal descriptions English speakers obligatorily coded the distinction between contact and non-contact and Korean speakers did not.

The authors interpreted these results as a lack of evidence for ‘language effects’ but faulty methodological assumptions invalidate these conclusions. To begin with, both Korean and Japanese do encode contact relationship, albeit through verbs, yet the authors downplayed the importance of this encoding, arguing that contact verbs “are only used in cases for which context specifically calls for such a distinction” (Munnich et al., 2001: 178). More importantly, the results may have been influenced by the bilingualism of the participants who, in the true and tried fashion, were treated as speakers of their L1s. Munnich and associates (2001) argued that, because their participants were recent arrivals who had learned their English after the age of 12, their language-specific naming patterns would have already been set and “even with substantial exposure to English, participants would not be expected to gain a native-like proficiency in English” (p. 180). They have not considered the possibility that, even with non-native-like L2 proficiency, ten or more years of L2 learning and residence in an English-speaking environment with high linguistic demands could have an impact on L1 competence: as a result, their participants may have performed as bilinguals and not as representative ‘native speakers’ of Japanese and Korean. But what do we really know about bilinguals’ spatial cognition?

3.3.3 *Spatial representations and cognition in bilingual speakers*

To date, only a few studies have explicitly engaged with L2 learning of spatial language (e.g., Ijaz, 1986; Jarvis & Odlin, 2000; Munnich & Landau, 2010). At the same time, most studies of spatial frames discussed above have actually been conducted with bi- and multilingual speakers yet they make only peripheral acknowledgments of L2 Spanish competence among the Maya, L2 English among the Tongans and the Guugu Yimithirr, and L2 Indonesian among the Balinese (Bennardo, 2000; Haviland, 1993, 1998; Levinson, 1997, 2003; Wassmann & Dasen, 1998). The lack of attention to participants’ bilingualism does not diminish the value of the studies, yet the approach which, by Levinson’s (2003) own admission, attempts “to avoid these sociolinguistic complexities” (p. 114) by making the other language invisible cannot tell the

full story of the interaction between language and cognition. In what follows, I will show what a close re-reading of these studies can add to our understanding of the bilingual mind.

L1 influence on L2 spatial categories and internalization of new categories. Ijaz (1986) used a semantic relatedness test and a sentence-completion test to compare representation and use of English spatial prepositions *on*, *upon*, *onto*, *on top of*, *over*, and *above* by native speakers of English and L2 users of English with L1 German and L1 Urdu. The analyses revealed differences between native speakers of English and L2 users who transferred the internal structure of spatial prepositions from their native languages. L1 German speakers, for instance, modeled the representation of *on* on the German *auf*, which has a stronger verticality component, approximating *on top of*. As a result, in sentences with non-vertical meanings (e.g., *dogs must be kept ___ a leash*) German speakers typically inserted the erroneous response *at*. Similar findings come from a study by Jarvis and Odlin (2000) that examined acquisition of L2 English spatial prepositions by speakers of L1 Swedish (which also relies on spatial prepositions) and L1 Finnish (which relies on locative cases). Their analysis of narratives elicited by a segment from Chaplin's *Modern Times* revealed inter-group differences: for instance, in references to the scene where the protagonists sit on a lawn, Swedes showed a strong preference for *in the grass* and Finns for *on the grass*. These preferences were linked to meanings attached to L1 morphemes.

Ijaz (1986) also found that learners did not necessarily transfer spatial representations wholesale, but rather differentiated between core and peripheral members of conceptual categories. Their representations of prototypical meanings of spatial prepositions closely resembled those of L1 English speakers, in contrast, prepositions used in peripheral or figurative meanings (e.g., *the apartment is directly over the variety store*) elicited different responses from L1 speakers of English and L2 users. Similarly, Krzeszowski (1990) found that prototypical uses of the English *over* (e.g., *he jumped over the wall*) were consistently and correctly translated into L1 Polish by advanced learners of L2 English as *nad/ponad* (over). There was significantly less agreement when the uses became less prototypical and literal (e.g., *he fell over*), indicating that the learners did not have a full representation of the L2 preposition, yet were hesitant to make metaphorical extensions of the L1 translation equivalents.

An intriguing glimpse into neural correlates of cross-linguistic influence in this area comes from Emmorey and associates (2005), who found that in descriptions of spatial relations monolingual English speakers display left parietal activation, while ASL–English bilinguals engage the parietal cortex bilaterally. Bilinguals processing spatial language in English still automatically activate the right parietal cortex involved in the visual-motoric transformation required for ASL. This activation was linked to enhanced spatial abilities, such

as mental rotation and image generation, yet it also indicated that, in order to speak one language in a target-like manner, bilinguals may need to suppress the automatic activation of the other language.

Studies conducted by Levinson (1997, 2003) with Guugu Yimithirr speakers may also be interpreted as evidence of L1 influence. Levinson (2003) notes that his experiment participants were men over the age of 40 for whom Guugu Yimithirr was the primary language. In an approach that aimed to minimize “any possible residual effect of ‘thinking for speaking’ in Guugu Yimithirr” (Levinson, 2003: 134), these participants were given English instructions and, in the verbal tasks, responded in English. The results revealed that in both verbal and non-verbal tasks L1 Guugu Yimithirr speakers using L2 English preferred absolute frames rather than the relative ones favored by L1 English speakers. These findings could be reinterpreted as ‘L1 thinking for L2 speaking’ or as L1 effects on verbal and non-verbal performance in the L2 English. Another possibility is that the local variety of English, also known as Hopevale English, is influenced by Guugu Yimithirr.

Convergence and in-between performance. Support for the latter interpretation comes from Levinson (2003), who states that “Hopevale English makes little use of the relative frame of reference” (p. 143), and from Haviland (1993), who notes that in speaking L2 English native speakers of Guugu Yimithirr rely on gestures that transmit the local system of coordinates. Their observations suggest that Hopevale English may display convergence, common for contact varieties, where English terms are linked, through gestures, to the absolute frame of reference adopted from Guugu Yimithirr. Similar findings come from research with Nakota, who complement the use of English with an auxiliary sign language or gestures that orient the interlocutors within the local system of coordinates (Farnell, 2009).

The implications of convergence were explored by Wilkins (reported in Levinson, 2003) in a study with speakers of Arrernte, an Aboriginal Australian language, and two populations of English speakers: residents of Sydney and residents of the Aboriginal community of Alice Springs who live in close contact with Arrernte speakers. His findings demonstrated that on the ‘animals-in-a-row’ task, Arrernte speakers favored absolute frames and English speakers from Sydney relative frames. English-speaking inhabitants of Alice Springs displayed an in-between performance pattern and awareness of two alternative solutions.

L2 influence on L1. An alternative to the in-between pattern is a shift in preferred frames of reference. Such a shift was observed among bilingual speakers in Bali, who adopted relative terms from (spatially relative) Indonesian and used them as descriptors in contexts where largely monolingual Balinese speakers relied on absolute frames (Wassmann & Dasen, 1998).

L1 attrition. Such shift may also lead to attrition, with the dominance of Guugu Yimithirr or Arrernte frames in English being but a transitory

generational phenomenon. Haviland (1993, 1998) and Levinson (1997, 2003) acknowledge that Hopevale Guugu Yimithirr is undergoing simplification under the influence of English and that the younger generation of its speakers – dominant in English – display a simplified grammar and a vastly changed system of cardinal directions, with some speakers no longer aware of the four contrasting cardinal terms. Their falling out of use means that the speakers are no longer forced to maintain unrelenting directional attentiveness and thus display poorer directional acuity than that of the previous generation.

Factors affecting acquisition of L2 spatial categories. To date, only one study has focused on factors that affect acquisition of L2 categories. Munnich and Landau (2010) examined acquisition of L2 English prepositions in 30 L1 speakers of Spanish (mean age = 31.6 yrs, range 18–65 yrs) and 30 L1 speakers of Korean (mean age = 28.3 yrs, range 20–44 yrs). Participants were divided into three groups based on their AoA: (1) 20 early L2 English learners (AoA < 8 yrs), (2) 20 mid-childhood L2 English learners (AoA 8–13 yrs), and (3) 20 late L2 English learners (AoA > 13 yrs). Each group had roughly the same number of speakers of each L1. They were presented with photographs of spatial arrangements (e.g., a blue ball *in* the container, a flower *on* the book) and were required to either fill in the blanks with appropriate prepositions or to judge how well each of two target prepositions fit the pictured relationship. The analysis revealed that AoA (but not LoI) was a reliable predictor of the proportion of correct responses in the mid-childhood range. In the early learner group there was no correlation with AoA, while late learners displayed positive effects of years of English instruction. These findings are further limited (if not invalidated) by the wide variation in participants' ages and by the fact that the authors failed to control for – or even to examine – levels of L2 proficiency.

Together, the studies to date tentatively suggest that the spatial domain is subject to language effects and that in the process of L2 learning speakers may restructure the ways in which they categorize spatial distinctions. These conclusions, however, require systematic testing in a variety of contexts, including ways in which speakers of languages that favor relative and intrinsic frames, like English, learn languages that rely on absolute frames, like Guugu Yimithirr.

3.4 Language effects in numerical, temporal, and spatial cognition: three cows in the field

“In ten, one up and out to three”, calls out charming Heather to our sweaty spin class, busily pedaling away on stationary bikes. Experienced ‘spinners’, we automatically process the first number as a reference to time, ten seconds, the second as a reference to gear, one gear up, and the third as a reference to position, position three. Yet humans did not always live in a world with so many

dimensions encoded in numerical language. Explorations in cognitive archeology, anthropology, and linguistics show that throughout history, humans ventured beyond the limits of language to create new modes of engagement with the material world, such as quantification, measurement, or time-keeping, and new systems of symbolic relations, such as equivalence, serial order, or chronology. The emergence of these systems preceded their linguistic encoding and when they did become encoded they, most likely, went through a period of variable reference, before becoming standardized or grammaticalized, and then spread as a result of linguistic and cultural diffusion. Today, some systems, such as the Julian-Gregorian calendar, may be shared by speakers of diverse languages, and others may separate speakers of the same language, as is the case of the metric and imperial systems used by speakers of English.

The evolution of these systems draws attention to the grounded and embodied nature of the human mind that can appeal to a variety of semiotic means besides language to solve puzzles presented by the environment and to impose a semblance of order on the world. The emergence, transmission, and acquisition of symbolic systems of reference to number, time, and space were facilitated by material anchoring in our own bodies and in symbolic cognitive artifacts, from notches on sticks and bones to clocks and calendars. Language, however, is the primary cultural tool that transmits these systems and, in the process, shapes the habits of the mind by focusing our attention on aspects of the material world (e.g., compass directions) and abstract properties (e.g., time intervals) relevant for everyday communicative practices.

Nevertheless, the widespread and pervasive use of the dominant Western systems perpetuate the illusion of their universality, leading some scholars to treat ‘number’, ‘time’, and ‘space’ as natural and innate categories. To defend such a view of ‘number’, Butterworth (2000) draws a parallel with color perception: “we cannot help but see the cows in the field as brown and white, nor can we help seeing that there are three of them” (p. 7). This is a perfectly adequate description of categorical perception by speakers of English and other languages that encode the categories *cow*, *field*, *brown*, *white*, and *three*. Yet, as seen in Chapter 2, it is less than adequate when it comes to speakers of languages that do not encode the category of *color* or the basic term for *brown* – their perception may be driven by categories that combine texture and shininess and focus on patterns of no note to Butterworth. Butterworth also hedged his bets by limiting the number of cows to three, covered by our number sense. But what if there were five of them? Would the Pirahã see ‘five’ cows? Would they judge these ‘five’ cows to be similar to five AA batteries or five piles of dung? The results of ethnographic and experimental studies suggest that the Pirahã would see *baagi* or *baágiso* [many] cows but may not perceive the analogy or numeric equivalence between the cows and the piles of dung (although they may be very quick to spot the causal relationship),

because ‘number’ is not a natural property of the world any more than ‘color’ is. The touching belief, espoused by Butterworth (2000) in their naturalness, innateness, and universality constitutes the most striking Whorfian effect and the best homage to Whorf.

The studies discussed here also show that for speakers socialized into a particular system, be it the metric system of my own schooling or the shadow system of young Ayaan Hirsi Ali, a transition to a new system may be a perplexing undertaking, where the new words and symbols do not automatically invoke familiar images. Even the world’s leading number expert, Stanislas Dehaene (2011), found it challenging to shift from Celsius to Fahrenheit:

In France, where I was born and raised, we use only the centigrade scale, in which water freezes at 0° and boils at 100°. Even after living in the United States for two years, I still found it difficult to think of 32 °F as cold, because for me 32° automatically evoked the normal temperature on a very warm sunny day! (p. 68)

The key factor in the acquisition of such systems is perceived relevance. A field linguist Evans (2010) confesses that if he failed to attend to compass directions when speaking L2 Kayardild, he would have to “face an embarrassment equivalent to not knowing my wife’s name, or not noticing whether you are male or female” (p. 165). His statement highlights the role of emotions in L2 learning and use and shows that speakers acquire symbolic systems to which they ‘ascribe significance’ and reject the ones they do not find relevant. Thus, in the sixteenth century, the Maya failed to impose their calendar on the devoted Christian Jerónimo de Aguilar, who maintained the Julian calendar and, with it, the chance of salvation. Today, English-speaking missionaries and Portuguese traders have similarly failed in making the Pirahã see the relevance of quantification practices – as a result, mere exposure to Portuguese words did not bring about acquisition of the ‘number’ category (Everett, 2012; Everett & Madora, 2012; Sakel, 2012). Young speakers of Guugu Yimithirr, on the other hand, have abandoned the absolute frame of spatial reference and embraced the relative frame, encoded in their dominant language English.

These outcomes of language contact remind us that language is inherently variable and that communities make choices as to which categories they treat as obligatory. They also remind us that our communication rarely, if ever, involves individual categories in the static world. To consider the interaction between the categories of time, number, and space unfolding in real time, I will now turn to ways in which we construct motion events.

4 Dynamic worlds: Linguistic construal of motion events

Most observers of the Navajo agree that motion pervades the Navajo universe ... In the Navajo films themselves and in the way they talked about what they were going to do in their films, we can see many examples of this inordinate need both to portray motion precisely and to use it as a recurrent theme.

Worth & Adair, [1972] 1997: 200–201

How can we find out what the world looks like through someone else's eyes? We can imagine it, as writers commonly do, or we can try to reconstruct it through people's words, as linguists do, we can even use eye-tracking equipment, as psycholinguists do nowadays. In 1966, communications scholar Sol Worth and cultural anthropologist John Adair, inspired by Whorf's ideas, decided to examine how people film events and then sequence them through the editing process in the hope that "processes involved in cognition might be better understood if the way in which people produced a structure of visual sequences were compared to the way in which the same people structured their verbal language" (Worth & Adair, [1972] 1997: 28).

In order to see the world *Through Navajo Eyes* (1997),¹ Worth and Adair taught film-making and editing to a group of six Navajos in Pine Springs, Arizona, where Adair had conducted his previous research. Pine Springs at the time was a small traditional community of about six hundred people, with a high preponderance of silversmiths and weavers, and had not yet been invaded by television – many of its inhabitants had seen no or very few films. Navajo continued to serve as the language of the home and the community, while English fluency varied by generation: most of the population under thirty was bilingual, while many of the older people spoke no English whatsoever. The six project participants were members of the younger generation who lived their lives through the means of Navajo and English (in contacts with the out-

¹ The 1972 edition of this book went out of print in 1991; in 1997 it reappeared in a revised edition, quoted here. The original films are available for rental from the Museum of Modern Art in New York.

side world), while many of their parents and grandparents were monolingual Navajos.

The teaching took place in English, yet there was a great difference between the movies made by the Navajos and those made by novice American students: in their editing, the Navajos literally ‘cut nature up’ and organized the flow of events in different ways. The timing of the sequences and the links between them, the use of jumpcuts, the lack of continuity of action, and the absence of narrative suspense, perceived as rule-breaking by American audiences, seemed perfectly logical to the Navajos. The Navajo film-makers also displayed unique sensitivity, attention and memory for events in motion and a great desire to portray motion precisely and to use it as a recurrent theme. To produce intricate patterns of the various forms of motion, they played with the speed of the object and camera movements, sometimes moving the camera in the same direction and sometimes in the opposite direction from the object.

The films also portrayed what seemed to be an inordinate amount of walking. At first the researchers thought that it was something Navajos shot when they didn’t know what to show or how to link sequences, and it was only after a series of interviews that they realized “how deeply the concept of walking was embedded in their way of seeing and of showing the world, and how deliberately they planned and used images of walking” (Worth & Adair, [1972] 1997: 146). They linked the focus on walking to the centrality of motion in the Navajo lexicon, with its pervasive and heavily inflected verbs (e.g., Young & Morgan, 1987; Witherspoon, 1977), and concluded that “most of the films and the students’ discussions of the films reflect what might be called a Navajo worldview – in Whorf’s words, a distinctive way not only of looking and organizing the world but a distinctive way of *not* organizing the world” (Worth & Adair, [1972] 1997: 207).

Yet the Whorfian argument that both the films and the motion lexicon reveal a culturally specific way of organizing the world was not of interest to supporters of the Brown-Lenneberg hypothesis, nor did the researchers consider whether the participants’ bilingualism might have affected their performance. To get a better sense of the relationship between language and motion events in monolinguals and bilinguals, in what follows, I will discuss two recent lines of research on language and motion cognition: studies of motion categorization and studies of event construals. This research is not uniform from a methodological point of view, therefore, I will discuss research design in conjunction with specific areas of study. The discussion of each area will begin with typologies that attempt to impose order on cross-linguistic variation and with hypotheses that link linguistic structures to cognition. Then, I will examine what we know about the ways in which monolinguals and bilinguals perceive, categorize, and remember motion events.

4.1 Motion

4.1.1 *Thinking for speaking about motion*

The world would be a very boring place if all we talked about were static spatial relations – things get much more interesting when we talk about actions and thus animate and inanimate entities hurling, reeling, bouncing, and swirling through space. And since we can't talk about actions without a real action hero, let us revisit for a moment the enchanted world of d'Artagnan and his friends created by Alexandre Dumas. Amidst the suspense, intrigue, and seduction of their heady escapades, those of us who read Dumas in translation never gave much thought to the possibility that translators may have added some 'action' to Dumas' descriptions. But take the very beginning of *The Three Musketeers*, where d'Artagnan visits Monsieur de Tréville. Just as he is about to receive a recommendation letter from de Tréville, d'Artagnan looks out the window and spots the stranger who robbed him in Meung – trembling with rage, he *s'élançait* [dashed] out of the room. Then, taking the point of view of de Tréville, Dumas (1995) concludes "*Et il disparut*" [And he disappeared] (p. 106). In a popular 1984 translation by Lowell Blair, we lose this deictic perspective but get the manner in which d'Artagnan disappeared: "And he ran out" (Dumas, 1984: 30). This pattern of addition continues as we follow d'Artagnan's flight out the door and down the stairs:

D'Artagnan, furieux, (1) avait traversé l'antichambre en trois bonds et (2) s'élançait sur l'escalier, dont il comptait (3) descendre les degrés quatre à quatre, lorsque, emporté par sa course, (4) il alla donner tête baissée dans un mousquetaire qui (5) sortait de chez M. de Tréville par une porte de dégagement, et, (6) le heurta du front à l'épaule, lui fit pousser un cri ou plutôt un hurlement. "Excusez-moi, dit d'Artagnan, essayant de (7) reprendre sa course, excusez-moi, mais je suis pressé". A peine (8) avait-il descendu le premier escalier, qu'un poignet de fer (9) le saisit par son écharpe et (10) l'arrêta. (Dumas, 1995: 106)

D'Artagnan, furious, (1) had crossed the anteroom in three strides and (2) was heading for the staircase, intending (3) to run down it, when (4) he collided with a musketeer who (5) had just come through another door. His forehead (6) struck him on the shoulder, making him utter a cry, or rather a howl. "Excuse me, but I'm in a hurry," d'Artagnan said (7) without stopping. (8) He had taken only one step down the stairs when a hand (9) seized his sash and (10) brought him to a halt. (Dumas, 1984: 30)

A quick comparison of the two paragraphs shows that Dumas has a rich palette of motion expressions at his disposal to describe d'Artagnan's hurry and that Blair faithfully renders some of these expressions (clauses 1, 6, 9). A closer look, however, reveals that Blair also adds some stylistic variety to the text: e.g., the verb *s'élançer* [to rush forward, to thrust] is translated as 'dashing' earlier in the episode and as 'heading' later on (clause 2). Blair also 'diversifies' the verb *descendre* [to descend] by specifying the manner of descending:

'run down' (clause 3) and 'take one step down' (clause 8). The same additive approach is taken to the portrayal of Athos' attempt to stop d'Artagnan: in French it is rendered through the succinct *l'arrêta* [stopped him] and in English as a vivid 'brought him to a halt' (clause 10).

The systematic pattern of adding information about motion is not unique to Blair or to translations from French. In a comparative analysis of a set of English and Spanish novels Slobin (1996b) found that the English novels displayed a greater variety of motion verbs than the Spanish ones. The translations from Spanish into English faithfully rendered available information about manner of motion and, in almost a quarter of the cases, also added some. In contrast, translations of English novels into Spanish lost about half of the information about manner and a quarter of information about path.

Slobin's (1996b) explanation of these differences in the treatment of motion is grounded in Talmy's (1985, 1991) typology, which views motion in terms of the following components: (a) *Figure* (F) or the moving object (*D'Artagnan had crossed the anteroom in three strides*); (b) *Ground* (G) or the reference-point object with respect to which the Figure moves, i.e., the source, goal, or location of motion (*D'Artagnan was heading for the staircase*); (c) *Path* (P) or the course followed by the Figure with respect to the Ground (*D'Artagnan intended to run down the staircase*) and (d) *Motion*, which may include Manner and/or Cause (the latter indicating whether the motion is self-propelled/spontaneous or caused) (*D'Artagnan collided with Athos*) (for discussion of other possible components, see Talmy, 1985, 2000).

Based on lexicalization of these components, Talmy (1985, 1991) divided languages into three groups. The first includes languages, such as Atsugewi, that conflate Motion with Figure, as in the English *to rain* or *to spit*. The second includes *satellite-framed languages* (S-languages) that encode manner (and cause) of motion in the main verb and path of motion in the satellites, such as prefixes or particles (e.g., *run out*), thus allowing for compact yet elaborate encoding of complex motion trajectories. This category includes Germanic (e.g., Dutch, English, German, Icelandic, Swedish, Yiddish), Slavic (e.g., Polish, Russian, Serbo-Croatian, Ukrainian), Finno-Ugric (e.g., Finnish), and Sino-Tibetan (e.g., Chinese) languages. The view of *satellites* varies across researchers: Talmy (1985: 102–105) defined satellites as prefixes and particles and excluded inflections and prepositions (for discussion, see also Beavers et al., 2010). In contrast, many other researchers treat prepositions as satellites (e.g., Regier & Zheng, 2007).

The third category consists of *verb-framed languages* (V-languages) that typically encode path in the main verb, leaving the marking of manner optional (e.g., *descendre* [descend]). The V-languages examined to date include Romance (e.g., French, Galician, Italian, Portuguese, Romansh, Spanish), Semitic (e.g., Arabic, Hebrew), Turkic (e.g., Turkish), and sign (e.g., ASL, Sign Language of

the Netherlands) languages, as well as Greek, Japanese, and Korean (Strömqvist & Verhoeven, 2004). The motion lexicon in V-languages consists of a small set of inherently directional (bare) verbs. To achieve elaboration similar to that in S-languages, these verbs must be combined with other verbs, adverbs, and additional clauses (e.g., *descendre les degrés quatre à quatre* [to run down the stairs two at a time]) or with mimetic (sound-symbolic) words and gestures (e.g., Allen et al., 2007). Some V-languages also disallow manner verbs in boundary-crossing situations, such as entering a house (*boundary-crossing constraint*) (Aske, 1989; Slobin & Hoiting, 1994).

Slobin (1991, 1996a,b, 2004a,b, 2006) adopted Talmy's typology to articulate a motion-specific version of his 'thinking for speaking' approach, known as the *manner salience hypothesis*. In this view, language-specific motion encoding serves a 'filtering' function: S-languages, which encode manner in the main verb and rely on finite, high-frequency verbs, draw attention to manner, while V-languages, which encode path in the main verb and manner in non-finite verbs and low-frequency lexical items, phrases or clauses, reduce the salience of manner and draw attention to path.

In the past two decades, the manner salience hypothesis received support from a variety of paradigms. Studies of L1 acquisition and of gestures by deaf children growing up without conventional linguistic input suggest that all children begin at a default starting point paying a more or less equal amount of attention to manner and path (Allen et al., 2007; Maguire et al., 2010; Zheng & Goldin-Meadow, 2002). This sensitivity is then modulated by linguistic input, which results in language-specific lexicalization patterns. Studies with a wide range of S-languages (Chinese, English, Finnish, German, Russian) and V-languages (French, Greek, Japanese, Hindi, Spanish, Turkish, Tzeltal) documented the emergence of such patterns by the age of three (Allen et al., 2007; Berman & Slobin, 1994; Gagarina, 2009; Hickmann & Hendriks, 2010; Hohenstein et al., 2004; Selimis & Katis, 2010; Slobin et al., 2011; Zheng & Goldin-Meadow, 2002). Language-specific patterns also appear to influence interpretation of novel verbs: toddlers (ages 2–2.5) learning English, Japanese, and Spanish interpreted them as path verbs, regardless of language background, while older children (ages 3 and 5) and adults displayed S- and V-specific patterns (Maguire et al., 2010). Selimis and Katis (2010) show that the developmental curve is not always linear: in Greek-speaking children it displayed a U-shape, with the proportion of manner verbs first increasing and then diminishing, with 10-yr-olds reaching the low manner verb frequency level of Greek-speaking adults.

Several studies, known as Frog stories, examined lexicalization patterns in a narrative context, using a picture-book, *Frog, Where Are You?* (Mayer, 1969). Their findings showed that children and adults speaking S-languages (English, German, Icelandic, Swedish) used a wider range of manner verbs, used them

more frequently, and provided more elaborate locative trajectories than speakers of V-languages (Hebrew, Italian, Spanish, Turkish, West-Greenlandic) (Berman & Slobin, 1994; Cardini, 2008; Slobin, 1996a,b; Strömqvist & Verhoeven, 2004).

Some researchers, however, voiced concerns about Mayer's (1969) book, pointing to the ambiguity of static pictures where movement must be inferred (Naigles et al., 1998; Selimis & Katis, 2010), the challenges of using a children's book with adult participants (Berthele, 2008), and differences in narratives elicited by static stimuli, such as Frog story pictures, and dynamic stimuli, such as videoclips (Allen et al., 2007; Loucks & Pederson, 2011; Naigles et al., 1998; Selimis & Katis, 2010). In a study with English- and Greek-speaking children and adults, Selimis and Katis (2010) found that cross-linguistic differences in motion encoding appeared earlier and were stronger in spontaneous conversations than in narratives elicited by films; in turn, in film-based narratives they were more pronounced than in picture-based narratives,

Nevertheless, studies using a variety of (mostly dynamic) stimuli, including cartoons, film segments, and videotapes of motion events, have corroborated the earlier finding that children and adult speakers of V-languages (French, Greek, Italian, Japanese, Spanish, Turkish) lexicalize manner less frequently than speakers of the S-language English (Allen et al., 2007; Cardini, 2010; Gennari et al., 2002; Hickmann & Hendriks, 2010; Naigles et al., 1998; Papafragou et al., 2002, 2006, 2008; Papafragou & Selimis, 2010; Selimis & Katis, 2010). In verb generation tasks, English speakers produced more manner verbs than speakers of Italian, suggesting greater ease of lexical access (Cardini, 2008). Typological differences also affected interpretation of novel verbs by adults: English speakers tended toward a manner interpretation and Spanish speakers toward path (Naigles & Terrazas, 1998).

These studies, however, shared a common limitation with Frog story studies – the focus on speech production. Gesture researchers have justly argued that the absence of an overt mention does not automatically imply that the speaker has not attended to a particular type of information (e.g., Gullberg et al., 2008). Studies that examined both speech and gestures showed that the two modalities form a tightly integrated system where information may sometimes be encoded in one modality and not the other. Yet gestures do not appear to play a compensatory role. Studies by Kita and Özyürek (2003) and Gullberg and associates (Brown & Gullberg, 2008; Gullberg et al., 2008) revealed systematic cross-linguistic differences in gestures accompanying motion talk. Speakers of the S-language English focused more on manner and tended to conflate manner and path in a single verbal clause and a single gesture. In contrast, speakers of V-languages French, Japanese, and Turkish focused more on path and when they did encode manner it often appeared in separate clauses, accompanied by manner-only and path-only gestures. On the other hand,

speakers of the V-language Spanish produced manner gestures in the absence of spoken manner encoding.

Together, studies of motion expression in speech and gesture have demonstrated that cross-linguistic differences in motion encoding lead speakers of different languages to focus on different aspects of motion for verbalization and gesturing and result in systematic differences in habitual lexicalization patterns, the ease of lexical access, and interpretation of novel verbs. These findings supported Slobin's (1996a,b) manner salience hypothesis and extended the notion of 'thinking for speaking' to 'thinking for speaking and gesturing'. The next logical question to ask was whether cross-linguistic differences in motion encoding affect selective attention in non-linguistic tasks. Would French fans of d'Artagnan watching a movie about the three musketeers pay less attention to the way in which he moves than English-speaking members of his fan club?

4.1.2 *Thinking without speaking?*

The interplay between linguistic encoding of motion and non-linguistic cognition has been of interest to researchers for a very long time, as seen in the 1966 Navajo film project (Worth & Adair, [1972] 1997) discussed earlier. Another early study, by Mori (1976), examined the implications of cross-linguistic differences in motion encoding in Japanese, which uses the same words to encode speed and temporal precedence, *hayai* [fast, early] and *oso* [late, slow], and Thai, which uses different terms for speed (*reo* [fast], *shaa* [slow]) and temporal precedence (*khon* [early], *lhang* [late]). The study compared Japanese and Thai preschoolers' assessments of the speed of moving objects (e.g., toy trucks, iron balls) and the duration of movement, as well as the justifications they gave for their answers. The results demonstrated that Japanese children tended to judge the speed of moving objects by temporal precedence and duration by the length of distance, and that spatiotemporal cognition changed more dramatically in the Japanese children upon entry to elementary school. The Thai kindergartners, on the other hand, displayed a better ability to discriminate between the categories of distance and duration, an outcome that was linked to linguistic encoding of these notions in Thai.

At the time, neither Worth and Adair's ([1972] 1997) nor Mori's (1976) study elicited replications or follow-ups. In the past decade, however, there has emerged a new paradigm for examination of motion cognition through the *triad categorization task*, with triads consisting of pictures, animations, or videotapes of the target motion event (e.g., a man jumping off the stairs) and alternates in terms of manner (e.g., a man falling off the stairs) and path (e.g., a man jumping on a couch). In different versions of this task, speakers of S-languages and V-languages may be asked to describe the events portrayed

(*verbal description task*), to decide which alternate is more similar to the target event (*similarity judgment task*), or to decide whether or not they had seen particular stimuli (modified in terms of path or manner) during the previous session (*recognition task*). A few studies used eye-tracking to examine whether speakers of different languages attend to different aspects of motion (Hohenstein, 2005; Papafragou et al., 2008).

The results of the verbal description and naming tasks are consistent with the previous findings: speakers of the S-language English focus significantly more on manner than speakers of V-languages Greek, Italian, and Spanish (Cardini, 2010; Gennari et al., 2002; Papafragou et al., 2002, 2008; Papafragou & Selimis, 2010). Loucks and Pederson (2011), however, found no statistical differences between English and Spanish speakers: both groups favored manner verbs in their descriptions (later on I will return to the likely explanation for this outcome).

Cross-linguistic differences also emerged in the eye-tracking tasks. In a study by Papafragou and associates (2008) Greek and English speakers displayed different patterns of visual preference prior to the verbal description task and the regions that attracted early attention were linked to language-specific preferences. In the non-verbal condition, eye movements were nearly identical until the last phase, where participants studied the last frame for later recall. Hohenstein (2005) found that 7-year-old English-speaking children tended to look longer at the manner matches than Spanish-speaking children of the same age.

Other non-verbal tasks produced conflicting results. In the similarity judgment task, three studies found no language effects (Cardini, 2010; Loucks & Pederson, 2011; Papafragou et al., 2002) and four studies found language-specific preferences for manner or path, in at least some conditions (Finkbeiner et al., 2002; Gennari et al., 2002; Hohenstein, 2005; Papafragou & Selimis, 2010). Bohnemeyer and associates (2006) compared similarity judgments by speakers of 4 S-languages (Dutch, German, Polish, Tiriyo), 12 V-languages (Basque, Catalan, French, Italian, Jalonke, Japanese, Hindi, Spanish, Tamil, Tidore, Turkish, Yucatec) and a serial-verb language, Lao, and found similarities between S- and V-language speakers and also high intra-typological variation. The only group that differed significantly from the others were speakers of the S-language Polish, who displayed the highest percentage of manner preference (85%).

In the recognition task, three studies found no language effects, even when preceded by the verbal description of the stimuli (Gennari et al., 2002; Loucks & Pederson, 2011; Papafragou et al., 2002). In contrast, Filipovič (2011) found a significant difference between speakers of English and Spanish. The participants in her study were asked to watch a block of videos portraying motion events with different types of manner (e.g., jumping, speed-walking, skipping),

to perform a distractor task, and then to watch another block of videos, which maintained the same figure, surroundings, and path as the targets but differed in one of the target manners (e.g., speed-walking replaced by skipping). They were asked to decide whether they had seen an identical event in the previous block. The task had two conditions, verbalization (where participants had to describe the videos) and non-verbalization (where they simply watched the videos). The analysis of recognition errors demonstrated that L1 English speakers performed significantly better than L1 Spanish speakers on the target items (but not on filler items), as would be expected from speakers of an S-language.

To explain the contradictory findings, researchers reconsidered the linguistic demands on ‘non-verbal’ tasks. Finkbeiner and associates (2002) found that the frequency of selection of manner frames by L1 English speakers was lower in the non-memory condition (where the frames could be seen) and higher in the memory condition (where they could not be seen) and interpreted this result as speech planning effects. A similar argument was made by Papafragou and associates (2008), who found language effects in eye-tracking conditions requiring memorization and description and interpreted them as linguistic encoding for subsequent recall. Gennari and associates (2002) and Cardini (2010) found that verbal interference (shadowing), where participants repeat random syllables or numbers after a recording, while viewing the stimuli eradicates language effects (due to interference with vocal or subvocal speech).

The debate about methodological issues in motion studies had both positive and negative outcomes. On the positive side, it led to the realization that some non-verbal tasks are still fundamentally linguistic tasks. On the negative side, it led to circular reasoning which begs the initial question of language effects on cognition and bases the ‘non-linguistic’ status of the task on performance results: cross-linguistic differences on non-verbal tasks are interpreted as evidence of either prior or subsequent linguistic encoding (Finkbeiner et al., 2002; Gennari et al., 2002; Papafragou et al., 2008; Papafragou & Selimis, 2010), even in cases where the researchers’ own data (e.g., the analysis of the relationship between linguistic labels and categorization preferences) do not support such interpretation (e.g., Papafragou & Selimis, 2010). In contrast, similarities are interpreted as ‘evidence against linguistic relativity’, without further consideration of the multiple variables that could have affected the outcomes (Cardini, 2010; Gennari et al., 2002; Papafragou et al., 2002; Papafragou & Selimis, 2010).

A closer scrutiny of the studies, however, shows that methodological choices affect the null findings just as much as they affect the findings of language effects. The first area of potential biases involves instructions. In the study by Gennari and associates (2002), instructions in the naming condition required a single verb phrase. Furthermore, examples for English speakers included only

manner verbs and path satellites and examples for Spanish speakers only path verbs and (bracketed) manner satellites. These suggestive examples may have artificially induced a stronger bias toward language-specific lexicalization patterns. In contrast, Papafragou and Selimis (2010) manipulated instructions to reduce cross-linguistic differences. In Study 1, which revealed cross-linguistic differences, participants were told: *Look! The turtle is doing something. Do you see the turtle doing the same thing now?* In Study 2, the instructions were changed to: *Look! Do you see the same now?* The change in instructions, combined with the change in presentation style (simultaneous instead of sequential), eliminated language effects yet it did so at the expense of clarity, introducing ambiguity in the judgment task (for discussion of clarity of instructions, see also Loucks & Pederson, 2011; for discussion of cross-cultural differences in perceptions of ‘similarity’ see Bohnemeyer et al., 2006).

Task results are also affected by the choice of stimuli: participants looking at static and dynamic stimuli may perform differently because people looking at static pictures infer, rather than perceive, the manner and path of motion (e.g., Allen et al., 2007; Naigles et al., 1998). Loucks and Pederson (2011) also argue against the use of computer animations (used by Bohnemeyer et al., 2006; Finkbeiner et al., 2002), because they differ greatly from motion events in the real world and also because they introduce additional biases, such as novelty.

The separation of manner and path in stimulus design and data analysis is also not as easy as it sounds. Eye-tracking studies in particular cannot always determine whether the participant following the moving figure is focusing on the manner or on the path. Bohnemeyer and associates (2006) also show that performance is influenced by particular types of manner and path: movement up or down a ramp attracts attention to path, while bouncing movement attracts attention to manner.

Task choice may introduce additional biases. Recognition tasks may be too easy and transparent (thus revealing no pattern of errors) or too difficult (thus producing similarly high numbers of errors) (Cardini, 2010), while forced-choice design may bear little resemblance to the categorization processes that take place in everyday cognition (Loucks & Pederson, 2011). Verbal suppression, so popular in research on language and cognition, also raises concerns because it obliterates the executive function we rely on in habitual thought and is thus of dubious ecological validity.

Bohnemeyer and associates (2006), Cardini (2010) and Loucks and Pederson (2011) offer an insightful discussion of design issues in motion research, with Loucks and Pederson (2011) making a compelling argument in favor of more ecologically valid designs. There is one issue, however, they do not mention and that issue – namely, participant selection – is the one that affects their own study. In a time-tested manner, Loucks and Pederson (2011) compared the performance of L1 English speakers to that of Spanish–English bilinguals residing

in the US and treated as L1 Spanish speakers. They were then ‘surprised’ to find that these Spanish speakers did not differ from English speakers in their preference for manner verbs. The researchers did not even consider the possibility of L2 English influence because none of the participants “were exposed to English while growing up at home, and no participant had achieved native-like fluency in English” (Loucks & Pederson, 2011: 118). As in the study by Munnich and associates (2001), discussed in [Chapter 3](#), the lack of ‘native-like fluency’ was assumed to be a sufficient guarantee against L2 influence on L1. Similar assumptions were made by Gennari and associates (2002), who pre-tested their stimuli with native English speakers and Spanish–English bilinguals residing in the US (finding, not surprisingly, no bias toward path among these Spanish speakers), and in the study by Papafragou and associates (2008) whose L1 Greek speakers were in reality Greek–English bilinguals residing in the US, a fact that was not considered in the analysis and only mentioned in a footnote (p. 168).

Yet the problem facing the research on language effects in motion perception and cognition is not as simple as finding the ‘right’ research design and ‘truly’ monolingual participants. Methodological errors may explain some contradictory results but at the heart of the contradictions are more fundamental problems: the limitations of Talmy’s typology and the focus on English as a canonical S-language.

4.1.3 *Moving beyond the S/V dichotomy*

In the past decade, several studies raised concerns about the limitations of Talmy’s (1985, 1991, 2000) typology: some failed to reveal meaningful differences between particular S- and V-languages, others identified S-framed languages with low manner verb usage and V-languages with low path usage, such as Romansh, and yet others identified languages, such as Arrernte or Basque, that do not easily fit within S- and V-categories (Cadierno & Ruiz, 2006; Levinson & Wilkins, 2006a,b; Strömquist & Verhoeven, 2004). To address such concerns, Slobin (2004b, 2006) proposed a third category of *equipollently-framed languages*, such as serial-verb languages, where path and manner have equal weight.

This proposal may not be an adequate solution, because it does not address the larger issues: the universality of motion components, the implicit assumption that verbs play a central role in descriptions of motion events, the conflation of structural options with patterns of preference, and the high intra-typological variation within traditional categories (Beavers et al., 2010; Levinson & Wilkins, 2006a,b). Thus, Levinson and Wilkins (2006b) show that the conflation of manner with instrument (e.g., *ride*, *drive*) and medium (e.g., *float*, *swim*) is not a ‘universal’ and some languages differentiate grammatically

between these components: Tiriyó encodes ‘aquatic’ postpositions that mark movement into and out of liquid. Levinson and Wilkins (2006b) and Beavers and associates (2010) also criticize the focus on the verb at the expense of other forms that encode motion distinctions. For instance, Wilkins (2004) showed that the grammar of Arrernte falls out of the S/V dichotomy because it contains an elaborate category of inflections for encoding of ‘associated motion’ (e.g., ‘do __ act while moving past’). This category focuses speakers’ attention on the interrelationship of motion events and allows them to create more complex motion paths than those encoded by speakers of English.

Concerns about the limitations of Talmy’s (1985, 1991, 2000) typology also emerged from studies that documented a wide array of intra-typological differences within S- and V- categories (e.g., Bohnemeyer et al., 2006; Hasko & Perelmutter, 2010). To illustrate these differences and their importance, I will compare two S-languages, English and Russian. This comparison is particularly instructive because it challenges the common view of English as a canonical manner language and suggests that the research outcomes to date have been negatively affected by the adoption of English as a ‘neutral’ language of convenience. To navigate the intricacies of Russian, I will appeal for help to another action hero, this time a Russian one – the nineteenth-century diplomat and detective Erast Fandorin, the protagonist of the popular historical mystery series by Boris Akunin. Table 4.1 offers a comparison of the Russian original and the English translation of Fandorin’s attempts to retrace the last steps of one murder victim.

Even a reader with little or no competence in Russian can see that now it is English that is getting out of breath trying to catch up with Russian and failing to approximate the Russian compactness. A reader with some Russian competence will also see that Andrew Bromfield, the translator of the Russian novel, is not adding any motion information – this time the information about the manner of motion is lost in translation: e.g., *ne zaezzhali* [did not stop by via riding/driving in and out] is rendered as ‘did not stop off’ (clause 5), *doshel* [reached the destination on foot] as ‘got back’ (clause 8) and *uehali* [rode/drove away, pl] as ‘left’ (clause 9). The opposite pattern appears in translations from English to Russian – in a study that compared the English original and the Russian translation of *The Hobbit*, Slobin (2004a) found that the Russian translator added manner verbs. But wait, aren’t both of them S-languages?

The first key difference between English and Russian lies in obligatoriness of manner encoding. Although English has been treated as the canonical ‘manner’ language, the encoding of manner in English is, in fact, optional, and English speakers commonly rely on high-frequency non-manner verbs *come*, *go*, or *get* (e.g., Table 4.1, clauses 1, 2, 3–4, 5, 8, 9). In contrast, in Russian, manner encoding is near-obligatory: the Russian lexicon has only a few non-manner verbs (e.g., *pribyl* ‘[to arrive], seen in clause 2) and no translation

Table 4.1 *Motion events in Russian and English*

Когда по коридору кто-то (1) шел, Маса прикладывал палец к губам... (Akunin, 1998: 23)	Kogda po koridoru kto-to (1) <u>shel</u> , Masa prikladyl palets k gubam...	Whenever anybody (1) <u>came walking</u> along the corridor, Masa pressed his finger to his lips... (Akunin, 2006: 18)
(2) Прибыли с Брестского вокзала в шестом часу. ...В девять ужинали в здешнем ресторане. Потом (3) поехали (4) кататься по ночной Москве. Никуда (5) не заезжали. (Akunin, 1998: 28)	(2) <u>Pribyli</u> s Brestskogo vokzala v shestem chasu. ...V deviat' uzhinali v zdeshnem restorane. Potom (3) <u>poehali</u> (4) <u>katat'sia</u> po nochnoi Moskve. Nikuda (5) <u>ne zaezzhali</u> .	We (2) <u>arrived</u> here from the Bryansk Station ^a after five o'clock. ... At nine we dined in the restaurant here, then we (3–4) <u>went for a ride</u> to look at Moscow by night. We (5) <u>did not stop off</u> anywhere. (Akunin, 2006: 21)
Сказал, что (6) дойдет пешком, хочет (7) прогуляться. (Akunin, 1998: 28)	Skazal, chto (6) <u>doidet peshkom</u> , hochet (7) <u>proguliat'sia</u> .	He said he would (6) <u>walk the rest of the way back</u> , he felt like (7) <u>taking a stroll</u> . (Akunin, 2006: 22)
До гостиницы-то Михал Дмитрич (8) дошел. (Akunin, 1998: 28)	Do gostinitsy-to Mihal Dmitrich (8) <u>doshel</u> .	Mikhail Dmitrievich (8) <u>got back</u> to the hotel all right. (Akunin, 2006: 22)
И вроде бы все, включая г-генерала, (9) уехали с ней? (Akunin, 1998: 30)	I vrobe by vse, vkluchaia g-general, (9) <u>uehali</u> s nej?	And it appears that all of you, including the general, (9) <u>left</u> with her? (Akunin, 2006: 23)

^a This appears to be a translation error: the original refers to Brest Station. The Bryansk Station did not exist in Moscow in 1882 when the action takes place – it was only opened in 1918.

equivalents of the English generics *come* and *go*. Russian speakers are required to distinguish between motion on foot (*idti/hodit'*) and motion by means of transportation (*ehat'/ezdit'*) (e.g., Hasko & Perelmutter, 2010).

These cross-linguistic differences lead to distinct habitual lexicalization patterns, well attested in Frog story studies. Hasko's (2010a) comparison of Russian and English Frog story corpora shows that Russian speakers use a greater variety of manner verbs and appeal to them more frequently than English speakers.² She also found that in some motion events, Russian speakers used

² Importantly, Hasko (2010a) counted imperfective and perfective verbs as a single lemma, she also collapsed simple motion verbs and prefixed verbs derived from them. If she had counted all of these lemmas separately, the lexical diversity of the Russian corpus would have been significantly higher.

manner verbs 100 percent of the time, while English speakers also appealed to non-manner verbs. Similar findings come from Slobin's (2006) Frog story studies, which show that in descriptions of the owl's exit, Russian speakers used manner verbs 100 percent of the time and English speakers only 32 percent of the time. In Akunin's (1998) novel, the near-obligatory Russian manner encoding often forces Bromfield to add verbiage, be it additional verbs, as in the awkward 'came walking' (clause 1) or collocations and idiomatic expressions (clauses 3–4, 6, 7).

The second difference between Russian and English involves compactness and the amount and type of information about motion events encoded in the verbs. Russian motion verbs obligatorily encode several types of information that are not commonly encoded in English. One critical distinction encoded in Russian but not in English involves *directionality* of motion, grammaticalized through stem variation in paired verbs. In each pair, a *unidirectional verb* refers to motion proceeding in a single direction (e.g., *ehat'* [to ride, drive in one direction]) and a *multidirectional verb* to motion proceeding in/from more than one direction, such as aimless movement, round trips, and habitual or repeated motion (e.g., *ezdit'* [to ride/drive back and forth, repeatedly]). Multidirectionality is not easily translated into English: e.g., in clause 5 in [Table 4.1](#), Bromfield renders *ne zaezzhali* as *did not stop off*. This choice conveys only part of the locative trajectory, while omitting manner (driving) and the round-trip nature of the stop.

The loss of manner information in transition to English is particularly noticeable in translations of Russian poetry, where translators are forced to choose between the rhythm and breathless lightness of the wording on the one hand and the mental image it conveys on the other. Take, for instance, this line from Boris Pasternak's poem:

- (1) Я дал разъехаться домашним. (Pasternak, 1998: 306)
 Ia dal raziehat'sia domashnim.
 [I (have) let ride (in different directions) (my) household (members)]
 I have let my household disperse. (Pasternak, 1983: 132)

Disperse is an inspired choice that preserves Pasternak's rhythm and the mental image of family members moving in different directions from a single point. Yet we also lose the manner encoded in the verb *raziehat'sia* [to ride/drive away from a single point in different directions] and with it the information that the family members are now far away.

This example also highlights the difference in encoding of locative trajectories in the two languages. In English, path may be encoded in the main verb, such as *disperse* or *descend*, yet it is commonly encoded through unbounded satellites (e.g., *up*, *down*). In Russian, the encoding of path is both more compact (bounded) and more distributed, with prefixes, suffixes, verb stems, and

prepositions providing different types of information. Multidirectionality, for instance, is commonly encoded through the verb stem, but in the case of *raziehat'sia* it is the prefix *raz-* and reflexive particle *-sia* that transform a unidirectional verb *ehat'* [to be riding/driving in a single direction] into a multidirectional one.

Another example of compactness and conflation of multiple types of information in a single Russian verb can be found in the translation of a very simple line from Anna Akhmatova:

- (2) А ко мне приходил человек. (Akhmatova, 1973: 52)
- А ko mne prihodil chelovek.
- [And to me came (on foot and left, masc) (a) person.]
- A man came to me. (Akhmatova, 1973: 4)

To preserve Akhmatova's rhythm, the translator selected the generic *came* that conveys the meaning of a visit in the past tense. This translation, however, skips the manner of motion and the temporal contours of a round-trip encoded in the multidirectional imperfective verb *prihodil*, which refers to a bounded event in the past (the man came and already left), in contrast to the perfective unidirectional verb *prishel* which refers exclusively to arrival (the man came).

This distinction takes us to aspect, the third major difference between English and Russian. In English, aspect is a syntactic category that functions in combination with tense; it is not an intrinsic characteristic of English verbs and is not marked in the infinitive. In Russian, aspect is an obligatory lexico-syntactic category, which characterizes all forms of the verb, including infinitives, imperatives, and participles. All Russian verbs belong to one of two aspectual categories – *imperfective*, which refers to the process, state or habitual action, and *perfective*, which refers to achievement or accomplishment – that do not correspond to tense–aspect combinations encoded in English (Hasko & Perelmutter, 2010; Pavlenko, 2010; Zalizniak & Shmelev, 2000).

The intersection of aspect and directionality adds another layer of complexity to the Russian motion verb system, because base imperfective verbs (e.g., *idtilhodit'* [to be walking in a single direction/to walk back and forth]), which form directionality pairs, can be combined with different bounded prefixes to form a variety of perfective verbs (e.g., *poiti* [to start walking]), resulting in aspectual clusters. At times, the same prefix can create a perfective and an imperfective verb (e.g., *shodit'* [to walk somewhere and come back, perf] or [to be descending, imp]) (Janda, 2010). The prefixes thus do a double duty, marking the aspectual category and adding information about the source, goal or trajectory of motion and/or the deictic perspective (e.g., *podoshel* [came over by walking, perf, past tense, masc]).

In Table 4.1, an excellent example of an aspectual pair is found in clauses 1 and 8: in 1, *shel* [was walking, imp] refers to motion in progress and in 8 *doshel* [reached the destination on foot, perf] refers to accomplishment. The translation *got back* conveys this accomplishment, while losing the information about the manner of motion. Once again, poetry offers an even better illustration of what is lost in translation:

- (3) Я сбежала, перил не касаясь, Я бежала за ним до ворот.
(Akhmatova, 1973: 42)
Ia *sbezhalā*, peril ne kasaiaś', Ia *bezhalā* za nim do vorot.
[I ran down, not touching the rails, I was running after him to the gate]
I ran downstairs, not touching the banisters, And followed him as far as
the gate.
(Akhmatova, 1973: 4)

In Russian, Akhmatova plays on the juxtaposition of the aspectual pair *sbezhalā* [down-ran, perf] and *bezhalā* [was running, imp]. The difference in the two actions is not easily conveyed either by the awkward juxtaposition of *ran/was running* or by the repetition of *ran/ran*. The translator's choice *followed* conveys this difference but at the price of manner, providing the reader with an impoverished mental image. Together, these examples show that Russian makes more obligatory and fine-grained distinctions in the domain of motion than English and encodes them in a more compact manner. In Hasko's (2010a) Frog story study, for instance, 75 percent of the Russian motion verbs encoded manner, path, and aspect. They also encoded directionality, tense, deixis, person, number and gender of the Agent (in past tense), boundary reaching and crossing, and spatiotemporal contours of motion events. As a result of these differences, each English motion verb has several corresponding Russian verbs (Hasko & Perelmuter, 2010; Pavlenko, 2010). This discontinuity creates great difficulties for L1 English speakers learning L2 Russian (Gor et al., 2009; Hasko, 2009, 2010b), giving rise to a whole industry of websites and textbooks dedicated solely to Russian motion verbs (e.g., Mahota, 1996; Muravyova, 1986).

The English–Russian comparison highlights two weaknesses in research on motion cognition that stem from the use of the English-centric lens. The first involves the replacement of obligatory encoding with frequent encoding as the source of language effects. The second involves the reliance on English as a canonical manner language. Yet English does not encode manner in an obligatory fashion and is closer to the middle of the manner salience continuum. Unfortunately, Talmy's (1985) typology does not distinguish between Russian and English in terms of obligatoriness, boundedness, compactness, and differentiation in the motion domain and treats both Russian prefixes and English particles as satellites. This approach may be justified from a semantic point of

view but from a psycholinguistic point of view boundedness and morphosyntactic position do matter. Their importance is seen in the distinct treatment of bounded and unbounded morphemes in interlingual identifications made by L2 learners (e.g., Jarvis & Odlin, 2000), including by L1 English learners of L2 Russian who identify English particles and prepositions with Russian prepositions and display difficulties in mapping English morphemes onto the Russian prefix system (Gor et al., 2009; Hasko, 2009, 2010b).

The research to date has not yet considered the impact of boundedness and obligatory encoding. Instead, we see a circular argument that treats language-specific lexicalization patterns as both the cause and evidence of cross-linguistic differences. An approach grounded in encoding frequency does not offer a solid ground for research because it is not clear what level of frequency is necessary to shape language effects. Research in other areas, such as grammatical number (Lucy, 1992b), suggests that language effects arise when languages make certain aspects of the outside world obligatory for grammatical encoding. This means that future studies of motion need to examine a maximally contrastive situation, where the difference is not in degree, but in obligatoriness of encoding of a particular feature. In the case of manner, this means that researchers need to compare V-languages with Slavic S-languages, such as Russian or Polish, where manner encoding is both compact and obligatory or near-obligatory.

Furthermore, there is no reason for motion research to be limited to manner and path. In the past few years, several studies have moved beyond these categories to examine cross-linguistic variation in the encoding of caused motion (Goddard & Wierzbicka, 2009; Kopecka & Narasimhan, 2012; Majid et al., 2007) and the implications of these differences for L1 acquisition (Slobin et al., 2011), habitual lexicalization and gestures (Gullberg, 2011; Majid et al., 2008), and cognitive preferences (Wolff & Ventura, 2009; Wolff et al., 2010).

To give but one example, Wolff and associates (Wolff & Ventura, 2009; Wolff et al., 2010) argue that languages without case systems and with more fixed word order, such as English or Chinese, allow for a greater range of entities in the subject position, including instruments and external forces, which makes sentences like “The knife cut the bread” semantically acceptable. In contrast, case languages, such as Russian or German, limit the subject position to self-energetic entities that can initiate events, such as animate subjects or natural forces. As a result, the Russian translation of the sentence “The knife cut the bread” [*Nozh narezal hleb*] is not semantically acceptable because the bread can only be cut by an animate entity as in *Mat’ narezala hleb* [(The) mother (into slices) cut (the) bread]).

To test the implications of these differences, Wolff and Ventura (2009) asked speakers of English and Russian to select sentences that best described

a set of animations (e.g., *The man in red made* (Russian *zastavil*) *the man in green cross the line* vs *The man in red let* (Russian *pozvolil*) *the man in green cross the line*). They found that in ambiguous situations where the patient's tendency and ability were unclear, L1 English speakers opted for causation verbs (e.g., *make*) and L1 Russian speakers for enabling verbs (e.g., *pozvolit'* [let]). L1 German speakers patterned with L1 Russian speakers in favoring enabling verbs (Wolff & Ventura, 2010). These patterns led the researchers to argue that in ambiguous situations restrictions on external argument positions (i.e., the preference for animate entities) lead speakers of German and Russian to focus on internal properties, such as the entity's intention, while speakers of English or Chinese consider a wider range of possible external arguments.

While future research on motion has a rich array of possibilities, it is important to recognize that the work grounded in Talmy's (1985, 1991, 2000) typology and Slobin's (1996a, 2004a, 2006) manner of salience hypothesis has made an important contribution to the study of language and motion cognition, providing compelling evidence of cross-linguistic differences in yet another domain originally viewed as 'universal'. These differences were documented in habitual language use and gesturing and in thinking for speaking, that is visual attention, perception, categorization, and memorization preceding or following verbal encoding. These findings, in turn, generated momentum in the study of L2 learning and bilingualism, with researchers asking how speakers of two or more languages perceive and lexicalize motion events encoded differently in their respective languages.

4.1.4 Motion categories of bilingual speakers

To date, the majority of the studies with bilingual speakers have focused on L2 learning effects in adults. A few studies have examined motion categories in other bilingual populations, such as L1 attriters and bilingual children, and some studies combined speech and gesturing about motion. The overview below excludes studies where the number of bilingual participants is in single digits because, given intrinsic variation within any speech community, it is not clear whether any generalizations can be made on the basis of case studies with four or six participants. The studies, summarized in Table 4.2, investigate three types of language interactions: L1 speakers of V-languages learning an S-language; L1 speakers of S-languages learning a V-language; and a within-category transition of speakers of one S-language (e.g., English) learning another (e.g., Russian). The majority of the studies examine the encoding of manner and locative trajectories in speech (and sometimes gesture), however, a few studies also consider other dimensions of motion, such as causation or placement.

Table 4.2 *Bilinguals' motion categories*

Studies	Languages	Participants	Tasks & stimuli	Findings
Vermeulen & Kellerman (1998)	L1 English L1 Dutch L2 English	53 participants: 7 English monolinguals in the UK 46 L1 Dutch learners of L2 English: 15 12-year-olds 16 16-year-olds 15 1st year university students	<i>Task</i> : oral narrative elicitation in L1 and L2 <i>Stimulus</i> : Mayer (1969)	L1 influence, proficiency effects
Kaufman (2001)	L1 Hebrew L2 English	30 Hebrew–English bilinguals in the US (ages 6–14 yrs, LoE 2–14 yrs)	<i>Task</i> : oral narrative elicitation in L1 <i>Stimulus</i> : Mayer (1969)	L1 attrition or incomplete acquisition
Finkbeiner et al. (2002)	L1 English L1 Japanese L1 Spanish L2 English	148 participants: Study 1 21 English monolinguals 24 Japanese monolinguals 17 Japanese–English bilinguals 23 Spanish–English bilinguals Study 2 63 English monolinguals	<i>Task</i> : similarity judgment task in L1 <i>Stimuli</i> : 10 triads of animations of novel motion events	L1 influence, task effects
Cadierno (2004)	L1 Spanish L1 Danish L2 Spanish	32 participants: 16 Spanish monolinguals 16 L1 Danish learners of L2 Spanish (8 advanced, 8 intermediate)	<i>Task</i> : written narrative elicitation in L1 and L2 <i>Stimulus</i> : Mayer (1969)	L1 influence
Cadierno & Ruiz (2006)	L1 Spanish L1 Italian L1 Danish L2 Spanish	48 participants: 16 Spanish monolinguals 16 L1 Italian learners of L2 Spanish 16 L1 Danish learners of L2 Spanish	<i>Task</i> : written narrative elicitation in Spanish as L1 or L2 <i>Stimulus</i> : Mayer (1969)	L1 influence

Hohenstein et al. (2006)	L1 Spanish L2 English	37 participants: 18 early Spanish–English bilinguals (mean age = 23 yrs, AoA < 5 yrs, mean LoE = 19.2 yrs) 19 late Spanish–English bilinguals (mean age = 34 yrs, AoA > 12 yrs, mean LoE = 14.7 yrs)	<i>Task</i> : online event description task <i>Stimuli</i> : 12 videos of motion events, with each path presented in two manners of motion	Bidirectional influence, in-between performance
Gor et al. (2009)	L1 Russian L1 English L2 Russian L2 English	70 participants: 10 Russian monolinguals (mean age = 36 yrs, range 20–54 yrs) 24 Russian–English bilinguals (mean age = 22 yrs, range 18–51 yrs, mean AoA = 8.5 yrs, range 0 – 13 yrs) 36 advanced American L2 learners of Russian (mean age = 31 yrs, range 21–56 yrs)	<i>Tasks</i> : (1) online grammaticality judgment task, (2) sentence-completion task, restricted control (production) task, sentence completion in Russian as L1 or L2	Incomplete L1 and L2 acquisition, proficiency effects
Hasko (2009, 2010b)	L1 English L1 Russian L2 Russian	89 participants: 30 Russian monolinguals (mean age = 19 yrs) 29 English monolinguals (mean age = 22 yrs) 30 advanced American learners of L2 Russian (mean age = 26.5 yrs, mean LoI = 5.3 yrs)	<i>Task</i> : oral narrative elicitation in L1 and L2 <i>Stimulus</i> : Mayer (1969)	incomplete L2 acquisition, L1 influence
Wolff & Ventura (2009)	L1 English L1 Russian L2 English L2 Russian	110 participants: Study 1 16 English monolinguals 16 Russian monolinguals (mean age = 50 yrs, range 30–68 yrs) 16 Russian–English bilinguals (mean age = 38.6 yrs, range 32 – 54 yrs, mean LoE = 6.9 yrs, range 5 – 10 yrs) Study 2	<i>Task</i> : sentence-picture-matching task <i>Stimuli</i> : Study 1 3 animations, 6 sentences Study 2 12 animations divided into four series, 24 sentences	L2 influence on L1

Table 4.2 (*cont.*)

Studies	Languages	Participants	Tasks & stimuli	Findings
Cadierno (2010)	L1 Danish L1 German L1 Russian L1 Spanish L2 Danish	16 English monolinguals	<i>Task:</i> (1) picture description task, (2) vocabulary production task, (3) vocabulary recognition task in Danish as L1 or L2 <i>Stimulus:</i> 12 pictures of boundary-crossing events	L1 influence
		16 Russian monolinguals (mean age = 48.2 yrs, range 34–68 yrs)		
		16 Russian–English bilinguals residing in the US (mean age = 34.2 yrs, range 27–43 yrs)		
		14 English–Russian bilinguals residing in Russia (mean age = 21.4 yrs, range 19–24 yrs)		
Lemmens & Perez (2010)	L1 Dutch L1 French L2 Dutch	48 participants: 12 L1 speakers of Danish 12 L1 German L2 learners of Danish 12 L1 Russian L2 learners of Danish	<i>Tasks:</i> argumentative essays, written tasks performed for exams	L1 influence
		12 L1 Spanish L2 learners of Danish		
		LoE 1.5 – 2.5 years L1 Dutch text corpus (52,000 words) L2 Dutch corpus of 1,247 texts written by L1 French learners of L2 Dutch (323,921 words)		
Pavlenko (2010)	L1 English L1 Russian L2 English	289 participants: 99 Russian monolinguals 116 English monolinguals 70 late Russian–English bilinguals (AoA 6 – 31 yrs; LoE 0.5 – 17 yrs)	<i>Task:</i> narrative elicitation in L1 and L2 <i>Stimuli:</i> 6 videoclips; Mayer (1969)	L1 maintenance in late bilinguals, L1 attrition (or incomplete acquisition) in early bilinguals
		4 early Russian–English bilinguals (AoA 0.5 – 3 yrs; LoE 16 – 23 yrs)		

Brown & Gullberg (2008, 2010, 2011)	L1 English L1 Japanese L2 English	57 participants: 13 English monolinguals (mean age = 27 yrs, range 18–48 yrs) 16 Japanese monolinguals (mean age = 38 yrs, range 34–44 yrs) 15 Japanese–English bilinguals in Japan (mean age = 36 yrs, range 19–47 yrs, mean AoA = 11.9 yrs, range 9–13 yrs) 13 Japanese–English bilinguals in the US (mean age = 30 yrs, range 21–45 yrs, mean AoA = 12.8 yrs, range 12–14 yrs)	<i>Task</i> : oral narrative elicitation task in L1 and L2 <i>Stimuli</i> : Canary Row (Freleng, 1950)	Bidirectional influence
Hendriks et al. (2008), Hendriks & Hickmann (2011)	L1 French L1 English L2 French	60 participants (mean age = 20 yrs): 12 English monolinguals 12 French monolinguals 36 English-French bilinguals: 12 low-intermediate mean LoE = 1 month 12 high intermediate 12 advanced mean LoE = 1 year	<i>Task</i> : oral narrative elicitation task in L1 and L2 <i>Stimuli</i> : 32 animated cartoons which differed in ground referent, path and manner of motion, figure object, and manner of cause	L1 influence, profi- ciency effects
Daller et al. (2011)	L1 German L1 Turkish L2 German	205 participants: 30 German monolinguals (mean age = 13.7 yrs, range 13–15 yrs) > Story 1 23 German monolinguals (mean age = 15.7 yrs, range 13–20 yrs) > Story 2 40 Turkish monolinguals (mean age = 13.2 yrs, range 12–14 yrs) 28 Turkish monolinguals (mean age = 20.7 yrs, range 19–24 yrs) 49 Turkish-German bilinguals in Germany 20 university students (mean age = 21.1 yrs, range 18–26 yrs) 29 secondary school students (mean age = 14.9 yrs, range 13–19 yrs)	<i>Tasks</i> : oral narrative elicitation in L1 and L2 <i>Stimuli</i> : (1) the Ball story; (2) the Bank story, from Plauen (1996 [1952])	Bidirectional influ- ence, context effects

Table 4.2 (*cont.*)

Studies	Languages	Participants	Tasks & stimuli	Findings
Filipović (2011)	L1 English L1 Spanish L2 English	35 Turkish-German bilinguals in Turkey, returnees from Germany (mean age = 20.8 yrs, range 17–26 yrs; mean age of return to Turkey = 13.3 yrs, range 10–16 yrs) 90 participants: 30 English monolinguals (mean age = 21 yrs) 30 Spanish monolinguals (mean age = 19 yrs) 30 early Spanish-English bilinguals (mean age = 27 yrs, AoA range 0–7 yrs), US residents enrolled in a medical interpreting course	<i>Tasks:</i> recognition <i>Task</i> <i>Stimuli:</i> 12 videoclips, each portraying three manners of motion	L1 influence
Gullberg (2011)	L1 Dutch L1 German L2 French	24 participants: 12 L1 Dutch learners of L2 French 12 L1 German learners of L2 French (LoI 9–11 yrs)	<i>Tasks:</i> oral descriptions of videoclips from memory <i>Stimuli:</i> videoclips	L1 influence on gestures
Larrañaga et al. (2011)	L1 English L2 Spanish	68 participants: 19 level 1 L1 English learners of L2 Spanish 19 level 2 L1 English learners of L2 Spanish 30 level 3 L1 English learners of L2 Spanish (mean LoE = 6 mos)	<i>Task:</i> oral narrative elicitation <i>Stimulus:</i> the Bank story, from Plauen (1996 [1952])	L1 influence
Berthele (2012)	L1 Romansh L1 German L2 German	37 participants: 13 L1 speakers of Romansh 6 L1 speakers of standard German 6 L1 speakers of Swiss German 12 L1 Romansh speakers of L2 German	<i>Tasks:</i> description of videoclips <i>Stimuli:</i> videoclips	L1 influence

Pavlenko & Volynsky (2012)	L1 English L1 Russian L2 English	99 participants: 38 English monolinguals 31 Russian monolinguals 30 Russian–English bilinguals: 10 early bilinguals (mean age = 21.3 yrs, AoA 0–6 yrs) 10 childhood bilinguals (mean age = 19.6 yrs, AoA 7 – 13 yrs) 10 late bilinguals (mean age = 25.1 yrs, AoA 14–31 yrs)	<i>Task:</i> narrative elicitation in L1 and L2 <i>Stimuli:</i> Mayer (1969)	Co-existence of language-specific patterns, no AoA effects
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4.1.4.1 *V > S transition: speakers of V-languages learning S-languages* Talmy's (1985, 1991, 2000) typology predicts that a transition from path-focused V-languages to manner-rich S-languages is more challenging than vice versa, because the learners have to acquire the habit of attending to manner of motion and encoding it in speech.

L1 influence. Studies of manner and path encoding support this prediction and reveal continuous L1 influence of V-languages (Japanese, Spanish) on S-languages (Danish, English) in speech and gestures (Brown & Gullberg, 2008, 2011; Cadierno, 2010) and in non-verbal tasks (Finkbeiner et al., 2002). For instance, Cadierno (2010) found that in descriptions of boundary-crossing events, L1 Spanish learners of L2 Danish favored constructions with non-manner verbs and path satellites and non-boundary-crossing expressions, whereas L1 Danish speakers used mostly manner verbs with path satellites. L1 Spanish learners of L2 Danish also differed from L1 Danish speakers in the vocabulary production task, generating significantly fewer manner verbs, and in the recognition task, where they recognized significantly fewer motion verbs. Filipovič (2011) found that even early Spanish–English bilinguals display less sensitivity to manner than English monolinguals and pattern with Spanish monolinguals in memory for manner of motion.

Several studies of V>S transition have examined other dimensions of motion, such as placement and posture. The key distinction here is between languages that use a generic 'dummy' verb to encode posture or placement (e.g., French *mettre*, Romansh *metter* [to put]) and languages that require differentiation between different types of placement (e.g., German *setzen* [to set], *legen* [to lay], *stellen* [to stand]) or posture (e.g., Dutch *staan* [to stand], *liggen* [to lie], and *zitten* [to sit]). In a study of a written corpus, Lemmens and Perrez (2010) found that under the influence of L1 French, learners of L2 Dutch underuse Dutch posture verbs, confuse the meanings of different posture verbs, and sometimes extend them inappropriately. A similar pattern was identified by Berthele (2012) in the speech of Romansh–German bilinguals, whose selection of placement verbs revealed traces of the L1 Romansh influence in the frequent usage of the basic German verb *tun* [to do] (appropriate although stylistically marked) and overgeneralization of the German verb *legen* [to lay]. These patterns suggested that they had not fully internalized the categorical distinctions made in German.

Internalization of new categories. Some L2 learners, however, do internalize new motion categories and lexicalization patterns. Daller and associates (2011) found that Turkish–German bilinguals residing in Germany learned to override the boundary-crossing constraint encoded in L1 Turkish and did not differ from monolingual German speakers in the use of manner verbs in a boundary-crossing context. Lemmens and Perrez (2010) argued that incorrect semantic extensions of L1 French learners of L2 Dutch also show that they

are beginning to internalize the key conceptual distinctions encoded in Dutch posture verbs.

Bidirectional influence, convergence, and in-between performance. Hohenstein and associates (2006) found bidirectional influence in motion event descriptions of Spanish–English bilinguals, who used significantly more manner verbs in L1 Spanish than Spanish monolinguals (L2 influence) and more path verbs than monolingual English speakers in L2 English (L1 influence). Daller and associates (2011) documented in-between performance in lexicalization of locative trajectories and the frequency of use of path satellites by Turkish–German bilinguals. What is particularly interesting is that, on all but one measure, bilinguals residing in Germany and Turkey were similar to each other in both L1 Turkish and L2 German. Their difference from the two monolingual groups was particularly pronounced in the linearization of clauses in L1 Turkish, suggesting a degree of convergence. Brown and Gullberg's (2008, 2011) analysis of speech and gestures of Japanese–English bilinguals revealed that in the encoding of manner the participants patterned with L1 Japanese speakers in both L1 and L2, displaying L1 influence on L2 English. Yet they also patterned with L1 English speakers by encoding manner in speech but not in the accompanying gestures, a pattern interpreted as L2 influence on L1 performance. In the encoding of path, bilingual speakers patterned between L1 Japanese speakers, who favored verbs, and L1 English speakers, who favored adverbials.

L2 influence on L1. Studies of bilingual motion talk also provide evidence of the influence of L2 S-languages on L1 V-languages. Hohenstein and associates (2006) identified the influence of L2 English on L1 Spanish in the use of both manner and path verbs. Daller and associates (2011) found L2 German influence on L1 Turkish in lexicalization of locative trajectories, the frequency of use of path satellites, and linearization of clauses. This influence was particularly pronounced in the group residing in Germany, whose choices differed from those of Turkish monolinguals and patterned with the choices made by German monolinguals. Returnees, i.e., bilinguals who returned from Germany to Turkey, also displayed some L2 German influence, particularly visible in the frequency of use of path satellites. The researchers found that the influence may be limited to particular aspects of motion talk: for instance, the boundary-crossing constraint was preserved in L1 Turkish despite the absence of such constraint in L2 German. These findings suggest that L2 influence may have also affected the results of Papafragou and associates (2008) whose Greek–English bilinguals diverged from the L1 Greek preference for path verbs – instead, they were equally likely to use either a path or a manner verb for descriptions of bounded events (i.e., events with a culminated path). Given that all of the bilingual participants resided in the US and thus had their L2 English highly activated, if not dominant, it is possible that they displayed the effects of the L2 English on L1 Greek lexicalization patterns.

L1 attrition and incomplete acquisition. Prolonged residence in the L2 context may also lead to L1 attrition and incomplete L1 acquisition. Kaufman's (2001) study of Frog story narratives elicited from Hebrew–English bilingual children in the US provides evidence of both processes. The analysis revealed a shift from lexically specified monolexemic verbs, common for L1 Hebrew, to verb and particle combinations, common for L2 English. In addition to such combinations, some participants also added unnecessary particles to L1 Hebrew verbs. While these findings may qualify as L2 influence on L1, the study also provides evidence of incomplete acquisition (or, for the older participants, L1 attrition) seen in the lack (or, alternatively, loss) of lexical specificity and the overuse of the general-purpose verb *halax* [to go] with particles.

4.1.4.2 *S > V transition: speakers of S-languages learning V-languages* The transition from S- to V-languages may be seen as less demanding, because the learners are not required to acquire a new 'focus of attention', yet it can still be challenging because they need to restructure their lexicalization patterns by shifting path expression from satellites to main verbs and to acquire new rules, such as the boundary-crossing constraint.

L1 influence. Studies that examined the S-to-V transition show that L2 learners – in particular at the earlier stages – also display L1 influence in L2 motion talk. Cadierno (2004) found that L1 Danish learners of L2 Spanish transferred L1 lexicalization patterns into L2 encoding of locative trajectories. This transfer resulted in more complex and elaborate path descriptions than those of L1 Spanish speakers. These descriptions, however, were created at the expense of grammatical accuracy, as seen in *satellization*, that is constructions with anomalous path particles (e.g., **El niño fue arriba de una roca* [The boy went on top of a rock]). Cadierno and Ruiz (2006) confirmed this pattern and also found that the learners transferred the L1 Danish pattern of using manner verbs in boundary-crossing contexts, disallowed in Spanish.

A similar satellization pattern was identified in studies of voluntary and caused motion expression (Hendriks et al., 2008; Hendriks & Hickmann, 2011). L1 English learners of L2 French at all levels of proficiency provided less information (*low density*) in L2 French than L1 speakers of French and English. In descriptions of voluntary motion they did provide path information – in accordance with the French pattern – but their descriptions of caused motion expressed path significantly less frequently than native speakers of either language (*avoidance*), because they have not yet fully internalized the French pattern of coding path through the main verb. In the absence of L1 English-like satellites in French, some learners transformed French path verbs into idiosyncratic satellite-like expressions. Larrañaga and associates (2011) identified similar difficulties in L1 English learners of L2 Spanish. In story-telling these learners favored cognate path verbs, such as *entrar* [enter], and

English-like manner verbs, such as *correr* [run] or *andar* [walk], whereas in the boundary-crossing situation, only a few advanced-level students correctly encoded manner in a satellite.

In a study of placement verbs, Gullberg (2011) found that L1 Dutch and L1 German learners of L2 French produce target-like French placement expressions. This is not surprising, because French, like Romansh, has only one translation equivalent of several placement verbs encoded in German and Dutch. Yet the learners also displayed residual L1 influence in gesture patterns: L1 Dutch speakers used more object gestures than native speakers of French, and L1 German speakers aligned more gestures with goal phrases.

4.1.4.3 *S > S transition: L1 speakers of S-languages learning other S-languages* The third group of studies involves a within-category transition, which should also be unproblematic. Yet recent studies show that the transition from English to Slavic languages is extremely challenging because it requires learners to attend to new types of information and to encode it obligatorily in a more compact manner through verb stems and prefixes.

L1 influence. Given the complexity of the Russian verb system, it is not surprising that even advanced L1 English learners of L2 Russian display L1 influence. Hasko (2009, 2010b) identified two types of L1 semantic transfer in Frog story narratives by advanced American learners of L2 Russian. The first type involves manner of motion and stems from incorrect interlingual identifications between generic English verbs, such as *go*, and manner-specific Russian verbs, such as *idti* [to go on foot, to walk]. For instance, one study participant produced a sentence *Sova prishla i mnogo pchel prishli* [The owl walked-in and many bees walked-in, pl]. This advanced L2 learner was familiar with the verb *letet'* [to fly], yet in spontaneous speech fell back on the incorrect interlingual identification between the generic English *come* and the manner-specific Russian *idti*. The second type of transfer stems from incorrect interlingual identifications between inherently unidirectional English motion verbs and multidirectional Russian verbs. An example of such transfer is seen in another learner's sentence: *Liagushka polzala iz banki* [(The) frog was crawling around out (of) (the) jar] (an appropriate choice here would have been *vypolzla* [crawled-out, perf, past tense, fem]).

This and other studies suggest that even highly advanced American learners of L2 Russian identify L2 Russian motion verbs with their L1 English equivalents and display lack of sensitivity to directionality and only limited ability to map unidirectional and multidirectional verbs onto real-world actions and events: they fail to differentiate systematically between unidirectional and multidirectional verbs and to process these verbs in a target-like manner (Gor et al., 2009; Hasko, 2009, 2010b).

Internalization of new categories. L1 Russian speakers, on the other hand, appear to be more successful in acquisition of Germanic S-languages. Cadierno's (2010) study of L1 Russian and L1 German learners of L2 Danish shows that both groups patterned with L1 Danish speakers in lexicalizing boundary-crossing events predominantly through manner verbs with path satellites and in the proportion of manner verbs generated in the vocabulary production task. At the same time, both learner groups differed from L1 Danish speakers in the use of non-boundary-crossing expressions and in recognition of manner verbs and of motion verbs in general.

L2 influence on L1 and in-between performance. Wolff and Ventura (2009) examined how Russian–English bilinguals use L1 Russian to describe ambiguous situations in which characters appeared unable to accomplish the action on their own. They found that their participants patterned with L1 English speakers in the preference for causal verbs (e.g., *zastavit'* [make]) and not with L1 Russian speakers, who favored enabling verbs (e.g., *pozvolit'* [let]). Somewhat weaker L2 influence was found in English–Russian bilinguals performing the task in L1 English. These American students studying in Moscow diverged from both patterns, using causal verbs less frequently than L1 English speakers and more frequently than L1 Russian speakers. This in-between performance may indicate the beginning of the restructuring process.

L1 attrition. The findings of L2 influence on L1 also suggest a possibility of L1 attrition in the motion lexicon, yet the studies to date show that in late or adult bilinguals the motion lexicon may be relatively stable. Studies conducted with several populations of Russian–English bilinguals reveal similarities in the use of L1 Russian motion lexicon by relatively monolingual and bilingual L1 Russian speakers (Pavlenko, 2010; Pavlenko & Volynsky, 2012).

Incomplete L1 acquisition. At the same time, studies with early Russian–English bilinguals, also known as *heritage speakers*, have documented incomplete acquisition of aspect and directionality in the L1 Russian lexicon. Gor and associates (2009) found that on the grammaticality judgment task early bilinguals were more willing than American L2 learners of Russian to accept the incorrect substitution of multidirectional verbs by unidirectional ones, demonstrating low sensitivity to distinctions in directionality.

Supporting evidence of incomplete acquisition of directionality and aspectual distinctions in L1 Russian comes from case studies of early bilinguals. Polinsky (2008) found that her study participants no longer perceived Russian verbs as perfective or imperfective – instead, following the constraints of English, they retained only one member of each aspectual pair, which they treated as lexical items without specified aspectual value. In Pavlenko's (2010) study, narratives by early Russian–English bilinguals displayed simplification of aspect, directionality, and manner distinctions. For instance, under the influence of the English *go*, the participants extended the L1 Russian verb *idti* [to

walk] to references to riding/driving, climbing, crawling and flying, thus patterning with L1 English speakers learning L2 Russian.

4.1.4.4 Factors affecting bilinguals' performance in the domain of motion Factors that affect motion framing by bilingual speakers include AoA, CoA, LoE, L2 proficiency, and language dominance. AoA and LoE were shown to affect the maintenance of the L1 motion lexicon, with early bilinguals most likely to display L2 influence on L1 and incomplete L1 acquisition (Gor et al., 2009; Hohenstein et al., 2006; Kaufman, 2001; Pavlenko, 2010; Pavlenko & Volynsky, 2012).

Vermeulen and Kellerman (1998) revealed the influence of proficiency (or, more specifically, diversity of the individual lexicon) on expression of causation in L2 English by L1 Dutch speakers. The effects of proficiency were also documented by Gor and associates (2009) in the grammaticality judgment task, where participants' accuracy in judging Russian verbs of motion rose incrementally with the rise in proficiency levels measured by the Oral Proficiency Interview. The study also documented the importance of the CoA: in the verb and sentence-completion tasks, heritage Russian speakers outperformed American L2 learners of Russian with similar levels of proficiency. Daller and associates (2011) documented the effects of language dominance and the context of language use: Turkish–German bilinguals living in Germany patterned with monolingual German speakers in lexicalization of locative trajectories, while bilinguals living in Turkey patterned with monolingual speakers of Turkish. In contrast, Brown and Gullberg (2008, 2010, 2011) found that Japanese–English bilinguals with intermediate proficiency levels displayed evidence of L2 influence on L1 in speech and gesture, regardless of the CoA and the context of language use.

Together, the findings of motion studies reveal that in order to talk about motion in a target-like manner, L2 learners have to restructure their lexicalization patterns and linguistic categories. Yet they do not answer the question of whether our languages shape what we see.

4.2 Event construal

4.2.1 Aspect and cross-linguistic variation in event construals

The categories like path or manner focus primarily on spatial properties of motion events, yet motion is a process that takes place both in space and time. Different languages – and different goals – may lead us to different verbalizations of the spatial and temporal dimensions of motion events. Take, for instance, such a simple action as dressing. If all we are interested in is the final result, we can simply say that someone 'put their clothes on', action completed.

Or we can follow the whole process, as does Bernhard Schlink (1997a) in *The Reader*, where he offers a languorous description of Hanna Schmitz putting on her stockings:

Sie zog die Kittelschürze aus und stand in hellgrünem Unterkleid. Über der Lehne des Stuhls hingen zwei Strümpfe. Sie nahm einen und raffte ihn mit wechselnd greifenden Händen zu einer Rolle. Sie balancierte auf einem Bein, stützte auf dessen Knie die Ferse des anderen Beins, beugte sich vor, führte den gerollten Strumpf über die Fuß spitze, setzte die Fuß spitze auf den Stuhl, streifte den Strumpf über Wade, Knie und Schenkel, neigte sich zur Seite und befestigte den Strumpf an den Strumpfbändern. Sie richtete sich auf, nahm den Fuß vom Stuhl und griff nach dem anderen Strumpf. (Schlink, 1997a: 15)

She took off the smock and stood there in a bright green slip. Two stockings were hanging over the back of the chair. Picking one up, she gathered it into a roll using one hand, then the other, then balanced on one leg as she rested the heel of her other foot against her knee, leaned forward, slipped the rolled-up stocking over the tip of her foot, put her foot on the chair as she smoothed the stocking up over her calf, knee, and thigh, then bent to one side as she fastened the stocking to the garter belt. Straightening up, she took her foot off the chair and reached for the other stocking. (Schlink, 1997b: 13)

Schlink's fine-grained description of fairly trivial actions is quite unusual – we are more likely to encounter such listing of minor sub-components of action in the IKEA instructions (turn this, insert that). But that's precisely why I picked this passage – its purpose is to remind us that the primary factors shaping event segmentation and verbalization are the nature of the linguistic task and the speaker's or writer's intent. Schlink's (1997a) description violates common writing conventions in order to slow down the motion, to portray Hanna through the eyes of the teenage protagonist Michael Berg, who is watching her through the door crack, and ultimately to draw the reader into the world of seduction. And writing conventions may not be all that Schlink breaks – recent scholarship indicates that this passage may also diverge from the conventions of German where motion events are commonly described from a holistic perspective, as single bounded macro-events (e.g., von Stutterheim & Nüse, 2003).

The studies of event construal are commonly grounded in Levelt's (1989) model of language processing, which differentiates between *macroplanning* (deciding what to say) and *microplanning* (deciding how to say it). Habel and Tappe (1999) and von Stutterheim and associates (von Stutterheim, 2003; von Stutterheim & Nüse, 2003) adopted this framework to articulate the *grammatical aspect hypothesis*, which links grammaticalization of aspectual distinctions to selection and organization of event information. This hypothesis follows Levelt's (1989) proposed progression from the conceptualizer (macroplanning) to the articulator (microplanning) but diverges in the underlying assumptions. Levelt (1989) views macroplanning as language-neutral and recognizes

language specificity only at the microplanning stage, while the grammatical aspect hypothesis suggests that macroplanning may also be language specific.

Nüse, von Stutterheim, and associates (Nüse, 2003; Schmiedtová et al., 2011; von Stutterheim & Nüse, 2003) argue that speakers of non-aspect languages, such as German, Norwegian, or Swedish, are pointed by their grammars towards a *holistic perspective* which views goal-oriented motion events as bounded with a possible endpoint. In contrast, grammars of aspect languages, such as English, Russian, or Spanish, require their speakers to differentiate between ongoing or completed events. This obligatory encoding may sensitize the speakers to ongoingness and predispose them to take a *phasal decomposition perspective*, where events are subdivided into phases, each of which could be selected as a reportable event. Some aspect languages, such as Czech or Russian, have aspectual systems that allow both a holistic and a phasal decomposition perspective and, in that case, as will be shown below, the speakers' choices may be affected by habitual patterns of language use (Schmiedtová et al., 2011).

These differences have implications for the four substages of language planning. The first substage of macroplanning involves *segmentation* or decomposition of events into phases or sub-events. Here, speakers of non-aspect languages may favor a more holistic perspective (*low granularity*), involving one macro-event or a few sub-events (e.g., she put the stocking on; she took the stocking and put it on). Speakers of aspect languages may decompose the same event into a detailed series of micro-events (e.g., she picked up the stocking, gathered it into a roll, balanced on one leg, leaned forward, slipped the stocking on, put her foot on the chair, smoothed the stocking, fastened it to a garter belt). The difference is in terms of preference and degree – as seen in Schlink's (1997a) passage, German speakers also have the means to discuss micro-events when they choose to do so.

The second substage of macroplanning involves *selection* of event components for subsequent verbalization. Here, speakers of non-aspect languages, such as German, may favor the endpoints to a greater degree than speakers of aspect languages. Schlink (1997a,b) is very consistent in including endpoints for each motion sub-event: *she rested the heel of her other foot against her knee, slipped the rolled-up stocking over the tip of her foot, smoothed the stocking up over her calf, knee and thigh*. In English, most of these endpoints would be optional and one could just as easily say *she slipped the stocking on and smoothed it over*.

Macroplanning is followed by microplanning. The first substage of microplanning involves *structuring* of the message with respect to predicate types and argument roles, anchoring points within referential frames (e.g., spatial and temporal), and attribution of informational status (topic/focus assignment). It is at this level, also known as *perspectivation*, that we note subtle

differences in temporal anchoring between the German text and its English translation. In German, Hanna's movements are represented sequentially as completed actions in simple past. In English, translator Carol Brown Janeway sometimes diverges from Schlink's choices and adopts progressive aspect to present some of the actions as ongoing and simultaneous with other actions: *Sie nahm einen* [she picked one up], for instance, is replaced with *Picking one up* and *Sie richtete sich auf* [she straightened up] with *Straightening up*. Cross-linguistic differences also appear in the last substage, known as *linearization* or the ordering of words and grammatical constituents for verbal representation. For instance, *zwei Strümpfe* [two stockings], the topic of the second sentence, appear at the very end of the German phrase but in the beginning of the English one, in accordance with the linearization conventions of each language.

To test the predictions of the grammatical aspect hypothesis, researchers commonly use video clips created by von Stutterheim and associates at the University of Heidelberg. These clips include two types of items: goal-oriented *motion events* and *distractors* or *fillers*, which show activities with no inferable endpoint (e.g., 'a candle burning'). Motion events are further subdivided into three categories. *Control items* are scenes with a high level of goal orientation that show the endpoint of the trajectory being reached (e.g., 'a dog running into a house'). *Critical items* involve scenes where the endpoint has to be inferred. Scenes with an intermediate degree of goal orientation facilitate inferencing by showing a visible, possible endpoint (e.g., 'two women walking toward a house'). Scenes with low degree of goal orientation depict motion without showing a clearly discernible endpoint (e.g., 'someone driving a jeep in the middle of the desert'). The randomized clips are presented to participants on the computer screen. In the *on-line verbal description task*, the participants are asked to answer the question "What is happening?" with regard to every scene. The computer records their responses and, in some studies, it additionally records *speech onset times* (SOTs) (von Stutterheim, 2003; von Stutterheim et al., 2002, 2009) and eye-tracking patterns (von Stutterheim & Carroll, 2006) (for a detailed description of materials and procedures, see Schmiedtová et al., 2011).

The findings of the studies to date reveal cross-linguistic differences between speakers of aspect and non-aspect languages. In the area of event segmentation, L1 speakers of non-aspect languages German and Swedish encode significantly fewer events than speakers of aspect languages Arabic, English, and Spanish, who tend to parse the same event sequence into smaller units and verbalize micro-events, such as 'he is scratching his head' or 'he is looking down' (Bylund, 2011a,b; Nüse, 2003; von Stutterheim & Nüse, 2003). These effects, however, may be limited to verbal encoding: e.g., Nüse (2003) found that German and English speakers differed in the verbal condition but not in

the non-verbal one, where they had to press a button whenever they thought one action began and another ended. These findings led Nüse (2003) to argue against 'Whorfian effects' in non-linguistic event cognition.

In the area of selection, studies of endpoint encoding show that in contexts where the endpoint was not reached but could be inferred, L1 speakers of non-aspect languages German, Norwegian, and Swedish mentioned the endpoints significantly more frequently than L1 speakers of aspect languages Arabic, English, Russian, and Spanish, who tended to describe events as ongoing (Athanasopoulos & Bylund, *in press*; Bylund, 2009, 2011b; Schmiedtová et al., 2011; von Stutterheim, 2003; von Stutterheim & Nüse, 2003; von Stutterheim & Carroll, 2006; von Stutterheim et al., 2009). For instance, in descriptions of the clip with two women, English speakers tended to say *Two women are walking down the road*, while speakers of German commonly included the inferred endpoint (the house) saying *Zwei Frauen laufen auf einem Feldweg Richtung eines Hauses* [Two women walk on a path towards a house].

Cross-linguistic differences may also affect SOT and eye-tracking results. A comparison of SOTs showed that L1 speakers of German started speaking later than L1 speakers of English and Spanish, suggesting that they wait longer for the motion event to unfold and for the endpoint to become inferable (Schmiedtová et al., 2011; von Stutterheim, 2003; von Stutterheim et al., 2002, 2009). Eye-tracking data revealed that L1 speakers of English started speaking before looking at the critical region (i.e., endpoint), while L1 speakers of German focused on the possible endpoint longer than L1 speakers of English both before and after starting to speak (Schmiedtová et al., 2011; von Stutterheim & Carroll, 2006; von Stutterheim et al., 2009).

In the area of temporal structuring, speakers of non-aspect and aspect languages were found to favor different linking strategies. L1 speakers of German, Norwegian, and Swedish preferred *anaphoric linking*, where the time of a given event is established in relation to the time of the preceding event through anaphoric adverbials and in particular sequential connectors, such as the Swedish *så* [and then]; speakers of Arabic, English, French, and Spanish, on the other hand, used *deictic linking*, focusing on the ongoingness of the events, and rarely made the temporal sequence of events explicit (Bylund, 2011a,b; Noyau et al., 2005).

To examine the implications of these differences for non-linguistic cognition, Athanasopoulos and Bylund (*in press*) created a triad categorization task where the target scene had an inferable endpoint and alternates showed the same type of motion with and without the endpoint. The participants had to perform a similarity judgment task in one of three conditions. In the memory condition, the clips were shown one at a time and matching had to be done based on memory. In the verbal interference condition, the clips were

shown one at a time as well but the memory task had to be performed with verbal interference, i.e., repeating a string of numbers. In the on-line condition, the three clips were shown at once. The results revealed cross-linguistic differences in the memory condition: while both groups paid more attention to ongoingness, L1 English speakers did so significantly more than speakers of L1 Swedish. These findings were interpreted as language effects: while the focus on ongoingness may be a universal perceptual bias, it appears to be reinforced by aspect languages and reduced by non-aspect languages. Consistent with previous findings, there were no differences in the verbal interference and on-line conditions, which suggested that not all tasks rely on linguistic constraints in parsing events.

Some studies, however, throw a wrench into predictions of the grammatical aspect hypothesis. Thus, Schmiedtová and Sahonenko (2008) found that native speakers of the aspect language Czech behave similarly to speakers of non-aspect languages in favoring a holistic perspective and focusing on endpoints. This focus was particularly striking in contexts where speakers of Russian (which encodes aspectual distinctions similar to those of Czech) favor phasal decomposition. Schmiedtová and Sahonenko (2008) attribute this outcome to semantic shift – triggered by long-term contact between Czech and German – that leads Czech speakers to favor perfective aspect in describing events that Russian speakers view as ongoing and describe through the secondary imperfective (see also Schmiedtová et al., 2011). In another study, speakers of the non-aspect language Dutch patterned with speakers of aspect languages in low frequency of endpoint encoding; their SOTs and eye fixations on endpoints were located between those of English and German speakers (von Stutterheim et al., 2009). Flecken (2011) linked this performance to the high frequency of the periphrastic Dutch construction *aan het*, used to express ongoingness. While German has similar constructions, German speakers in her study displayed a significantly lower frequency of use of such progressive markers.

To sum up, the studies to date suggest that speakers of non-aspect languages German, Norwegian, and Swedish habitually segment events in a less fine-grained way, mention the endpoints more frequently, look at the endpoint area in the visual stimuli for a longer time, and start speaking later than speakers of aspect languages Arabic, English, Russian, and Spanish. On the other hand, speakers of the aspect language Czech and the non-aspect language Dutch were shown to pattern with the opposite group, raising questions about the centrality of aspect encoding in event construal. Yet even if aspectual distinctions are only a part of the story, it does appear that speakers of different languages construct events in somewhat different ways – at least in laboratory conditions. The next question to answer, then, is how bilingual speakers construct the same events in their respective languages.

4.2.2 Event construal in bilingual speakers

To answer this question first-hand, I travelled to Heidelberg where my colleagues kindly allowed me to go through the experimental procedure and to verbalize my responses while they tracked my eye-gaze. It appears that I performed as expected of a multilingual dominant in two aspect languages, English and Russian, adopting a phasal decomposition perspective on the critical items. In the case of the two women, for instance, I just could not claim confidently that they were walking toward the house – all I saw was women walking and, as far as I was concerned, they could be walking past that house and into the woods. Notably, my two main languages are not at cross-purposes and the dominance in English may simply reinforce the phasal decomposition perspective available through Russian. But what about bilinguals who try to reconcile distinct perspectives offered by aspect and non-aspect languages?

L1 influence. The evidence to date suggests that some L2 learners continue to construe goal-oriented motion events in accordance with L1 principles of information organization. In selection of event components, L1 English and L1 Russian learners of L2 German encoded significantly fewer endpoints than L1 speakers of German; L1 English learners of L2 German also displayed L1-like SOT patterns (Schmiedtová et al., 2011; von Stutterheim, 2003; von Stutterheim & Carroll, 2006). L1 Czech learners of L2 German also differed from L1 speakers of German but in the opposite direction, encoding significantly more endpoints, in accordance with Czech patterns (Schmiedtová & Sahonenko, 2008; Schmiedtová et al., 2011). Consequently, in the description of the two women in L2 German, L1 Russian speakers would say something along the lines of *Frauen gehen einen Weg entlang* [Women walk a path along], while L1 Czech speakers would add an endpoint as in *Zwei Frauen gehen zu einem Haus* [Two women walk towards a house].

Convergence, restructuring, and in-between performance. A few studies revealed an in-between performance pattern. In the area of event segmentation, Bylund (2011a,b) found that Spanish–Swedish bilinguals displayed a significantly lower degree of granularity in L1 Spanish than monolingual Spanish speakers and a significantly higher degree in L2 Swedish than relatively monolingual Swedes. An intra-group comparison of L1 and L2 performance revealed that the degree of event granularity was the same in both languages. Based on participants' learning trajectories and their LoR in Sweden, this outcome was interpreted as convergence.

In the area of event selection, in contexts where endpoints could not be easily inferred, L1 German speakers describing motion events in L2 English mentioned the endpoints frequently, patterning with monolingual German speakers. In contrast, in contexts where endpoints could be inferred they approximated monolingual English speakers in the low frequency of

Table 4.3 *Bilinguals' event construals*

Studies	Languages	Participants	Tasks & stimuli	Findings
v. Stutterheim (2003) ^a	L1 Arabic	110 participants (ages 19–34 yrs):	<i>Task:</i> (1) film retelling task; (2) online event description task in L1 and L2 <i>Stimuli:</i> (1) Quest, a 7min long silent film; (2) 36 video clips (8 critical, 8 control, 20 fillers)	L1 influence, in-between performance, partial approximation of L2 patterns
	L1 Spanish	20 L1 speakers of Arabic ^b		
	L1 English	20 L1 speakers of Spanish		
	L1 German	20 L1 speakers of English		
	L2 English	20 L1 speakers of German		
	L2 German	15 English-German bilinguals 15 German-English bilinguals		
v. Stutterheim & Carroll (2006)	L1 Arabic	120 participants (ages 20–37 yrs):	<i>Task:</i> (1) online event description <i>Task:</i> (2) eye-tracking in L1 and L2 <i>Stimuli:</i> 80 videoclips (18 critical, 18 control, 44 fillers)	L1 influence, in-between performance, partial approximation of L2 patterns
	L1 Norwegian	20 L1 speakers of Arabic		
	L1 English	20 L1 speakers of Norwegian		
	L1 German	20 L1 speakers of English		
	L2 English	20 L1 speakers of German		
	L2 German	20 English-German bilinguals 20 German-English bilinguals		
Schmiedtová & Sahonenko (2008)	L1 Czech	120 participants (ages 18–28 yrs):	<i>Task:</i> online event description task in L1 and L2 <i>Stimuli:</i> 40 videoclips (8 critical, 8 control, 24 fillers)	L1 influence
	L1 Russian	30 L1 speakers of Czech		
	L1 German	30 L1 speakers of German		
	L2 German	30 L1 speakers of Russian		
		15 Czech-German bilinguals		
		15 Russian-German bilinguals		
Bylund (2009)	L1 Spanish	46 participants:	<i>Tasks:</i> (1) online event description task in L1; (2) grammaticality judgment task in L1 <i>Stimuli:</i> 41 video clips (27 motion events, 14 fillers)	L2 influence on L1, AoA effects
	L2 Swedish	15 Spanish monolinguals 31 Spanish-Swedish bilinguals (mean age = 32.4 yrs, range 20–49 yrs; mean AoA = 8.9 yrs, range 1–19 yrs; mean LoE = 24.8 yrs, range 12–42 yrs)		

Bylund & Jarvis (2011)	L1 Spanish L2 Swedish	55 participants: 15 Spanish monolinguals 40 Spanish-Swedish bilinguals (mean age = 32.5 yrs, range 19–49 yrs; mean AoA = 9.6 yrs, range 1–23 yrs; mean LoE = 22.7 yrs, range 12–34 yrs)	<i>Tasks:</i> (1) online event description task in L1, (2) auditory grammaticality judgment test in L1 <i>Stimuli:</i> 41 video clips (27 motion events, 14 fillers)	L2 influence on L1
Bylund (2011a)	L1 Spanish L1 Swedish L2 Swedish	55 participants: 15 Spanish monolinguals 15 Swedish monolinguals 25 Spanish-Swedish bilinguals (mean age = 30.2 yrs, range 20–41 yrs; mean AoA = 5.7 yrs, range 1–11 yrs; mean LoE = 24.6 yrs, range 12–34 yrs)	<i>Tasks:</i> film retelling task in L1 and L2 <i>Stimuli:</i> 4 min segment from Chaplin's <i>Modern Times</i>	Co-existence of language- specific patterns, convergence
Flecken (2011)	L1 Dutch L1 German L2 German	51 participants: 19 L1 speakers of Dutch (mean age = 20.4 yrs, range 18–23 yrs) 19 L1 speakers of German (mean age = 24.3 yrs, range 20–35 yrs) 13 early Dutch-German bilinguals: 12 pupils (mean age = 16.6 yrs, range 16 – 19 yrs) 1 46 yr old teacher	<i>Tasks:</i> online event description task in Dutch and German (language order randomized, with the task in the second language performed 4 months after the first experiment) <i>Stimuli:</i> 65 video clips (48 critical items, 17 distractors)	Divergence from both patterns
Chen et al. (2012)	L1 English L1 Chinese L2 English	111 participants: 30 English monolinguals (mean age = 20 yrs, range 18 – 30 yrs) 32 Chinese–English bilinguals in Taiwan with high English proficiency (mean age = 21 yrs, range 19 – 40 yrs, AoA > 11) 49 Chinese–English bilinguals in Taiwan with low English proficiency (mean age = 18 yrs, range 17–18 yrs, AoA > 11)	<i>Tasks:</i> sentence-picture matching <i>Stimuli:</i> 116 pictures and sentences (54 target and 62 fillers), divided into three sets of 80, each of which contained 18 target sentences and pictures and 62 fillers	L2 influence on L1

^a Details of research design of this and follow-up studies are reported in Schmiedtová and associates (2011).^b The term *L1 speakers* refers to participant populations known not to be monolingual.

endpoint encoding, in the focus on ongoingness in prototypical situations (e.g., ‘a car driving along a road’), and in SOTs (von Stutterheim, 2003; von Stutterheim & Carroll, 2006; Schmiedtová et al., 2011). This performance pattern was interpreted as a start of the restructuring process (Schmiedtová et al., 2011).

Co-existence of language-specific naming patterns. In the area of temporal structuring, Spanish–Swedish bilinguals in Bylund’s (2011a) study behaved in a target-like way in both languages, using a deictic frame (progressive) in L1 Spanish and anaphoric linkage through sequential connectors in L2 Swedish. These findings suggested that when it comes to microplanning, bilinguals may be able to maintain two distinct patterns.

L2 influence on L1. Studies by Bylund (2009) and Bylund and Jarvis (2011) revealed the influence of L2 Swedish on endpoint encoding frequency and tense use in L1 Spanish. Spanish–Swedish bilinguals in the two studies – in particular those who acquired L2 Swedish before the age of 12 – encoded endpoints at a significantly higher rate than monolingual Spanish speakers. For instance, the two women in the scene discussed above were commonly described as *están caminando* [are walking] by monolingual speakers and as *están caminando hacia una casa* [are walking toward a house] by L2-Swedish-influenced bilinguals. Bilinguals also displayed higher frequency of use of the non-aspectually marked simple present and a lower frequency of the progressive than native speakers of Spanish (Bylund & Jarvis, 2011). Using data from studies of L1 acquisition of Spanish, Bylund (2009) and Bylund and Jarvis (2011) argue that this performance should be interpreted as L2 influence on L1, rather than incomplete acquisition.

Chen and associates (2012) found the influence of L2 English on sensitivity to temporal contours in Chinese–English bilinguals. Chinese is a tenseless language which often does not mark explicitly the timing of an event. The authors hypothesized that L1 Chinese speakers may develop a habitual extended-present time frame that encompasses the immediate future and the recent past and that they may restructure this frame under the influence of L2 English. The study compared the performance of Chinese–English bilinguals with high and low L2 English proficiency on a picture-matching task performed in L1 Chinese. The pictures portrayed three phases of an event: imminent future (e.g., a person about to throw a frisbee), ongoing present (e.g., a person in the process of throwing a frisbee), and completed past (e.g., a person who has thrown a frisbee). The participants saw a Chinese sentence on the screen, followed by two pictures, one of which corresponded to the sentence (target) and the other depicted the same action in a different temporal phase (alternate), and had to select a match. The results demonstrated that L1 English speakers (performing the task in English) and bilinguals with high L2 English proficiency (performing in

Chinese) produced significantly more matches than speakers with low L2 English proficiency.

Factors affecting bilinguals' event construals. The studies to date revealed several factors that affect event construal in bilingual speakers. The first factor, as in many other domains, is the age of L2 acquisition. Bylund (2009) found that temporal structuring (perspectivation) and the frequency of endpoint encoding in Spanish–Swedish bilinguals are linked to the AoA: participants who acquired L2 Swedish before the age of 12 diverged from the L1 Spanish pattern, while those who acquired L2 Swedish after 12 converged with monolingual Spanish speakers. These findings were replicated in a study by Bylund and Jarvis (2011) with a larger group of Spanish–Swedish bilinguals: participants with earlier AoA were more likely to encode endpoints in L1 Spanish. Neither study revealed LoE effects – this finding was attributed to the fact that all participants had lived in Sweden for at least 12 years. The AoA effects led Bylund (2009, 2011b) to suggest that there is a point around puberty when L1 patterns become more stable and susceptibility to L2 influence and L1 restructuring decreases. At the same time, he acknowledged that while AoA may affect the *degree* of susceptibility or resistance to restructuring, it does not guarantee impermeability to L2 influence.

The second factor involves the area in question: thus, Bylund (2011a,b) found that the same Spanish–Swedish bilinguals displayed distinct patterns of performance in event segmentation (convergence) and temporal structuring (co-existence of language-specific patterns). Bylund (2011a,b) tentatively explained these differences through levels of processing: temporal structuring is a microplanning process, where the maintenance of linguistic conventions is desirable if not obligatory, while event segmentation is a more general macroplanning process, where convergence could provide an economical solution. Another important factor involves the type of adjustment to be made. Studies by von Stutterheim and associates (von Stutterheim, 2003; von Stutterheim & Carroll, 2006; Schmiedtová et al., 2011) suggest that internalization of a phasal decomposition perspective may be easier, because aspect encoding is explicit and more or less transparent; in contrast, the holistic perspective and the need to encode endpoints are not.

The third factor, identified by Chen and associates (2012), is L2 proficiency and, more specifically, sensitivity to aspectual contrasts. Thus, Bylund and Jarvis (2011) found that Spanish–Swedish bilinguals who displayed the highest degree of L2 Swedish influence in endpoint encoding in L1 Spanish also displayed least sensitivity to Spanish aspectual errors in the grammaticality judgment task.

Together, these findings suggested that the process of L2 learning and use may trigger restructuring in the way we segment and sequence events and enhance sensitivity to spatiotemporal contours encoded in the L2.

4.3 Language effects in motion cognition: ‘reprogramming’ the mind

Event perception, the key focus of the perceptual process in animals and humans, requires us to perceive complex, and usually moving, clusters and patterns of stimuli as single units and to respond to them accordingly. Species vary in the complexity of events they can perceive: humans can perceive changes imperceptible to apes, apes can discriminate hand signs that are too subtle for dogs, and dogs can distinguish events that are too complex for rats (Donald, 1991). The key difference between human and animal event perception is in the type of memory involved: while large-brained animals rely on episodic memory, humans can also rely on semantic memory. What does this reliance mean for event construal and motion cognition?

Four decades ago, Worth and Adair argued that linguistic structure shapes the way individuals select, assign significance to, and sequence visual events in the film-making process. Soon after the publication of their 1972 book such arguments went out of fashion and the prevailing opinion concurred that superficial linguistic differences should not be treated as cognitive differences in perception of event boundaries (e.g., Givón, 1991; Nüse, 2003). The studies of event construals reviewed here suggest that linguistic differences are not superficial – while they do not ‘determine’ perception, they interact with universal perceptual processes, increasing our sensitivity to particular aspects of events and decreasing the salience of others.

Berman and Slobin (1994) described this interaction through two principles: *filtering*, according to which experiences are ‘filtered’ through language for speaking purposes (e.g., agency, endpoints), and *packaging*, according to which events are combined into a hierarchical set, located in time and space, in accordance with language-specific narrative conventions (e.g., causality, temporality). Studies that adopted Levelt’s (1989) model further decomposed ‘filtering’ (macroplanning) into event segmentation and selection of components for subsequent verbalization, and ‘packaging’ (microplanning) into structuring and linearization. Together, empirical studies of motion and event construals presented compelling evidence that cross-linguistic variation in motion and event encoding affects all aspects of the speech planning and execution process, extending Slobin’s (1996a) notion of ‘thinking for speaking’ to *thinking, seeing, and gesturing for speaking about motion events*.

The studies with bilingual speakers also show that the domain of motion displays much more stability than the domains of color or artifacts. In my own studies, the same speakers who displayed destabilization and restructuring in the categories of color, artifacts, and emotions, displayed impressive maintenance of the complex distinctions required in the domain of motion (Pavlenko, 2010; Pavlenko & Volynsky, 2012). At the same time, this complex domain

remains daunting for American learners of L2 Russian, who display high levels of proficiency in other areas but give up when it comes to verbs of motion (Gor et al., 2009; Hasko, 2009, 2010b).

While lacking the panache of Worth and Adair's ([1972] 1997) study with the Navajos, studies of motion events have taken us closer to understanding how speakers parse – or do not parse – ‘the kaleidoscopic flux of impressions’. At the same time, in their present format, they can take us only so far. From a theoretical point of view, future studies of motion events need to engage not only with linguistic theories but also with theories of visual cognition and the interplay between verbal and visual processing. They also need a broader analytical framework that moves beyond Ground, Figure, Manner, and Path to include dimensions not encoded in English. The studies to date also have methodological shortcomings. By placing controlled visual stimuli in front of participants, they gain in reliability but lose out in generalizability and ecological validity. Similar to studies that draw conclusions about color processing on the basis of processing of Munsell color chips, studies of event construals draw conclusions on the basis of videoclips portraying unrelated and often unnatural-looking events, irrelevant to participants' lives. Their artificiality may enhance the processing due to novelty, yet the sheer number of paths and manners of motion places unrealistic demands on the memory load and reduces face validity and similarity to everyday processing. As a consequence, this approach may address the Brown-Lenneberg hypothesis, but it does not address Whorf's habitual thought. We simply do not know if participants would process events outside the lab in a similar manner, nor do we know how they would recall, reconstruct or imagine everyday motion events.

Most importantly, future studies of motion and cognition need to involve speakers of languages that differ markedly from English in the ways they segment events, select components for description and assign roles to event participants. For instance, Kalam, spoken in Papua New Guinea, has only a few verb roots for causal events. As a result, one cannot say in Kalam “something broke X”, instead one must say “something happened to X and it broke” (Pawley, 2011). Episodic sequences and complex events, such as “They gathered wood for the night”, require more sub-events to be mentioned than is the case of English and elicit a series of verbs packed into a single-clause construction:

Kik am mon pu-wk d ap agi kn-ya-k
 They go wood hit-smash get come ignite sleep-3PL-PAST
 (Pawley, 2011: 16)

Pirahã has a similar structure, with serial verbs composed of multiple roots and suffixes which serve to mark information that is not commonly grammaticalized in English, such as frustration experienced in the beginning or at the end of an event or motion directionality (e.g., *-b* marks action performed in a

downward motion and *-p* action performed in an upward motion). Pirahã also requires its speakers to outline more sub-events, so that the equivalent of the English “That smells good” becomes something along the lines of “It pleases me, the smoke, which hits my nose, as I pass by your fire” encoded in a single serial verb (Everett, 2012: 132). Kayardild, spoken in Australia, requires the use of suffixes marking goals or intentions. As a consequence, “you need to reprogram your mind if you learn Kayardild,” argues Australian linguist Evans (2010), in order “to pay careful attention to the different ways people go about achieving their goals, and to break down the ways we impute intention into a nuanced set of subtypes” (p. 72). Another field linguist and L1 English speaker Harrison (2010) recalls the efforts required for learning the Tuvan equivalent of the word ‘to go’:

[E]very time I moved, pantomimed, or pointed to indicate “go”, I seemed to elicit a different word. It turned out that learning to say “go” in Tuvan is much more complex than I’d imagined. It requires not only an internal compass but also an acute awareness of the local landscape, even parts of it that may not be visible. (p. 49)

It is precisely this ‘reprogramming’ of attention and awareness that we need to examine if we are to puzzle out how “users of markedly different grammars are pointed by their grammars toward different types of observations” (Whorf, [1940] 2012: 282–283). Unfortunately, the experimental approaches discussed in this and preceding chapters can take us only so far when it comes to understanding the ‘reprogramming’ of the bilingual mind. Documenting stages of cognitive restructuring, they show that bilinguals rarely behave as ‘two monolinguals in one’. They do not address, however, the key question in the study of the bilingual mind: why do so many bilinguals feel that they ‘think’ differently in different languages? To answer this question we will have to go beyond the study of single linguistic categories, such as aspect or number, beyond single cognitive processes, such as selective attention or similarity judgments, and ultimately beyond structural language patterns and beyond Whorf to the study of the ways in which people recall events and transform them into narratives.

5 Narrative worlds: Locating ourselves in storylines

The culturally shaped cognitive and linguistic processes that guide the self-telling of life narratives achieve the power to structure perceptual experience, to organize memory, to segment and purpose-build the very “events” of a life. In the end, we *become* the autobiographical narratives by which we “tell about” our lives.

Bruner, 1987: 15

Of all narratives in the world, the one most important to us is the narrative of our own life – its loss shatters our sense of self. A glimpse into such an unpopulated universe comes from Lev Zasetsky, a 23-year-old Russian soldier who received a severe head wound during the 1943 battle of Smolensk. In the notes written later, he poignantly states that this was the day he died:

I’m in a kind of fog all the time, like a heavy half-sleep. My memory’s a blank. I can’t think of a single word. All that flashes through my mind are some images, hazy visions that suddenly appear and just as suddenly disappear, giving way to fresh images. But I simply can’t understand or remember what these mean. Whatever I do remember is scattered, broken down into disconnected bits and pieces ... How horrible this illness is!

I still can’t get a grip on myself, can’t figure out what I was like before, what’s happened to me... (Luria, 1972: 11–13)

The damage to the left occipito-parietal region left Zasetsky with severe amnesia: while he eventually recovered memories of his childhood, he had trouble remembering the recent past and the functions of everyday objects. Zasetsky also suffered from aphasia, where linguistic forms became disconnected from their referents: looking at objects, plants or animals he could not remember their names, hearing words he could not interpret their meanings, nor could he recall words at will. He also partially lost his vision and spatial orientation skills: he could not see his own right side and everything he perceived appeared as fragments in a constant state of flux. “It was depressing, unbearable to realize how miserable and pathetic my situation was”, states Zasetsky in his diary, “You see, I’d become illiterate, sick, had no memory” (Luria, 1972: 35).

Nevertheless, Zasetsky started writing the story of his illness, a few sentences at a time, “stubbornly hunting for words, frantically trying to grasp them and

put them into a sentence before the idea escaped him” (Luria, 1972: 81). Over the next 25 years, he wrote more than three thousand pages which form the core of Luria’s (1972) famous book *The Man with a Shattered World* (its more optimistic Russian title is *Потерянный и возвращенный мир* [The lost and returned world]), and Zaslavsky’s own title is *Я снова борюсь!* [I am fighting again!]). But why did he spend so many agonizing years producing this document? In Zaslavsky’s own view, writing allowed him to recover his ‘lost’ life: “he could try gradually to assemble the bits and pieces of his past, compare and arrange them into episodes, create a coherent view of what his experience and desires were” (Luria, 1972: 83–84). Zaslavsky’s desperate search for narrative coherence reminds us that human cognition is, essentially, narrative in nature: narratives play a fundamental role in the development and functioning of the human mind, allowing us to puzzle out the past, give meaning to the present, and plan the future. In the words of Hardy (1968), “we dream in narrative, day-dream in narrative, remember, anticipate, hope, despair, believe, doubt, plan, revise, criticize, construct, gossip, learn, hate and love by narrative” (p. 5). But do we all transform experience into narratives in the same way?

To answer this question, British psychologist Sir Frederic Bartlett ([1932] 1995) asked his Cambridge students to read and recall a Native American folktale, *The war of the ghosts*. His analysis revealed that, in the process of remembering, the story was distorted in a number of ways: the sequence of events was changed and simplified, new rationalizations were added for events whose explanations were unclear (e.g., ‘something black came out of his mouth’ was transformed into ‘he foamed at the mouth’ or ‘his spirit fled’), and unfamiliar details were either omitted or transformed into familiar notions (e.g., ‘canoes’ were replaced by ‘boats’ and ‘paddling’ by ‘rowing’). These changes followed a predictable and systematic pattern. To capture these regularities, Bartlett ([1932] 1995) put forth the notion of the *schema*, defined as “an active organization of past reactions, or of past experiences, which must always be supposed to be operating in any well-adapted organic response” (p. 201). Transforming forever our understanding of the process of remembering, he argued that

remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction, or construction, built out of the relation of our attitude towards a whole active mass of organized past reactions or experience, and to a little outstanding detail which commonly appears in image or in language form. It is thus hardly ever really exact... (Bartlett, [1932] 1995: 213)

Rediscovered during the cognitive revolution of the 1960s and 1970s, Bartlett’s ideas inspired active exploration of narrative forms of memory organization, giving rise to more specific theoretical constructs of *scripts*, “a predetermined, stereotyped sequence of actions that defines a well-known situation”, such as a visit to a restaurant (Schank & Abelson, 1977: 41; Schank,

1990), *story grammars* that attempted to capture the structure of narratives (Mandler & Johnson, 1977) and *associative networks* that aimed to explain the formation of schemas through connections strengthened by repeated co-activation (Rumelhart & McClelland, 1986). To understand the effects of language on memory, Loftus and Palmer (1974) showed participants several films portraying car accidents and then elicited recalls through differentially worded questionnaires. The question “About how fast were the cars going when they smashed into each other?” elicited higher estimates of speed than questions using the verbs *collided*, *bumped*, *contacted*, or *hit*. During a retest a week later, the participants previously exposed to the verb *smashed* were more likely to respond positively to the question whether they saw any broken glass. These findings allowed the researchers to link verbal framing to eyewitness memory and to argue that the label used to describe an event may affect its mental representation.

If this is the case, how do speakers of different languages transform ‘the same’ experience into narratives and how do these transformations then affect their recall? In the preceding chapter, we discussed how, in the 1960s, Worth and Adair ([1972] 1997) compared ways in which speakers of English and Navajo transformed their experiences into visual narratives. In the 1970s, linguist Wallace Chafe and his associates (Chafe, 1980), inspired by Bartlett’s ([1932] 1995) ideas, took a different tack and examined how speakers of different languages transform the same visual narrative (experience) into oral narratives.

To create a visual narrative that would be understandable across many different cultures, the researchers produced their own 6-minute-long film, now known as the Pear film.¹ The film portrays a man picking pears on a ladder in a tree. Below the tree there are three baskets into which he dumps the pears from the pocket of his apron. A boy on a bicycle approaches the tree, takes a basket full of pears, places it on the rack and rides off. Then we see the boy riding down the road and a girl on a bicycle approaching from another direction. As the boy turns to look at the girl, his bike hits a rock and falls over, and the pears spill out onto the ground. Three boys pick up the scattered pears and put them back in the basket. The bike boy offers them three pears and they walk away, eating their pears. Meanwhile, the pear picker gets down and notices that he only has two baskets where there used to be three. Then he sees three boys approaching, eating their pears. He watches them as they pass by and walk into the distance.

The oral and written retellings of the film, known as Pear stories, were collected from speakers of Chinese, English, German, Greek, Haitian Creole,

¹ The Pear film can be found at Chafe’s website at www.linguistics.ucsb.edu/faculty/chafe/pear-film.htm. The film and English and Chinese Pear stories can also be found at Mary Erbaugh’s website at <http://pearstories.org/>.

Japanese, Malay, Persian, Quiché Maya, Sacapultec, and Thai. The analysis of these narratives revealed cross-linguistic differences in perceptions of the narrative task, in narrative schemas guiding recall and – as discussed in [Chapter 2](#) – in the lexical choices made by speakers of different languages (Chafe, 1980). In the next three decades, these findings were supported and expanded by other studies that used the Pear film, Frog story books and other visual stimuli: these studies, discussed in [Chapter 4](#), found that cross-linguistic variation in the encoding of motion, aspect, and temporality may lead speakers of different languages to attend to different aspects of events (e.g., endpoints) and to segment them in a more or less fine-grained way (Berman & Slobin, 1994; Bylund, 2009, 2011a,b; Cardini, 2008; Nüse, 2003; Slobin, 1996a,b, 2004a,b, 2006; Strömqvist & Verhoeven, 2004; von Stutterheim, 2003; von Stutterheim & Nüse, 2003; von Stutterheim & Carroll, 2006). Bartlett's ([1932] 1995) and Chafe's (1980) insights into the effects of narrative schemas help us understand these effects and extend them to the recall and organization of episodic memory.

Yet there may be even more to narrative effects. Prominent developmental psychologist Jerome Bruner (1987: 15) contends provocatively that “the culturally shaped cognitive and linguistic processes” structure our perceptual experience and affect organization and functions of autobiographical memory. If Bruner is correct, then it is not just our narratives about events but our very memories of ourselves that should be affected by the change in language – but are they?

I will begin the discussion below with an overview of the evolution and structure of autobiographical memory and the role of language in its organization and development. Then, I will examine cross-linguistic differences in autobiographical narratives and narrative socialization practices and their effects on recall and organization of autobiographical memories in (largely) monolingual speakers. Next, I will explore ways in which languages mediate autobiographical memory in speakers of two or more languages.

5.1 Autobiographical memory: linguistic or non-linguistic?

5.1.1 *Evolution and functions of autobiographical memory*

Researchers commonly view memory as a set of dynamic, integrated systems, divided into *implicit* (procedural) memory or the ‘know-how’, which requires little to no conscious awareness, and *explicit* (declarative) memory, which is subject to conscious recall (Baddeley et al., 2009; Bauer, 2007; Fivush, 2011). Explicit memory is further subdivided into *semantic* memory, which involves explicit knowledge about the world (e.g., Szczyrk is a winter sports center in Poland) and *episodic* memory, which involves specific events located in space

and time (e.g., the people I met at a conference in Szczyrk) (Tulving, 1972, 2002).

Recent scholarship further differentiates between episodic and autobiographical memory and suggests that each system has its own evolutionary history, functions, and neurological correlates. General episodic memory appears to be a phylogenetically older system that evolved to support adaptive short-term goal processing: it is concrete, time-bound, sensory-based and cue-driven, and, together with procedural memory, is present in some form in birds, animals, human infants, and prelinguistic adults, allowing for situational analysis and recall (Bauer, 2007; Conway, 2005; Donald, 1991, 2001; Fivush, 2011; Nelson, 2006). Autobiographical memory may have emerged later to support long-term goal processing, planning, and anticipation (Williams & Conway, 2009) and co-evolved with self-consciousness and language, enabling the transition from the mimetic to the mythic stage of human development (Donald, 1991, 2001).

Three aspects distinguish autobiographical memory from the general episodic memory. To begin with, it involves *autonoetic consciousness* or awareness of the self as the experiencer of the event; this consciousness allows for self-cuing and voluntary recall or re-experiencing of events, often described as ‘mental time travel’ (Tulving, 2002), which differentiates human memory from primate cognition. Secondly, autobiographical memory is constitutive of the self – it serves directive, social and emotional functions, including self-definition and self-regulation; its disruptions lead to the breakdown of coherence, the loss of the sense of self (in the case of amnesia), or the emergence of delusional versions of the self (in the case of schizophrenia and other mental illnesses). Most importantly, autobiographical memory relies on narrative schema to provide an organizational framework and to combine individual events into a coherent narrative that includes past, present, and future (Baddeley et al., 2009; Conway, 2005; Fivush, 2011; Fivush et al., 2011; Nelson, 2006; Rubin, 1998; Williams & Conway, 2009).

The key question for the present inquiry involves the nature of this narrative schema and the role of language in the development of autobiographical memory. Developmental psychologists Bruner (1987), Nelson (2005), and Fivush (2011) view language as central in the development of autobiographical memory as a “uniquely human form of memory that moves beyond recall of experienced events to integrate perspective, interpretation, and evaluation across self, other, and time to create a personal history” (Fivush, 2011: 560). In contrast, a well-known neuroscientist Damasio (1994, 1999, 2010) has repeatedly argued that our narrative ability is rooted in visual imagery, ‘natural wordless storytelling’, which is shared with other animals, precedes language and “can be accomplished without language, using the elementary representational tools of the sensory and motor systems in space and time” (Damasio, 1994: 243). Autobiographical memory, in this view, relies on ‘primordial’ non-verbal

narratives, defined as “the imagetic representation of sequences of brain events” (Damasio, 1999: 188), and not on higher-order narrative schemas that transform visual images into verbal narratives. At the same time, Damasio (2010) concedes that autobiographical memory is a dynamic phenomenon, subject to continuous, albeit mostly unconscious, (re-)construction:

As lived experiences are reconstructed and replayed, whether in conscious reflection or in nonconscious processing, their substance is reassessed and inevitably rearranged, modified minimally or very much in terms of their factual composition and emotional accompaniment. Entities and events acquire new emotional weights during this process.

Some frames of the recollection are dropped on the mind’s cutting-room floor, others are restored and enhanced, and others still are so deftly combined either by our wants or by the vagaries of chance that they create new scenes that were never shot. That is how, as years pass, our own history is subtly rewritten. (pp. 210–211)

Damasio’s (2010) compelling metaphor highlights the effects of agency (‘our wants’), affect (‘new emotional weights’) and individual trajectories (‘vagaries of chance’) but assigns no role to language. He is undoubtedly right about our ability to encode and recall memories without the aid of language. Helen Keller ([1903] 1996), for instance, recalled the trees, fields, and flowers she saw in the first nineteen months of her life and isolated incidents that occurred after her illness and before the arrival of her teacher Anne Sullivan. Yet she also poignantly admits that at that time she did not know she existed: she “was carried along to objects and acts by a certain blind natural impetus” but her inner life was “a blank without past, present, or future, without hope or anticipation, without wonder or joy or faith” (Keller, 1908: 114). In contrast, Ildefonso did have a clear sense of self but as he “learned language, he could play back his memories like video tapes and replace all those senseless mouth movements, scribbles, typed notes, and signs with meaning. He was full of questions and wanted explanations for thousands of confusing incidents” (Schaller, [1991] 2012: 92–93). Zasetky also recalled the images of his past: “the shore of the Don where I liked to swim when I was a child, the cathedral in Epifan’...” (Luria, 1972: 96), yet he needed language to organize them into a meaningful sequence. These examples remind us that the transformation of an array of episodic memories into autobiographical memory is predicated on language acquisition and narrative thought.

5.1.2 *The role of language in development of autobiographical memory*

The capacity to remember is already evident in the first year of human life: infants can distinguish familiar sights (mama!) and sounds (Russian!) from novel ones. Studies by Bauer (2007) show that by the age of 9 months, infants can recall (i.e., imitate) sequences of actions (e.g., pulling a mitten off a

puppet's hand, shaking the mitten), with 50 percent of the infants displaying recall after one month of delay. By the second year of life, the ability to form memories becomes both reliable and robust, with 100 percent of the children recalling action sequences after a month of delay. This ability, however, does not extend to long-term autobiographical memory – most adults have difficulties recalling the earliest years of their lives, a phenomenon named by Freud *infantile amnesia* (Bauer, 2007; Pillemer, 1998).

Autobiographical memory – and a conscious autobiographical self – commonly emerges between the ages of 2 and 4, although some individuals, like Helen Keller, may recall events from the time when they were less than 1 or 2 years of age and others have few or no memories from the period before the age of 6 or even 8 (Bauer, 2007; Jack et al., 2012; Nelson, 2005; Peterson et al., 2011; Pillemer, 1998). Vladimir Nabokov (1966), in his celebrated autobiography *Speak, Memory*, dates 'the awakening of consciousness' and his earliest self-memory to age 4 and links it to internalization of the notions of number and time:

I had learned numbers and speech more or less simultaneously at a very early date, but the inner knowledge that I was I and that my parents were my parents seems to have been established only later, when it was directly associated with my discovering their age in relation to mine. Judging by the strong sunlight that, when I think of that revelation, immediately invades my memory with lobed sun flecks through overlapping patterns of greenery, the occasion may have been my mother's birthday, in late summer, in the country, and I had asked questions and had assessed the answers I received. (p. 21)

Nabokov's description illustrates the complexity of autobiographical memory that combines 'bottom-up' sensory components with the 'top-down' attempts of dating particular memories and placing them in the known chain of events. The ability to impose the temporal code and other top-down schemas is predicated on language acquisition, which triggers dramatic changes in children's social and cognitive functioning, decreasing their reliance on external cues and increasing the reliance on language. As a representational system, language offers an additional means of memory encoding and retrieval, enables memory rehearsal in inner speech and collective sharing of memories, and provides a narrative framework for development of forms and functions of autobiographical memory, allowing us to organize experience, to attribute temporal and causal structure to events and to transform events into stories (Bauer, 2007; Fivush, 2011; Fivush & Bauer, 2010; Fivush & Haden, 2003; Nelson, 2003, 2006).

Developmental psychologist Katherine Nelson (2005) argues that children's development of autobiographical memory retraces Donald's (1991, 2001) evolutionary stages (discussed in Chapter 1). Like a prelinguistic adult, a 2-year-old child with basic linguistic skills lives in an episodic present or the mimetic stage of development. The acquisition of narrative skills enables the transition

to the mythic stage, the development of narrative thought, and consolidation of autobiographical memory. Studies by Peterson and associates (2009, 2011) show that while 2-year-olds do encode memories, their memories are more fragile than those of older children, who can take advantage of narrative embedding. At the same time, Jack and associates (2012) found that six years after an event staged by the researchers, 20 percent of the young participants – including one who was 27 months old at the time – could provide verbal descriptions of the event.

The process of memory consolidation commonly takes place in parent–child talk about past events, known as *shared reminiscing* (Nelson, 2003, 2005). The joint construction of past events provides children with narrative models and teaches them how to integrate explanatory, evaluative, and interpretive information about how and why events occurred as they did: “the narrative form takes a mundane event, gives it a setting of time and place, provides a central action or goal, a motivation, highlights a highpoint of surprise, success, or failure, an emotion, a conclusion, and an evaluation” (Nelson, 2003: 13). Nabokov (1966), for instance, fondly recalls his walks and conversations with his mother, who “cherished her own past with the same retrospective fervor that I now do her image and my past”:

“*Vot zapomni* [now remember],” she would say in conspiratorial tones as she drew my attention to this or that loved thing in Vyra – a lark ascending the curds-and-whey sky of a dull spring day, heat lightning taking pictures of a distant line of trees in the night, the palette of maple leaves on brown sand, a small bird’s cuneate footprints on new snow. As if feeling that in a few years the tangible part of her world would perish, she cultivated an extraordinary consciousness of the various time marks distributed throughout our country place. (p. 40)

Yet the ability to recall individual memories is not sufficient for creation of a coherent autobiographical narrative: young school-age children remember and narrate single events but display difficulties when asked to tell a ‘life story’. The narrative shaping of autobiographical memory continues in late childhood and adolescence, as individuals acquire the notion of calendar time (usually by age 12), develop the skills of psychological evaluation, temporal structuring, and causal reasoning, and internalize canonical biographical forms, life scripts, and master narratives (Berntsen & Bohn, 2009; Fivush et al., 2011; McAdams, 2006; Nelson, 2003).

Together, studies in developmental psychology show that language plays an important role in development of autobiographical memory but they do not tell us whether the structures that govern transformation of personal experience into narratives are universal or whether they vary across languages and cultures. To address this issue directly I will turn to studies of life-storytelling and narrative socialization across cultures and then consider the implications of their findings for autobiographical memory. This inquiry will be guided

by a series of questions, starting with a basic one: does everyone have a life story?

5.2 Autobiographical narratives and their effects on autobiographical memory

5.2.1 *Does everyone have a life story?*

Anthropologist Birgitt Röttger-Rössler (1993) recalls that when she was conducting her fieldwork among the Makassar in Indonesia, she postponed life-story collection till the end and even then approached only individuals with whom she had established a close relationship, yet “not one villager was willing to speak about his or her own life, not even some episodes of it” (p. 366). After several failed attempts, she dropped her intention to collect anything similar to Western autobiographies and shifted focus to storytelling in everyday conversation.

Could it be that the Makassar did not divulge personal experiences to outsiders? Such taboos are not unheard of: for instance, Palmer (2003), an anthropologist raised in a traditional Kiowa family, states that the Kiowa “don’t usually like to tell intimate details to strangers” and “prefer to keep stories within a relatively tight, informal circle of close friends and relatives” (p. xvi–xvii). This was not, however, the case among the Makassar – they were perfectly happy to discuss other people’s lives and even to talk about personal experience, yet their narratives focused on public selves and on events, actions, and social roles, rather than on the ‘inner lives’, leading Röttger-Rössler (1993) to complain that “it is almost impossible to learn something about the feelings and emotions of the narrator when listening to a story he presents” (p. 366).

Similar failures to collect a recognizable life story were reported by ethnographers who worked with the Ilongot in the Philippines (Rosaldo, 1976), the Pintupi in the Australian Western Desert (Myers, 1979), the Kwaio in the Solomon Islands (Keesing, 1985), and Native Americans in the US (Wong, 1992). These failures were attributed to the clash in storytelling conventions, whereby local communities privileged public, rather than inner, selves, and anecdotal moments, rather than a unified chronological life story. Yet, surely the fact that members of these communities retell individual events suggests that their autobiographical memories are organized just like ours?

Interestingly, it appears that the low premium placed on chronological life-storytelling does affect memory for childhood events. Leichtman and associates (2003) found that, in India, only 12 percent of the rural participants and 30 percent of the urban ones reported a specific memory from childhood: the majority provided only general or episodic memories, even when pressed for specific episodes. Rural participants often appeared puzzled or annoyed by the

request to report early memories and indicated that, in their view, such memories were unimportant. Most participants also did not know their birthdates and were unable to date their memories.

These findings illustrate three loci of cross-linguistic and cross-cultural variation in autobiographical narration: temporality, tellability, and life scripts. To begin with, as seen in [Chapter 3](#), speech communities differ in the temporal codes used for ‘tagging’ events and linking them to each other in memory. Secondly, they differ in the types of events deemed *tellable*, i.e., culturally relevant, interesting, and reportable (Labov, 1972; Linde, 1993), and *untellable*, i.e., irrelevant, uninteresting, offensive, socially inappropriate, or potentially incomprehensible to the audience (Miller et al., 2007). Most importantly, they differ in narrative conventions that govern life-storytelling as such and in *life scripts*, that is mental representations of collectively shared social norms with regard to expected life events (e.g., graduation, job, marriage, childbirth), and their timing and importance in the average life course (Berntsen & Bohn, 2009; Fivush & Haden, 2003; Linde, 1993). Indian villagers did not assign much significance to their childhood, but then neither did eighteenth-century American memoirists, who apologized for inclusion of ‘the insipid anecdotes’ of their childhood – in contrast, in the nineteenth century, childhood assumed a central place in the telling of American lives (Bjorklund, 1998). Today, American life stories also single out ‘adolescence’ as a unique developmental stage, yet this category is a twentieth-century invention and is not recognized in many cultures around the world (Hatcher, 1994).

The existence of storytelling conventions does not imply, however, that individual narratives always follow a predetermined script. Narrative scholars have long noticed an inherent contradiction between the demands placed on narration by life scripts and tellability. As pointed out by the French narratologist Todorov (1977) (whose life story, incidentally, we will examine in [Chapter 6](#)), a sequence of facts does not constitute a narrative – they must have elements in common, at the same time, they cannot have all elements in common for there will be no story. To transform experience into narrative, one has to tell “a story that is at once recognizably canonical and recognizably noncanonical” (Bruner, 2001: 30), because tellability, in the Western tradition, lies in the extraordinariness of the life or the event in question – it should, in some ways, violate expectations (Chafe, 1994; Labov, 1972; Linde, 1993). Augustine’s *Confessions*, commonly viewed as the first Western autobiography, furnish many such episodes, including the time when he and his fellow mischief-makers stole pears from the neighbor’s yard.²

² The parallels between this iconic episode and Chafe’s (1980) *Pear* film are impossible to ignore, yet one is left to wonder whether this intertextuality is intentional or coincidental on the part of the makers of the *Pear* film.

There was a pear tree near our vineyard laden with fruit, though attractive in neither color nor taste. To shake the fruit off the tree and carry off the pears, I and a gang of naughty adolescents set off late at night after (in our usual pestilential way) we had continued our game in the streets. We carried off a huge load of pears. But they were not for our feasts but merely to throw to the pigs. Even if we ate a few, nevertheless our pleasure lay in doing what was not allowed. (Augustine, 1991: 29)

Since Augustine, Western autobiography has centered on such pivotal points, known as *turning points*, a term first used in English in 1851 by John Ruskin (Bjorklund, 1998; Bruner, 2001; Fivush et al., 2011; Linde, 1993). Autobiographical memory also privileges events that violate schematic expectations (e.g., the time our car hit a deer), individual turning points (e.g., the birth of my son), and historic turning points, encoded in *flashbulb memories* (e.g., September 11th). In Neisser's (1982) view, "the flashbulb recalls an occasion when two narratives that we ordinarily keep separate – the course of history and the course of our own life – were momentarily put into alignment" (p. 47), creating a particular turning point, a *historic moment*.

Flashbulb memories display consistent structure: people remember the place (on 9/11 in 2001, I was in a conference room in Ritter Hall), time (it was morning), ongoing activity (I was in a committee meeting), informant (Dean Sewell, who walked out after reporting to the committee and then walked back in to announce the attack), aftermath (the committee continued its discussion as if nothing happened), and one's own affect (utter shock). Neisser (1982) argues that these canonical categories reflect narrative structures that govern transformation of experience into narrative. But are these structures truly universal?

5.2.2 *Are there universal narrative structures?*

Early in the twentieth century, Russian linguist and folklore scholar Vladimir Propp ([1928] 1968) made a pioneering attempt to capture generic narrative structures. His analysis of the morphology of the Russian fairytale revealed that a 'good story' usually involves an obstacle confronting the protagonist and the protagonist's attempt to solve the problem. A similar conclusion was reached by Labov (1972; Labov & Waletzky, 1967), who identified the basic structure of oral narratives of personal experience: an (optional) abstract or narrative opening (what is the story about), an orientation (time, place, characters), a complicating action (what happened), an evaluation (why is the story interesting, what to think about particular characters and events), a resolution (how did it end or get resolved), and an (optional) coda that signals that the story ended and perhaps briefly recapitulates the story and its significance.

The problem is that this schema reflects the structure of Anglo or 'Western' narratives but is not always applicable to other narrative traditions. Speakers

of Australian Aboriginal languages, such as Guugu Yimithirr, Pintupi, or Warlpiri, and Native American languages, such as Itzaj Maya or Navajo, favor the schema of a journey and cyclic narrative organization, with parallelisms and repetition occurring at all structural levels, from morphemes to discourse (Eickelkamp, 2008; Gale, 1995; Haviland, 1991; Hofling, 1993; Klapproth, 2004; Myers, 1986; Worth & Adair, 1997). The mismatch in the structures of expectation between speakers used to the complication/resolution schema and speakers used to the journey schema may lead to intercultural miscommunication and, sometimes, to devaluing of particular styles. Thus, McGregor (1987) notes that the “strong orientation on movement from place to place” in Australian Aboriginal narratives “almost certainly contributes more than any other single factor to the immediate European reaction of impatient boredom” (p. 20).

This ambiguity takes us to another source of cross-linguistic variation: thematic, causal, and temporal coherence. The Anglo narrative tradition privileges *topic-centered* chronological personal narratives that focus on a single experience and establish clear temporal and causal connections between events (Linde, 1993; Tannen, 1980). In contrast, Japanese narratives may combine two or three similar incidents into a single story, while Spanish narratives favor the *topic-associating* structure that links events that happened at different times and places and to different people (McCabe & Bliss, 2003; Minami, 2002). Australian Aboriginal narratives often consist of two storylines, with storytellers constantly shifting character focus, within and between episodes, without specifying either temporal or causal connections (Eickelkamp, 2008; Gale, 1995; Klapproth, 2004; McGregor, 1987). Depending on how familiar their listeners are with canonical plots, and whether they are ready, or authorized, to understand them, traditional Aboriginal and Native American narratives may omit parts that are vital for understanding of the story, offer abridged or elliptical narratives, or engage the audience in the discovery process, treating the narrative as a kind of map (Eickelkamp, 2008; Klapproth, 2004; Palmer, 2003).

In the area of temporality, cross-linguistic variation is evident in the types of temporal codes employed (see Chapter 3), in lexical, grammatical and discursive means of establishing temporal relations, such as tense and aspect (see Chapter 4), and in the importance assigned to temporal coherence. Traditional Aboriginal Australian narratives, for instance, differentiate between *yuti*, which refers to immediate experience, and the foundational time-space construct of *tjukurrpa* [The Dreaming], that invokes a sacred era in which ancestral beings created the world (Klapproth, 2004; Myers, 1986). In contrast, Māori narratives emphasize the relational notion of time, placing events on the timeline relative to each other. Māori mothers make more references to relative time than Pakeha, New Zealanders of European origin (Reese et al., 2008).

Narrative traditions also differ in the amount of evaluation: in the context of the same narrative task, Greek speakers may include more evaluative comments than speakers of American English (Tannen, 1980), English speakers more than speakers of Japanese (Minami, 2011) and Pakeha more than Māori (Holmes, 1998). These differences may lead to intercultural misunderstandings: Māori narrators, for instance, may dispense with resolutions and codas, creating personal stories that sound incomplete to their Pakeha interlocutors (Holmes, 1998).

This cross-linguistic variation is particularly striking in the area of self-reflection. Life stories collected from the Kwaio, the Pintupi, the Ilongot, and the Makassar downplay emotions and introspection and focus on social roles and cultural expectations (Keesing, 1985; Myers, 1979; Rosaldo, 1976; Röttger-Rössler, 1993). Thus, Keesing (1985) found that pointed questions about childhood, dating, marriages, and children allowed him to elicit life stories from several Kwaio women, yet these narratives were constructed as moral texts about “women’s virtues, their paths to prestige, the ancestral rules governing their lives, and their appropriate roles vis-à-vis the watchful and potentially punitive ancestors, their daughters, and their husbands” (p. 31). Myers (1979) similarly noted that the Aboriginal life stories he elicited “emphasize the cultural expectations much more than they do the specific experiences and interpretations of the individual; they seem illustrations rather than self-conscious introspections” (p. 348). It is these differences that led Rosaldo (1976) to conclude about his Ilongot informant: “I do not believe that members of his culture were accustomed to telling their life stories in any form, and certainly not in a way intimate, revealing and confessional” (p. 122).

In fact, ‘intimate, revealing, and confessional’ *autobiography* – an individual life story that begins in childhood, develops chronologically, and offers insights into the protagonist’s inner world – is a relatively recent literary invention (Bakhtin, 1986; Conway, 1998; Marasco, 2011; Misch, 1951; Wu, 1990). Misch’s (1951) magisterial survey of the development of Western autobiography shows that the earliest preserved ‘autobiographies’ are descriptions of rulers’ lives appearing in New Kingdom tomb inscriptions and Assyrian cuneiform chronicles of the third and second millennia BC. The emergence of these ‘political autobiographies’ was motivated by the political and spiritual needs of rulers of the city-states, who no longer had personal access to all members of their growing communities and wanted to establish their power and legitimacy in the eyes of their constituencies and the gods and spirits of the netherworld. To do so, they appealed to visual imagery, as seen in Egyptian reliefs, and to new semiotic means, writing and the calendar, which facilitated the tracing of genealogies and establishment of *biographical time* (Bakhtin, 1986). The key purpose of these early texts was self-glorification, as illustrated in the inscription produced by the Assyrian king Tiglath-Pileser I in 1100 BC:

The fame of my mighty power, my victory in battle, the subjection of the enemy who hated Assur, and whom Anu and Ramman had given to me, have I written in my memorial tablet and my foundation-inscription and placed in the temple of Anu and Ramman, the great gods, my Lords, for eternal ages. (Misch, 1951: 38)

This inscription also illustrates the conventionalized nature of early records, created to commemorate public events. As a result, argues Misch (1951), “in all this abundance of material there is an infinite poverty of individual character” (p. 19). The shift towards more personalized accounts took place in the fifth and fourth centuries BC in Greece, where the development of historiography and Socratic philosophy – and, with it, intense self-scrutiny – increased the importance of and the interest in individualized self-accounts. Greek autobiographies include *ephemerides* [diaries of king’s activities], preserved in royal archives, *hypomnemata* [Latin *commentarii*, ‘notes’ to aid future historians] written by kings, generals, and politicians in self-glorification, self-justification, or self-apology, and speeches and personal letters, which, in the case of prominent political figures, such as Alexander the Great or Ptolemy I, were collected in volumes for the wider reading public, curious about the lives of others (Marasco, 2011). The change affected even funerary inscriptions, which, from the fourth century BC onwards contain more biographical details, such as the age and place of birth of the deceased, father’s name, and the cause of death (Momigliano, 1993). In the Hellenistic age, the new genre rose to prominence and after Alexander’s death, more than a dozen of his companions wrote memoirs with their own, often competing, versions of the events (Marasco, 2011). In the second century BC, the Greek tradition inspired first known Roman autobiographies, and in the first century BC, Sulla’s and later Caesar’s accounts of their political and military achievements became greatly popular with Roman audiences. By the late first- early second century AD, when Plutarch and Suetonius published their famous studies of lives, biography and autobiography were in full swing.

The importance of Augustine’s *Confessions*, which appeared in the fourth century AD (397–8 AD) is not in being ‘the first’ autobiography but in breaking with the earlier tradition: the subjective tone and the focus on inner experience distinguish his memoir from the third-person military reports authored by Caesar, a record of deeds produced by Augustus, or humble yet impersonal meditations left to posterity by Marcus Aurelius. Shifting the focus to inner thoughts and feelings, Augustine shaped Western autobiography in a way comparable only to Rousseau, whose *Confessions*, published in 1781, created a new secular hero and changed the focus of memoirs from military exploits and religious conversion to everyday life.

The development of Chinese autobiography took a different tack: the *Biography of Master* (of the) *Five Willows*, written in third person by Augustine’s contemporary, T’ao Ch’ien (365–427), established a convention of impersonal

descriptions of public lives. Only in the sixteenth century did Chinese readers begin catching glimpses of the writers' inner worlds, from domestic squabbles to misdeeds and remorse, and only in the twentieth century did the translation of Rousseau's *Confessions* usher in the era of (some) self-disclosure (J. Wang, 2008; Wu, 1990).

To recognize the historically, culturally, and socially constructed nature of life-story genres, the discussion below will differentiate between *personal narratives*, i.e., event-oriented stories that appear to be universal, and *autobiographies*, i.e., chronologically organized life stories created for public consumption that appear to emerge later in human history, motivated by institutional needs and facilitated by the invention of writing and the calendar. The two genres, nevertheless, have a common aspect: both are grounded in narrative structures used for the selection, sequencing, and evaluation of personal events. Let us now examine whether, and if so, how cross-linguistic and cross-cultural variation in narrative structures and conventions affects narrative selves.

5.2.3 *Is there a universal narrative self?*

Cross-linguistic differences in conventionalized narrative selves can be found in a variety of areas, starting with the authorial stance: life-storytelling in English privileges the first person, while traditional Chinese writing encourages an impersonal third-person perspective or a collective 'we' (Shen, 1989; J. Wang, 2008; Wu, 1990). They are also evident in distinct pronominal, gender, and kinship systems, which categorize and position people in different ways and mark different social roles and relationships (Everett, 2012; Mühlhäusler & Harré, 1990; Siewierska, 2004; Wong, 1992). Most importantly, they are evident in the functions of autobiographical narratives: Western life stories are told to make "a point about the speaker" (Linde, 1993: 21), while in East Asia, in the Australian Western Desert, among Native Americans and the Makassar of Indonesia, personal narratives are told to make general points about the ways of the world and to position narrators in terms of cultural expectations and recognizable social roles (Keesing, 1985; Myers, 1979; Rosaldo, 1976; Röttger-Rössler, 1993; Wong, 1992). These differences suggest that adoption of personal memory for self-definition is inextricably linked to the Western concept of the autonomous self (Wang & Ross, 2007).

Anthropological research provides compelling evidence that the Western conception of self as discrete, autonomous and individual is not directly applicable to many other societies, where people situate themselves in the nexus of social roles and familiar relations (Harris, 1989). The very term, *the self*, a reflexive pronoun preceded by a definite article like a discrete entity, is an English-language reification (Besemeres, 2002). In other languages, reflexive pronouns and particles appear as grammatical objects, such as the Russian

sebia (to self) and *-sia* (oneself), which complicates the translation of English expressions, such as *self-consciousness* or *self-esteem*. Geertz (1984) captures this cross-cultural variation in his famous statement:

The Western conception of the person as a bounded, unique, more or less integrated motivational and cognitive universe, a dynamic center of awareness, emotion, judgment, and action organized into a distinctive whole and set contrastively both against other such wholes and against a social and natural background is, however incorrigible it may seem to us, a rather peculiar idea within the context of world's cultures. (p. 126)

Postmodernist critique has problematized the East/West dichotomy, showing that cultural selves are multiple and context-dependent: 'egocentric' Americans may display interdependent relational selves and 'sociocentric' Toraja of Indonesia independent autonomous selves (Hollan, 1992). Nevertheless, in the fields of psychology and human development, the distinction between the individualistic West (commonly represented by middle-class white North American undergraduates) and collectivistic East (commonly represented by middle-class Chinese students) continues to hold and to inspire research on the self. In order to present the findings of this research fairly, in what follows – and in the next chapter – I will temporarily adopt this lens, despite the oversimplification and reductionism inherent in the East/West dichotomy.

Before I do that, however, I would like to recognize the nuanced complexity of personal storytelling and the fact that each narrative tradition also gives rise to unconventional narratives, some of which, like Augustine's and Rousseau's *Confessions*, become the new canon. A wonderful example of such narratives comes from the 'golden era' of the Heian court (ninth to twelfth centuries AD) in imperial Japan, where literacy practices were affected by gender. Japanese men studied classical Chinese and followed Chinese models in their writing, while aristocratic women, such as Lady Murasaki or Sei Shōnagon, used colloquial Japanese and produced diaries, poetry, and prose unburdened by Chinese models and conventions. Wu (1990) argues that "nowhere in the world at that time or even in the next five or six centuries was there such a vivid and varied description of daily life, a free and easy avowal of feeling and thought" (p. 13).

My own personal favorite is Sei Shōnagon (2006), with her witty comments and perennial lists of things that infuriate, terrify, embarrass, or delight the senses. Ten centuries later, we can still relate to her irritation by people who continuously bemoan their lot in life, envy others and demand to be let in on every trivial little thing, by guests who arrive when you have something urgent to do and prattle on and on, by babies that cry when you are trying to hear something, and by lovers who speak admiringly of their past lady friends. Yet Sei Shōnagon may also puzzle the reader unfamiliar with the Japanese language and narrative tradition. Her translator Meredith McKinney (2006) notes

that she often launches into new scenes without any orientation, describes them through time-neutral verbs and, following the classical Japanese tradition, omits the subjects of these verbs. As a result, her descriptions have a timeless dreamy quality: we are never quite sure who the experiencer is and whether the event we witness is a recollection or a whimsical image.

This ambiguity reminds us that despite the similarities in our inner feelings and the connection we might feel to Sei Shōnagon's self-reflection and introspection, cross-linguistic differences in narrative structures and selves are real and affect both conventional and unconventional narratives. In the Japanese narrative tradition, for instance, the evaluation component is less central; as a consequence, Japanese speakers give high ratings to stories with a clear chronological sequence but little evaluative description, while English speakers expect 'good' stories to contain not only temporal but also evaluative components (Minami, 2011). Similarly to other areas of cross-linguistic variation, the key difference between narrative traditions is not in the stories that *can* be elicited but in the stories that *are* habitually told, in the functions such habitually told stories serve in creating and performing narrative selves, and in the ways such selves are constructed in the process of narrative socialization, to which I turn next.

5.2.4 *Cross-linguistic variation in narrative socialization practices*

Cross-linguistic and cross-cultural variation in the construct of self affects both the frequency and the functions of shared reminiscing in the process of narrative socialization: European-American mothers engage in past-events talk significantly more frequently than Chinese, Korean, and Thai mothers and use shared reminiscing for didactic and social functions, such as problem solving, relationship and conversation maintenance, emotion regulation and development of children's self-esteem; in contrast, Chinese, Korean, and Thai mothers often treat narrative practices as a didactic medium that reinforces moral lessons and assists in children's self-improvement (Kulkofsky et al., 2009; Miller et al., 1996, 1997; Wang & Fivush, 2005; Winskel, 2010). Nor do all communities stress the past in similar ways: Indian parents, for instance, favor the present and speak to children in order to correct their behavior or to encourage them to undertake particular actions (Leichtman et al., 2003).

Cross-linguistic variation also affects parental interactional styles: European-American mothers display a more elaborate, emotional and child-centered style, pose more open-ended questions and focus on the child's thoughts, feelings, and memories, while Chinese and Korean mothers are more likely to pose yes/no questions, to ask the same questions repeatedly and to focus on social norms, behavioral expectations, and children's past transgressions (Kulkofsky et al., 2009; Leichtman et al., 2003; Miller et al., 1996, 1997; Mullen & Yi,

1995; Wang, 2004, 2006a,b; Wang et al., 2000; Wang & Fivush, 2005; Winskel, 2010). The co-constructions of events by Chinese parents and children are also more likely to end in didactic codas explicitly outlining the implications of a particular rule violation (e.g., “Saying dirty words is not good”, “Next time I won’t do it again”) (Miller et al., 1997).

Other communities may discourage children’s active participation in narrative activity: in the traditional Aboriginal communities of the Australian Western Desert, for instance, children are expected to observe and understand the world around them and thus listen attentively to stories, without asking questions (Klapproth, 2004). This tradition, however, is about to change. Recent research shows that indigenous communities of Australia are experiencing not only a language shift, to English and English-based Creoles, but also a shift in narrative styles and narrative socialization practices. Disbray (2008) documented the emergence of new storytelling practices, such as narrative co-construction based on picture books, while Eickelkamp (2008) found changes in traditional practices, such as sand storytelling (stories accompanied by pictures drawn in the sand): the Anangu children in her study still engaged in sand storytelling but the nature of these stories has changed from canonical narratives to self-referential reporting of concrete events. Both researchers also documented the persistence of some traditional elements, such as the cyclic journey schema, repetition, guessing, and inferencing.

The findings to date reveal the heterogeneous and dynamic nature of narrative socialization practices which differ both within and across communities simplistically categorized as ‘Eastern’ or ‘Western’ (e.g., Fivush et al., 2011; Tōugu et al., 2011). They also underscore that Western narrative socialization practices are not superior to those of more traditional societies: for instance, Reese and associates (2008) found that in New Zealand Māori mothers provide a richer reminiscing environment than Pakeha mothers – they were less elaborative when talking about trivial past events but more elaborative when talking about culturally significant events, such as childbirth. But the key question we need to ask is this: do cross-linguistic differences in narrative socialization affect autobiographical memory?

5.2.5 *Cross-linguistic variation in autobiographical memory*

Studies of autobiographical memories show that cross-linguistic variation in narrative socialization practices affects consolidation of early memories and focal attention and memory contents. The most striking finding involves systematic variation in the average age of earliest memories. Māori adults report significantly earlier memories (average age 2.5 yrs) than English speakers in the US and New Zealand (average age 3.5 yrs), who, in turn, report earlier memories than Chinese and Korean speakers (average age 4–5 yrs, depending

on the study) (Hayne & MacDonald, 2003; MacDonald et al., 2000; Mullen, 1994; Pillemer, 1998; Wang, 2001, 2006b). English-speaking children in North America retrieved earlier ($M = 28.2$ months) and a greater number of memories from early childhood than Chinese children ($M = 41.4$ months), suggesting that they consolidate earlier memories better, retain them for a longer period of time, and display a slower decline in memory accessibility with age (Peterson et al., 2009). In contrast, in India the majority of the participants could not produce memories from early childhood or even date their memories; among the six urban participants who did report dates, the ages of the earliest memories varied between 6 and 11 (Leichtman et al., 2003).

The second systematic finding involves the effects of parental elaboration, whereby children of more elaborative parents are more likely to provide more detailed narratives and to include more evaluative information later on in life (Fivush et al., 2011). Wang and associates (Han et al., 1998; Kulkofsky et al., 2009; Wang, 2004, 2006a) and Minami (2002) found that European-American children between the ages of 3 and 8 produced more detailed and elaborate personal narratives, with more references to specific past events and emotions, and more evaluations than Chinese, Korean, and Japanese children of the same age. Chinese children produced narratives that equaled in volume to the American ones but differed in terms of structure: their 'bare bones' accounts contained sequences of activities, while American children tended to provide more 'fleshed-out' descriptions of individual events. Korean children's narratives tended to be shorter and more succinct than either European-American or Chinese narratives but similar in structure to the latter – they provided skeletal descriptions of multiple events and included more references to other people and group activities than those by American children. Japanese children also produced succinct narratives combining multiple isolated but related events (Minami, 2002). Both Korean and Chinese children displayed the specificity common for American four-year olds only by the age of six (Han et al., 1998).

The third systematic finding involves cross-linguistic differences in attention foci and the types of self-presentation. Wang (2004) found that Chinese children present more interdependent selves, describing themselves in terms of their social roles, context-specific characteristics and overt behaviors, while European-American children present more independent selves, describing themselves in terms of their inner thoughts, feelings, preferences, personal attributes, and beliefs; they also tend to provide more positive self-evaluations than Chinese children. These structuring principles also affect communication between hearing parents and deaf children: a comparison of personal narratives of an American (David) and a Taiwanese (Qing) child revealed that Qing's stories about herself were less developed than those about others; in contrast, David produced equally complex stories about himself and others (Van

Deusen-Phillips et al., 2001). The differences in self-presentation and attention foci may also affect autobiographical memory in adults: several studies found that Chinese and Korean adults recall more events with a group or social orientation (interdependent focus) and American adults more events with individual significance (independent focus) (Conway et al., 2005; Mullen, 1994; Wang, 2001; Wang & Ross, 2005).

The findings of language effects on autobiographical memory allow us to formulate two hypotheses with regard to the bilingual mind. First, we might hypothesize that language may act as a preferential retrieval cue in a mind mediated by two or more languages. Secondly, we might hypothesize that bicultural bilinguals may display differences in the timing and content of memories linked to distinct linguistic communities, produce different autobiographical narratives in their respective languages, and experience difficulties in translating the same memories and experiences into the other language. To see if this is indeed the case, let us look, once again, at Nabokov's English-language memoir about his Russian childhood.

5.3 Bilinguals' autobiographical narratives and memories

5.3.1 *Speak, memory: Nabokov's three autobiographies*

Born in 1899, in a wealthy aristocratic Russian family, Vladimir Nabokov was raised in three languages: Russian as a dominant language, followed by French, beloved by the Russian aristocracy, and English, highly esteemed by his anglophile father. In 1919, the Nabokov family, forced to flee from the Russian revolution, moved to England, where Vladimir and his brother attended Cambridge, and then made a home in Berlin. By the time Nabokov arrived in the US in 1940, he had been writing in Russian for more than three decades and publishing for two, yet he is primarily known as an English-language writer. Nabokov's mastery of English was such that he never hesitated at writing his memoir, *Conclusive Evidence* (1951), in English, yet the task turned out to be agonizingly difficult even for this master stylist, due to the tension between the language of the memories and the language of the telling:

Книга "Conclusive Evidence" писалась долго (1946–1950), с особенно мучительным трудом, ибо память была настроена на один лад – музыкально недоговоренный русский, – а навязывался ей другой лад, английский и обстоятельный. (p. 6)

[The book "Conclusive Evidence" was being written over a long period of time (1946–1950), with particularly agonizing difficulties, because [my] memory was attuned to one [musical] key – the musically reticent Russian, – but it was forced into another key, English and deliberate] (my translation – A.P.) (Nabokov, [1967] 2011: 6)

Conclusive Evidence came out in the US in 1951 and Nabokov was already working on *Lolita* when a newly founded Russian-language publishing house

in New York asked if he would translate one of his English novels into Russian. Instead he offered his memoirs. The translation for an audience of Russian émigrés made many explanations unnecessary, yet at the same time, the use of the childhood language triggered new memories, akin to the Proustian *madeleine*, and allowed for elaboration of those only sketched in English. The preface to the new book, published under the title *Drugie berega* [Other shores] in 1954, thus defines the relationship between the two versions:

Предлагаемая русская книга относится к английскому тексту, как прописные буквы к курсиву, или как относится к стилизованному профилю в упор глядящее лицо.

[The proposed Russian book relates to the English text like block-capital letters to cursive or like a face that stares at you directly relates to a stylized profile.] (my translation – A.P.) (Nabokov, [1967] 2011: 6)

In the mid 1960s, Nabokov, by then world-famous and living in Switzerland, undertook revisions of the original English version of his autobiography. In this he was guided by the changes made in the Russian version and by the reminiscences and documents he had received from his sisters and his genealogically minded cousin Sergey. In the preface to the new memoir, published in 1966 as *Speak Memory: An autobiography revisited*, Nabokov acknowledges the agonizing difficulty of fitting his Russian memories back into the strait-jacket of English:

For the present, final, edition of *Speak, Memory* I have not only introduced basic changes and copious additions into the initial English text, but have availed myself of the corrections I made while turning it into Russian. This re-Englishing of a Russian re-version of what had been an English re-telling of Russian memories in the first place, proved to be a diabolical task. (1966: 12–13)

An analysis of Nabokov's memoirs shows that some of his memories include specific words or phrases and are, thus, 'linguistic' in form. His early memories often feature Russian, as in his mother's nostalgic reminder "*Vot zapomni*" [Now remember] (1966: 40) or his father's joyful exclamation upon arrival at Victoria Station in 1919 "*Mi v Anglii, mi v Anglii*" [We are in England, we are in England] (p. 60). On other occasions his relatives speak French. His mother mutters that the peasants who are rocking her husband in celebration of his latest decree might not catch him: "*Un jour ils vont le laisser tomber*" [One day they will let him fall] (1966: 31), while his little brother utters "*Ah, que c'est beau!*" [Ah, how beautiful!] (p. 47), faking surprise and excitement over the Christmas gifts the two of them had already unwrapped and rewrapped.

These words and phrases, reproduced in their original language, do not cause Nabokov any difficulties. What he finds disconcerting is the lack of the seamless concord between the English words of his memoir and the Russian world of his childhood memories. To resolve the contradiction, at least partially, he

liberally sprinkles the English-language memoir with Russian words. The little path in the park retains its ‘real’ name, *tropinka Sfinksov* [path of the Sphingids] (Nabokov, 1966: 41), the mushroom-picking practice is referred to as “the very Russian sport of *hodit’ po gribi*” [literally: walking for mushrooms] (Nabokov, 1966: 43) and when the word *dusk* does not capture the leisurely fading of the summer day, it is replaced with “the lovely Russian word” *soomerki* [dusk] (Nabokov, 1966: 81).

One may argue, however, that these lexical borrowings are simply a creative way of adding ‘authenticity’ to the English text. This explanation does not work for the changes made in transforming *Conclusive Evidence* into *Drugie berega* [Other shores]. Writing in his native Russian for the audience of émigrés well-familiar with the realia he describes, Nabokov does not need to emphasize authenticity. And yet he appears to recall more and with more precision, not only because the words and the things are now in full sync, but because the very fact of using Russian appears to trigger new memories and details. For instance, *Conclusive Evidence* features a funny yet fairly anonymous description of the old housekeeper and her pathological stinginess (Nabokov, 1951: 25). In the Russian version, the use of her name and patronymic brings forward her smell of coffee and decay (Nabokov, [1967] 2011: 35), which is then transferred into the new English version (1966: 45). *Conclusive evidence* also features a loving description of Nabokov’s first toilet room “casually situated in a narrow recess between a wicker hamper and the door leading to the nursery bathroom” (Nabokov, 1951: 51). In the Russian retelling, the word *korzina* [basket, hamper] triggers a new aural memory: “между плетеной бельевой корзиной с крышкой (как вспомнился ее скрип!)” [between a wicker laundry basket with a cover (how I [suddenly] remember its creaking!)] (Nabokov, [1967] 2011: 70). The Russian description also features additional visual details of the room: the two halberdiers in the stained-glass window and the little flotilla in the bathtub consisting of a wooden thermometer, a celluloid swan and a toy boat. Some made it into *Speak, Memory*, while other smells, sights, and sounds remained in the Russian version only, as did the recollection of sweet warm porridge triggered by the words *korm* [food] and *kormit’* [to feed] (Nabokov, [1967] 2011: 71).

I could continue listing the details that emerged for the first time in *Drugie berega*, but what do these examples really reveal? Perhaps, all we see is the artistry of the master stylist who is playing with a more familiar medium, as seen in the alliteration *chernila pahnut chernoslivom* [the ink smells of prunes] (Nabokov, [1967] 2011: 66), which did not appear in the English versions. Boyd (1991), Nabokov’s leading biographer, does think that working in Russian Nabokov seemed to recall more and more exactly than when he wrote in English, but even if the switch to Russian did trigger new memories, how generalizable is Nabokov’s experience?

5.3.2 *Bilingual autobiographical memory: 'language tagging' and differential access*

To determine whether bilinguals' autobiographical memories are 'tagged' by respective languages, researchers elicit memories through two techniques: free recall and cued recall. In the *free recall* procedure, participants are asked to recall meaningful personal events without a specific cue. In studies with bilingual participants, memories are elicited twice, once in each language, preferably on different days. In the *cued recall* procedure, each participant is given several cue words (15–50) and asked to associate each cue with a specific autobiographical event, writing down a few words about the event in question. The sessions are conducted first in one language and then in the other, with the order of languages counterbalanced across participants, commonly late bilinguals whose memories are linked to experiences in distinct linguistic and cultural settings (Javier et al., 1993; Larsen et al., 2002; Marian & Kaushanskaya, 2007; Marian & Neisser, 2000; Matsumoto & Stanny, 2006; Schrauf & Rubin, 1998, 2000, 2004) (Table 5.1).

In analysis, recalls are first categorized as *linguistic* or *non-linguistic*. Linguistic memories, such as Nabokov's *Vot zapomni* [Now remember], are divided into: (a) *congruent*, i.e., memories where the language of encoding and the language of recall are the same; (b) *crossover*, i.e., memories encoded in one language and triggered by a cue in another; and (c) *mixed*, i.e., memories encoded in both languages of the individual. The *language of encoding* is usually understood as the language of the environment but this does not have to be the case. In many contexts, from bilingual families to minority neighborhoods, individuals may experience events in a language different from that of the country of residence or in more than one language (as is the case for some of Nabokov's multilingual memories). Individuals may also narrate events to themselves in a language different from that of the environment and in that case the events may be encoded in the language of the inner speech, rather than in the external language.

Cued recall studies conducted with late Spanish–English (Schrauf & Rubin, 2000, 2004), Russian–English (Marian & Neisser, 2000), Polish–Danish (Larsen et al., 2002), and Japanese–English bilinguals (Matsumoto & Stanny, 2006) reveal that linguistic memories may constitute up to 80 percent of all memories (Schrauf & Rubin, 2000) and that the majority of these memories are congruent: in other words, L1 cues are more likely to activate memories of earlier events or events in the country of origin and L2 cues memories of later events that took place after arrival in the L2 country. Mixed memories were found to be equally accessible through both languages of bilingual individuals (Marian & Neisser, 2000). Studies of retrieval of general knowledge by bilingual speakers similarly show that retrieval is faster and more accurate when the languages of encoding and retrieval match (Marian & Fausey, 2006; Marian & Kaushanskaya, 2007).

Table 5.1 *Bilingual autobiographical memory*

Studies	Languages	Participants	Tasks	Findings
Javier et al. (1993)	L1 Spanish L2 English	5 Spanish–English bilinguals (3 females, 2 males, ages 29–66 yrs)	<i>Tasks:</i> free recall	Language congruity effect: memories more detailed and emotional when the languages of encoding and retrieval match
Marian & Neisser (2000)	L1 Russian L2 English	<i>Study 1</i> 20 Russian–English bilinguals (11 males, 9 females, mean age = 21.8 yrs, mean AoA = 14.2 yrs) <i>Study 2</i> 24 Russian–English bilinguals (12 females, 12 males, mean age = 20.2 yrs, mean AoA = 13.4 yrs)	<i>Tasks:</i> <i>Study 1:</i> cued recall in L1 Russian and L2 English; <i>Study 2:</i> cued recall with Russian and English words in Russian, and with Russian and English words in English	Language of encoding effect and language context effect: L1 Russian cues (and interview context) triggered more memories encoded in Russian and L2 English cues (and interview context) more English memories
Schrauf & Rubin (1998)	L1 Spanish L2 English	12 Spanish–English bilinguals (8 females, 4 males, mean age = 65 yrs, mean AoA = 28 yrs, LoR > 30 yrs)	<i>Tasks:</i> cued recall in L1 Spanish and L2 English	Language of encoding effect: L1 Spanish cues triggered earlier memories
Schrauf & Rubin (2000)	L1 Spanish L2 English	8 Spanish–English bilinguals (6 females, 2 males, mean age = 65.6 yrs, mean AoA = 28 yrs, mean LoR = 37.6 yrs)	<i>tasks:</i> cued recall in L1 Spanish and L2 English	Language of encoding effect: L1 Spanish cues triggered earlier memories
Larsen et al. (2002)	L1 Polish L2 Danish	20 Polish–Danish bilinguals (ages 51–61 yrs, LoR = 30 yrs): 10 early arrivals (mean AoA = 24 yrs, range 20–26 yrs) 10 late arrivals (mean AoA = 34 yrs, range 30–36 yrs)	<i>Tasks:</i> (1) cued recall in L1 Polish and L2 Danish; (2) language background questionnaire with self-ratings of proficiency	Language of encoding effect: L1 Polish cues triggered more memories from the decades prior to immigration, L2 Danish cues more memories from the decades after

Marian & Kaushanskaya (2004)	L1 Russian L2 English	47 Russian–English bilinguals (24 females, 23 males, mean age = 21 yrs, mean AoA = 14 yrs)	<i>Tasks:</i> cued recall in L1 Russian and L2 English	Language congruity effect: memories were higher in emotional intensity when the languages of encoding and retrieval matched
Schrauf & Rubin (2004)	L1 Spanish L2 English	30 Spanish–English bilinguals (mean age = 69.4 yrs, mean AoA = 22.1 yrs)	<i>Tasks:</i> (1) cued recall in L1 Spanish and L2 English, (2) rating of memories (visual and auditory detail, emotional intensity, linguistic information, frequency of rehearsal, significance)	Language of encoding effect: L1 Spanish cues triggered earlier, pre-immigration memories Recency effect: L2 English memories were rated higher in vividness and emotional intensity
Matsumoto & Stanny (2006)	L1 Japanese L2 English	15 English monolinguals (mean age = 20.9 yrs) 18 Japanese–English bilinguals (mean age = 22.7 yrs)	<i>Tasks:</i> (1) cued recall in English (monolinguals), in L1 Japanese and L2 English (bilinguals); (2) reporting of earliest memories; (3) language background questionnaire	Language of encoding effect: L1 Japanese cues triggered more Japanese memories, L2 English cues more English memories Age of encoding effect: English monolinguals retrieved memories from an earlier life period than Japanese–English bilinguals
Schwanberg (2010)	L1 Spanish L2 English	19 Spanish–English bilinguals with post-traumatic stress disorder (PTSD) and a history of significant childhood trauma	<i>Tasks:</i> (1) PTSD scale (CAPS-1) in L1 Spanish and L2 English; (2) Traumatic Memory inventory (TMI-PS) in L1 Spanish and L2 English (including a verbal recount of an early traumatic experience)	Language congruity effect: frequency and intensity of responses higher in L1 Spanish (language of the childhood trauma memories) than in L2 English

The ‘tagging’ phenomenon is also extensively documented in clinical research. Case studies of bi- and multilinguals in psychotherapy and psychoanalysis show that the switch to the L1 may facilitate recollection of early memories, trigger retrieval of previously repressed traumatic memories, evoke new details of memories rendered schematically in the L2 and rekindle emotions experienced at the time of remembered events (Aragno & Schlachet, 1996; Buxbaum, 1949; Greenson, 1950; Schwanberg, 2010). In one study, a Spanish–English bilingual used L2 English to discuss a traumatic experience from early childhood, when she and her family had been in a serious car accident. She was then asked to switch to her L1 Spanish and spoke for several more minutes, gradually slowing down and then asking for permission to stop because the L1 triggered the image of her injured father next to her in the ambulance and reminded her of the fear she experienced for his life: “It was like I was seeing it, right there in front of me – the accident. It wasn’t like that when I was speaking in English” (Schwanberg, 2010: 52).

These findings show that language serves as one of the organizing principles in bilingual autobiographical memory, offering differential – or at least preferential – access to different life periods and events. The language of encoding and the language(s) used during the event itself become a stable property or ‘tag’ of linguistic memories, facilitating their retrieval in that language (*language of encoding effect*), as seen in the case of Nabokov’s *Drugie berega*. This does not mean, of course, that memories encoded in one language are inaccessible in another – as seen in the case of Nabokov’s English-language memoirs they can be translated, yet something may be ‘lost in translation’. The match between the languages of encoding and retrieval appears to result in more accurate, detailed, vivid and emotional recalls (Javier et al., 1993; Marian & Kaushanskaya, 2004; Schwanberg, 2010; see also Evans, 2010: 199–201). This *language congruity effect* stems from repeated co-activation which links L1 words and multi-sensory experiences and it is these links that make the words of one’s primary language feel ‘real’ and lead Nabokov, dissatisfied with *dusk*, to sneak in the Russian *soomerki*.

5.3.3 Bilinguals’ autobiographical narratives

Yet ‘language tagging’ does not fully capture the interplay between language and autobiographical memory in the bilingual mind. We also have to ask whether the language of encoding affects the focus and content of autobiographical memories. And if so, would a different language of retrieval affect the segmentation and mental reconstruction of events, directing attention to aspects of experience that are not typically encoded in the original language? These questions have not yet been asked in the study of autobiographical memory but we do have some preliminary evidence suggesting that they should be (Table 5.2).

Table 5.2 *Bilinguals' autobiographical narratives*

Studies	Languages	Participants	Tasks	Findings
Dart (1992)	English French	English–French bilingual girl, recorded between ages 4.1 and 4.6	Spontaneous narratives told when she was in a room by herself and recorded without her knowledge	Language of the telling effect: different narrative styles in English and French
Marian & Kaushanskaya (2004)	L1 Russian L2 English	47 Russian–English bilinguals (23 males, 24 females, mean age = 21 yrs, mean AoA = 14 yrs)	<i>Tasks:</i> cued recall in L1 Russian and L2 English	Language of retrieval effect: more group-oriented mem- ories in L1 Russian, more self-oriented memories in L2 English
Burck (2005)	Different L1s L2/LX English	24 bi- and multilinguals (14 females, 10 males, ages 19 – 58 yrs, residing in the UK)	<i>Tasks:</i> research interview	Unique coherence systems cre- ated to account for bi- and multilingual selves
Pavlenko (2006b)	Different L1s	1,039 bi- and multilinguals (731 females, 308 males, ages 16 – 70 yrs)	<i>Tasks:</i> Bilingualism and Emotions Questionnaire (BEQ)	Unique coherence systems cre- ated to account for bi- and multilingual selves
Koven (2007)	Portuguese French	23 Portuguese–French bilingual females	<i>Tasks:</i> elicited narratives of personal experience told in both languages	Language of the telling effect: different narrative styles in Portuguese and French
Wang et al. (2010)	L1 Chinese (Mandarin or Cantonese) L2 English	125 Chinese–English bilinguals residing in Hong Kong (ages 8–14 yrs): n = 33 (mean age = 8 yrs, 20 females, 13 males) n = 32 (mean age = 10 yrs, 13 females, 19 males) n = 28 (mean age = 12 yrs, 14 females, 14 males) n = 32 (mean age = 14 yrs, 22 females, 10 males)	<i>Tasks:</i> (1) elicited memories of four past events – in either Chinese or English, randomly assigned; (2) open-ended self-description; (3) forced-choice task: statements of cultural values	Language of retrieval effect: more group-oriented mem- ories in L1 Chinese, more self-oriented memories in L2 English

Wang and associates (2010) found that Chinese–English bilingual students in Hong Kong produced significantly longer, more elaborate and more self-centered memory accounts in L2 English. Chinese memories commonly centered on social activities conducted jointly with others, e.g., “Once, my classmates and I were making a poster. One classmate wanted us to use his design. The rest of us didn’t really like his idea. We didn’t know what to do and argued with him.” (Wang et al., 2010: 562). English memories, on the other hand, emphasized children’s own roles, feelings, opinions, and perspectives, e.g., “recently I won this science competition thing at school and when I got the award I told one of my friends. Then he just didn’t believe it so then I got a bit angry because he’s supposed to believe it.” (Wang et al., 2010: 562). Similar findings come from Marian and Kaushanskaya’s (2004) study with Russian–English bilinguals. In their L1 Russian narratives, participants used more first person plural pronouns, such as *my* [we], and other group references, such as *nasha semia* [our family], suggesting more attention to others. The L2 English narratives, on the other hand, were more self-focused, as seen in the greater use of the first person singular. These findings suggest that the language of retrieval may trigger culturally congruent self-schemas and channel attention toward culturally relevant aspects of events, including the focus on one’s own activities and inner experiences versus those of others.

In another study, Wang (2009) examined differences in perceptual processing and remembering between European-Americans and Asians using three tasks: (1) recall of events recorded in a personal diary, (2) recall of a fictional narrative, (3) segmentation of the same fictional narrative. The findings revealed a consistent difference between the two groups, with European-Americans displaying superior recall and more fine-grained segmentation. These findings were interpreted as evidence of cross-cultural differences in perceptual processing and memory consolidation, with European-Americans engaging in more ‘effective’ processing and Asians seeing “the world as made up of fewer discrete events” (p. 129). These conclusions, however, may be a little too hasty: a close look at the study participants and design suggests a possible alternative interpretation. All participants were college students in the US and presumably performed the task in English. ‘European-Americans’ were likely L1 English speakers. In contrast, the group labeled ‘Asians’ consisted of students of Chinese, Indian, Korean, Pakistani, and Vietnamese origins (as well as ‘unreported’ origins), who had moved to the US, on average, at age 6.5 (task 1), 4 (task 2), and 14 (task 3). These AoAs suggest that all of the ‘Asian’ participants must have been more or less bilingual and that, for some at least, English was the L2 learned later in life. As a consequence, the findings of the study may simply reveal the effects of a weaker L2 on event segmentation and memory organization and retrieval.

The most systematic study to date has been conducted by Koven (1998, 2001, 2007), who examined how women bilingual in Portuguese and French

talk about the same experience in their two languages. The participants were asked for stories about times when they laughed hysterically, times when they were very afraid, and bad experiences with strangers and family members and friends, in both France and Portugal. To approximate the context of a natural conversation, the stories were told to other Portuguese–French bilinguals rather than the researcher herself. In the first stage of the study, stories were elicited twice, first in French and then in Portuguese, or vice versa. In the second stage, the researcher interviewed the participants about their experience of telling the same story in two languages. Next, the original recordings and transcribed stories were reviewed with another group of bilinguals with a similar background. In the last stage, five bilinguals listened to sample stories in both languages and were asked to describe how they imagined the speakers. This approach allowed the researcher to integrate her own analytical perspective with those of the speakers and listeners.

Three findings of the study present particular interest for our discussion. To begin with, several participants stated that Portuguese transports them to a different time and place, because it evokes childhood memories (e.g., “I’m very attached to the language, because it reminds me of all my memories. All my good childhood memories” (Isabel in Koven, 2007: 73)) and summer vacations in Portugal (e.g., “I think that when I start speaking Portuguese, well, immediately it evokes for me my vacation, you know ... what I experience there, the people that I see...” (Clara in Koven, 2007: 72–73)). Providing discursive evidence of ‘language tagging’, such comments suggest that tagging is at the heart of bilinguals’ perception of inhabiting ‘different worlds’.

Secondly, comparative analysis of the narratives showed that the speakers adopted divergent styles when telling ‘the same’ stories: Portuguese narratives contained significantly more past-tense narrator speech and were told in a more ‘objective’ or neutral tone, while French narratives displayed more affective and interpersonal engagement and a higher proportion of the here and now interlocutory speech. The speakers were also more willing to use French colloquialisms and obscenities as narrators and characters, while in Portuguese, colloquial speech and profanities were assigned to others. These differences were linked to distinct linguistic repertoires the participants have been socialized into. Their Portuguese, learned from parents and relatives, was marked as non-standard, regional, rural and ‘old-fashioned’ and associated with identities of Portuguese villagers and émigrés. In contrast, their French, learned in school and in interaction with friends, was like that of their monolingual peers and associated with identities of young, working-class, urban and suburban Parisians. As a result, in Portuguese, they resorted to linguistic repertoires of their immigrant parents and peasant relatives, presenting themselves as well-mannered but less empowered émigrés, while in French they adopted the critical stance and colloquial discourses of their peers, presenting themselves as tough Parisian youths.

These distinct repertoires, in turn, affected the speakers' self-perceptions and the ways in which others perceived them. Several study participants linked their own perception of distinct selves to differences in their Portuguese and French lexical repertoires (Koven, 2007: 77) and to divergent perceptions of themselves by others. The independent listeners of the recorded stories also described the same speakers differently as Portuguese and French narrators: in French, the women were characterized as more aggressive and assertive and in Portuguese as calmer, controlled, and conciliatory. Their Portuguese style was also associated with rural origins, as seen in comments such as "Can't you hear what a *peasant* she sounds like?" (Koven, 2007: 152).

Together, these studies reveal an intriguing interplay between cultural self-schemas, the linguistic resources available for narrative self-construction, and remembered selves. They suggest that, depending on the language of encoding and recall, we may narrate (and possibly also perceive and remember) ourselves differently and focus more on culturally relevant aspects of the situation, thus paying more attention to others in Chinese or taking a more critical evaluative stance in French (Koven, 2007; Marian & Kaushanskaya, 2004; Wang et al., 2010).

5.3.4 *Bilinguals' systems of coherence*

What are the implications of this duality for our sense of self? The key task of autobiographical memories and narratives is the maintenance of a coherent self (Conway, 2005; Linde, 1993). Experiences that challenge the sense of coherent self, from amnesia to migration, require people to develop new systems of coherence. To examine how bilinguals impose coherence on their self-perception and self-narration, I added a question "Do you feel like a different person sometimes when you use your different languages?" to the web-based BEQ Jean-Marc Dewaele and I (Dewaele & Pavlenko, 2001–2003) administered to bi- and multilinguals around the world. The analysis of 1,039 responses revealed that 65% ($n = 675$) of the participants answered the question positively, 26% ($n = 266$) negatively, 6% ($n = 64$) gave an ambiguous response (*no but*) and 3% ($n = 34$) did not answer the question (Pavlenko, 2006b). The majority of the positive responses were elaborated, suggesting that the respondents saw the need to justify and explain the affirmative answers. In doing so, they used one or more of four coherence systems. The first, *one language–one personality*, adopts a non-agentive view of the speaker, links individual selves to languages, and suggests, in a lay version of the linguistic relativity hypothesis, that we are also spoken by the languages we speak:

Absolutely. Speaking a different language means being a different person belonging to a different community character type emotional type. (Marina, 42, Russian–English–Hebrew–Ukrainian) (Pavlenko, 2006b: 12)

The other three systems attempt to reunite the perception of different selves with the belief in a unitary and coherent self. The *in-between* system acknowledges the different selves but splits the difference in the middle, creating a position at the intersection of different worlds. The *language of the self* system posits that only one of the languages, most commonly the L1, is 'the language of true self', while other languages function as *masks* or Jungian *personae*:

I feel less myself when speaking any language other than German but not in a bad sense. I feel more like I am acting a persona which can be good or bad. (Stephanie, 31, German–English–Spanish) (Pavlenko, 2006b: 18)

The notion of *personae* is also adopted in the fourth system, *language-independent self*, which posits a unitary self, independent of language and projected differently through different languages. Interestingly, several of the respondents who answered the question negatively also adopted this view of a single, true self, independent of the change in language:

Different languages allow me different thought structures and possibly different ways of feeling too. But these changes do not affect me deep within where I remain the same person. (Erica, 38, German–English) (Pavlenko, 2006b: 24)

Importantly, the majority of the respondents were well-educated individuals who had time to reflect on the relationship between bilingualism and self. Their answers are representative of the ways in which English-speaking elite bi- and multilinguals maintain linguistic self-coherence at the turn of the twenty-first century but should not be generalized to *all* bi- and multilinguals. At the same time, the findings of Pavlenko's (2006b) study are consistent with those of Koven's (2007) study and other studies of bilinguals' 'different selves' (Burck, 2005; Kramsch, 2009).

Burck's (2005) analysis of life-story interviews shows that her bi- and multilingual participants also experienced "a different sense of identity in the different languages" (Wasan, Gujarati–Hindi–English, p. 60) and a preoccupation with maintaining narrative coherence across the different selves and worlds delineated by their respective languages. Their attempts to resolve this conflict reveal the same coherence systems as in my own study. Thus, Polish–English bilingual Konrad draws on the *one language – one personality* system which attempts to reconcile the Polish world of the home and the English world of the outside:

I was just trying to make a sort of language connection to that. [...] I mean by the end, I suppose the problem for me could have been, was I this English person, or was I this Polish person? [...] So I think I had trouble in creating an identity that was, so I split my identities, I suppose. [...] And I had to be the sort of English gentleman type and then the Polish person I was, was much more emotional and mixed up and puzzled really. (Burck, 2005: 59)

This quote, which itself displays the lack of coherence, illustrates the ongoing process of imposition of coherence on bilingual lives. Other participants in Burck's (2005) study adopted alternative solutions: Mandarin–English bilingual Di-Yin posited a Chinese ‘core’ which linked the ‘true’ self to the L1, Cantonese–English bilingual Quinlan saw herself as “half way in between”, while Angela, who grew up speaking Sicilian, Albanian, and Italian, and later English, found her ‘home’ in French (pp. 62–63).

Together, these studies show that some bi- and multilinguals perceive multiple linguistic selves as a threat to the perception of self-coherence. This anxiety is reinforced by the “ideologically monolingual nation-states” (Koven, 2007: 245) that equate national unity with a common language and bilingualism with cognitive dissonance and suspicious loyalties (Anderson, 1991; Pavlenko, 2005, 2006b, 2011b, f). Attempts to manage the discontinuity and to impose coherence on self-perception range from acknowledgments of fragmentation and multiplicity to creation of a hybrid identity in a third or liminal space, to the imposition of a single ‘true’ self that is either linked to a single language or is alinguistic and unthreatened by different linguistic personae (Burck, 2005; Kramsch, 2009; Pavlenko, 2006b).

5.3.5 *Factors affecting the relationship between language and memory in the bilingual mind*

The studies to date reveal that the relationship between autobiographical memories and languages in the bilingual mind is affected by the AoA, CoA, language dominance and proficiency. In terms of CoA, ‘language tagging’ effects are more likely in languages learned in distinct contexts (Larsen et al., 2002; Marian & Kaushanskaya, 2004, 2007; Marian & Neisser, 2000; Matsumoto & Stanny, 2006; Schrauf & Rubin, 1998, 200, 2004). ‘Language tagging’ effects are also mediated by the AoA, both as the age of L2 acquisition and as the age of arrival in the L2 context. Thus, in a study with Polish–Danish bilinguals Larsen and associates (2002) found that for early immigrants (mean age = 24 yrs) L1 Polish memories dropped off soon after immigration, while later immigrants (mean age = 34 yrs) maintained Polish as the language of autobiographical memory for another decade. In the next chapter, we will return to this intriguing finding and see what it tells us about the language of inner speech.

The language of encoding is also affected by language dominance and proficiency. Matsumoto and Stanny (2006) found that Japanese–English bilinguals with lower levels of language proficiency were more likely to encode their memories in L1 Japanese and to think of them in Japanese prior to verbal retrieval in either language, while students with higher levels of proficiency reported an equal amount of memories encoded in L1 Japanese and L2 English. The researchers also found that Japanese–English bilinguals did not differ from

English monolinguals in the age of the earliest retrieved memory; however, in the cued recall procedure English speakers systematically retrieved memories from a significantly earlier period of life.

This is not to say that autobiographical memories are always narrated in the target-like way. Studies of oral and written personal narratives show that L1 narrative conventions may affect autobiographical narration in the L2. McCabe and Bliss (2003) found that even highly fluent Spanish–English bilingual children may use some L1 Spanish narrative conventions in L2 English, including topic-associating structure, use of references to family members as a means of coherence maintenance, and the emphasis on description, location, and evaluation, at the expense of event sequencing. Gale (1995) showed that Warlpiri children writing in L2 English use L1 Warlpiri narrative conventions, such as the presence of two storylines, the lack of orientation, the focus on travel and destinations, and the choice of past continuous as a dominant verb form, e.g., “Yesterday, I was stealing little Terry’s motorbike. Then I was riding over to Michael’s” (p. 52). Patterns of L1 transfer were also found in autobiographical narratives by Warlpiri adults, who provided what a Western reader might see as “tedious detail” (Gale, 1995: 41) about the work tasks they performed each day, and in Māori narratives told in L2 English, without evaluation, resolution or a coda (Holmes, 1998).

An excellent example of L1 influence is found in Jade Snow Wong’s memoir *Fifth Chinese daughter* ([1950] 1989). Born in twentieth-century US, Wong was brought up by the standards her immigrant parents brought with them from nineteenth-century Imperial China. Breaking with Chinatown tradition, Jade Snow Wong joined the mainstream English-speaking society and even did the unthinkable – published an autobiography at the age of 24. This autobiography, however, adopted the third person singular voice, common for traditional Chinese life-writing. In the preface Jade Snow Wong justified this choice as follows:

Although a “first person singular” book, this story is written in the third person from Chinese habit. The submergence of the individual is literally practiced. In written Chinese, prose or poetry, the word “I” almost never appears, but is understood ... Even written in English, an “I” book by a Chinese would seem outrageously immodest to anyone raised in the spirit of Chinese propriety. ([1950] 1989: xiii)

A quarter of a century later, another Chinese-American, Maxine Hong Kingston (1976), would challenge this tradition and adopt the individual “I”. Yet even today, the clash between rhetorical conventions of Chinese and English still affects Chinese students in English-speaking academia, who find their papers returned to them with comments asking for elimination of the passive voice and the transformation of the many ‘we’s into ‘I’ (Braxley, 2005; Shen, 1989). This transformation, however, is difficult to accomplish because,

as seen in Wong's comments, the choice of a linguistic strategy is deeply linked to emotions and the sense of self.

5.4 Language effects in autobiographical memory: Damasio's error?

Prominent neuroscientist Antonio Damasio (1994, 1999, 2010) has repeatedly argued that autobiographical memory is a prelinguistic phenomenon grounded in visual memory³ and 'primordial' narrative structures. His view is at odds with conclusions reached by the leading scholar of autobiographical memory, David Rubin (1998), who states that "what is included and excluded depends in part on the language available and the narrative structures used. If no words exist to describe something or if the narrative structure omits something, it is less likely to be remembered" (p. 53). A similar position is adopted by prominent cognitive psychologist Roger Schank (1990), who highlights the role of storytelling in the process of remembering:

From the point of view of memory, the process of telling a story is significant because of the subprocess of composing the story that telling entails. In order to compose a story, one has to search memory for relevant episodes to relate and discard episodes that one chooses not to relate. Thus, the composition of a story requires both a search and an evaluative process that selects and discards items found during the search. (p. 138)

Schank (1990: 203–204) argues that the process is shaped by language and culture and that to prepare students to actually communicate in a foreign language, FL instruction should shift focus from grammar to canonical stories or frames of reference. The studies reviewed here support Bruner's (1987), Rubin's (1998) and Schank's (1990) view of the role of language and culture in organization of autobiographical memory and show that different narrative traditions place different values on inner experience, shared reminiscing, and life-storytelling, ascribe significance (tellability) to different types of events, focus attention on different aspects of events, and use different temporal and causal schemas to link individual memories into a coherent whole. These differences, in turn, may affect consolidation and recall of early memories, the amount and type of details speakers recall, and the focus of attention (e.g., on the inner experience versus social roles and behavior of others).

These findings suggest that theories that disregard Bartlett's ([1932] 1995) insights, be it Damasio's (2010) account of how the self comes to mind or the Self-Memory System (Conway, 2005; Williams & Conway, 2009), have a rather glaring gap: they miss the fact that organization of autobiographical memory is affected by the language of encoding and retrieval and by language- and

³ This argument, of course, does not apply to blind individuals; consequently, the assumption made here is that autobiographical memory relies on several sensory modalities.

culture-specific narrative conventions. Damasio's (2010) 'primordial' narrative structures are as much of an illusion as a universal category of color, number, time, or space. This illusion is by no means benign – as Hymes (1996) repeatedly pointed out, it promotes narrative inequality and disenfranchises those who rely on non-standard narrative modes. This awareness is particularly important given the prominence accorded to autobiographical memories – and their 'truth value' – by Western institutions, from immigration authorities that rely on life stories to determine people's futures, to the court system that privileges eyewitness testimony, to therapists who elicit memories to diagnose mental health, to academic fields that analyze stories, memoirs, and autobiographies to create theories of the human mind and the social world.

And yet, with the notable exception of psychoanalysis and psychotherapy, whose practitioners pioneered the inquiry into the vagaries of bilingual autobiographical memory (e.g., Buxbaum, 1949), many institutions and academic fields continue to treat language as a relatively transparent medium for conveyance of autobiographical memories. For instance, Röttger-Rössler (1993), who documented the reluctance of the Makassar to engage in life-storytelling activities and attributed it to the particularities of the local culture, discounted any influence of the fact that her communication with informants took place in a bilingual mode, a mix of Makassar (in which she was less than proficient) and Indonesian (which most informants did not speak fluently), and confidently stated that "this bilingual mode of conversation only rarely provokes misunderstandings, even when complex phenomena were being discussed" (p. 366).

Even more disconcerting is the lack of attention to language effects in research on eyewitness testimony (to which I will return in the next chapter) and asylum interviews. Herlihy and associates (2012), for instance, offer a thoughtful discussion of several factors that affect recall in asylum interviews, yet the language of the interview is mentioned only in passing. In contrast, Blommaert's (2001, 2010) sociolinguistic explorations show that life-storytelling by African asylum seekers in Belgium is significantly complicated by the lack of shared cultural and narrative assumptions between the interviewers and the interviewees and by the use of *lingua francas*, such as English or French, in which the interviewees (and, for that matter, some interviewers) may not have full proficiency. Narratives told in a less proficient language may display an inability to convey unfamiliar concepts and categories, lack of temporal coherence (due to the absence of tense and aspect markers) and lack of causal coherence (due to the absence of articles and cohesive devices). The use of interpreters does not fully resolve the problem because it does not eliminate the key expectation of the interviewers, namely a chronological sequence of 'true' events, embedded in the Julian-Gregorian calendar.

Government officials may also position themselves as experts on 'plausible' events and sequences of events, denying applications to asylum seekers whose

accounts deviate from their expectations (Blommaert, 2010). This is not to say that conscious distortions of truth do not occur – undoubtedly individual asylum seekers or, for that matter, eyewitnesses, may distort the truth, be it consciously or unconsciously. The most prominent example in recent history is Ayaan Hirsi Ali (2007: 193), who publicly acknowledged inventing a story of persecution that weaved her own experiences with those of other refugees in order to stay in the Netherlands. It would be silly to argue that the language of experience gets us closer to ‘the truth’ – a lie may be told in any language. At the same time, as we have seen above and will see again in Chapter 7, the use of the language of experience does bring the storyteller closer to the experience itself. Consequently, even in contexts where individuals are attempting to do their best, their recalls may be affected by the relationship between the language of encoding and the language of recall: if the two are congruent the recalls may be more detailed but also more traumatic (e.g., Schwanberg, 2010) and if they are not, the recalls may appear inexact or incoherent, especially when told in a weaker language (e.g., Blommaert, 2001).

Having said this, I also need to acknowledge that the work on bilingual autobiographical memory is still at its inception. In terms of methodology, the studies to date have largely been limited to recalls elicited by cue words, an approach that might lead to overrepresentation of linguistic memories. Furthermore, as Koven (2007) rightly argues, autobiographical-memory studies acknowledge that memories are produced in a narrative form but treat the elicitation procedure as a cognitive task and do not analyze the narratives in their own right, as discursive productions, thus making the notion of what counts as more ‘vivid’ or ‘detailed’ rather fuzzy. Another limitation involves the focus of the studies on ‘language tagging’ and the effects of priming on the focus on self versus others. Future research needs to examine the effects of language on segmentation, selection, and sequencing of events in autobiographical memory and the ways in which individuals re-narrate themselves in the process of L2 acquisition.

The studies have also been largely limited to one type of bilingual – adults who learned their languages in distinct contexts (most often sequentially) and who had maintained at least limited proficiency in two or more languages. Future research needs to examine autobiographical memories and self-construction in other types of bilingual speakers, including simultaneous bilinguals, multilinguals, and language attriters. Studies with simultaneous bilinguals will allow us to see if differences in socialization practices may lead to differences in the age of recall, while studies with language attriters will answer the question of whether, and if so, how, changes in dominance and proficiency affect memory encoding and retrieval. Given the effects of verbal framing (Loftus & Palmer, 1974) and story creation (Schank, 1990) on memory, future research also needs to examine how transformation of experience into narrative – or into narratives

in two or more languages – affects subsequent recall. After all, as Kundera (1995) has famously argued, remembering is also a form of forgetting:

We immediately transform the present moment into its abstraction. We need only recount an episode we experienced a few hours ago: the dialog contracts to a brief summary, the setting to a few general features ... Remembering is not the negative of forgetting. Remembering is a form of forgetting. (p. 126)

Now, what did I forget? The purpose of this chapter was to tell a coherent narrative about language effects on bilingual autobiographical memory and self-narration. In the best academic narrative tradition, I have tried to impose structure on the story and to offer clear arguments and cogent summaries. Yet a discerning reader has probably noticed by now that the story is not fully coherent, that it resists the tight framework I tried to impose on it, and that time and again I had to abandon narrative threads promising to take them up in the next chapter. This tension stems from the discontinuity between the conventional view of narrative as a single-voiced and monologic activity and the role of dialogic interaction in the development and production of narrated autobiographical memories. While I had to respect the academic tradition in which most memory studies have been conducted, now I am free to acknowledge that no one speaks with a single voice, that no narrative is devoid of context and audience (even if it is the self), and that interaction with others is central for the emergence of autobiographical memory, understanding, and consciousness. So let us examine what it means for bilinguals to speak with more than one voice, or, shall we say, with a forked tongue?

6 Discursive worlds: Inner speech, interpretive frames, and the accomplishment of intersubjectivity

The true locus of culture is in the interactions of specific individuals and, on the subjective side, in the world of meanings which each one of these individuals may unconsciously abstract for himself from his participation in these interactions. ... the degree to which the socialized behavior of any given individual can be identified with or abstracted from the typical or generalized culture of a single group varies enormously from person to person.

Sapir, 1949: 515

In the mid 1990s, I was a graduate student in linguistics at Cornell University, working on my dissertation. Inspired by Bartlett's ([1932] 1995), Worth and Adair's ([1972] 1997) and Chafe's (1980) research, I wanted to make my own films to see whether the process of learning a new language may lead L2 learners to 'see' things that monolingual speakers of their L1 do not. What I did not know was what those 'things' should be. And then I came across an essay on bilingualism, dialogism, and schizophrenia¹ by a French scholar, Tzvetan Todorov (1985, 1994). The essay described an unusual experience Todorov had in translating a conference paper from his L2 French into the L1 Bulgarian – he suddenly found himself changing the argument into its opposite. The essay both puzzled and intrigued me – if only I could capture something like that! And then I caught a lucky break – Todorov came to Cornell to give a talk and kindly agreed to be interviewed. In what follows, I will use this unpublished interview (Todorov, 1997) and Todorov's (1985, 1994, 1996, 2008) autobiographical writings to guide further inquiry into linguistic thought and the relationship between bilingualism and cognition.

Born in 1939, Tzvetan Todorov came of age in a Bulgaria ruled by communist ideology. Eager for access to the outside world, he started learning foreign

¹ It is important to acknowledge that many mental health professionals and patients, as well as linguists, find the metaphoric link between bilingualism and schizophrenia problematic if not offensive, yet the metaphor is pervasive in both scholarly and autobiographical literature and I would be remiss if I did not mention it. It is equally important to recognize that the identification of schizophrenia as the 'split mind' (Greek) condition with a dissociative identity disorder or 'split personality' is erroneous: schizophrenia is characterized by disintegration of thought and speech processes, auditory hallucinations, and delusions (Jones & Fernyhough, 2007; Paradis, 2008).

languages: first English, with a private tutor, then German in school, and then Russian in an elite bilingual school, where all subjects, except for Bulgarian language and literature, were taught in Russian. By the age of 13, young Tzvetan was a Bulgarian–Russian bilingual. At the university, he majored in Slavic and Bulgarian philology and also began studying his next language, French, first half-heartedly, and then, when a trip to Paris emerged on the horizon, with a private tutor. In 1963, 24-year-old Todorov arrived in Paris and immersed himself in French. After a brief stint at the Alliance Française, he enrolled at the Sorbonne, where he studied linguistic and literary theory with Barthes, Benveniste, and Jakobson, and eventually received a doctorate. The only other Bulgarian in his milieu was a casual acquaintance, Julia Kristeva, and so French became his dominant language – a year after his arrival, Todorov began publishing articles in French.

As the years went by, Todorov's position shifted from that of an outsider, a Bulgarian in France, to an insider, a Parisian intellectual of Bulgarian origin. In 1981, eighteen years after his arrival in Paris, he got an opportunity to return to Bulgaria – for the first time – as part of the French delegation at the conference dedicated to the 1300th anniversary of the Bulgarian state. When he sat down to write his conference paper, he realized: “I had to write it in French and then translate it into Bulgarian, because my thinking was going on in French” (Todorov, 1997). Yet in translating the paper, Todorov was suddenly struck by the feeling that in Bulgarian his argument did not make sense. More dilemmas surfaced upon arrival in Bulgaria: Todorov no longer knew how to respond when friends or acquaintances complained about their conditions of life, and when he tried to adopt his Bulgarian persona, the interlocutors – aware that he would soon be on a plane back to Paris – reacted with skepticism and distrust.

The resulting essay (Todorov, 1985, 1994) was his attempt to understand this experience of ‘double-thinking’. We can hypothesize that his perception of ‘different selves’ was reinforced by ‘language tagging’ in autobiographical memory and his sense of an inner conflict by sociopolitical differences between Bulgaria and France. Yet neither ‘language tagging’ nor different lifestyles can explain why he changed his argument into its opposite. In what follows, I will examine the possible sources of this volte-face, beginning with a simple question that we have not asked so far: what do people actually mean when they say they ‘think in a language’?

6.1 Bilingualism and inner speech

6.1.1 *Speaking for thinking: inner speech as a form of linguistic thought*

One of the first changes Todorov (1997) noticed soon after his arrival in Paris involved his own private verbal behavior: “I remember that the first three

months I used to take notes of the books that I was reading still in Bulgarian, so if I would buy a book and write in the margin, it will be Bulgarian words, but after three months or four months I started taking notes in French”. From a sociolinguistic perspective, we could explain this shift as accommodation to the language of the environment (and the language in which the books were written and discussed), and from a psycholinguistic one as a change in the levels of language activation and proficiency: Bulgarian was becoming de-activated due to disuse and French more activated due to full immersion. Yet there is another way to see this shift – as a change in the language of *private writing*, i.e., writing directed at oneself, and, more generally, in the language of *inner speech*, the subvocal self-talk that takes place in an identifiable linguistic code and is directed primarily at the self. It is this subvocal self-talk that Todorov (1997) sees as ‘thinking in a language’, as seen in his comment that he wrote his paper in French because his “thinking was going on in French”.

The view of thinking as a silent dialog with one’s soul is an intrinsic part of the Western philosophical tradition – it can be traced all the way to Plato. Wilhelm von Humboldt, the forefather of the linguistic relativity hypothesis, named this thinking *Innere Sprachform* [inner speech]. Humboldt’s ideas greatly influenced Russian linguist Aleksandr Potebnya, whose work on language and thought inspired the next generation of Russian thinkers, Lev Vygotsky, Aleksandr Luria, and Mikhail Bakhtin. Turning the Humboldtian view on its head, Vygotsky (1986: 84–89, 94; 2005: 713–716)² argued that children’s linguistic and cognitive development begins with external *social speech*, proceeds through the stage of egocentric audible speech (*private speech*), and culminates, around age 6, in silent *inner speech*, which maintains the social role of its precursors, functioning as an inner dialog with the self. Luria (1972) reinforced this view, showing how a brain-damaged patient, Zasetky, appealed to journal writing – a form of inner dialog – in order to salvage his thinking ability and ultimately his dignity.

Bakhtin (1981) shared Vygotsky’s interest in dialogism as well as Humboldt’s belief in the power of multilingualism: he argued that it was the multilingual consciousness of Roman authors, whose Latin bore traces of Greek, Aramaic, and Oscan, that enabled them to look at their own language through the lens of another, to separate language from reality, and to create the modern novel. Only *mnogoiazychie* [multilingualism, polyglossia], argued Bakhtin (1981:

² The translations of Vygotsky’s work into English have been justly criticized for mistranslation, errors, and uncritical acceptance of falsifications, omissions, and distortions introduced by Soviet editors (e.g., Kellogg & Yasnitsky, 2011; van der Veer & Yasnitsky, 2011). To balance accessibility with reliability, all of my references include English-language editions and the recent, revised Russian-language edition of Vygotsky’s work.

61), “fully frees consciousness from the tyranny of its own language and its own myth of language”, giving rise to parody and travesty:

in the process of literary creation, languages interanimate each other and objectify precisely that side of one’s own (and of the other’s) language *that pertains to its world view* ... For the creating literary consciousness, existing in a field illuminated by another’s language, it is not the phonetic system of its own language that stands out, nor is it the distinctive features of its own morphology nor its own abstract lexicon – what stands out is precisely that which makes language concrete and which makes its world view ultimately untranslatable, that is, precisely the *style of the language as a totality*. (Bakhtin, 1981: 62)

And it is to Bakhtin that Todorov appealed in attempting to understand his own multilingual predicament.³ Similar to other bi- and multilinguals trying to pinpoint the sources of differential self-perception, he did not turn to lexical or morphosyntactic categories of the kind discussed in Chapters 2, 3, and 4 – instead he appealed to larger and more elusive discursive constructs of ‘different selves’ or ‘multiple worlds’ (Burck, 2005; Grosjean, 1982; Koven, 2007; Kramsch, 2009; Pavlenko, 2006b; Piller, 2002). Bakhtin’s ideas were particularly useful in articulating these constructs because of his emphasis on stratification and heteroglossia *within* languages. For Bakhtin (1986), all speech is inherently dialogic and heteroglossic:⁴

Our speech, that is, all our utterances (including creative works), is filled with others’ words, varying degrees of otherness or varying degrees of “our-own-ness”, varying degrees of awareness and detachment. These words of others carry with them their own expression, their own evaluative tone, which we assimilate, rework, and re-accentuate. (p. 89)

Each utterance in this dialog invokes earlier acts of communication and each text links to other texts (*intertextuality*) (Bakhtin, 1986; Holquist, 1990). Such polyphony may give rise to internal conflicts, similar to the one described by Todorov (1985, 1994), yet Bakhtin (1986) also highlights the dialectical process that allows the mind to resolve the tension between the polyphonic tendencies in speech and the individual search for coherence:

The process of gradual obliteration of authors as bearers of others’ words. Others’ words become anonymous and are assimilated (in reworked form, of course); consciousness is *monologized*. Primary dialogic relations to others’ words are also obliterated – they are,

³ Todorov’s reliance on Bakhtin is not coincidental. Fluent in Russian and well-familiar with Russian philosophical tradition, he was instrumental in bringing Bakhtin to the attention of Western scholars (Todorov, 1984).

⁴ In view of Bakhtin’s emphasis on multivoicedness, it is ironic that one of the key scholarly pre-occupations has been the authorship of his own works. Here, I refer mostly to single-authored works, while recognizing that some, such as *Marxism and the Philosophy of Language*, were co-authored by Voloshinov (Alpatov, 2005).

as it were, taken in, absorbed into assimilated others' words (passing through the stage of "one's own/others' words"). ... Then this monologized consciousness enters as one single whole into a new dialogue (with the new external voices of others). (p. 163)

The sociocultural turn in Western humanities, inspired by Bakhtin's and Vygotsky's ideas, gave rise to new conceptions of language, self, and mind as dialogical and multivoiced and inspired new directions in research in anthropology, linguistics, and psychology (e.g., Hermans & Gieser 2012; Holquist, 1990; Matusov, 2011; Todorov, 1984; Wertsch, 1991). Sociocultural studies of children's development – discussed in the preceding chapter – provided compelling evidence that children acquire language, culture, autobiographical memory and self dialogically, through interactional routines (Fivush, 2011; Fivush & Haden, 2003; Miller et al., 1996, 1997, 2007; Nelson, 2003, 2005, 2006; Schieffelin & Ochs, 1986). Studies of young children's private speech and crib monologues also challenged some of Vygotsky's assumptions, revealing an earlier age of emergence of inner and private speech, a greater complexity than observed in the social speech of the same child, and a wider variety of functions, not limited to self-regulation (Diaz & Berk, 1992; Nelson, 2006). In cognitive and developmental psychology, inner and private speech were linked to development of autobiographical memory, consciousness, and creativity (Diaz & Berk, 1992; Duncan & Cheyne, 1999; Fernyhough, 1996; Fields, 2002; John-Steiner, 1997; Nelson, 2006; Neuman & Nave, 2010; Vocate, 1994; Winsler et al., 2009), in sport psychology to motivation and enhanced performance (Hardy, 2006; Tovaes, 2010), and in clinical and neuropsychology to specific neural correlates and to auditory verbal hallucinations in schizophrenia (Brown, J., 2009; Fernyhough, 2004; Jones & Fernyhough, 2007) (for an overview see Winsler, 2009).

These studies also found that individuals interweave verbal and non-verbal modes of thought in different ways: some may favor visual or kinesthetic thinking, while others privilege 'thinking in words' (John-Steiner, 1997). Yet they also confirmed what we already know as human beings – that, at some point or other, all humans talk to themselves. Our inner voices help us to plan and remember, to interpret our environment and gain control over situations, to encourage, comfort and motivate ourselves and to 'talk things through'. We use them to make private comments we would not want others to hear, to argue silently with our partners, to vent our frustration over the decisions of our superiors, to drown the voices of our parents, and to whisper tender words of love that are not meant to reach their object's ears. A 1976 Nobel laureate of literature, Saul Bellow, offers a compelling portrait of this 'inner observer':

I suppose that all of us have a primitive prompter or commentator within, who from earliest years has been advising us, telling us what the real world is. There is such a commentator in me ... From this source come words, phrases, syllables, sometimes

... whole paragraphs fully punctuated ... There is that observing instrument in us – in childhood at any rate. At the sight of a man's face, his shoes, the color of light, a woman's mouth or perhaps her ear, one receives a word, a phrase, at times nothing but a nonsense syllable from the primitive commentator. (in John-Steiner, 1997: 31)

Yet there is a major problem with our assumptions about inner and private speech – most, if not all, studies to date have been conducted in Western contexts and we do not know whether their findings are applicable to non-Western contexts and non-industrialized societies. Do hunters, gatherers, or reindeer herders have time and inclination for extensive inner speech? Do they encourage and regulate themselves through private speech? And if they do, do private and inner speech take the same form and serve the same functions across languages and cultures?

One intriguing study suggests that some communities do not perceive the relationship between thinking and speaking in the exact same way as we do. Kim (2002) compared task performance by European-Americans and Asian-Americans under different conditions and found that, contrary to Vygotskian assumptions, thinking out loud (private speech) did not affect the performance by European-Americans and actually impaired task performance by Asian-Americans. In turn, an articulatory suppression task, which interferes with inner and private speech, negatively affected European-Americans' performance and made no impact on Asian-Americans. These findings suggested that cognitive processing by European-Americans involved more verbal behaviors, be it inner or private speech, than processing by Asian-Americans, who performed better in silence. Further support for these conclusions came from questionnaire responses by the study participants that revealed greater reliance on language and talking in thinking among European-Americans. Kim (2002) linked her findings to East Asian philosophy, which does not assume a connection between talking and thinking. They are also consistent with the findings of narrative socialization studies, discussed in the preceding chapter, which show that East Asian cultures place lesser emphasis on verbalization of personal experience.

In the West, on the other hand, the connection between thinking and speaking is commonly taken for granted – and so is inner speech: “this nearly continuous inner conversation is so much a part of our everyday experience that we rarely notice or remark on it” (Fields, 2002: 255). Only a dramatic change brings this behavior to our attention – and that's precisely what happens when the inner voice changes language. This shift catches us by surprise because inner speech, and the language in which it takes place, are outside of our conscious control: with the exception of deliberate mental rehearsal, we cannot force inner speech in another language any more than we can switch an inner language off. How, when, and why does the ‘inner observer’ change language? How does an external L2 become the language of the self? What are the functions of inner speech

in the L2? What is its role in the L2 learning process? And what is its relationship to linguistic thought?

6.1.2 *The change of language in inner speech and its implications for thought*

6.1.2.1 *L1 as the language of the self* To examine what factors shape language use in inner and private speech and private writing in bi- and multilinguals, the BEQ web-questionnaire (Dewaele & Pavlenko, 2001–2003) included two questions. The first, open-ended, question asked: “If you do write in a personal diary – or were to write in one – what language(s) do you or would you use and why?” The responses showed – not surprisingly – that L1-dominant speakers who reside in the L1 context use L1 as the language of private writing and inner speech. More interestingly, they also revealed that, similar to Todorov, many respondents identify ‘inner speech’ with thought:

Afrikaans my L1. It is the language in which I think and feel most. (Fanny, 30, L1 Afrikaans, L2 English, L3 German, L4 Xhosa, dominant in L1 Afrikaans)

Welsh. I think in Welsh and therefore it would be easier to write my thoughts in Welsh. (Colin, 23, L1 Welsh, L2 English, L3 French, L4 Breton, dominant in L1 Welsh)

I would use French. Because it is the language I use for the inner speech. (Stephanie, 30, L1 French, L2 English, dominant in L1 French)

Probably English as I tend to think to myself in English. (Diana, 26, L1 English, L2 Spanish, L3 Italian, dominant in L1 English and L2 Spanish)

These responses also showed that bi- and multilingual speakers who remain L1-dominant and reside in the L1 context may not experience – or at least detect – any influence of other languages on their inner speech, thinking, or the sense of self. A Chinese–English bilingual Veronica Zhengdao Ye (2007) recalls that when she still lived in China

I had a fairly good command of basic English, but it had never influenced my way of thinking and experiencing the world until I moved to Australia. (p. 69)

Once they move to the L2 context, however, many speakers experience a dissociation between the languages of exterior and interior, a mismatch in communicative expectations, and, at times, even a loss of a recognizable voice (Vitanova, 2010). Well-known historian Gerda Lerner (1997) recalls this disconnect as a central characteristic of her first years in the US:

For nearly two years, I managed on that level of crude communication [in English], while my thoughts and dreams went on unperturbed in German. (p. 35)

A similar experience is reported by another German immigrant, who later became a famous historian in the UK, Eric Hobsbawm (2002) – upon his arrival in London, 16-year-old Eric kept a diary in L1 German, which he was afraid to

forget. Some of our questionnaire respondents also acknowledge using private writing to maintain inner speech in the L1:

I write in a diary and use my L1 – no question. Why? a) My English grammar is better / comes easier than my German b) a conscious effort to continue using my English – I do too much in German as it is c) the diary was started before I spoke German and I don't want to switch languages. (Zoe, L1 English, L2 French, L3 German, dominant in L1 English and L3 German, resides in Germany)

I keep two diaries one in English and one in German. I can actually express myself entirely satisfactorily in both languages but I make a point of still writing in German in order to keep in touch with my mother tongue. The German diary is certainly more personal than the English one. (Miriam, 38, L1 German, L2 English, dominant in L1 German and L2 English)

Hungarian as this was my only dominant language at the time I began to write a diary (in the age of 14). As I have spent several years in Germany and mostly among Germans it was always very important for me to keep Hungarian as my "intimate" language and also I used to force myself to use Hungarian in my inner speech. (Nadya, 31, L1 Hungarian, L2 German, L3 English, L4 Norwegian, L5 Russian, dominant in L1 Hungarian and L2 German)

Yet the 'forcing' of inner speech may not work: Hobsbawm's (2002) diary, for instance, lasted for two years but, at the start of 1936, it ended in English, with an acknowledgment that its author was forgetting the German language. Eva Hoffman's celebrated memoir *Lost in Translation* (1989) poignantly describes the disintegration of inner speech she experienced as a teenager after her family emigrated from Poland to Canada:

The worst losses come at night. As I lie down in a strange bed in a strange house ... I wait for that spontaneous flow of inner language which used to be my nighttime talk with myself ... Nothing comes. Polish, in a short time, has atrophied, shriveled from sheer uselessness. Its words don't apply to my new experiences; they're not coeval with any of the objects, or faces, or the very air I breathe in the daytime. In English, words have not penetrated to those layers of my psyche from which a private conversation could proceed. This interval before sleep used to be the time when my mind became both receptive and alert, when images and words rose up to consciousness, reiterating what had happened during the day, adding the day's experiences to those already stored here, spinning out the thread of my personal story. Now, this picture-and-word show is gone; the thread has been snapped. I have no interior language, and without it, interior images – those images through which we assimilate the external world, through which we take it in, love it, make it our own – become blurred too. (pp. 107–108)

Hoffman's (1999) insights enrich our understanding of the relationship between language and autobiographical memory by highlighting the role of inner speech in encoding of experience and the maintenance of a coherent self-narrative:

I understood how much our inner existence, our sense of self, depends on having a living speech within us. To lose an internal language is to subside into an inarticulate

darkness in which we become alien to ourselves; to lose the ability to describe the world is to render that world a bit less vivid, a bit less lucid. (p. 48)

The teenage protagonist of Hoffman's (1989) memoir feels suspended between stories and selves because her attriting L1 Polish is no longer fully functional and the newly mastered L2 English is still insufficient as a meaningful means of processing and encoding experience. The only way out of this 'inarticulate darkness' is through development of a new inner voice.

6.1.2.2 "*The voices of others invade me*": *internalization of L2 inner speech* Echoing Bakhtin's (1981) view of inner speech as appropriation, ventriloquation, and assimilation of the voices and words which first existed "in other people's mouths, in other people's contexts, serving other people's intentions" (p. 294), Hoffman (1989) vividly depicts her own process of internalization of inner speech in the L2:

All around me, the Babel of American voices, hardy midwestern voices, sassy New York voices, quick youthful voices, voices arching under the pressure of various cross-currents ... Since I lack a voice of my own, the voices of others invade me as if I were a silent ventriloquist. They ricochet within me, carrying on conversations, lending me their modulations, intonations, rhythms. I do not yet possess them; they possess me. But some of them satisfy a need; some of them stick to my ribs. ... Eventually, the voices enter me; by assuming them, I gradually make them mine. (pp. 219–220)

Hoffman is not alone in observing her mental space invaded by others' voices. A similar observation was made by an applied linguist Elisabeth Barber (1980), who visited Russia and had to communicate in Russian (studied ten years earlier) with the curators at the Hermitage:

By the third day also, the linguist in me was noticing a rising din of Russian in my head: words, sounds, intonations, phrases, all swimming about in the voices of the people I talked with ... The sounds in my head became so intense after five days that I found myself mindlessly chewing on them, like so much linguistic cud, to the rhythm of my own footsteps as I walked the streets and museums. Whenever I noticed this din, the linguist in me would demand to know what I was saying. Half the time I had to look what I was saying up, or somehow reconstruct what it meant from the context in which I had heard it hours or days earlier. The constant rehearsal of these phrases of course was making it easier and easier to speak quickly and fluently; things popped out as prefabricated chunks. But I had no control over what my subconscious fed into my "chewer" each day. It fed me what it considered to be memorable – usually from a surprising or stressful or isolated incident – not what I considered maximally useful. Nonetheless, my overall command of Russian improved more in a single week than it would have in a month or two of intensive reading. (Barber, 1980: 30)

Resonating with experiences of other applied linguists, Barber's (1980) observations inspired empirical investigations of inner and private speech in the L2 (for a comprehensive review see Guerrero, 2005). The methods of data

collection in these studies vary depending on the phenomenon in question: studies of inner speech rely on self-reports in the form of diaries, questionnaires, or interviews (e.g., Bedford, 1985; Larsen et al., 2002; Schrauf, 2009), studies of private speech use audio- and video-recordings and ethnographic observations (e.g., Lee, 2008; Saville-Troike, 1988; Smith, 2007; Yamada, 2005), and studies of private writing focus on notebooks and diary entries (e.g., Beaujour, 1989; Lee, 2008) (Table 6.1).

These studies show that the process of internalization of L2 inner speech begins with spontaneous playback (*the din phenomenon*) and overt or covert rehearsal of L2 words and phrases (Braxley, 2005; Burck, 2005; Guerrero, 2005; Luykx, 2003; Orellana, 1994; Vitanova, 2010). In a Bakhtinian (1981) framework, this playback can be reinterpreted as appropriation of the voices of others – partners, friends, teachers, even fictional characters. For instance, in Orellana's (1994) study, 3-year-old Spanish–English bilinguals used L1 Spanish in play interactions but switched to L2 English to act out characters from popular culture (e.g., “I’m Supergirl!”, “I’m Peter Pan! I’m flying!”). Similarly, in Luykx's (2003) study, a 3-year-old girl, dominant in L1 Aymara, produced utterances in L2 Spanish that were mostly “verbatim repetitions of utterances by parents, siblings, or the TV” (p. 29). The appropriation of these L2 voices for external speech suggests the beginning of the L2 internalization process.

Adults also replay others' voices. At its most extreme, this polyphony can be witnessed in voice-hearers, i.e., speakers with auditory hallucinations (Jones & Fernyhough, 2007). Clinical case studies of bi- and multilinguals with auditory hallucinations show that in schizophrenia inner voices or auditory hallucinations may appear in all languages of the individual and even in a mixed format, with late bilinguals displaying more symptoms in the L1 (Paradis, 2008).

The playback, as noted by Barber (1980), is also central in the L2 learning process. Thus, in a study with 472 L1 Spanish learners of English, Guerrero (2005) found that 59 percent of the participants replayed voices in L2 English. Braxley's (2005) study of academic writing provides an excellent example of what such a voice might sound like. An international student who took part in the study commented that whenever she wrote in L2 English she heard the voice of her English teacher:

I hear his voice: “Show don't tell! This sounds unnatural! You are sounding Thai!” It's horrible, but it's a good warning; it's like stuck on the back of my head. (Braxley, 2005: 23)

In Bakhtin's (1986) terms, this voice is so audible because it has not yet been assimilated and appropriated as one's own. The student's use of the term ‘stuck’ also reminds us that we have little control over the voices we hear: the

Table 6.1 *Bilinguals' inner speech*

Studies	Languages	Participants	Tasks & stimuli	Findings
Vaid & Menon (2000)	L1 Spanish L2 English	552 Spanish–English bilinguals: 438 English-dominant 82 Spanish-dominant 32 balanced	<i>Tasks:</i> questionnaire with questions about the language of inner speech and self-ratings of proficiency	Language of inner speech predicted by LoR, language proficiency, and language of elementary school instruction
Larsen et al. (2002)	L1 Polish L2 Danish	20 Polish-Danish bilinguals (ages 51 – 61 yrs, LoR = 30 yrs): 10 early arrivals (mean AoA = 24 yrs, range 20 – 26 yrs) 10 late arrivals (mean AoA = 34 yrs, range 30 – 36 yrs)	<i>Tasks:</i> (1) cued recall in L1 Polish and L2 Danish; (2) questionnaire with questions about inner and private speech and private writing and self-ratings of proficiency	Frequency of use of L1 Polish predicted by AoA, frequency of use of L2 Danish by L2 proficiency: early arrivals were more likely to be more proficient in and to use L2 Danish more frequently for inner and private speech
Guerrero (2005)	L1 Spanish L2 English	472 ESL students in Puerto-Rico divided by test scores: 161 low proficiency 192 intermediate proficiency 73 high proficiency 46 advanced proficiency	<i>Tasks:</i> (1) questionnaire about inner speech and mental rehearsal; (2) interviews with 9 participants	Frequency of use of L2 English for inner speech predicted by L2 proficiency
Dewaele (2006, 2009, 2012)	Different L1s L2/LX English	1,464 bi- and multilinguals (1,033 females, 421 males, ages 16–73 yrs)	<i>Tasks:</i> BEQ: close-ended question about the language of inner speech and an open-ended question about language choice for a diary	Frequency of use of L2/LX for inner speech predicted by AoA, CoA, self-perceived language proficiency, frequency of language use and the size of the speaker's network

Matsumoto & Stanny (2006)	L1 Japanese L2 English	15 English monolinguals (mean age = 20.9 yrs) 18 Japanese–English bilinguals (mean age = 22.7 yrs)	<i>Tasks:</i> (1) cued memory recall; (2) reporting of earliest memories; (3) language background questionnaire	Frequency of use of L1 for inner speech prior to recall in L2 predicted by L2 proficiency
Schrauf (2009)	L1 Spanish L2 English	60 Spanish–English bilinguals (mean age = 69 yrs, AoA range 15–38 yrs, mean AoA = 22 yrs): (1) 13 low intermediate in L2 English (2) 30 high intermediate in L2 English (3) 17 fluent in L2 English	<i>Tasks:</i> (1) Language Assessment Scales; (2) questionnaire with questions about inner speech and pri- vate writing and self-ratings of L2 proficiency	Frequency of use of L2 English for inner speech predicted by L2 proficiency

polyphony finds a way into our mental space whether we want it or not and soon we hear ourselves ‘thinking in more than one language’.

What is interesting about the L2 learning process is the distinct functions of inner speech in L1 and L2. Inner and private speech in L1 are commonly used for self-regulation (e.g., to facilitate planning or learning of new concepts, to assist in memorization or lexical search, to gain control over a particular task) and for self-evaluation (e.g., to provide a positive or negative evaluation of one’s decision-making or planning, through metacomments to self, such as *right, no, or wait*). In turn, inner and private speech in L2 are involved in imitation, repetition of others’ utterances, vicarious responses (e.g., to teacher’s questions), mental rehearsal (including spontaneous playback), and language play (Guerrero, 2005; Lantolf, 2000; Lee, 2008; Pavlenko & Lantolf, 2000; Saville-Troike, 1988; Smith, 2007).

These functions, however, are particularly prominent in the beginning of the L2 learning trajectory. With increases in L2 proficiency, inner speech in the L2 is used less frequently for mental rehearsal and more frequently for language play and dialogic purposes (Guerrero, 2005).

Dewaele’s (2006a, 2012) analysis of responses to the BEQ also shows that bi- and multilinguals are more likely to use the LX (L2–L5) for social speech than for inner speech. This finding suggests a ‘lag’ in the internalization process, consistent with Vygotsky’s (1986, 2005) theory. But how do we actually appropriate the voices we hear?

6.1.2.3 Private writing as a means of appropriating inner speech in the L2 To appropriate new voices and impose a semblance of coherence on the polyphony, L2 learners often appeal to private writing, which offers a convenient way of creating an imaginary addressee (Dear Diary), with whom one could practice a new voice in a safe and private space. Todorov’s new voice emerged in his book notes, while Hoffman (1989) started a diary, forcing herself to make a decision between Polish, which was quickly becoming “a dead language” (p. 120), and English, “the language of the present, even if it’s not the language of the self” (p. 121). Writing also facilitated the transition for Korean immigrant in the US Helen Kim (2000), who spent her teenage years caught between languages and unable to render her thoughts in either:

At the age of twelve, I started writing poems and short stories in Korean, but I wasn’t learning any more Korean, and my English wasn’t good enough to describe the complex emotions I was beginning to experience. I remember sometime around age fourteen visualizing what I wanted to express and consciously leaving out the words because they were inadequate. My journals, which are filled with Korean, Konglish, bad English, and English, chronicle the frustration of this language transition. (p. 122)

Another Korean–English bilingual, Ha-Yun Jung, recalls that during a childhood stay in Thailand, her language dominance shifted to L2 English and so did her inner speech. After her family returned to Korea, she resorted to writing to preserve English as her inner voice:

I started to keep a diary in English. I no longer used English with other people; it had become a language that was completely personal and singularly mine. ... my writing was entirely devoid of descriptions or details, with hardly a mention of friends or family, filled with sentences that began with “I”, relentlessly pouring out how *I* felt, over and over, as if the words were coming from solely within myself, a place disconnected with the outside world, a place where no one or nothing else could find a way in. On Sept. 25th, 1981, the day I woke to find my mother unconscious, with a bottle of rat poison by her bedside, I came home from the hospital, closed the door, sat at my desk and wrote, in English: “I don’t know where to begin. I can’t believe it.” (in Lesser, 2004: 159–160)

The use of private writing as a means of development and maintenance of inner speech in the L2 is also reported by some of the BEQ respondents:

When I learnt Czech I wrote a diary in Czech in order to learn more – otherwise I don’t write a diary. (Jutta, L1 German, L2 Russian, L3 English, L4 Italian, L5 Czech, dominant in L1 German and L5 Czech, the language of her partner)

Some years ago I used to write in languages I know less well (Finnish French or German) for practice... (Laura, 37, L1 Finnish, L2 Spanish, L3 English, L4 French, L5 German)

To date, only one case study known to this author engaged in a longitudinal examination of appropriation of L2 voice. To understand the role of private writing in the process, a scholar of Russian and French literature, Beaujour (1989), analyzed letters, diaries, notebooks, and novels of Russian–French bilingual writer Elsa Triolet. Following her French husband, Triolet moved to Paris in 1918, at the age of 22. She began her writing in L1 Russian, orienting herself toward the Russian-speaking audience back ‘home’, but by the time she wrote her third novel, *Zashchitnyi tsvet* [Camouflage], in 1928, she – like Todorov – was feeling out of sync:

Le drame de *Camouflage* se joue en France, entre personnages parlant, pensant, sentant français. On croirait un livre traduit du français, et pourtant la langue du roman est profondément russe. Il s’ensuit un étrange, un irréductible décalage...

[The drama of *Camouflage* is played out in France among characters who speak, think, and feel French. It would appear to be a book translated from the French, and yet the language of the novel is profoundly Russian. As a result, the novel is strangely, hopelessly out of phase with itself...] (Beaujour, 1989: 64)

Faced with the contradiction between her mother tongue and her stepmother tongue and unwilling to write in French, Triolet ceased writing altogether:

J’ai donc cessé d’écrire ... Et c’était mieux ainsi, puisque l’outil que je possédais s’avérait inutilisable pour communiquer avec mes lecteurs: la langue! Ma langue

maternelle, mon irremplaçable langue ... Elle ne me servait plus à rien ... Je n'avais plus rien à dire en cette langue que je connaissais jusqu'au fin fond de moi-même.

[So I stopped writing ... And it was better so, since my instrument – my language – had turned out to be useless for communicating with my readers. My mother tongue, my irreplaceable language ... was no good to me anymore ... I had nothing more to say in this language which was part of my innermost self.] (Beaujour, 1989: 65)

Eventually, Triolet did start writing in French, yet she also continued to write in Russian and the process of the appropriation of her French voice lasted for two decades, culminating in the appearance of her first French novel, *Bonsoir, Thérèse*, in 1938. Beaujour's (1989) study shows that Triolet began trying her hand at French well before she stopped writing in Russian: her notebooks interweave exercise-like descriptions in French, self-translations of her Russian novels into stiff and stilted French, and a diary, written in Russian, with frequent French insertions, as in *Chuvstvuiu sebja ridicule* [I feel (Rus) ridiculous (Fr)]. Even a part of Triolet's first French novel was initially written in Russian and then translated into French, yet Triolet felt that "self-translation actually jeopardized the intimate conversation with herself that she prized above all in her writing" (Beaujour, 1989: 69), and so she resumed this conversation in French, becoming one of the leading French writers of her generation.

6.1.2.4 Language selection and functions of bi- and multilinguals' inner speech For Triolet, the L2 became a genuine 'language of thought'. A similar transition was accomplished by other translangual scholars and writers, from Todorov to Lerner and Hoffman:

It took several years before I began to think in English. It was exciting when it actually happened and it made a qualitative difference in the way I lived. I began to be able to express myself with the speed and precision characteristic of me and most of the time I could find the word I needed without resorting to a dictionary. (Lerner, 1997: 40)

When I talk to myself now, I talk in English. ... If I tried talking to myself in my native tongue, it would be a stumbling conversation indeed, interlaced with English expressions. So at those moments when I am alone, walking, or letting my thoughts meander before falling asleep, the internal dialogue proceeds in English. (Hoffman, 1989: 272)

Yet there is an important difference between Hoffman and Lerner on the one hand, and Todorov and Triolet on the other. Todorov maintained fluency in his L1 Bulgarian and Triolet managed to preserve her L1 Russian: even when she stopped writing in Russian, she continued to visit the USSR and to translate Russian works into French. In contrast, Hoffman, Lerner and Japanese–English bilingual Kyoko Mori experienced the loss of the L1 as a meaningful vehicle of thought, emotion, and communication. This loss is acutely felt by Mori:

In Japanese, I don't have a voice for speaking my mind... Trying to speak Japanese in Japan, I'm still thinking in English. I can't turn off what I really want to say and

concentrate on what is appropriate. Flustered, I try to work out a quick translation, but my feelings are untranslatable and my voice is the voice of a foreigner. (Mori, 1997: 16–17)

Lerner similarly mourns this loss and the resulting inability to communicate with her sister in their family language German:

I no longer thought in German and therefore could not express anything significant in that language. I lacked the facility, I said. I would often start a letter to Nora in German and give it up after a few lines, switching to English. (Lerner, 1997: 44)

This is not to say that a transition to a new language – and new inner speech – is an obligatory part of the immigrant experience. Many immigrants live their lives in their native languages, keeping the other language at bay. For instance, poet Luis Cernuda retained L1 Spanish as the language of inner speech through more than a decade of residence in the US, so that upon arrival in Mexico he felt agin in sync with himself:

Sentí como sin interrupción continuaba mi vida en ella por el mundo exterior, ya que por el interior no había dejado de sonar en mí todos aquellos años.

[I felt as if through it my life continued without interruption into the exterior world, since in my interior it had never stopped sounding during all those years.] (Pérez Firmat, 2003: 71)

Other bi- and multilinguals may have more than one language of inner speech. Nabokov, for instance, maintained Russian as the language of everyday family communication, inner speech and even poetry, yet his diary was written in English, both in America and in francophone Switzerland (Boyd, 1991). The same multiplicity and flexibility are seen in responses to the BEQ question about the language of private writing:

Where my first three languages are concerned I usually think in that language when I am in the respective country and writing in that language is easier than ‘bending’ my brain around another language. (Mikaela, 27, L1 German, L2 English, L3 Russian, L4 Greek, L5 Japanese, dominant in both L1 and L2)

I do use both French and English because that’s how sentences come to my mind. They come naturally in one of the languages because they are related to particular situations or experiences and also because sometimes there seems to be no exact way to say it in the other language. (Therese, 24, L1 French, L2 English, L3 German, dominant in L1 French)

on the rare occasions that I keep a diary I will write in the language that I use most in that situation. may switch languages several times within an entry. (Alexandra, 24, L1 German, L2 English, L3 French, dominant in L1 German)

To understand the factors that shaped these perceptions, Dewaele (2006a, 2009, 2012) examined responses to the BEQ question: “If you form sentences silently (inner speech), how frequently do you typically use ...?” The participants rated the use of each language, from L1 to L5, as Never, Rarely,

Sometimes, Frequently, All the time, or Not applicable. The analysis of 1,454 responses revealed that the L1 was the preferred language of inner speech, with the frequency of use of other languages diminishing from L2 to L5. At the same time, the LX (a later learned language, from L2 to L5) may also become the language of inner speech. Factors that facilitate the shift to the LX included the AoA (younger learners of the LX used it more frequently for inner speech), self-perceived proficiency (LX inner speech emerged in speakers with medium proficiency and more proficient users of the LX were more likely to use it for inner speech), CoA and socialization in the LX (speakers who learned the LX in a naturalistic environment used it more frequently for inner speech), frequency of language use (higher frequency of social speech in the LX increased the likelihood of its use for inner speech), and the size of the speaker's network (the larger the network the more likely the use of the LX for inner speech). Most effects were particularly pronounced for the L2 and L3; the L4 and L5 effects patterned similarly but the effects were usually too small to be significant.

Larsen and associates (2002) found that language choice in the inner speech of Polish immigrants was predicted by the age of arrival in Denmark (which, for these immigrants, coincided with the AoA): later arrivals appealed to L1 Polish more frequently than earlier arrivals. Proficiency in L2 Danish significantly correlated with the use of Danish for inner speech, while proficiency in L1 Polish did not affect the choice of Polish for inner speech, most likely because all participants maintained high Polish proficiency.

Another set of predictors involves language dominance and the LoR. In a large-scale study with Spanish–English bilinguals in the US, Vaid and Menon (2000) found that among Spanish-dominant bilinguals, 43% reported thinking in Spanish only and 44% reported thinking in both languages. In contrast, among English-dominant bilinguals only 20% reported thinking in both languages, whereas 71% reported thinking in English only, a trend that suggests an ongoing shift to English. The dominant language of inner speech was predicted by the LoR in the US and the language of elementary school instruction.

Other studies have confirmed the role of L2 proficiency as predictor of the choice of L2 for inner speech. Matsumoto and Stanny (2006) found that Japanese students with lower levels of L2 English proficiency reported that autobiographical memories first came to them in L1 Japanese even in response to L2 English cues, suggesting that they continued to encode them in Japanese. In Guerrero's (2005) study, the frequency of reported L2 English inner speech increased with the increase in proficiency, from 75% at the lower level of proficiency to 98% at the advanced one. In turn, Schrauf (2009) found that among older Spanish–English bilinguals in the US, high proficiency (fluent) individuals were most likely to use L2 English for note-taking and inner speech.

These factors can be organized into three clusters. The first involves the AoA: languages acquired earlier in life are more likely to be used in inner and private speech (Dewaele, 2006a, 2009; Larsen et al., 2002; Vaid & Menon, 2000). The second involves the CoA: speakers who learn the language in the context where it is spoken (as opposed to the FL classroom), speakers who had resided in the target-language context for a longer period of time, and speakers with more extensive social networks are more likely to use the language in question for inner speech (Dewaele, 2006a; Vaid & Menon, 2000). The effects of these two clusters are not surprising – as seen in the preceding chapters, both AoA and CoA affect L2 development across a variety of areas. The intriguing finding involves the third cluster, which combines the language of the environment with the frequency of language use, language dominance and proficiency (Dewaele, 2006a; Guerrero, 2005; Larsen et al., 2002; Matsumoto & Stanny, 2006; Schrauf, 2009).

In the view adopted here, the link that ties these factors with each other and with Barber's (1980) *din* phenomenon is *the level of language activation*. A language is activated when a sufficient amount of positive neural impulses reaches its neural substrate (Luria, 1973), enabling comprehension and production. The amount of impulses necessary for activation at any given moment constitutes its *activation threshold*. According to the Activation Threshold Hypothesis (Paradis, 2004), the selection of a particular language in the bi- and multilingual mind requires that its activation threshold exceed that of the competing languages, which are simultaneously inhibited. Consequently, frequent language use leads to a lowered activation threshold (due to continuous activation), making the more activated language more accessible to the speaker and thus contributing to the perception of 'language dominance'. Insufficient inhibition of the competing language may lead to interference, while successful inhibition and long-term lack of stimulation may lead to language attrition.

If we extend this approach to inner speech, we might hypothesize that increased levels of L2 activation trigger the *din* phenomenon and eventually lead to internalization of L2 inner speech. Yet, as seen in the comments from one of our questionnaire respondents, appropriation of a new inner voice is not tantamount to 'thinking in a new language':

When I was living in South America 6 years ago I thought and wrote things in Spanish. Even though I wasn't fluent in Spanish. I guess just because I was living there and being exposed to Spanish constantly I started to use Spanish in my writing & thinking. Even though at that time I would have been more fluent in either English or Dutch. (Monika, L1 Dutch, L2 English, L3 German, L4 French, L5 Spanish)

This comment suggests that while the more activated L2 may begin to dominate – visibly – the language of inner speech, leading to self-perception of

‘thinking in’ that language, a more proficient L1 may continue – imperceptibly – to affect the L2 verbalization process.

Given the elusive nature of inner speech, it is not surprising that the research on bilingualism has, for the most part, steered clear of the phenomenon. Yet its importance to bi- and multilinguals’ sense of self is indisputable and, in order to be ecologically valid and relevant, future scholarship needs to address inner speech and to examine the relationship between inner speech and ‘thinking for speaking’, the effects of levels of activation on inner speech, and the trajectory of inner speech development. From a theoretical standpoint, this inquiry can draw on Bakhtin’s (1981, 1986) insights and on Paradis’ (2004) Activation Threshold Hypothesis, and from a methodological one, on technological developments that provide us with new ways of capturing inner and private speech (Winsler, 2009) and on advances in neuroimaging that allow us to examine neural correlates of inner speech in two or more languages (Brown, 2009; Jones & Fernyhough, 2007; Paradis, 2008). Kim’s (2002) findings also suggest the need for cross-linguistic and cross-cultural studies of the salience, frequency and perceived importance of speech in this most private of all communicative domains, communication with the self.

6.2 Bilingualism and intersubjectivity

6.2.1 *Discursive relativity and interpretive frames*

Now, the change in the language of inner speech explains only part of Todorov’s puzzle, namely his perception that his ‘thinking’ was going on in French. It does not explain why he had reversed his argument when translating his paper from French to Bulgarian any more than it clarifies the source of conflict between inner voices poignantly depicted by Hoffman (1989):

Should you marry him? the question comes in English.
 Yes.
 Should you marry him? the question echoes in Polish.
 No.
 ... Should you become a pianist? the question comes in English.
 No, you mustn’t. You can’t.
 Should you become a pianist? the question echoes in Polish.
 Yes, you must. At all costs. (p. 199)

To understand why bilinguals may link their languages to different points of view and to push further our exploration of “thought insofar as it is linguistic” (Whorf, [1936] 2012: 87), I will link Bakhtin’s (1981) *raznoiazychie* [heteroglossia] to Lucy’s (1996) *discursive relativity*, which recognizes that monolinguals may also espouse diverse, and sometimes incommensurable,

worldviews. In this view, relativity is both an inter- and an intra-language phenomenon, with each language offering its speakers many different *discourses* and *interpretive frames*, that is assemblages of lexical items, metaphors, rhetorical practices, and scripts that structure speakers' expectations, assign interpretations to social events, and serve as a kind of memory structure facilitating understanding, encoding, recognition, and recall (Bateson, 1954; Goffman, 1974, 1981; Schank, 1990; Tannen, 1993). In what follows, I will distinguish the inherently evaluative *interpretive frames*, such as *invasion of privacy* or *sexual harassment*, from the *frames of reference*, such as spatial frames, which serve referential but not necessarily evaluative purposes.

The heterogeneity of discourses and interpretive frames within languages does not preclude cross-linguistic and cross-cultural differences in available or preferred discourses and frames. *Privacy*, for instance, is a salient interpretive frame in English, while in Russian, until recently, it had neither a translation equivalent nor a corresponding discourse (Karasik et al., 2005; Pavlenko, 2003, 2011c). *Sexual harassment* is also a recognizable – albeit often contested – interpretive frame in English, linked to a legitimate and salient discourse. In contrast, its Russian equivalent *seksual'noe domogatel'stvo* [sexual harassment] is a recent loan translation, commonly used in ironic descriptions of foreign realia.

Cross-linguistic studies show that differences in preferred interpretive frames affect the ways in which members of particular speech communities perceive the recall task and process and recall events. Tannen's (1980, 1982, 1993) analysis of narratives elicited by the Pear film revealed that Americans framed the Pear story as a film recall, using cinematic jargon, and reporting events as objectively and neutrally as they could. Greeks, on the other hand, recounted the events as such, without mentioning the film, and ascribed social roles and motives to the characters, offering explanations and judgments of their actions. Liebes and Katz (1990) compared recalls of the soap opera *Dallas* by middle-class Americans and Israelis, and by Arabs, Russians, and Moroccan Jews settled in Israel. They found that in retelling particular episodes, Americans and Israelis focused on the intentions of individual characters, offering psychoanalytic explanations of various happenings (a finding consistent with Linde's (1993) identification of psychoanalysis as a popular coherence system in American life stories). Arabs and Moroccan Jews focused on power issues and on individuals' positions within family and society, while Russian immigrants offered a critical reading of particular story lines, focusing on messages, rather than individuals, and exposing the manipulative nature of soap opera as a genre.

In psychology, such differences are commonly discussed as 'cross-cultural', yet, as argued in the preceding chapters, this approach creates more problems than it solves. 'Culture', often conflated with national origins, remains a

poorly defined and ambiguous construct, whose use obfuscates the fact that the locus of analysis in such cross-cultural research is actually language. It is discourses and interpretive frames that constitute ‘the world of meanings’ which, in Sapir’s (1949) view, we abstract from our interactions with others. Sapir’s (1949) definition of culture, cited in the beginning of this chapter, also reminds us that members of different ‘cultural groups’ do not always ‘toe the cultural line’: differences in interpretive frames are as likely to occur within speech communities as they are across communities. At the same time, the studies above show that some discourses, interpretive frames or ways of speaking are more salient than others in particular contexts at particular points in space and time, allowing members of a speech community to reach agreement on the common interpretation of reality.

6.2.2 *The accomplishment of intersubjectivity*

This interlocutor agreement on the interpretation of a temporarily shared social reality is known as *intersubjectivity* (Rommetveit, 1979a,b; Wertsch, 1985a,b). The accomplishment of intersubjectivity was of great interest to Sapir (1949), who placed the locus of culture in interaction and to Whorf ([1940b] 2012), who stressed its linguistic nature: “Whenever agreement or assent is arrived at in human affairs, and whether or not mathematics or other specialized symbolisms are made part of the procedure, THIS AGREEMENT IS REACHED BY LINGUISTIC PROCESSES, OR ELSE IT IS NOT REACHED” (p. 271, capitals in the original). This argument, made a few paragraphs before the famous quote about dissecting nature, rarely appears in discussions of the SWH, yet, as argued compellingly by Lee (1996, 1997), it is central to an understanding of Whorf’s view of relativity. Whorf’s main interest was not in the thought potential and imperceptible language effects on non-linguistic cognition (as interpreted by Brown and Lenneberg) but in the ordinary human agreement and in ways in which we “calibrate the way [we] make meaning against the practice of other people” (Lee, 1997: 446).

This accomplishment of intersubjectivity can take a variety of forms. To begin with, we need to agree that entities have agreed-upon names. The famous incident where Annie Sullivan pours water on Helen Keller’s hand is important precisely because, for Helen, it is the first occurrence of true intersubjectivity. A century later, the same breakthrough was accomplished by Ildefonso, who realized that all objects around him have agreed-upon names (for discussion, see Chapter 1). These examples also illustrate the level of intersubjectivity, discussed in Chapter 2, namely agreement on ways in which linguistic categories map onto referents in the material world. In the absence of such agreement, an L1 Russian speaker asked to pass a *cup* may look at the interlocutor with surprise, because there are no cups on the table, only *bumazhnye stakanchiki* [little

paper glasses]. In the process of adjustment or calibration of agreement, these glasses may transform into cups.

Another type of intersubjectivity, illustrated in [Chapters 3 and 4](#), involves agreement on numerical, temporal, and spatial frames of reference: a failure to attend to the agreed-upon coordinates may result in shame and embarrassment and in, in the case of direction-giving, in communication breakdowns. [Chapter 5](#) highlighted agreement on narrative conventions, including narrative structure, tellability, and life scripts, critical for storytelling, with the lack of shared assumptions resulting in boredom or confusion. Intersubjectivity is also central in our own research enterprise, and in [Chapter 1](#) I have argued that the lack of intersubjectivity and agreement continues to plague the very area of research that is the subject of this book.

Undoubtedly, even among monolingual speakers, the communion of minds is by no means complete: members of different social circles, speakers of different genders or generations, people situated at different levels of social hierarchy, and scholars differing in epistemologies may assign different interpretations to ‘the same’ words, utterances, and texts. Recognizing the fragile and partial nature of intersubjectivity, Rommetveit (1979b) argued that in the world of multiple social realities complete intersubjectivity is a convenient fiction. Even when we have the feeling that we found the exact and socially appropriate expression of what we want to make known, we may fail to make ourselves understood because our “everyday communication takes place in a pluralistic, multifaceted, only fragmentarily known and only partially shared social world, a world fraught with ideological conflicts, generation gaps, and uneven distribution of power, knowledge and expertise” (Rommetveit, 1979b: 148).

The gap between ourselves and our interlocutors becomes even wider when we attempt to reach intersubjectivity in a new language. The triggers that make L2 learners feel ‘out of sync’ range from major misunderstandings to very subtle differences: for an American user of L2 French, Alice Kaplan (1994), for instance, even the French *chat* “is not a cat at all but a new creature in new surroundings” (p. 59). The strategies L2 learners use to bridge the gap vary – some, like Luis Cernuda, may distance themselves from the L2 community and wait for the return to the L1, while others, like Hoffman, Todorov or Triolet, shift to the new language of inner speech, in order to feel ‘in sync’ with their new interlocutors.

Yet in and of itself a new voice does not suffice – to reach intersubjectivity in a new language, we have to internalize new interpretive frames and to readjust the salience of already existing ones, learning, once again, what frames to use, with whom, how, and when. The first successful accomplishment of intersubjectivity in the L2 may be no less momentous than the discovery that objects have names. Spanish–English bilingual Ariel Dorfman (1998), for instance, vividly recalls the moment when his spontaneous use of

the impersonal Spanish *se* marked him as an insider and signaled that he was finally ‘thinking in Spanish’:

A day comes back to me – I must have been sixteen – the first time I realized that Spanish was beginning to speak me, had infiltrated my habits. It was in carpentry class and I had given a final clumsy bang with a hammer to a monstrous misshapen contraption I had built and it broke, fell apart right there, so I turned to the carpentry teacher and “*Se rompió*”, I said, shrugging my shoulders. His mouth had twisted in anger. “*Se, se, se.*” he hissed. “Everything in this country is *se*, it broke, it just happened, why in the hell don’t you say I broke it, I screwed up. Say it, say, *Yo lo rompí, yo, yo, yo*, take responsibility, boy.” And all of a sudden I was a Spanish speaker, I was being berated for having used that form of the language to hide behind, I had automatically used that ubiquitous, impersonal *se*... (pp. 114–115)

The connection between languages and interpretive frames has important implications for multilingual interaction, suggesting that a shift in language may trigger, or even necessitate, a realignment of interpretive frames. A vivid example of such realignment comes from an interaction an American journalist David Shipler (2002) witnessed in Israel:

An Arab merchant, giving directions for picking up a television set to a Jew who speaks both Hebrew and Arabic, told him first in Hebrew to go to Givat Shaul. Then, after they had switched to Arabic, the merchant told him to go to Deir Yassin. (p. 21)

To interpret the two as the same geographical location, the hearer has to know that Givat Shaul Bet is a contemporary Hebrew name of a Jerusalem neighborhood built in 1949 on the land previously occupied by the Palestinian village Deir Yassin, the site of the 1948 massacre which precipitated the Palestinian exodus. The exodus, *Nakba* [disaster, catastrophe], is commemorated annually, the day after the Israeli *Yom Ha’atzmaut* [Independence Day], placing the two names in the context of incommensurable discourses and competing histories. The realignment of interpretive frames is also at the heart of Todorov’s volte-face experience:

The problems arose when I began translating my talk, originally written in my acquired language, French, into Bulgarian, my native tongue. It wasn’t so much a question of vocabulary or syntax, but in changing languages I noticed that I had changed my imagined audience. And at that moment I realized that the Bulgarian intellectuals to whom my discourse was addressed could not understand the meaning I intended. ... the modification my projected listeners seemed to be suggesting ... required that I change an affirmation into its direct opposite. (Todorov, 1994: 210)

The French version of his conference paper advocated renunciation of nationalist values, a point of view that resonated with his liberal colleagues in Paris. Yet for Bulgarian intellectuals, with whom he identified in Bulgarian, the nationalist discourse was the only public alternative, and a form of opposition, to communist ideology. To accomplish intersubjectivity with his Bulgarian

audience, Todorov (1994) had to renounce what he had come to believe. But how generalizable is his experience? Do other bilinguals shift frames when shifting languages?

6.2.3 *Bilinguals' use of interpretive frames*

The exploration of interpretive frames has a long pedigree in bilingualism research, starting with the work by Susan Ervin-Tripp, who was interested in how adult L2 learners acquire new meanings and “propositions containing value judgments and beliefs” (in Dil, 1973: 8). In the study that formed the basis of her dissertation, Ervin-Tripp (1964) used Thematic Apperception Test (TAT) cards – which portray ambiguous genre scenes open to multiple interpretations – to elicit stories from French–English bilinguals residing in the US, most of whom were or had been at one point married to Americans. The participants were divided into two groups, with one telling L1 French stories in the first session, and the other one L2 English ones. Six weeks later, each group was asked to tell the stories in the other language. The analysis of the stories in French and English revealed a difference in attention foci and interpretive frames: English stories displayed more emphasis on achievement, while French stories described more verbal aggression toward peers and more withdrawal and autonomy than the ones elicited in English.

More recently, similar results were obtained by Tiemann (2012) with TAT cards and the Rorschach administered to Spanish–English bilinguals and by Panayiotou (2004a), who elicited bilinguals' reactions to the ‘same’ story read to them in English and Greek a month apart. The character in the story, Andy/Andreas, was a successful professional who devoted all of his time to work and did not spend enough time with his elderly mother or his girlfriend. The participants were asked how they felt about him and what they would tell him if he were a person close to them. Their responses showed that the shift in language led to a shift in interpretive frames: Andreas' situation elicited sympathy and concern and Andy's disapproval or indifference.

These findings, compelling to linguists, are judged inconclusive by psychologists who object to small participant samples and the absence of quantitative analyses and ‘monolingual controls’ (e.g., Ramirez-Esparza et al., 2006). At the same time, potential language-related shifts in response to the same sets of stimuli are of major concern to psychologists, because the whole enterprise of psychology depends on the reliability of translated instruments. As a result, psychologists too began studying bilinguals' use of interpretive frames. In a paradigm-setting study, Hong and associates (2000) found that Chinese–English bilinguals display internal or individualistic attributions in response to American visual stimuli or *primes* (e.g., Superman, American flag) and external or collectivistic attributions in response to Chinese primes (e.g.,

Table 6.2 *Bilinguals' interpretive frames*

Studies	Languages	Participants	Tasks & stimuli	Findings
Ervin-Tripp (1964)	L1 French L2 English	64 French–English bilinguals in the US (mean age = 38 yrs; LoR > 4 yrs, mean = 12 yrs)	<i>Tasks:</i> (1) Thematic Apperception Test (TAT) picture interpretation; (2) word-association test	Language effects: in English more emphasis on achievement (in women), in French on verbal aggression and withdrawal-autonomy
Hoffman et al. (1986)	L1 Chinese L1 English L2 English	12 English monolinguals 24 Chinese–English bilinguals	<i>Tasks:</i> (1) reading 4 character descriptions; (2) free impressions writing task; (3) free recall writing task; (4) recognition memory task; (5) inference task	Language-schema congruence (codability) reduces reliance on memory and increases reliance on schema-based inferencing
Ralston et al. (1995)	L1 Chinese L2 English	52 native speakers of English, managers in the US (mean age = 31.3 yrs) 104 Chinese–English bilinguals, managers in Hong Kong: 52 in L1 Chinese (mean age = 36.7 yrs) 52 in L2 English (mean age = 35.3 yrs)	<i>Tasks:</i> Schwartz Value Survey in Chinese or English	Language effects: higher scores on collectivistic values in L1 Chinese, higher scores on individualistic values in L2 English
Hull (1996)	L1 Chinese L1 Korean L1 Spanish L2 English	148 participants, immigrants in the US (AoA > 8 yrs) 57 Chinese–English bilinguals 17 Korean–English bilinguals 74 Spanish–English bilinguals	<i>Tasks:</i> personality questionnaire California Psychological Inventory completed twice, once in the L1 and once in L2 English, with 5–15 days between sessions	Language effects: between-language differences on some of the measures; in all three groups, scores on Good Impression higher in the L1 and scores on Achievement via Conformance higher in the L2 English

Trafimow et al. (1997)	L1 Chinese L2 English	276 Chinese–English bilinguals in Hong Kong (mean age = 18.5)	<i>Tasks:</i> self-attitude instrument in Chinese or English	Language effects: more collectivistic responses in Chinese and idiocentric responses in English
McCrae et al. (1998)	L1 Chinese L2 English	<i>Study 1</i> 162 Chinese–English bilinguals in Hong Kong (ages 18 – 40) <i>Study 2</i> 633 Canadian students of European ancestry (n = 314) and Chinese ancestry (n = 319) (mean age = 19.3) <i>Study 3</i> 99 Canadian students: 42 Canadian-born Chinese (98% dominant in English) 57 Hong Kong born Chinese (70% dominant in Chinese)	<i>Tasks:</i> Revised NEO Personality Inventory; <i>Study 1:</i> administered in Chinese or English <i>Study 2:</i> administered in English <i>Study 3:</i> ratings of two Chinese peers of the participant's choice: one born in Canada and the other in Hong Kong (administered in English)	Study 1: no language effects in monocultural bilinguals Studies 2 and 3: acculturation effects Study 1 also revealed that translation can produce systematic distortions
Ross et al. (2002)	L1 Chinese L1 English L2 English	111 participants: 32 European Canadians 27 Chinese Canadians 52 Chinese–English bilinguals, LoR 1–11 yrs, mean = 7.1 yrs	<i>Tasks:</i> (1) self-description questionnaire; (2) cultural viewpoint questionnaire	Language effects: Chinese responses displayed higher agreement with Chinese values, more collective self-statements and references to others, and lower self-esteem
Verkuyten & Pouliasi (2002)	L1 Greek L1 Dutch L2 Dutch	183 participants: 51 Dutch monolinguals (ages 9 – 12 yrs) 58 Greek monolinguals (ages 9 – 12 yrs) 74 Greek-Dutch bilinguals in the Netherlands (ages 9 – 12 yrs)	<i>Tasks:</i> cultural values and self-evaluation questionnaire in Dutch and Greek filled out after presentation of visual primes (e.g., national flag, the Acropolis, a windmill, a person in traditional clothing)	Language effects: more collectivistic and family values, identification with friends and situational explanations in the Greek condition

Table 6.2 (Cont.)

Studies	Languages	Participants	Tasks & stimuli	Findings
Pavlenko (2003, 2011c)	L1 Russian L2 English	130 participants: 40 English monolinguals (ages 18–26 yrs) 40 Russian monolinguals (ages 18–26 yrs) 50 Russian–English bilinguals: 18 FL users (ages 18–26 yrs) 32 L2 users (ages 18–31 yrs, AoA range 10 – 26.5 yrs, mean AoA = 16 yrs; LoR range 1 – 17 yrs, mean LoR = 6 yrs)	<i>Tasks:</i> recall of two films: L2 users participated in a randomized 2x2 condition, with one film recalled in L1 Russian and the other in L2 English	Language effects: Differences in interpretive frames used in Russian and English CoA effects: FL users relied on L1 Russian frames, L2 users used additional interpretive frames internalized in the US both in L2 English and in L1 Russian
Marian & Kaushanskaya (2004)	L1 Russian L2 English	47 Russian–English bilinguals (mean age = 21 yrs, mean AoA = 14 yrs)	<i>Tasks:</i> cued recall in L1 Russian and L2 English	Language effects: more collectivistic frames in L1 Russian, more individualistic frames in L2 English
Panayiotou (2004a)	L1/L2 Greek L1/L2 English	10 bilinguals, ages 22–50 yrs, residing in the US and in Cyprus	<i>Tasks:</i> responses to scenario presented in English and, a month later, in Greek	Language effects: greater concern in Greek, indifference or disapproval in English
Ramirez-Esparza et al. (2006)	L1 Spanish L1 English L2 English	<i>Study 1:</i> 168,451 English speakers in the US; 1,031 Spanish speakers in Mexico <i>Study 2:</i> 25 Spanish–English bilinguals in the US (mean age = 25 yrs) <i>Study 3:</i> 54 Spanish–English bilinguals in the US and Mexico (mean age = 33.6 yrs) <i>Study 4:</i> 170 Spanish–English bilinguals in the US (mean age = 25 yrs)	<i>Tasks:</i> (1) Big Five Inventory (web-based in Study 1); (2) background questionnaire with self-ratings of proficiency (Studies 2–4)	Language effects: extraversion, agreeableness, and conscientiousness scores higher in English, neuroticism scores higher in Spanish

Verkuyten & Pouliasi (2006)	L1 Greek L1 Dutch L2 Dutch	413 participants (ages 18 – 70 yrs) 92 Dutch monolinguals 110 Greek monolinguals 211 Greek-Dutch bilinguals in the Netherlands (mean LoR = 27.3 yrs) with high levels of Greek and Dutch proficiency	<i>Tasks:</i> cultural values and self-evaluation questionnaire in Dutch and Greek filled out after presentation of visual primes (e.g., national flag, the Acropolis, a windmill, a person in traditional clothing)	Frame switching primed by language, with more negative self-evaluations and collectivistic frames primed by Greek
Luna et al. (2008)	L1 Spanish L2 English	135 female Spanish–English bilinguals <i>Study 1</i> 14 bicultural bilinguals (ages 24–59 yrs) <i>Study 2</i> 28 bicultural bilinguals (mean age = 22 yrs) <i>Study 3</i> 93 monocultural bilinguals (mean age = 22 yrs)	<i>Tasks:</i> (1) Bem inventory; (2) Cultural Life Style Inventory; (3) Implicit Associations Test (IAT); (4) interpretation of 4 advertisements; (5) word categorization; (6) semi-structured interviews, with one session conducted in Spanish and another in English	Language effects: the same women described as self-sufficient in Spanish and other-dependent in English
Chen & Bond (2010)	L1 Chinese L2 English	<i>Study 1</i> 213 Chinese–English bilinguals, university students in Hong Kong (104 males, 109 females, mean age = 21.5 yrs) <i>Study 2</i> 76 female Chinese–English bilinguals, university students in Hong Kong (mean age = 20 yrs)	<i>Study 1</i> <i>Tasks:</i> (1) Big Five inventory administered in either Chinese or English; (2) self-reports of language proficiency <i>Study 2</i> <i>Tasks:</i> (1) personality assessments; (2) interviews in English and Chinese; (3) observer ratings; (4) post-interview questions	Perception effects: L1 English speakers rated higher on Assertiveness, Extraversion, and Openness to Experience than L1 Chinese speakers Language effects small in magnitude and greater for observer ratings than for self-ratings

Table 6.2 (Cont.)

Studies	Languages	Participants	Tasks & stimuli	Findings
Danziger & Ward (2010)	L1 Arabic L2 Hebrew	44 Arabic-Hebrew bilinguals (Arab Israelis) (ages 20–28 yrs)	<i>Tasks:</i> Implicit Associations Test (IAT)	Positive bias toward Arab versus Jewish names reduced in Hebrew
Wang et al. (2010)	L1 Chinese (Mandarin or Cantonese) L2 English	125 Chinese–English bilinguals in Hong Kong: 8 yr olds n = 33 10 yr olds n = 32 12 yr olds n = 28 14 yr olds n = 32	<i>Tasks:</i> (1) elicited memories of four past events – in either Chinese or English, randomly assigned; (2) open-ended self- description; (3) forced-choice task: statements of cultural values	Language effects: more collectivis- tic frames in L1 Chinese, more individualistic frames in L2 English
Tiemann (2012)	L1 Spanish L2 English	26 Spanish–English bilinguals, ages 18–48 (mean = 27.7), half born outside of the US and half born in the US of immigrant parents; half were patients in therapy and half were not	<i>Tasks:</i> (1) Bilingual Acculturation Scale; (2) interpretations elicited by four TAT cards; (3) Rorschach Comprehensive System (RCS)	Language effects: differences in decision-making styles, elicited stories, and in RCS protocols which required different key variables for cluster interpret- ation and diagnosis

Chinese dragon, Great Wall). These findings allowed the authors to articulate the *Cultural Frame Switching hypothesis*, which posits that bicultural bilinguals, i.e., bilinguals with extensive exposure to and experience in two cultures, may shift interpretive frames, values and attributions when primed by culturally relevant stimuli (see also Benet-Martinez et al., 2002).

These effects were replicated with linguistic primes: Chinese–English bilinguals adopted more collectivistic frames in Chinese and more individualistic frames in English (Chen & Bond, 2010; Ralston et al., 1995; Ross et al., 2002; Trafimow et al., 1997; Wang et al., 2010). To give but one example, Ross and associates (2002) compared self-descriptions and questionnaire responses of Chinese–English bilinguals born in China and residing in Canada to responses provided by Canadian-born participants of European and Chinese descent. The results showed that bilinguals responding in Chinese made more collectivistic self-statements and displayed higher agreement with Chinese beliefs and values than all other participant groups. They also reported significantly lower self-esteem than the other participants and were equally likely to make favorable and unfavorable self-statements and to report negative and positive moods. Bilinguals writing in English patterned with native speakers of English in making more favorable self-statements and reporting higher self-esteem and more positive moods.

In other studies, Spanish–English, Chinese–English, and Korean–English bilinguals displayed greater concerns about group affiliation and making a good impression in the L1 (Hull, 1996), Russian–English bilinguals displayed more attention to others in L1 Russian and more self-focus in L2 English (Marian & Kaushanskaya, 2004), Greek–Dutch bilinguals used different self-evaluation frames in their respective languages (Verkuyten & Pouliasi, 2002, 2006), Arabic–Hebrew bilinguals exhibited more positive bias toward Arabic names in Arabic (Danziger & Ward, 2010), and Spanish–German bilinguals rated themselves higher on extraversion and neuroticism in Spanish and on agreeability in German (Veltkamp et al., *in press*). Spanish–English bilinguals also rated themselves differently on personality traits in Spanish and English (Ramirez-Esparza et al., 2006) and described the same women as self-sufficient in Spanish and as other-dependent in English (Luna et al., 2008). These effects were limited to bicultural bilinguals (Luna et al., 2008; McCrae et al., 1998). Jared and associates (2013) further found that Mandarin–English bilinguals named culture-specific pictures faster in the appropriate language, suggesting that the CoA affects the strength of the links between words and representations.

To see whether the use of language-congruent frames affects memory, Hoffman and associates (1986) created English- and Chinese-language descriptions of four characters. Two of them had short labels (schemas) in English but not in Chinese (*the artistic type*, *the liberal type*) and the other two had short

labels in Chinese but not in English (*shì gù* [worldly, experienced, socially skillful, devoted to family, somewhat reserved], *shēn cáng bú lòu* [knowledgeable and skilled in a variety of areas, reluctant to display this knowledge]). Chinese–English bilinguals read the descriptions of these characters and five days later performed a free impressions task (writing down their impressions of each character), free recall (writing down as many statements from the original description as they could remember), recognition (rating statements as previously seen or not), and inferencing (rating new statements as likely with regard to particular characters). The analysis demonstrated that in both languages the availability of a schema reduced attention to detail and decreased memory for previously presented information, while increasing reliance on schematic thinking and inferencing.

Together, the studies reviewed here show that bicultural bilinguals possess dynamic language- and culture-specific interpretive frames which can be activated by linguistic, visual and situational cues and used in language-appropriate ways as they would be in the process of accomplishment of intersubjectivity in everyday interaction. This linguistic and cultural accommodation was shown to affect cognitive processing (e.g., self- and other-perception), memory, and inferencing. At the same time, the findings of the framing studies are constrained by the limitations of the cultural priming paradigm.

From a theoretical point of view, the key limitation is the reliance on an essentialist notion of ‘culture’ and an oversimplified artificial dichotomy of individualistic/Western and collectivistic/Eastern culture and self. The collectivistic portrayal offers but a caricature of contemporary urban China or Russia, where the rocky transition to a market economy displayed the extremes of Western individualism and frontier mentality. The studies also rarely stop to consider what cultural communities the participants have actually been socialized into. As a result, it is not clear what exactly is being primed by, let’s say, English which appears, variably, as a foreign language (e.g., in China), the language of the colonizer (e.g., in Hong Kong), or a second language (e.g., in immigrant families in the US) (Oyserman & Lee, 2007). Koven (2007) justly argues that generic constructs, such as ‘self-construal’, conceal the lack of understanding of the actual mechanism by which linguistic categories become linked to culturally appropriate interpretive frames.

From the point of view of data collection and analysis, limitations include the reliance on stereotyped visual stimuli, such as national flags or pictures of James Bond, on self-reports in the form of questionnaires and inventories, and on translated instruments, with all the problems inherent in translation. The interpretations of these data transform and reify them as meaningful ‘personality differences’, yet what we really see is language performance on verbal tasks (for an extended critique of such approaches see Kagan, 2012). Ironically, the analytical procedures adopted in Cultural Frame Switching studies commonly

erase language in the process of data coding. Koven (2007) rightly points out that translation of responses from Chinese to English prior to coding dissociates content from form, as a result, “scholars are noting a pragmatic phenomenon – how language-change plays a role in creatively transforming context – without actually treating the speech produced by bilinguals as discourse to be analyzed in context” (p. 30).

Koven’s (1998, 2001, 2007) own research, discussed in Chapter 5, shows that the bilingual women in her study do not simply speak the two languages but are also ‘spoken by’ them, with differences linked not to generic Portuguese and French ‘cultures’ but to experiences of socialization in the two communities and – in a truly Bakhtinian fashion – to verbal repertoires, behavioral norms, and voices assimilated in the process:

in Portuguese I adopt the talk of my region, and which is ... to speak a little vulgarly ... I speak like the people from over there, I say the little dirty words, I goof around like people from there, I tease like people from over there ... I joke around differently too, y’know, tons of little things like that. (Ana in Koven, 2007: 72, 77)

Sometimes when I hear myself speaking Portuguese, I feel like I don’t recognize my voice sometimes ... I feel like I have another voice when I speak Portuguese and to have two different voices ... It feels strange ... I feel like I’m another person. (Susana in Koven, 2007: 77)

Portuguese, acquired from immigrant parents and relatives, is often used by these women to channel ‘old-fashioned’ and ‘backward’ social norms, with a story about sexual harassment, for instance, invoking feminine virtue which men are expected to respect. In contrast, French, acquired from monolingual peers, is used to present youthful and modern perspectives, and a retelling of ‘the same’ experience in French may shift the frame from feminine virtue to the rights of a non-consenting modern woman. But what about the creative freedom of bilingual consciousness invoked by Bakhtin?

6.2.4 “What privacy? in Russian it doesn’t exist”

Reading and re-reading Todorov’s (1994) essay during my Cornell years, I had repeatedly asked this question and eventually decided on a dissertation study that would examine whether bilinguals keep their interpretive frames tightly compartmentalized or whether they can borrow frames from one language when speaking in another. But which frames should I pick? One day, I was in my room, reviewing the literature and trying to decide on the actual frames, when my mother Bella – who, at the time, was living with me – came in and started to chat. Too busy and stressed out to engage in a conversation, I asked for some privacy. The request enraged my mother: “You want what?!” Now, it has been repeatedly argued that Russian has neither translation equivalents nor behavioral correlates of *privacy* and *personal space* (e.g., Karasik et al.,

2005), yet this was not the case of a simple misunderstanding. My mother was a fluent speaker of English and well-familiar with the notion of *privacy*, yet, as a Russian, she found this interpretive frame utterly inapplicable to our mother–daughter relationship and, frankly, offensive. Needless to say, this was the day when my dissertation study – on privacy and personal space – began to take shape.

Several years later, the lack of *privacy* in Russian affected my life once again, this time in connection with my mother’s funeral. To honor and remember Bella as she would want to be remembered – young, happy, beautiful, and full of passion for life, teaching, adventure – I held a private ceremony at Philadelphia’s Jewish cemetery, a low-key affair, attended by family members and Bella’s closest friends. Standing next to the memorial wall where the urn with Bella’s ashes was about to be interred, I passed around her favorite pictures from childhood on. Photographs have always been important in our family. In 1941, as the Nazi army was invading Ukraine, my grandmother and my 12-year-old mom escaped Kharkov as *bezidentsy* [refugees, literally: runners-away] with just one suitcase, full of family pictures. Five decades later, it was my mother and I who were *bezidentsy*, leaving the Soviet Union. All we were allowed to take with us was three hundred dollars and three small suitcases. The choice of possessions was easy: one suitcase contained clothing, one cloth diapers for my eight-month-old son, and one was full of family pictures. Everything else could be purchased anew.

And so there we were, celebrating my mother’s life. First came a picture of Bella as a jolly plump semi-naked baby smiling at the photographer from the depths of a velvet-covered armchair. Then it was mom as a pretty high school student in a *tubeteika* (a little Asian beanie hat) in Kazakhstan, where she and grandma had settled during World War II. Next came a post-war picture of a beautiful young woman standing proudly next to her first love, a Yugoslavian student at the Kiev Military Academy, just days before Stalin issued his infamous decree prohibiting marriages between Soviet citizens and foreigners. Mom, smiling happily, with a baby in her arms – me. Bella, the ever-popular teacher, with her students. I pass the pictures around, trying to say a few words about each one, without choking on tears, when, suddenly, I hear an unfamiliar screechy voice asking in Russian: “So, who is being buried here? Bella? Which Bella? Ah, Bella from Kiev? And where did she live in Kiev?” A middle-aged stranger on her way to the family grave crashes our little funeral ceremony to satisfy her curiosity. Eventually, one of my mother’s friends manages to shoo her away, leaving my American partner stunned at the invasion – he has heard of ‘wedding crashers’ but not of ‘funeral crashers’. I shrug helplessly – I have told him many a time that Russian has no word for ‘privacy’.

To examine the effects of this lexical gap, I made two films, based on a single script, one in the US (*The Ithaca Story*) and one in Kiev (*Kiev Story*) (Pavlenko,

1997, 2003, 2011c). In these films, a young woman, strolling through busy city streets, stops for a brief chat with her acquaintances but refuses their invitation to stay and continues to walk. Eventually, she sits down on an empty bench. Taking a (note)book out of her bag, she starts writing something down (*The Ithaca Story*) or reading (*Kiev Story*). A young man comes over and sits down on the bench within approximately four feet of the woman. He does not look in her direction. The woman starts fidgeting and eventually puts her (note)book in the bag, gets up and leaves.

Both films had a music soundtrack but no linguistic interactions, so the language of the environment had to be inferred. The decision to portray a male–female interaction was based on two factors. First of all, previous research on violations of privacy and personal space in North American contexts had suggested that men invade women’s spaces more frequently than women invade men’s spaces and more than men invade other men’s spaces (Wood, 1994). At the same time, invasions of women’s spaces by men could have a range of alternative interpretations, from an innocent flirtation to a pick-up attempt.

The films were shown to four groups of participants: L1 English speakers in the US, L1 Russian speakers in Russia, advanced FL learners of English in Russia (FL users), and late Russian–English bilinguals in the US (L2 users). In each group, half of the participants saw *The Ithaca Story* and the other half saw *Kiev Story*. L2 users were further divided into English- and Russian-language conditions; in contrast, FL users were asked for recalls in English only (for design details see Table 6.2 and Pavlenko, 2003, 2011c). The individual recalls were elicited by instructions “Please, tell what you just saw in the film”, with the expectation that in imposing narrative structure on events they would infer the reasons for the woman’s departure.

The findings revealed that native speakers of English and Russian differed in the dominant interpretations of the woman’s departure: English-language interpretations emphasized the woman’s ‘loss of comfort’, while Russian ones favored gender-based scenarios, such as ‘unsuccessful pick-up’ or ‘dislike of the guy’. Most importantly, English speakers consistently saw something in *The Ithaca Story* that Russian speakers did not: the bubble of personal space.⁵ In their recalls, 85 percent of the English speakers spontaneously referred to the invasion of privacy or personal space (e.g., “she felt almost invaded, like her privacy was being invaded”, “the girl’s privacy was being invaded”, “the guy was invading her space”, “he was in her space kind of”). Several participants also noted the distance between the two characters (e.g., “he sat down a little too close for her comfort”, “he was... maybe too close”). Russian speakers, on the other hand, had not observed any invasion or intrusion and did not

⁵ In descriptions of *Kiev Story* only two participants referred to *invasions of privacy or personal space*.

comment on the spatial proximity of the characters in either film, although they could have said that the man was sitting *slishkom blizko* [too close] to the woman. These distinct patterns suggested that English speakers consistently paid more attention to interpersonal distances and perceived violations of personal space.

So, what did bilinguals do in the context of this pronounced difference in interpretations?

Five of the L2 users, i.e., Russian–English bilinguals residing in the US, also saw personal space being invaded in *The Ithaca Story* and commented on it, one in an English-language narrative and four in Russian-language narratives. Since they perceived language to be a constraint on the task, their narratives contained no code-switching – instead, in the absence of translation equivalents of *privacy* and *personal space*, the references included one lexical borrowing, “интрузивность” [*intruzivnost’*, intrusiveness], two loan translations, “он... мм... вторгается в ее одиночество” [he... uhm... is invading her solitude] and “тот молодой человек, который вторгся в ее... эмоции, чувства” [that young man who invaded her... emotions, feelings], and one unfinished, self-interrupted clause, “что он пересек, то есть, что она уже не может быть одна” [that he crossed, so, that she can no longer be alone]. The use of these “American” frames in Russian-language narratives challenges the straightforward predictions of the Cultural Frame Switching hypothesis and reminds us that bilinguals frequently appeal to words and frames from one language when using another. Debriefing interviews with the study participants furnished several examples of such code-switching. Natasha, for instance, appealed to code-switching when explaining why she found it impossible ‘to think’ about privacy in Russian:

...английское слово *privacy* для меня существовало, но оно никогда у меня не ассоциировалось с жизнью российской, никогда оно у меня не переводилось... оно существовало совершенно отдельно, мм, особым *privacy* миром, каким оно вот и является таковым. То есть, для того, чтобы подумать об этом на русском языке, мне нужно было бы найти очень много специальных отдельных слов, и когда мне хотелось что-то такое вот утвердить свою *privacy*, я именно употребляла слово *privacy* даже по отношению к своему мужу... русскому.

[...the English word *privacy* has existed for me but for me it was never associated with Russian life, it was never translated ... it existed complete separately, in its own *privacy* world, just as it is. So, in order to think about it in Russian, I would need to find very many special separate words, so when I wanted to somehow establish my *privacy*, I would use the word *privacy* even when talking to my husband ... a Russian.]

(Natasha in Pavlenko, 2003: 274–275)

The findings also show that in the case of a dissociation between the visual stimulus (American) and the language of the task (Russian), bilinguals performing the task in an American context may choose the frames congruent

with the visual stimulus and the context, rather than with language per se. At the same time, the participants displayed full awareness of the cultural specificity of *privacy* and of constraints on the usage of this interpretive frame in Russian:

Или, например, *privacy* ... какая *privacy*? ... по-русски этого нету, я не могу сказать по-русски, знаешь, ну я могу сказать “Я хочу побыть одна”, но это звучит слишком драматично, да? ... когда ты говоришь по-английски “*I need my privacy*” это более как ежедневная вещь и никто, никого это не волнует...

[Or take, for instance, *privacy* ... what *privacy*? ... in Russian this doesn't exist, I cannot say in Russian, you know, well, I can say “I want to be alone”, but this sounds too dramatic, yes?... when you say in English “*I need my privacy*” this is more like an everyday thing and no one, it doesn't bother anyone...] (Alyona in Pavlenko, 2003: 275)

The use of interpretive frames was also influenced by the CoA. The frames involving *privacy* and *personal space* appeared only in L2 users' narratives – FL users favored gender-based interpretations and did not comment on the spatial proximity of the characters. A replication of this study with films that portrayed violation of informational privacy revealed the same pattern: FL users did not comment on the privacy of information, while L2 users referred to the character's need to be alone and not to share personal information, with two of them making direct references to *privacy* and *personal space*: “her personal space was intruded”, “she, uhm, obviously gets angry at her roommate about not keeping her privacy” (Pavlenko, 2002b). Interestingly, in the debriefing interviews, some FL users stated that they had seen the terms *privacy* and *personal space* previously yet they were not sure about their precise range of reference and contexts of use. These CoA effects suggest that culture-specific interpretive frames are acquired in dialogic interaction with target-language speakers. Another study participant who appealed to these frames revealed in a debriefing interview that he acquired them through miscommunication with English-language speakers:

Я бы сказал... здесь такое ударение на личное/частное, такое большое... каждый, так, скажем... я бы сказал, американцы, так, они... так... они очень большое внимание уделяют своей личности, *privacy*, даже когда люди знакомятся, они, я бы сравнил бы, здесь они легко знакомятся и дальше дело идет хорошо, а потом ужедостигаешь такого барьера, стены, уже эта стена, стена *privacy*, то есть, через нее ты уже не пройдешь... и они здесь уважают свою *privacy*, и я не знаю, это... это... для меня это чуждо...

[I would say... there is such an emphasis here on personal/private, such big... everyone, so to say... I would say, Americans, so, they... so... they pay a lot of attention to their personality, *privacy*, even when people meet, they, I would compare, here they meet easily and all goes well, and then you reach that barrier, a wall, already this wall, the wall of *privacy*, that is, you can't get through it... and here they respect their *privacy*, and I don't know, for me it's foreign...] (Alex in Pavlenko, 2003: 275–6)

While Natasha and Alyona cited above have assimilated the notion of *privacy* as their own interpretive frame, Alex's comments show that internalization of new frames is not tantamount to a change in the system of personal values and beliefs – one may not, personally, place a high value on *privacy* yet still use the frame to understand the behavior of others. Such usage, however, may be constrained by context: in Russian-speaking contexts, the frame may be perceived as inapplicable, as seen in my mother's reaction to my invocation of *privacy*.

6.3 Language effects in the use of interpretive frames: speaking with a forked tongue?

Following Bakhtin (1981, 1986), Vygotsky (1986, 2005), Sapir (1949) and Whorf (1956, 2012), the studies discussed here locate the locus of culture and linguistic thought “in the interactions of specific individuals” (Sapir, 1949: 515) and show that members of different speech communities may not share interpretive frames and, consequently, display difficulties in calibrating agreement and accomplishing intersubjectivity. These studies link bilinguals' perception of ‘thinking differently in different languages’ to changes in the voice of inner speech and shifts in interpretive frames (and imaginary audiences) triggered by the change in language. But do they imply that bilinguals speak with a forked tongue? The Cultural Frame Switching hypothesis answers this question positively, predicting that in each language bicultural bilinguals will pattern with monolinguals, yet this assertion needs to be qualified in a number of ways.

To begin with, as Sapir (1949) gently reminds us, monolinguals do not always behave ‘like monolinguals’ – they too have a variety of alternatives at their disposal and even if some interpretive frames are favored by the majority, there are always speakers who diverge from the mold and adopt alternative points of view. As a consequence, bi- and multilinguals have an even wider variety of options: they can position themselves as insiders, siding with the majority; they can adopt a frame used by their preferred minority group, or they can choose to speak as outsiders, bringing in novel frames, perspectives, and points of view.

Moreover, bilinguals are not always oriented towards monolingual speakers of their respective languages. Oftentimes, they interact with other bi- and multilinguals and, instead of compartmentalizing their interpretive frames, draw creatively on the polyphony of their linguistic repertoires, engaging in Bakhtinian (1981) ‘double-voicing’ and drawing on frames of one language when speaking another, through code-switching, lexical borrowing, loan translation, and language play (Beaujour, 1989; Besemeres, 2002; Kramsch, 2009; Yildiz, 2012). A charming example of such frame play (literally!) can be found

in an essay by Japanese–German bilingual writer Yoko Tawada (2003), who confesses that her L2 German words often trigger thoughts, reactions, and associations different from those conventionalized in the German speech community, through links with words of her L1 Japanese. Thus, she hears the echoes of the Japanese homophone *ramen* in the German word *Rahmen* [frame] and playfully stretches the meaning of *Rahmenhandlung* from ‘frame story’ to ‘frame shop’ to ‘ramen noodle shop’.

For Bakhtin (1986), the double-voicedness and *vnenakhodimost’* [outsideness, exteriority, estrangement] enabled by bilingualism, are a major source of literary creativity:

In the realm of culture, outsideness is a most powerful factor in understanding. It is only in the eyes of *another* culture that foreign culture reveals itself fully and profoundly (but not maximally fully, because there will be cultures that see and understand even more). A meaning only reveals its depths once it has encountered and come into contact with another, foreign meaning: they engage in a kind of dialogue, which surmounts the closedness and one-sidedness of these particular meanings, these cultures. We raise new questions for a foreign culture, ones that it did not raise itself; we seek answers to our own questions in it; and the foreign culture responds to us by revealing to us its new aspects and new semantic depths. (p. 7)

This creativity finds a perfect outlet in the work of bilingual writers who sneak words, puns, and jokes across the language border, be it Nabokov’s *soomerki*, Triolet’s *ridicule*, or Tawada’s *Rahmenhandlung*, and is particularly impressive in *translingual writers*, that is, writers who write primarily in a stepmother tongue (Kellman, 2000). Among them, to name but a few, are Julia Alvarez (L1 Spanish), Andrei Codrescu (L1 Romanian), and Ha Jin (L1 Chinese), who write in the L2 English; Vassilis Alexakis (L1 Greek), Assia Djebar (L1 Arabic), and Andreï Makine (L1 Russian), who write in the L2 French; Alina Bronsky (L1 Russian), Terezia Mora (L1 Hungarian) and Feridun Zaimoğlu (L1 Turkish), who write in the L2 German; and Chingiz Aytmatov (L1 Kyrgyz), Chingiz Abdullayev (L1 Azerbaijanian), and Fazil’ Iskander (L1 Abkhazian), who write in the L2 Russian. Echoing Bakhtin (1986), Hoffman (1999) argues that the ‘double’ vision gives bilingual writers a unique advantage:

Being deframed, so to speak, from everything familiar, makes for a certain fertile detachment and gives one new ways of observing and seeing. It brings you up against certain questions that otherwise could easily remain unasked and quiescent, and brings to the fore fundamental problems that might otherwise simmer inaudibly in the background. This perhaps is the great advantage, for a writer, of exile, the compensation for the loss and the formal bonus – that it gives you a perspective, a vantage point. (p. 50)

Yet there is one area where this advantage disappears and that is poetry. Nabokov, who wrote some of the most elaborate and sophisticated English-language prose, remained faithful to his poetic Russian muse. And Todorov

confessed in his interview with me that he feels no affective ties to French poetry – the poetry that touches him most deeply is actually Russian:

I feel more sensitive to poetry in Russian than in any other language, maybe in Bulgarian too, but I have been fond of poetry in Russian in a way that I have never been in French or English, so if in my old days I, I try to come back to poetry, probably I will have to come back to Russian, more strongly, and it may become again a more important language, and more important for my identity. (Todorov, 1997)

Initially, I discounted this statement as a nod to my own Russian background and a way of being nice. Yet a decade later, Todorov (2008) made a similar statement in an interview with Catherine Portevin: “the power of these words,” he said about Russian poets Pasternak and Tsvetayeva – whose lines he can still recite after all these decades – “comes from a sense of the absolute necessity of this exact word, excluding all other possibilities” (pp. 389–390). His emotional connection to Russian poems is akin to my own physical links to their words, yet Todorov had never lived in Russia – most of his adult life was lived in French and partially in English. So why would Blok, Pasternak, and Tsvetayeva affect him more than Rimbaud, Verlaine or Prévert? To answer this question, I will turn to the relationship between languages and affect and to another French speaker who loved Blok’s poetry, famous artist Marc Chagall.

7 Emotional worlds: Emotion categorization, affective processing, and ascription of significance

... Я просыпаюсь в отчаянии нового дня, моих надежд	Je me réveille dans le désespoir D'une journée nouvelle, de mes désirs	[I wake up in despair of a new day, my hopes
еще не нарисованных не протертых краской. Я бегу вверх к кистям засохшим и распинаюсь как Христос прибитый гвоздями к мольберту. Неужели я законченный? Картина моя закончена? Все сияет, льется, бежит.	Pas encore dessinés Pas encore frottés de couleurs Je cours là-haut Vers mes pinceaux séchés Et tel le Christ je suis crucifié Fixé avec des clous sur le chevalet Suis-je fini, moi Mon tableau, est-il fini Tout brille, tout coule, tout court	not drawn yet not rubbed by paint. I run upstairs to dried-up brushes and crucify myself like Christ nailed to the easel. Am I finished? Is my painting finished? All shines, flows, runs.
Остановись, еще мазок. Там черный цвет, там красный, синий уложился и меня тревожат ох как меня тревожит... (from <i>The Painting</i> by Chagall, 1945–1950, in Kamensky, 1989: 362)	Arrête! Encoure une touche La couleur noire Le rouge, le bleu s'installent Et cela m'inquiète Oh! comme cela m'inquiète (authorized French transla- tion in Chagall, 1975: 14–17)	Stop, one more stroke. There black color, there red, dark-blue is laid and troubles me oh how it troubles me...] (literal translation into English mine)

One of Humboldt's key claims, reiterated by Bakhtin, Vygotsky, and Sapir, was that, by pushing the boundaries of language, poetry offers us unique insights into the distinctive nature of language-worlds (Leavitt, 2011; Underhill, 2009). Yet to express the writer's feelings and to touch the reader, poetic language requires unmediated access to our emotions. This access does not appear to be the same in multilinguals' languages and Todorov, who spent most of his adult life in France, is still moved by Russian and Bulgarian poetry in a way he is not by poems in French. The same could be said about Marc Chagall,

who had lived in France for more than six decades but continued to express his feelings through poems in Russian like the one above. This poem, like the Russian exclamation *Ох боже!* [Oh God!] in Chagall's self-portrait on the cover of this book, suggests that Russian was Chagall's language of the heart. Yet a closer look at Chagall's linguistic trajectory and paintings – including *Oh God!* – will reveal a hidden dimension and show that the interaction between languages and affect in the multilingual mind is more complicated than commonly assumed.

To discuss Chagall's linguistic engagements, I will draw on his autobiography¹ and on his biographies and memoirs of his family members and friends (Chagall, 1946; Haggard, 1986; Harshav, 1992, 2003, 2004, 2006; Kamensky, 1989; Meyer, 1964; Wullschlager, 2008).

Moyshe Shagal was born in 1887 in a Hasidic² family near the town of Vitebsk, in the Western provinces of the Russian Empire (Lithuania, present-day Belarus). His native language was actually Yiddish, not Russian, and it remained his principal language until the age of 13, when he graduated from *heder* [Jewish elementary school] and got accepted – thanks to a strategically placed bribe – in a Russian-medium state school. There, Shagal joined Russian, Polish, Belarusian, and a few Jewish boys (among them future sculptor Ossip Zadkine) and encountered, for the first time, Russian as a primary means of communication, rather than the language of the outside world. His memoirs show that this initial encounter with Russian and the unfamiliar Cyrillic alphabet caused stuttering, pain and resentment:

What was the good of those lessons? One hundred, two hundred, three hundred pages of my books I would have torn out ruthlessly, scattered to the four winds. Let them whisper in the air to each other all the words of the Russian language, all the words of all the countries and all the seas. Let me alone! (Chagall, 1960: 49)

Yet eventually Shagal, following countless other upwardly mobile young Jews, abandoned the language of the shtetl and adopted Russian as the language of high culture, intellectual aspirations, and civilized modernity. For this ambitious young generation, breaking “out of the strong chains of a totalizing religion and folklore, with their collective answers to all questions, their imposing conventions and social pressures of a small town” (Harshav, 2006: 52), Russian opened access to higher education, professional training, life beyond the Pale.

¹ The original Russian text of Chagall's autobiography appears to be lost – the book is available only in translation: the primary translation into French by Chagall's wife Bella, follow-up translations from French into English (Chagall, 1960) and other languages, including a back-translation into Russian (Chagall, 2011), and an authorized translation from Russian into Yiddish, which corrects some of the inconsistencies present in the French version (this and other autobiographical writings translated from Yiddish into English can be found in Harshav, 2004).

² Hasidism was a Jewish revivalist movement founded in mid-eighteenth century and popular with Eastern European Jews.

For Shagal, it also opened up the world of visual art, forbidden in the Orthodox tradition of his family – even the word *khudozhnik* [artist] had to be borrowed from Russian, for Yiddish did not possess a word that named his aspirations. Russian also facilitated his entry into the artistic milieu of St. Petersburg, where he moved in 1906 to continue his training (incidentally, one of his teachers, Dobuzhinsky, also taught drawing to young Vladimir Nabokov). By then, Russian had become the language of his daily life – he even tried his hand at Russian poetry, which he dreamed of showing to his favorite Symbolist poet, Aleksandr Blok. Even his name became russified – Moyshe Shagal became Mark Shagalov, just as his future wife Berta became Bella.

In 1911, support from a wealthy patron enabled the talented 23-year-old to continue his training in Paris, where he settled in the artists' colony La Ruche [The beehive], alongside Rivera, Modigliani and other aspiring artists. Since Shagal spoke no French, his initial interactions were with fellow Russian speakers and Yiddish-speaking Eastern European Jews, among them Aleksandr Archipenko, Sonia Delaunay-Terk (née Sarah Stern), Anatoly Lunacharsky, and Chana Orloff from Ukraine, Jacques Lipchitz and Chaim Soutine from Lithuania, Moïse Kogan from Bessarabia, Moïse Kisling from Poland, and Ossip Zadkine, an old friend from Vitebsk. Russian also enabled his friendship with a Swiss poet, Blaise Cendrars, who spoke the language fluently after a few years spent in St. Petersburg and Nizhny Novgorod and who introduced Shagal – who by then had become Marc Chagall – to Apollinaire, Delaunay, Léger, Modigliani, and Picasso. This new milieu was not exclusively French speaking either: several of Chagall's contemporaries, including Cendrars, Delaunay, Eluard, and Modigliani, and later Aragon, Dali, and Picasso, were married or attached to Russian-speaking women (e.g., Modigliani at the time was having an affair with the poet Anna Akhmatova).

Despite the excitement of his new life, Chagall continued to miss Russia and in 1914 he decided to come back for a short visit, to attend his sister's wedding and to see his fiancée, Bella. The timing could not have been worse – soon after his arrival, World War I broke out and the borders closed, forcing Chagall to remain in Russia for the next eight years. Having married Bella, he attempted to build a new life. After the October revolution, his old friend from La Ruche, Lunacharsky, became the Soviet Commissar of Enlightenment (Education and Culture) and appointed Chagall Commissar of Art in Vitebsk. There, Chagall founded the People's Art School and hired such prominent artists as Kazimir Malevich and El Lissitzky (in 1920, the lively intellectual atmosphere in Vitebsk also attracted Bakhtin). These hires turned out to be a bad idea – Malevich dismissed Chagall's colorful representational paintings as old-fashioned and Chagall's students left him to join Malevich's class, forcing Chagall to resign in humiliation.

Oh God! was painted in Vitebsk in that period and the exclamation conveys Chagall's pain and anxiety. Yet the painting also hides another language of emotions – the topsy-turvy head is a visual rendition of the Yiddish idiom *der kop is im fardreyt* [his head is turned around one turn too many or 'screwed up'], which refers to the state of disorientation (Harshav, 2006; Taylor, 2011). One of Chagall's signature images, it also appears in the portrait of a poet Mazin, entitled *The Poet or Half-Past Three*. This painting is often treated as a self-representation by Chagall, who loved to refer to himself as a painter-poet and befriended Blok, Esenin, Mayakovsky, and Pasternak in Russia, and Apollinaire, Cendrars, Eluard, Prévert, and Valéry in France. As in *Oh God!*, the external language of emotions in *Half-Past Three* is Russian – the poet's notes contain a love poem often attributed to Blok. Yet the *fardreyter kop* or *kop arop* [head upside down] is far more effective in rendering the painter-poet's exhilaration and inspiration that "flows like wine at half-past three in the morning" (Taylor, 2011: 9).

The two paintings also share the third language – both are signed with the French version of the artist's name, Chagall, revealing an identity function played by French. This function became particularly important after 1922, when Chagall and his wife had left the Soviet Union (with the help of the same Lunacharsky) and, after a short stay in Berlin, settled in Paris. There, their life continued in a plurilingual mode, in French, Russian, and Yiddish, the connection to which was strengthened in 1935, when the Chagalls attended the opening of the Museum of Jewish Art in Vilna (then Poland, now Lithuania), the traditional center of Yiddish cultural life in the Pale. The meeting with Vilna's Yiddish poets rekindled their homesickness and nostalgia and both Chagalls turned to Yiddish as a literary medium. Bella began writing her memoir *Burning Lights* (published posthumously in 1946) and Marc tried his hand at Yiddish poetry.

Throughout his life in France (and the time spent in the US), Chagall continued to speak, read, and correspond in Yiddish and Russian and used both languages to write poetry, sometimes translating it from one into the other. Poetry was an emotional outlet at times when he needed to express deep feelings but was unable to paint, be it after the outbreak of World War II, which forced him to leave France for the US, or after the death of Bella, the love of his life and a faithful companion for more than two decades. Yiddish remained at the heart of Chagall's emotional world and his visual imagery often draws on Yiddish idioms. Yet Yiddish was also the language of the restrictive world Bella and Marc Chagall yearned to escape, and the language of their love, family, parenting, and of Chagall's autobiography was Russian, not Yiddish. Russian diminutives expressed Chagall's tender feelings for Bella, whom he lovingly called *Bellochka* and *ptashka* [little bird], for Ida or *Idochka*, for whom he remained *papochka* [dear father], for his second wife Valentina (Vava) Brodskaya, also

a Russian speaker, and even for his French- and English-speaking companion Virginia Haggard, whom he called *Virginichka*.

And while Chagall easily expressed emotions in his fluent albeit idiosyncratic French, he did not connect with his feelings through French in the same way he did through Yiddish or Russian. He never wrote poetry in French and complained to Virginia Haggard that she “would have to guess how much he loved [her], because he could express it only in a painting or a Russian poem” (Haggard, 1986: 164). Todorov displays the same dissociation between Bulgarian and Russian on the one hand and French on the other:

I am not sure I ‘like’ the French language. I try to use it as well as I can, to express my thoughts and feelings with utmost clarity and precision, but it remains an instrument to me, not an object of affection. (Todorov, 2008: 177)

But why is it that Chagall and Todorov could connect with poetry in Russian, learned in late childhood and teenage years, but not in French, the language in which they lived most of their adult lives? How can we explain the dissociation between their French and emotional experience? And what effects might it have on cognitive processes and articulation of thought?

To answer these questions, I will turn to the interaction between languages and emotions in the bi- and multilingual mind. I will begin with an overview of the key theories that try to determine what emotions *are*. Then, I will shift focus to what emotions *do* and, taking advantage of their multidimensionality, revisit the key aspects of the interaction between language and cognition discussed in this book. First, I will discuss linguistic categorization, with the focus on emotion words in monolingual and bilingual affective lexicons. Next, I will examine emotions as discursive practices and look at socialization of affect across languages, cultures, and historic periods. Then, I will turn to affective processing as a neurophysiological mechanism and examine why we connect to poetry better in some languages than in others, what this connection reveals about language, cognition, and ‘ascription of significance’ in the bilingual mind and what it means for those of us who are bi- and multilingual but do not particularly care for poetry.

7.1 Emotion theories and their implications for the bilingual mind

My overview of the key emotion theories will focus on two major psychological paradigms, deterministic and emergentist. This is undoubtedly a gross oversimplification of a very complex and vibrant field of research but it is a useful starting point, because it allows me to focus on the key paradigmatic differences in assumptions about the nature, universality, and discreteness of emotion categories and their implications for bi- and multilingual speakers.

7.1.1 *Deterministic approaches: basic emotion theories*

Deterministic approaches, also known as biological or universalist, are grounded in Darwin's (1872) *The expression of the emotions in man and animals* and treat emotions as "biologically determined processes, depending on innately set brain devices, laid down by a long evolutionary history" (Damasio, 1999: 51). The impetus for the revival of Darwinian ideas came from two emotion scholars, Ekman and Friesen, who, in the late 1960s, got a rare opportunity to watch hundreds of hours of footage documenting daily life in the highlands of New Guinea. After watching the films for six months, the two decided that they "never saw an unfamiliar expression" (Ekman, 2003: 5). This conclusion inspired Ekman to go to New Guinea in person to examine emotional expressions of members of the Fore tribe. Since Ekman did not know any Fore, his work relied on "the help of a few boys who had learned Pidgin from a missionary school" (Ekman, 2003: 7). With the help of these volunteer interpreters and a set of photographs, Ekman set out to collect stories of emotional events from his participants. The process was quite difficult – "like pulling teeth" (Ekman, 2003: 7) – leading him to comment that "perhaps making up stories about strangers was just something the Fore didn't do" (p. 7). The follow-up experiments asked participants to match these stories to pictures of facial expressions of Caucasian Americans or to portray the emotions they would have experienced as protagonists of the stories. The fact that New Guineans could match most emotions portrayed by Americans and vice versa convinced Ekman that he had located the universals of human emotional experience.³

Follow-up studies provided further evidence that, across languages and cultures, prototypical facial and vocal expressions are identified at levels higher than chance (Bryant & Barrett, 2008; Ekman, 2003; Elfenbein & Ambady, 2002). To explain these findings, Ekman (1992, 2003) and Izard (1977, 2009, 2011) put forth basic emotion theories that assume the existence of a core set of universal (*basic*) emotions, such as anger, fear, sadness, joy/happiness, disgust, and surprise. These emotions represent innate affect programs that are triggered by external stimuli to produce the same patterns of response across cultures, including universally understood facial expressions. The programs are subserved by the limbic system and executed through connections to the brain stem and the hypothalamus. Some scholars differentiate between primary and secondary or *social emotions*, such as shame or pride, subserved additionally by prefrontal and somatosensory cortices (Damasio, 2003, 2010). Both types of emotions are commonly examined through brain activity, physiological responses and facial and vocal expression in primates, healthy adults,

³ A very different account of Fore emotional life comes from Jared Diamond (1999: 281–282), who, incidentally, also worked among the Fore in the 1960s, learned their language and noted sentiments that they *did not* experience.

and brain-damaged patients (Damasio, 1994, 1999, 2003; Ekman, 2003; Izard, 2009, 2011; Le Doux, 1996). These studies suggest that language is not essential for emotional experience: primates, infants, and prelinguistic adults display ‘basic emotions’ in the absence of language. Helen Keller ([1903] 1996), for instance, recalls that prior to Anne Sullivan’s arrival she experienced feelings akin to anger, frustration, and surprise and displayed pleasure through hopping and skipping and displeasure through temper tantrums.

Given the secondary role of language in basic emotion theories, it is not surprising that their practitioners have never articulated any implications for the L2 learning process. From the deterministic point of view, L2 learning is unproblematic because it does not involve changes on either the cognitive or neurophysiological level – as innate affective programs, emotions do not vary across languages and cultures, consequently, they “cannot be created, taught, or learned via cognitive processes” (Izard, 2009: 4–5) and are experienced regardless of whether they are named by the speaker’s language (Ekman, 2003). This means that L2 learners will be expected to (a) transfer their universal patterns of vocal and facial expression of emotions; (b) to learn new patterns of morphosyntactic encoding, and (c) to link L2 emotion words to preexisting cognitive representations of ‘basic’ categories. On the level of discourse, L2 learners are expected to internalize new social rules of emotion management and display, regarding who should show which emotion to whom and when and how it should be expressed. All of this should be fairly easy: a prominent linguist, Pinker (1997), comfortingly states that he has “never heard a foreign emotion word whose meaning was not instantly recognizable” (p. 367). The difficulties, if any, would stem from the phonological and structural aspects of L2 words.

7.1.2 *Emergentist approaches: appraisal and social constructionist theories*

While Ekman was conducting his research in New Guinea, anthropologist Jean Briggs was writing up her experiences of living among the Utku Eskimo. Her celebrated ethnography, *Never in Anger* (1970), together with studies conducted among the Tahitians (Levy, 1973), Fula (Riesman, 1977), Ilongot (Rosaldo, 1980), Pintupi (Myers, 1979, 1986) and the Ifaluk (Lutz, 1986, 1988), challenged basic emotion theories, revealing cross-cultural and cross-linguistic variation in the structure of the emotion domain and organization of emotional lives.

Challenges also emerged within the deterministic paradigm. While the basic premise of universals, with its compelling appeal to our common humanity, appears incontrovertible, the devil is in the details and the proponents of basic emotions have failed to agree on which – if any – emotions are to be considered ‘basic’ (e.g., Ortony & Turner, 1990; Turner, 2000: 68–69), on the principled

means for distinguishing between emotions and attitudes or motivational and cognitive states (e.g., Ortony & Turner, 1990), on the vocal profiles of particular emotions (e.g., Pavlenko, 2005: 46–47), and on their physiological and neural correlates (e.g., Barrett et al., 2007a). The lack of correlation between different measures of autonomic, somatic, and cortical arousal further suggests that physiological arousal is not a unitary phenomenon (Barrett et al., 2007a; Salzman & Fusi, 2010; Sander et al., 2005) and that a ‘brain state’ cannot predict affective interpretations and behavioral and cognitive consequences (Kagan, 2007).

These challenges are addressed in the *emergentist paradigm*, which views emotions as emergent phenomena that (a) arise in the process of subjective appraisal of incoming stimuli in terms of individual needs and goals, (b) integrate cognitive appraisals, physiological states, behavioral consequences, and discursive resources, and (c) lead to culturally appropriate reactions and courses of action (Barrett, 2009; Barrett et al., 2007a,b; Brosch et al., 2010; Mesquita & Leu, 2007; Oatley, 1992; Russell, 2003; Scherer, 2009). In this paradigm, language is seen as a mediating tool that facilitates acquisition of emotion categories and accomplishment of intersubjectivity. Helen Keller ([1903] 1996) would have agreed with this view – in her memoir she recalls that “in the still, dark world in which I lived there was no strong sentiment or tenderness” (p. 12) and recounts how difficult it was for her to enter the emotional worlds of others, to puzzle out the meanings of individual emotion words, such as ‘love’ (p. 15), and to link these words to their referents in the social world.

Disagreements within the emergentist paradigm involve the sequencing of events. In appraisal theories, such as the *componential process model* put forth by Scherer and associates (Brosch et al., 2010; Sander et al., 2005; Scherer, 2009), appraisals of emotion stimuli trigger patterns of physiological reactions (including some possibly hard-wired responses, such as the startle reflex), motor expression, and action readiness, all of which are integrated as ‘modal emotions’. In constructionist approaches, such as the *conceptual act model* put forth by Barrett and associates (Barrett, 2009; Barrett et al., 2007a), preexisting states of arousal (*core affect*) are transformed into intentional emotion states through linguistic and cultural resources:

During emotional experience (“How do I feel?”) and emotion perception (“Is the rat afraid?” “Is my friend angry?” “Is my dog sad?”), representations of internal sensations from the body and external sensations from the world are made meaningful by categorizing them. This categorization uses emotion knowledge that has been learned via prior experience. Together, these three sources of information create the variety of mental states (that represent your own feelings of your experience of someone else’s behavior) named with emotion words. . . . So, when a person is feeling angry, for example, he or she has categorized sensations from the body and the world using conceptual knowledge of the category ‘anger.’ As a result, that person will experience an unpleasant, high arousal

state as evidence that someone is offensive. In fear, he or she will experience the same state as evidence that the world is threatening. (Barrett, 2009: 1292–1293)

Potentially, one could also envision a compromise which brings together the two theories in a two-stage process: in the first, largely automatic, stage, evaluation triggers physiological reactions (or core affective states) as outlined in the componential process model, while in the second, conscious, stage, emotional experience is interpreted through the categories and frames available to the experienter, as outlined in the conceptual act model.

The implications for bilingualism, however, do not depend on which specific approach one supports. From an emergentist perspective, L2 learning requires restructuring at all levels of emotion representation and processing. At the linguistic level, L2 learners may have to modify vocal, lexical, and morphosyntactic patterns of emotional expression and identification, adjusting, for instance, the salience and importance of particular vocal cues. They also need to internalize patterns of emotional expression that do not have L1 equivalents. At the cognitive level, L2 learners may have to modify mental representations of emotion categories and patterns of cognitive appraisal – this process may include category restructuring, expansion, and narrowing, as well as internalization of new emotion categories that do not have a counterpart in the L1. And at the discursive and social level, L2 learners have to internalize new norms of emotion regulation and display. Changes may also be needed at the neurophysiological level in terms of somatic states and other physiological responses elicited by particular triggers. Let us now see how the evidence from research with bi- and multilinguals bears on the contrasting predictions made on the basis of deterministic and emergentist theories and what this research can tell us about the connection between languages and emotions in bi- and multilinguals.

7.2 Emotions as linguistic categories

7.2.1 *The wrath of Achilles: evolution and variation in the emotion lexicon*

Following the seductive model offered by Berlin and Kay (1969), supporters of basic emotion theories posited that emotion lexicons too “will be shaped in systematic ways by the biological constraints of universal core affects” (Lutz & White, 1986: 416). To identify this evolutionary sequence, Hupka and associates (1999) compiled English-language entries from dictionaries for 64 ‘representative languages’, dismissing concerns about translation non-equivalence as “based on ethnographic publications reporting the impressions of the author” (p. 248). The researchers did not know any of the languages in question, did

not possess any information about the accuracy of particular dictionaries, the frequency of occurrence of the terms, or their morphosyntactic categories (all were reduced to nouns), nor did they consult the work in historical linguistics. The resulting universal evolutionary sequence began with *anger* and *guilt* in Stage 1, continued with *adoration*, *alarm*, *amusement*, and *depression* in Stage 2, and *alienation*, *arousal*, and *agony* in Stage 3, ending with *eagerness* in Stage 4. Let me draw the curtain here – suffice it to say, it did not take.⁴ To be fair, many psychologists are aware that emotion terms are not faithful representations of experiential phenomena and have tried, for a long time, to come to terms with the interpretive nature of emotion words and the problem of translation non-equivalence (e.g., Kagan, 2007, 2012; Russell, 1991, 2005; Shweder, 1994).

At the heart of the problem of translation non-equivalence is dramatic cross-linguistic variation in the organization of the emotion domain at all three levels of lexical encoding: superordinate, basic, and subordinate. At the superordinate level, many languages – including Biminkuskusmin, Dani, and Ommura of Papua New Guinea, Chewong of Malaysia, Ifaluk of Micronesia, Fante and Dagbani of Ghana, Gidjingali of Australia, and Tahitian – do not have a term equivalent to *emotions* (Dzokoto & Okazaki, 2006; Heelas, 1986; Levy, 1973; Lutz, 1986). This lexical gap does not mean that their speakers do not experience affect – rather, it suggests that experiences we see as ‘emotional’ are categorized and interpreted in different ways. Speakers of Fante and Dagbani, for instance, favor somatic categories: the Fante category *atsinka* refers to both emotional and physiological states, such as hunger or thirst (Dzokoto & Okazaki, 2006). In turn, speakers of Balinese, Fula, Ifaluk, Ilongot, Kaluli, Makassar, Minangkabau, Pintupi, and Samoan see emotions as relational phenomena that arise between, and not inside, people (Geertz, 1984; Gerber, 1985; Heider, 1991; Lutz, 1986, 1988; Myers, 1979, 1986; Riesman, 1977; Rosaldo, 1980; Röttger-Rössler, 1993; Schieffelin & Ochs, 1986). In Ifaluk, “one person’s anger (*song*) entails another’s fear (*metagu*); someone’s experiencing grief and frustration (*tang*) creates compassion/love/sadness (*fago*) in others” (Lutz, 1988: 82).

In fact, our own category of *emotions* as a set of bodily feelings, disengaged from moral, cultural and social systems, is a relatively recent invention, linked to the rise of Western psychology. Dixon (2003) shows that secularization of the new scientific enterprise prompted a shift away from the Latin modes of expression, such as *perturbations animae* [perturbations or disturbances of the soul], *motus animae* [movements of the soul] and *passiones animae* [passions

⁴ Readers interested in the actual evolution of emotion vocabulary can find reconstructions of Proto-Indo-European emotion words at www.utexas.edu/cola/centers/lrc/iedocctr/ie-ling/ie-sem/pie-emotion.html

of the soul], firmly embedded in Christian thought. The replacement term *emotions* was pioneered by Scottish philosophers David Hume and Thomas Brown and adopted in the nineteenth century by a wide range of scholars, from Bain and Darwin to James and Spencer.

Nowadays, many languages encode something akin to our *emotions* category, yet they may still differ in patterns of structural encoding (Alvarado & Jameson, 2011; Harkins & Wierzbicka, 2001; Pavlenko, 2002a; Pavlenko & Driagina, 2007; Semin et al., 2002; Yee Ho, 2009). English, for instance, favors monolexemic adjectives that refer to inner states, while Russian and Polish favor adverbs and intransitive – and often reflexive – verbs which present emotions as actions and (voluntary self-manufactured) processes. As a result, Russian poetry often loses out in translation, as seen in this example from Aleksandr Blok, the poet so admired by Chagall, Nabokov and Todorov. The poem describes an unexpected visit by his beloved:

Все это было немножко досадно
И довольно нелепо.
Впрочем, она захотела,
Чтобы я читал ей вслух Макбета.
[But she (suddenly) wanted/expressed desire
for me to read *Macbeth* aloud (to) her – A.P.]
Едва дойдя до пузырей земли,

О которых я не могу говорить без волнения,
Я заметил, что она тоже волнуется...

(1908 in Blok, 2009: 172)

All this was irritating enough,
and a little ridiculous.
When I read her *Macbeth* aloud
she started to laugh.

No sooner had I got to “The earth’s
bubbles”
(which I can’t speak about without
excitement) than I noticed
she too was excited...
(translation by Geoffrey Thurley in
Glad & Weissbort, 1992: 7)

There are several discrepancies between the original text and Thurley’s translation. One, highlighted by my gloss, is factual: in Russian the beloved wanted *Macbeth* read to her but never laughed. Others are semantic and structural: in Russian, emotions and attitudes are described with adverbs *dosadno* [vexing, annoying] and *nelepo* [absurd, nonsensical], a noun *volnenie* [anxiety, nervousness, agitation] and a reflexive verb *volnuetsia* [to worry (oneself), to be upset, agitated, troubled], while English relies on one noun and three adjectives, with both *excitement* and *excited* misrepresenting the nervous agitation of *volnenie*. As a result, the Russian text conveys the anxiety and nervous fretting of two people in love, alone for the first time, while the English one, with its *laughter* and *excitement*, offers a static and falsely positive image.

This distorted image stems from the non-equivalence of emotion terms at the basic and subordinate levels of encoding: English does not have an exact equivalent of the Russian *volnovatsia*, while Russian does not have

an equivalent of *excited*. In fact, many languages do not have equivalents of ‘basic’ English terms. To begin with, some categories are simply not encoded: Minangkabau, for instance, lacks equivalents of *disgust* and *fear* (Heider, 1991). Second, emotions differentiated in English may be encoded with a single monolexemic term: thus, Gidjingali uses a single word for *fear* and *shame*, Ilongot and Ifaluk for *anger* and *sadness*, and Indonesian and Pintupi for *shame* and *embarrassment* (Gerber, 1985; Lutz, 1988; Myers, 1979; Rosaldo, 1980; Wierzbicka, 1986). Third, emotions encoded by a single term in English may be differentiated by other languages: thus, Russian and Samoan have two terms that roughly connote *anger*, German and Yankunytjatjara three, Mandarin Chinese five, and Biblical Hebrew seven such terms (Harkins & Wierzbicka, 2001; Pavlenko, 2005). Many languages also encode categories that do not have English equivalents: in Fante, for instance, *anibre* [red-eye] refers to both jealousy and determination to achieve something (Dzokoto & Okazaki, 2006).

The level of differentiation within the domain of emotions and the meanings of individual emotion words are also subject to diachronic change. A case study of such change in ancient Greek has been conducted by Harris (2001), who argues that there is more lost in translations of the *Iliad* than colors and that readers who interpret Achilles’ behavior as individual anger, rage, or wrath misunderstand the emotional world of the ancient Greeks. Harris (2001) shows that the terms *mēnis* [long-lasting wrath] and *cholos* [bile] and their later replacements *orgē* [(irrational) intense and active anger, desire for revenge, accompanied by pain] and *tumos* [beginning or less irrational anger] divided the semantic landscape of anger in ways different from the English *anger*, *wrath*, *fury*, and *rage*. Similar to the ‘anger terms’ of Fula or Ifaluk, these Greek words referred to social and frequently persisting states, triggered by a perceived insult to one’s honor and displayed in a public setting. The outburst and cooling of anger were interpreted by ancient Greeks primarily as divine, royal or political acts – rather than as physiological states – as seen in the case of Homeric Achilles, whose unwillingness to dampen his *mēnis* [long-lasting wrath] against Agamemnon led to disastrous consequences for the Achaeans.

What are the implications of this cross-linguistic variation for acquisition and use of emotion words in another language? Undoubtedly, some non-equivalents – or at least their English translations – may be, to use Pinker’s (1997) terms, perfectly ‘recognizable’ to speakers of English: *Schadenfreude*, for instance, is an emotion of *joy* with a causal antecedent of another’s misfortune. In contrast, others, from the Fante *anibre* [red-eye, jealousy, determination] to Korean *dapdaphada* [sadness/aversion], may be less transparent and more difficult to match with familiar somatic states and map onto customary triggering stimuli.

7.2.2 *Emotion words in the bilingual lexicon*

To understand the structure of the bilingual emotion lexicon, psychologists commonly appeal to sorting, similarity judgments, and categorization tasks (Alvarado & Jameson, 2011; Stepanova Sachs & Coley, 2006), while applied linguists and linguistic anthropologists examine lexical choices in conversations and narratives (Panayiotou, 2004a,b; 2006; Pavlenko, 2002b, c, 2008; Pavlenko & Driagina, 2007; Yee Ho, 2009). In what follows, I will discuss the findings to date in terms of cognitive restructuring in the bilingual mind and then consider them in the light of predictions articulated on the basis of competing emotion theories. I begin this discussion with my own studies, specifically designed to examine L2 acquisition of emotion word pairs that differed in terms of conceptual and structural equivalence.

New category learning. A comparison of the Russian texts and English translations of the poems by Blok and Chagall reveals a partial overlap between the two lexicons. From the conceptual viewpoint, both languages encode full conceptual equivalents, such as *otchaianie/despair*, partial equivalents, such as *trevozhit'/trouble*, and non-equivalents, such as the English *excited*. From the structural viewpoint, they overlap in encoding emotions as nouns, often used in prepositional phrases (e.g., *v otchaianii/in despair*), as modifiers, that is adverbs, adjectives and pseudo-adjectives (e.g., *dosadno (adv)/irritating (adj)*), and as transitive (e.g., *trevozhit'/to trouble*) and intransitive verbs (e.g., *volnovat'sia/to worry*). The difference between the two languages lies in the distribution of terms across the categories: Russian has a high number of intransitive (and oftentimes reflexive and durative) emotion verbs and a variety of emotion adverbs, while English has many adjectives and transitive verbs but only a few intransitive ones (e.g., *to rejoice, to worry*). These differences are reflected in usage preferences: L1 Russian speakers favor intransitive emotion verbs and adverbs in contexts where L1 English speakers rely on emotion adjectives (Pavlenko, 2002b; Pavlenko & Driagina, 2007).

To examine the implications of this partial equivalence I have conducted a series of studies where monolingual and bilingual participants, L1 and L2 speakers of English and Russian, watched and recalled two short wordless films I made based on the same script in the US (*The Letter*) and in Ukraine (*Pis'mo* [The Letter]) or a segment from the TV series *Mr. Bean* (Pavlenko, 2002b, c, 2008; Pavlenko & Driagina, 2007). The analysis of their use of emotion terms revealed that the easiest terms to acquire – not surprisingly – are ones that are both conceptual and structural equivalents. In the recalls of *The Letter* and *Pis'mo*, L1 speakers of Russian and English identified the emotions of the main character with translation equivalents *rasstroennaia* [fem]/*upset*. L2 learners of Russian and English patterned with monolingual speakers of their respective target languages in the use of these emotion terms, revealing the

Table 7.1 *Bilinguals' emotion categories*

Studies	Languages	Participants	Tasks & stimuli	Findings
Pavlenko (2002b, c)	L1 English L1 Russian L2 English	40 L1 speakers of Russian, ages 18–26 yrs 40 L1 speakers of English, ages 18–26 yrs 31 Russian–English bilinguals, AoA 13 – 19 yrs, LoR 3 – 8 yrs	<i>Tasks:</i> elicited film recalls <i>Stimuli:</i> two 3-min long films <i>The Letter</i> , <i>Pis'mo</i> [The Letter]	Translation non-equivalence, L2 influence on L1
Panayiotou (2004a,b, 2006)	L1/L2 Greek L1/L2 English	5 Greek–English bilinguals 3 English–Greek bilinguals 2 multilinguals with English and Greek learned as additional languages	<i>Tasks:</i> semi-structured interviews, responses to scenarios, translations <i>Stimuli:</i> emotion words, scenarios in English and Greek	Translation non-equivalence, code-switching to refer to non-equivalents, internalization of L2 categories, L2 influence on L1
Stepanova Sachs & Coley (2006)	L1 Russian L1 English L2 English	22 L1 Russian speakers 22 L1 English speakers 22 Russian–English bilinguals, 18 in Moscow and 4 in Boston	<i>Tasks:</i> categorization, triad sorting, free sorting <i>Stimuli:</i> (1) stories describing jealousy- or envy-eliciting situations; (2) 27 sentences describing neutral, envy- or jealousy situations	Translation non-equivalence, co-existence of L1 and L2 categories, L2 influence on L1
Pavlenko & Driagina (2007)	L1 English L1 Russian L2 Russian	49 L1 speakers of Russian, ages 18–26 yrs 50 L1 speakers of English, ages 18–26 yrs 30 English–Russian bilinguals, American learners of FL Russian, ages 19–56 yrs	<i>Tasks:</i> elicited film recalls <i>Stimuli:</i> 3-min long film <i>The Letter</i>	Translation equivalence and non-equivalence, internalization of L2 categories and patterns, L1 influence

Pavlenko (2008)	L1/L2 English L1/L2 Russian	30 L1 English speakers, ages 18–22 yrs 29 L1 Russian speakers, ages 18–21 yrs 23 Russian–English bilinguals, ages 18 – 40 yrs, mean AoA = 21.4 yrs, mean LoR = 4.2 yrs 30 English–Russian bilinguals, American learners of FL Russian, ages 19–56 yrs	<i>Tasks:</i> elicited film recalls <i>Stimuli:</i> <i>The Letter</i> , <i>Mr. Bean in the swimming pool</i>	Translation equivalence and non-equivalence, internalization of L2 categories and patterns of structural selection, L1 influence
Yee Ho (2009)	L1 Cantonese L2 English	33 Cantonese–English bilinguals, ages 20–26 yrs	<i>Tasks:</i> questionnaire, story writing <i>Stimuli:</i> modified version of the BEQ	Translation non-equivalence, greater lexical and syntactic variation and semantic elaboration of anger in L1 Cantonese
Alvarado & Jameson (2011)	L1/L2 English L1 Vietnamese	30 L1 speakers of English 30 L1 speakers of Vietnamese in Vietnam 30 L1 speakers of Vietnamese in the US 30 Vietnamese–English bilinguals	<i>Tasks:</i> triad categorization task <i>Stimuli:</i> 15 emotion words in Vietnamese and English	Translation equivalence and non-equivalence, co-existence of L1 and L2 categories

ability to use these terms appropriately in context (Pavlenko, 2008; Pavlenko & Driagina, 2007).

L2 learners also easily acquire L2 terms that collapse distinctions made in the L1. For instance, in a study by Yee Ho (2009), L1 Chinese descriptions of anger – a domain with a high degree of lexical differentiation – relied on combinations of morphemes *fen*, *nu*, and *qi* with other morphemes. In contrast, L2 English descriptions of the same experiences favored the adjective *angry* (71% of all word tokens) and its cognates *anger* and *angered* (85.5%), which collapse the distinctions made in Chinese.

The greatest difficulties in L2 learning stem from translation non-equivalence, that is, language-specific emotion terms, such as the English noun *frustration* or the Russian verb *perezhivat'* [to experience something keenly, to worry, to suffer things through], that require L2 learners to develop new mental representations and to link them to specific external referents. In Pinker's (1997) terms, the gloss of *perezhivat'* is undoubtedly 'recognizable' to English speakers, yet the term itself may not be easily available as an interpretive category. In the study by Pavlenko and Driagina (2007), advanced American L2 learners of Russian demonstrated great mastery of the Russian emotion lexicon but did not use *perezhivat'*, even though the term was systematically used by native speakers of Russian in the context of the same narratives. In debriefing interviews, several learners stated that they 'had seen' or 'studied' the verb but were not sure of its range of reference and the contexts to which it might apply.

Panayiotou (2004a) investigated the use of two non-equivalent emotion terms, English *frustration* and Greek *stenahoria* [literally 'constricted space', sadness/discomfort/suffocation], often described as a feeling of doom, passivity, and hopelessness, accompanied by experience of suffocation, being unable to breathe, not having enough space. *Stenahoria* is also seen as a relational emotion, experienced among people who care about each other. Bicultural bilinguals with experience of living in both Greek-speaking and English-speaking environments were able to define the two emotion terms and to pinpoint the differences between the two, down to the somatic states experienced in each case, suggesting that socialization in the L2 community facilitates internalization of translation non-equivalents.

L1 influence on L2 categorization and naming patterns. In contexts where the L2 makes distinctions not encoded in the L1, partial equivalence may lead to partial acquisition of L2 emotion words whose use may also display L1 influence. To give but one example, Russian differentiates between the relational process of *serdit'sia* [to be cross/angry at someone] and the (self-manufactured) process of *zlit'sia* [to be experiencing anger, for a variety of reasons, including abstract causes], which are subsumed by the English *anger*. While *zlit'sia* may appear more 'recognizable' to an English speaker, *serdit'sia*

is more frequently used in Russian. Misled by this frequency, American L2 learners of Russian map the verb *serdit'sia* onto the mental representation of English *anger* and use it in contexts where Russian speakers do not perceive any relational anger and sometimes do not see any anger at all (Pavlenko & Driagina, 2007).

L1 influence may also arise in contexts where L1 emotion terms do not have L2 equivalents. For instance, the English notion *fun* is commonly translated into Russian with nouns *vesel'e* [merriment, gaiety], *razvlechenie* [entertainment, amusement], and the adverb *veselo* [merrily, gaily], yet none refer to the potential of certain phenomena to elicit joy (e.g., *linguistics is fun* would be rendered into Russian as *zanimatel'naia lingvistika* [entertaining/interesting linguistics]). As a consequence, in narratives elicited by the same segment of the *Mr. Bean* series L1 English speakers referred to *fun* (and potential joy) in contexts where L1 Russian speakers did not, and some L1 English learners of L2 Russian directly translated the English expression *something fun is going on* as *что-то весело происходит там* [something joyfully (is) going on there], violating both semantic and morphosyntactic constraints of Russian (Pavlenko, 2008).

Translation non-equivalence may also prompt strategic uses of L1 to refer to emotional phenomena not encoded in the L2. Thus, some American L2 learners of Russian reverted to lexical borrowing and code-switching to talk about *frustration*, which does not have a translation equivalent in Russian (Pavlenko & Driagina, 2007). A similar phenomenon is identified among English–Greek bilinguals, who feel that *frustration* does not have an equivalent in Greek:

I know that most Greeks in Greece would translate it as *apogoteftika* [disappointed] but I know that that's not enough because you don't have the frustration, frustration has this tension and that's not expressed in *apogoteftika* but you get that in *tsantistika* [disappointed/upset – A.P.] but then in that it's almost like you are leaving the problem, I think, isn't it? So you can't get too close to it... (Julia in Panayiotou, 2004a: 9)

In monolingual contexts, such speakers may feel 'handicapped' when discussing emotion categories not encoded in their L2, as does Chinese–English bilingual Jock Wong (2007):

... using English, I find it exceedingly difficult to tell my friends that I *sek* (literally 'kiss', but here it roughly means 'dote on') my nephews very much; nor is it easy to express my feeling of *mm sedek* (very roughly, 'unable to emotionally let go of something which one feels strongly for') to a friend when we are about to part. (p. 73)

L1 influence may also affect patterns of structural selection. English speakers commonly favor adjectival constructions which combine state and change-of-state verbs with emotion adjectives or pseudo-participles (e.g., *she got upset*). Russian speakers, in the same context, may describe emotions as processes through intransitive emotion verbs (e.g., *ona rassstroilas'* [she upset (herself),

past tense/perfective] or as states through adverbial constructions (e.g., *ei grustno* [it is sad to her]) (Pavlenko, 2002b, 2008; Pavlenko & Driagina, 2007). American learners of L2 Russian tend to transfer the L1 English adjectival pattern to Russian, producing constructions that violate the morphosyntactic constraints of Russian and implicitly categorize emotions as inner states (Pavlenko, 2008; Pavlenko & Driagina, 2007). L1 Russian learners of L2 English, on the other hand, do not display L1 influence on structural selection, most likely because the verbal pattern is rendered virtually impossible by the low number of intransitive English emotion verbs.

Co-existence of language-specific naming patterns. To remain ‘readable’ to their interlocutors, bi- and multilinguals who live their lives through two or more languages often maintain language-specific patterns of emotion categorization and expression. Nabokov, for instance, describes Humbert Humbert’s feelings in the same episode of *Lolita* as *frustration* in English and as *obida* [hurt, offence, resentment, grudge] in self-translation into Russian, thus creating two very different emotional worlds for his respective audiences (Wierzbicka, 2011).

Empirical studies also provide evidence of co-existence. Thus, Alvarado and Jameson (2011) found that on a similarity judgment task, Vietnamese–English bilinguals responding in L2 English separated *shame* and *anguish* from other negative emotion clusters, patterning with L1 English speakers; in contrast, bilinguals responding in L1 Vietnamese placed *xâ u hō* [shame] in the high arousal cluster, together with the counterpart of *fear*, patterning with L1 Vietnamese speakers. Co-existence has also been documented by Stepanova Sachs and Coley (2006), who examined two sets of partial translation equivalents in Russian and English, *jealousy/revnost*’ and *envy/zavist*’. Russian makes a categorical distinction between *zavist*’ and *revnost*’, with the latter caused only by romantic or sibling rivalry. In contrast, English has a fuzzy boundary between *jealousy* and *envy*, both of which can be triggered by material possessions, social promotion, or simply someone’s good luck (e.g., “Your Caribbean cruise sounds amazing – I am so jealous!”). In Russian, the latter feeling would be categorized exclusively as *zavist*’/*envy*. In the first study, Stepanova Sachs and Coley (2006) presented participants with scenarios describing prototypical jealousy- or envy-arousing situations and found that Russian speakers made a categorical distinction between *revnost*’ and *zavist*’, while English speakers saw both *envy* and *jealousy* as equally appropriate terms to describe envy situations. Russian–English bilinguals responding in L1 Russian differentiated categorically between *revnost*’ and *zavist*’, while in L2 English they made no such distinction in reference to ‘envy’ stories.

L2 influence on L1 categorization and naming patterns. A closer look at the results, however, revealed that the difference in appropriateness ratings was greater in Russian monolinguals than in bilinguals responding in L1 Russian,

suggesting potential L2 influence on L1. To test this possibility further, in the second study, Stepanova Sachs and Coley (2006) asked Russian–English bilinguals to perform a triad sorting task and a free sorting task, using single sentences referring to situations invoking jealousy, envy and general negative feelings. They found that bilinguals treated envy and jealousy situations as more similar than monolingual Russian speakers, suggesting a blurring of category boundaries under the influence of L2.

L2 influence may also lead to category expansion. For instance, Panayiotou (2006) found that under the influence of the L2 English *guilt*, some Greek–English bilinguals expanded the L1 Greek category *enohi* [guilt] (which refers to serious transgressions) and used it inappropriately, e.g., in reference to eating too much cake. In contrast, a participant who maintained separate categories switched from L1 Greek to L2 English to say that she felt *guilty* about being away from her family in Cyprus because she did not view her stay in the US as a transgression.

Such code-switching is often used by bilinguals to refer to emotions not encoded in the other language. One such emotion, not encoded in either Greek or Russian, is *frustration*. In Panayiotou's (2004a,b) studies Greek–English bilinguals switched to L2 English to refer to *frustration*. A Russian actress Elena Koreneva (2003) similarly appealed to English to describe “*frustration* – a feeling of dissatisfaction mixed with vexation/annoyance that appears after great expectations” (p. 383; translation from Russian into English mine) in a memoir depicting her life in the US (for discussion, see also Wierzbicka, 2011). English speakers too may appropriate new emotion terms: American academic Cathy Davidson (1993) found that after three prolonged stays in Japan she internalized Japanese terms and attitudes related to cultural embarrassment:

my language for cultural embarrassment, for not quite knowing just how I should act, is Japanese. If I were blindfolded and tossed into absolutely any foreign country – France, Hong Kong, Zaire – I'm positive that within two minutes I'd be bowing, apologizing, and exclaiming, “*Hazukashii!*” (p. 196)

L1 attrition and incomplete acquisition of L1. In the context of prolonged L2 exposure, reduced use of the L1 may lead to attrition of the L1 emotion lexicon. Russian–English bilinguals living in the US no longer use the term *perezhivat'* in contexts where it is used by Russian monolinguals (Pavlenko, 2002c). Attrition may also affect the emotion lexicon in general: Ben-Rafael (2004) found, for instance, that L1 French lexicons of French–Hebrew bilinguals in Israel contained but a few emotion words: *triste* [sad], *heureux* [happy] and *content* [glad, content]. Here is how one of the BEQ respondents describes such attrition:

I cannot understand why I have lost the ability to express most of feelings in French but it has happened. Somehow it seems easier in L2 [English]; doing it in French

requires more effort, concentration and involvement. (Helene, L1 French, L2 English, L3 German, dominant in L2 English)

Factors affecting cognitive restructuring in the emotion domain. The factors that affect restructuring in the emotion lexicon have not yet been systematically investigated – what has been established is the effects of the relationship between respective linguistic categories: (a) conceptual and structural equivalence facilitate internalization of L2 emotion vocabulary; (b) partial equivalence may facilitate restructuring, especially when the L1 makes more fine-grained lexical distinctions than the L2; (c) structural non-equivalence and more fine-grained distinctions in the L2 complicate restructuring and may give rise to L1 influence; and (d) translation non-equivalence complicates internalization of new emotion words.

The lack of attention to factors affecting restructuring is only one of many lacunae in the study of the emotion lexicon. At the basic and subordinate levels, research needs to move beyond decontextualized similarity judgments and examine categorization of external referents through scenarios (e.g., Stepanova Sachs & Coley, 2006) and videoclips (e.g., Pavlenko, 2002b, c, 2008; Pavlenko & Driagina, 2007), and the use of emotion words in the context of affective interaction. And at the superordinate level, future research needs to address the truly Whorfian question of how speakers make transitions between ‘emotion’ languages and languages that do not encode an abstract category of ‘emotions’ and how they learn to ‘cut up’ and ‘organize’ their social worlds and ‘ascribe significance’ in new ways. Can speakers of English, for instance, transform what they see as individual ‘emotional experiences’ into interpersonal phenomena?

7.2.3 *Whorfian effects in linguistic categorization of emotions*

My own suspicion is that many English speakers – and, for that matter, many Westerners – would draw the line at any such re-categorization, because they have come to view *emotions* as a ‘natural’ category and emotion words as reflections of ‘real’ phenomena. In fact, basic emotion theories espoused by lay people and academics from other fields are often even more radical and all-inclusive than Ekman’s (1992, 2003) and Izard’s (1977, 2009, 2011) actual proposals. Thus, an archeologist Gräslund (2005) argues that

we share much of our emotional repertoire with other higher mammals. Anger, fear, anxiety, respect, happiness, the joy of reunion, parental love, sorrow, sadness, loneliness, apathy, friendship and sexual frustration, perhaps also melancholy, longing, jealousy, hate and a lust for revenge are all things that we encounter in some form among several other higher animals. (p.7)

Compelling to anyone who ever had a pet, such arguments are nevertheless flawed, because they fail to recognize that *anxiety*, *melancholy* or *sorrow* are

interpretive categories imposed by us on the animal world. The disregard of language effects compromises the validity and reliability of emotion research on several levels: (a) the use of assumed ‘translation equivalents’ creates false correspondences; (b) the use of monolexemic ‘basic’ terms imposes the structure of English on languages that favor multiword expressions; (c) the use of the forced-choice task imposes answers, and (d) reliance on decontextualized static stimuli imposes an ethnocentric view of emotions as inner states, consistent with their adjectival encoding in English (Alvarado & Jameson, 2011; Boster, 2005; Goddard, 2002; Mesquita & Leu, 2007; Russell, 1991).

The results may be further compromised in the process of data analysis. For instance, Boster (2005) adopted a free-choice paradigm, where participants could use any single term to describe facial expressions of emotions. The data analysis, however, treated these descriptions as comparable, without acknowledging that speakers of English and Spanish used adjectives, speakers of Italian adjectives and nouns, and speakers of Polish nouns only. The equation of the Polish noun *uśmiech* [smile] with the English adjective *happy* was particularly conspicuous in view of the fact that Polish does encode a high-frequency adjective *szczęśliwy* [happy]. In fact, all four languages encode emotion nouns, adjectives, adverbs, and verbs, and one is left to wonder if differences in structural choices reflected differences in task instructions, emotion conceptualization, or interpretation of the stimuli or the task itself.

The findings may also be biased by the use of (invisibly) bilingual participants. Thus, Bryant and Barrett (2008) found that the Shuar of Amazonian Ecuador performed similarly to native speakers of English in matching vocal expressions of basic emotions to corresponding pictures of facial expressions, with the exception of *disgust*, poorly identified by both groups (possibly due to the poor quality of the stimulus). Much is made in the study of the fact that the Shuar are a traditional hunter-horticulturalist society with limited exposure to Western media, yet no discussion is offered of the fact that all of the participants were bilingual in Spanish and the task instructions were offered in L2 Spanish. As in many other studies, the possibility of L2 influence was discounted by assuring the reader that, despite bilingual education, “Shuar is their first and primary language” (Bryant & Barrett, 2008: 139). Yet one cannot discount the possibility that the history of interaction with Spanish speakers and the Spanish-language experimental mode could have influenced their performance.

The studies with bi- and multilingual speakers show that in the process of acquiring a new language, L2 learners may experience linguistic and cognitive restructuring in: (a) the vocal cues used for emotional expression and identification; (b) the structure of the lexical domain (e.g., American learners of L2 Russian or Chinese may need to internalize more fine-grained distinctions in the domain of anger), (c) category structure (e.g., under the influence

of L2 English Russian–English bilinguals may experience the blurring of the boundaries between L1 Russian emotion terms *revnost* ‘[jealousy] and *zavist* ‘[envy]’; and (d) category salience (e.g., *perezhivat*’, salient in the L1 Russian context, may lose salience for Russian–English bilinguals living in the US). Pinker’s (1997) facile statement about immediate ‘recognizability’ of foreign emotion words obfuscates the provisional nature of translation and the fact that recognition is an interpretive act and it is English translation equivalents that are ‘recognized’ and not the actual foreign words. In contrast, for many bi- and multilinguals, translation non-equivalence is a real phenomenon and a ‘handicap’ they have to overcome if they want their feelings to be known. For a Korean–English bilingual Kyung-Joo Yoon (2007), for instance, even an L2 as rich in ‘basic’ emotion terms as English is insufficient to describe her feelings:

I feel that I can discuss both my sensations and my emotions accurately in Korean, but not in English, and that by trying to describe them in English I misrepresent them. (p. 120)

Is it possible that Chagall too felt the limits of French words? Or was his preference for Russian and Yiddish due to the incomplete mastery of French? Chagall’s handwritten notes and the testimonies of his contemporaries (Haggard, 1986; Harshav, 2004, 2006; Kamensky, 1989; Meyer, 1964; Wulfschlager, 2008) show that he spoke French fluently, albeit with a Russian accent, could make nuanced differentiations, such as “*On aime la France, mais on est amoureux de l’Italie*” (Haggard, 1986: 87), and advised his translators on how to render his poetry best into French (Chagall, 1975). At the same time, Chagall, who did not have any formal instruction in French, never mastered the intricacies of French spelling – his love letters to Haggard are full of spelling errors and apologies for the atrocious quality of his French (Haggard, 1986; Harshav, 2004). In contrast, his Russian, learned in school, was fluent and grammatical and, apart from minor influences from French, remained as such throughout his life (e.g., Kamensky, 1989).

Yet different literacy skills are only a part of the puzzle. Wulfschlager (2008), who spent a long time working with Chagall’s multilingual archive, argues that the artist displayed different affective styles in his respective languages: “his Yiddish persona was nostalgic and mournful, his French one was upbeat and integrated” (p. 447). This melancholy comes across in his Yiddish poems, where “tears fall like stones, melt and flow into a river” (Harshav, 2004: 559) and in his Russian poems, like *The Painting* cited earlier. Perhaps, it is this melancholic style that explains his predilection for Yiddish and Russian poetry? But how, then, do we explain the difference in styles? Are they an idiosyncratic peculiarity of an eccentric genius, or a reflection of different ‘cultural selves’? Earlier, I have argued that an explanation of one ambiguous construct,

such as ‘self’ or ‘personality’, through the means of another poorly defined construct, such as ‘culture’, is reductionist at best and utterly misguided at worst. To understand the genesis of affective styles, let us now place them in their discursive, social, and historic contexts.

7.3 Emotions as social categories

The poignant reminiscences of the multilingual American writer Bharatee Mukherjee (2004) show that even ‘basic’ emotion categories, such as fear, are learned in the context of discursive practices, produced in particular social and historic circumstances:

The Hindu-Muslim riots of 1946, the fiercest in communal memory, drove the last of the Mukherjee clan out of their hometown, where Muslims constituted an overwhelming majority. The refugees brought with them tales of arson, rape and looting. From their tears and nightmare-hour screams, I learned the special resonance that *bhoi*, the Bangla word for fear, carries. There is no English equivalence for the scale of terror that *bhoi* implies. In words such as *bhoi*, the individual experience of fear is shot through with the memory of unspeakable communal suffering. (p. 15)

Interestingly, *bhoi* happens to be the reconstructed Proto-Indo-European root for ‘to fear, to be afraid’ (still evident in the Russian verb *boiatsia* [to fear]), yet for Mukherjee, it is not a generic term that persisted, unchanged, through millennia. For members of her generation, *bhoi* is a situated emotion, inseparable from the collective memory of violence accompanying the partition of British India, when the largely Hindu western part became Indian West Bengal and the predominantly Muslim east became East Pakistan and, in 1971, Bangladesh.

The social and historic situatedness of emotions is acknowledged in studies conducted in anthropology, history, human development, and sociology that approach affect⁵ as a social and discursive practice (Ahmed, 2004; Lutz & White, 1986; McElhinny, 2010; Reddy, 2001, 2009; Richard & Rudnyckyj, 2009; Stearns & Stearns, 1985, 1986). Their findings show that affective repertoires and socialization practices vary across languages, cultures, and historic periods, and, more specifically, across *emotional communities*, that is communities that share a common understanding of emotion standards and normative affective styles (Rosenwein, 2002, 2006).

7.3.1 Affective socialization across cultures

Studies of affective socialization show that at the end of their first year infants develop a rudimentary emotional understanding and the ability to intentionally

⁵ The terms *affect*, *emotions*, *feelings*, and *sentiments* are used as synonyms in this book – I do not assign undue significance to the fact that English provides us with four terms in this area.

produce and interpret facial, gestural, and vocal affective cues. Emotion talk begins in the second year, and by the end of the second year toddlers use a variety of emotion words. By the third year they develop a causal theory of emotions and the ability to identify potential causes among an array of social events, to predict consequences, and to identify emotions expressed through verbal and non-verbal means (e.g., “Grandma mad... I wrote on wall”) (Bretherton et al., 1986; Clancy, 1999; Fivush & Wang, 2005; Miller & Sperry, 1987; Taumoepeau & Ruffman, 2008; Widen & Russell, 2008).

This development takes place in interactions with care-givers (and, as Mukherjee reminds us, many others) that provide children with opportunities to label emotional events, link them with causes and consequences, develop prototypical emotion scripts, and internalize language-specific resources for emotion recognition, interpretation and display (Bretherton et al., 1986; Clancy, 1999; Fivush & Wang, 2005; Miller & Sperry, 1987; Taumoepeau & Ruffman, 2008). By the age of four to five, children begin to understand that two people may feel differently about the same situation and to differentiate between emotional experience and expression. Yet their emotion categories are still broader than those of adults: preschool children may experience difficulties in identifying facial expressions of emotions (Widen & Russell, 2008), inferring emotional states of others (Aldridge & Wood, 1997), and interpreting vocal expressions where content (their main cue) does not match paralinguistic cues (Morton & Trehub, 2001).

Highly elaborative styles facilitate the development of emotional intersubjectivity (Fivush & Wang, 2005; Taumoepeau & Ruffman, 2008), yet the goals of affective socialization and, consequently, parental styles vary across speech communities. Wang and associates (Fivush & Wang, 2005; Wang & Fivush, 2005; Wang & Ross, 2007; Wang, 2001, 2008a) found that middle-class European-American mothers commonly aim to raise ‘emotionally intelligent’ and expressive children. They believe that children have independent emotional experiences and that emotional talk helps children understand and regulate their emotional responses. As a consequence, they adopt a ‘cognitive approach’ to emotional regulation and display a highly elaborative conversation style, asking children questions about their feelings, encouraging discussion and negotiation, and offering elaborate explanations of the causes and consequences of particular emotional states. In contrast, Chinese mothers commonly assume that they have full access to children’s emotional experience and adopt a ‘behavioral approach’ that provides little elaboration and focuses on teaching moral lessons and behavioral control, treating emotions as potentially destructive to interpersonal harmony. As a result, American preschoolers display better emotional understanding than their Chinese peers and use more references to internal states in recollections of past events (Fivush & Wang, 2005; Han et al., 1998; Wang 2004).

Keller and Otto (2009), who compared infant socialization in middle-class German families and among the Nso farmers of Cameroon, show that socialization of affect also involves regulation of emotions. German mothers state that they aim to raise emotionally expressive and autonomous children – to do so, they encourage positive emotions in infants and maintain a lot of face-to-face contact. In contrast, Nso mothers aim to raise inexpressive and calm children, who allow them to do their work and are not afraid of multiple caretakers, consequently, they suppress negative emotions through breastfeeding, shaming, and requests for compliance. These strategies result in different patterns of emotion regulation in the infants: when picked up by a stranger visiting the family, the majority of Nso infants displayed no signs of behavioral or physiological stress (as measured by the concentration of salivary cortisol).

These findings suggest that from earliest childhood affective socialization shapes not only our interpretive categories but the very embodiment of emotions, resulting in cross-cultural variation in patterns of autonomic response and somatic emotion-based illnesses (Hinton & Hinton, 2002). The scarcity of such findings to date may be explained by the focus on universals rather than particulars of emotional experience and biases in research design (Mesquita & Leu, 2007). To give but one example, Levenson and associates (1992) compared physiological responses induced in American and Minangkabau participants – incidentally bilingual in Indonesian – by contracting facial muscles into prototypical configurations of five ‘basic’ emotion states. The Minangkabau view emotions as interpersonal phenomena and out of 129 volunteers, only 46 could produce the required expressions and even those were “of significantly lower quality than those of the Americans” (p. 976), leading the researchers to lower the cutoff rating. At the end, only 7 participants produced ‘usable’ physiological data for all five emotions, the rest was pooled into approximately 27 trials per emotion. The Minangkabau also displayed markedly diminished skin conductance response and reported experiencing the emotions at less-than-chance levels (14.7% of the trials), in contrast to Americans who reported higher-than-chance levels (33.1%). Nevertheless, expert data aggregation allowed Levenson and associates (1992) to claim that they used a valid emotion-elicitation task and found “cross-cultural consistencies in autonomic nervous system (ANS) differences between emotions” (p. 972).

Alternatively, one may argue that the study revealed cross-linguistic differences in conceptualization of emotions and their embodiment. It is up to future research to resolve this dilemma and to determine whether, how, and when affective socialization may influence the ways in which our common biological endowment processes emotional stimuli and generates and regulates the somatic sensations and reactions we have come to interpret as ‘emotions.’

7.3.2 *Emotional communities across time periods*

The interplay between socialization and affect is also examined in ethnographic and historiographic studies of emotional communities. To understand the development of emotion norms and evolution of affective practices these studies examine artifacts and textual materials, ranging from personal letters, diaries, and poetry to legal documents, child-rearing manuals, and funerary inscriptions (Dixon, 2003; Harris, 2001; Hochschild, 1979, 1983, 2003; McElhinny, 2010; Misch, 1951; Reddy, 2001, 2009; Richard & Rudnyckyj, 2009; Rosenwein, 1998, 2002, 2006; Stearns, 1989, 1994, 2006; Stearns & Stearns, 1985, 1986; Tarlow, 2012).

These studies make several contributions to our understanding of emotions as linguistic, cognitive, and social categories. To begin with, they show that emotion lexicons are not a stable domain – the ways in which emotions are named, talked about, and expressed constantly change, shaped by social and political changes, cultural and linguistic contact, and, in the modern era, by political institutions that aim to produce governable subjects and by economies that manipulate affect as a commodity in the form of affective labor. The systematicity of change is documented by Bouvier (2009), who found that French translations of Sappho's poetry from the sixteenth to the twentieth century display marked differences in affective lexicons, indicative of the mores of each epoch. The influence of language contact is seen in studies of Russian affective repertoires: in the Russian empire, the influx of French and German speakers led to a Europeanization of affective repertoires and the very view of emotions (Plamper et al., 2010), while today Russian expression of affect is influenced by English-language media, which have prompted adoption of new emotion categories, such as *frustratsia* [frustration], new emotional interjections, such as *wow!* and *yess!*, and new modes of non-verbal emotion displays, such as high-five. Rosenwein's (2006) analysis of funerary epitaphs produced in Gaul between AD 350 and 750 revealed that emotion norms may vary not only across time periods but also across communities united by the same language (Latin) and religion (Christianity): at Trier the emphasis was on words of affection in the context of family relationships and mourners were willing to pay for extra words, such as *dulcissima* or *carissimus*; in Vienne, emotion words were virtually absent from epitaphs until the sixth century and when they did appear they were immediately tied to otherworldly values.

The second important contribution involves changes in the understanding of individual emotions. Take, for instance, *happiness*. The Ifaluk view its 'translation equivalent' *ker* as amoral, if not immoral (Lutz, 1988). In contrast, in contemporary America, *happiness* is treated as a universal right and a worthy goal: we are encouraged to live our lives 'in pursuit of happiness'. Yet our relentless celebration of happiness is a relatively recent phenomenon – its origins are

traced by Ehrenreich (2009) to the nineteenth-century New Thought movement, which opposed the dominant Calvinist ethic and adopted 'positive thinking' as a healing technique and a way to promote wealth and success. In the twentieth century, this ideology became enshrined as a dominant, if not mandatory, cultural attitude, and adopted by corporate America, the health profession, religious establishments, and even academia, with happiness studies and positive psychology emerging as legitimate fields of study (for an extended critique, see Kagan, 2012).

The third important contribution involves the evolution of the norms of emotion regulation and display (Harris, 2001; Rosenwein, 1998; Stearns & Stearns, 1986). Take, for instance, anger. Already in antiquity, the social value of anger control was evident to some political leaders, as seen in this inscription by the Persian King Darius I (550–486 BC):

I am not hot-tempered. What things develop in my anger, I hold firmly under my control by my thinking-power. I am firmly ruling over my own <impulses>. (Harris, 2001: 231)

Harris (2001) argues that by the late Roman republic the reputation for uncontrollable anger became genuinely harmful for public figures. Both Cicero and Caesar advocated anger management, warning audiences against the dire consequences of *iracundia* [irascibility]. This approach was exemplified in Caesar's own policy of *clementia* [mercifulness], which stands in dramatic contrast to his assassination (ironically, he could have lived much longer if not for the clemency extended to his enemies). The ideology of self-restraint was adopted by his heir Augustus, and from then on, the character of a Roman ruler could be signaled by his control over anger. These conventions were then adopted in medieval writing, where political adversaries could be presented negatively through displays of excessive anger (Rosenwein, 1998).

The same norms did not always apply to common individuals. Stearns and Stearns (1986) argue that in colonial America, anger served a key function in regulating social relations, and the street life of preindustrial cities included loud arguments, quarrels and frequent fights. In the eighteenth century, new religious and philosophical ideas emphasized the need for anger control, and by the nineteenth century, these expectations were elaborated in popular fiction, ladies' magazines, and child-rearing manuals. By the 1860s, the new norms began to affect behavior: people were learning to 'channel' anger and corporal punishment for childhood transgressions became less frequent. In the 1920s, concerns about the rapidly growing workforce, increasing numbers of women in the workplace, unionization and strikes led to expansion of anger-control strategies to all spheres of private and public life, in particular the workplace. At the same time, social and economic tensions, coupled with glorification of righteous anger in the media, shaped an ambivalent attitude towards anger,

producing a gap between anger management norms and the violence evident in daily life.

So far these arguments have been uncontroversial – even supporters of ‘basic’ emotions acknowledge cross-cultural variation in the norms of emotion regulation (e.g., Ekman, 2003) – but here is where it gets really interesting. Historiographic studies show that changes in political and material conditions may affect the very nature of emotional experience: the reduction in infant mortality in Europe led to more intense affection for and greater emotional investment in children, suggesting that there is more to parental love than an innate affective program (Rosenwein, 2002, 2006; Stearns & Stearns, 1985, 1986; see also Dureau, 2012). Historians also highlight changes in emotion-based somatic illnesses: *accidie*, *hysteria*, *melancholy*, and *neurasthenia*, which once had great importance in the Western world, have become obsolete, while *anxiety*, *burnout*, *depression*, and *stress* are widely recognized, even though they had hardly registered even a century ago (Ehrenreich, 2009; Stearns, 1994; Stearns & Stearns, 1986).

Non-verbal emotion displays are also subject to change, even though the constraints placed by our biological endowment make our facial expressions less flexible than words (e.g., Barrett et al., 2007b). For instance, basic emotions theorists treat a combination of an upturned mouth with contraction of muscles around the eyes as a universal display of *happiness* (Ekman, 2003); in contrast, art historians Trumble (2004) and Szarota (2006) argue that interpretations of facial expressions should always be placed in the proper historic and social context: while it is possible that the enigmatic ‘smiles’ of archaic Greek or Etruscan sculptures represent happiness and contentment, one should not forget that upturned mouths were also carved on the faces of mortally wounded soldiers lying on the battlefield. Consequently, “while the archaic smile may be associated with the decorous function of the kouroi and korai it adorns, any particular meanings it may have had must remain more or less obscure” (Trumble, 2004: 18).

A similar argument can be made about Mesoamerican figurines from the Remojadas – their ‘smiling’ and ‘laughing’ faces may portray unadulterated joy, yet the animated faces, puffy cheeks, and tongues protruding from the open mouth may also be evidence of intoxication and the figures could represent ritual participants or even sacrificial victims.⁶ From an art-historical perspective, then, interpretation of facial expressions from different cultural traditions is not an easy task and requires much more than a simple matching of muscular contractions with ‘basic’ emotion terms. Nor should the smile be treated as unchanging: Trumble (2004) argues that, with the spread of Western

⁶ For more information on the figurines from the Remojadas, see the website of the Metropolitan Museum of Art at www.metmuseum.org/Collections/search-the-collections/50006048

media imagery and advances in modern dentistry, the smile “is getting broader, wider, fiercer, and seems certain to become more so” (p. 162).

The studies of affect as a discursive, social, and historic practice reveal dramatic variation in the norms of emotion regulation and display. On the level of linguistic categorization, they document variation in the structure of ‘basic’ emotion categories, such as *anger* or *happiness*; they also show that secondary emotion categories, such as *anxiety*, *frustration*, or *melancholy*, may be added to our interpretive repertoires or removed as obsolete. On the level of discursive practices, they document variation in the norms of emotion regulation, interpretation and display, and in resulting affective styles. Lastly, on the level of embodiment, they hint at the possibility that affective socialization practices may differently shape our autonomic reactivity, somatic sensations, emotion-based illnesses, and non-verbal displays of emotions. These findings raise an important question for the study of the bilingual mind: if affective norms and practices differ across speech communities, how do we enter the emotional world of another community and accomplish emotional intersubjectivity in another language?

7.3.3 L2 learning as the re-routing of the feeling trajectory

7.3.3.1 *Lost in translation: emotion identification in the L2* Briggs’ (1970) ethnography *Never in Anger* is usually celebrated for what it tells us about the emotional world of the Utku Eskimo. Yet the book has also made another, equally important, contribution to emotion research by revealing the difficulties of entry into the emotional world of speakers of another language. Briggs (1970) describes how difficult it was for her to interpret verbal and non-verbal displays of affect among the Utku. Was the comment “always writing!” an implied criticism of her behavior? “I never knew; the voices were always cheerful” (p. 248). She was also at a loss in interpreting a comment her friends always made while parting:

“We’ll miss (*hujuujaq*) you when you first leave”, they used to say warmly, and then they always added matter-of-factly: “But it will be all right (*naamak*); only Saarak will be unhappy (*naamangnit*), poor dear (*naklik*).” I never failed to be startled when I heard this, and a little wounded. (Briggs, 1970: 71)

Similar difficulties were encountered by other anthropologists: Gerber (1985) recalls being puzzled by the Samoan *lotomamā* “as genuinely unfamiliar, a truly specifically Samoan way of feeling” (p. 144), Lutz (1988) confesses that at times she failed “to share emotional assumptions or commitments” (p. 46) of the Ifaluk she resided with, and Dureau (2012), who did her field-work among the women of the Solomon Islands as a young mother, acknowledges that, in the beginning, she allowed the similarities between English

and the anglophone vocabulary of the local Pijin “to lull me into assumptions of understanding” (p. 148). As her understanding of the local vernacular and local community increased, she began to recognize the relative superficiality of emotional similarities based on presumed English-Pijin equivalences, and the fallacy of the resulting empathy and intersubjectivity, including in the domain of maternal love.

To move beyond initial and often faulty assumptions and to understand the emotional world of their host community, L2 learners – including anthropologists – have to puzzle out unfamiliar behaviors, to identify what triggers which ‘emotions’ and when, to learn how particular ‘emotions’ might be managed and to discover what cues to pay attention to and how to interpret verbal and non-verbal ‘emotion displays’. And while Briggs (1970) eventually managed to describe what she understood to be ‘the Utku norms’, the understanding came at a very high price of cross-cultural misunderstanding and temporary ostracism by the host community.

From the very beginning of her stay, Briggs was repeatedly irritated by behaviors she interpreted as an imposition on her privacy, personal space, and the meager supply of goods. The Utku had no problem in identifying her outbursts as anger. Briggs, however, failed to recognize imperceptible displays of anger provoked by her own emotional outbursts. Things came to a head after the anthropologist, acting as a translator, had lost her temper with white fishermen who, in her view, were taking advantage of her hosts. The community ostracized her but the ostracism was so subtle that it took her some time to realize that things were not the way they used to be. The realization was brought to the fore when she accidentally came across a letter written by one of the members of the community in which she was described as an annoying, angry liar who should not be studying Eskimos and should leave as soon as possible.

Briggs’ (1970) experiences show that outside of the experimental laboratory, emotion identification is not an easy task. In fact, it is not always an easy task inside the lab and even with static, decontextualized and often exaggerated or ‘prototypical’ stimuli (Barrett et al., 2007b). Native speakers of Indo-European (Dutch, English, German, Hindi, Spanish, Swedish) and non-Indo-European (Arabic, Cree, Japanese, Shuar) languages are significantly more accurate (accuracy rates between 58% and 94%) in identifying emotions in their L1 based on vocal cues, even when utterance content is neutral or unintelligible; non-native speakers and speakers unfamiliar with the language also identify emotions at above-chance levels but they do so at a slower pace (Pell & Skorup, 2008) and with significantly lower accuracy rates (between 33% and 72%) (Bryant & Barrett, 2008; Graham et al., 2001; Pell et al., 2009; Scherer et al., 2001; Thompson & Balkwill, 2006; for reviews of earlier work see Elfenbein & Ambady, 2002; Juslin & Laukka, 2003; Pavlenko, 2005). These findings

suggest that identification of emotions in L2 relies not only on cross-linguistic similarities but also on language- and culture-specific cues.

7.3.3.2 Never in anger: accomplishment of emotional intersubjectivity in the L2 While accurate identification of emotions is critical for cross-cultural communication, L2 learners aspiring to achieve emotional intersubjectivity also have to internalize new norms of emotion regulation and display. Briggs (1970), for instance, was successful in uncovering ‘the Utku norms’ but did not internalize them, instead she continued to be ‘startled’ and ‘wounded’ and “suffered from the contrast between the restrained Utku ways of expressing affection ... and the ways that were a part of [her] own nature” (p. 117). The contrast was particularly stark in the case of anger: the anthropologist and her hosts differed in the types of situations that triggered anger and in the regulation of anger displays. To fit in in her new emotional community, Briggs had to change her attitude towards the incidents that elicited resentment, yet this was something she was unable, or perhaps unwilling, to do, firstly because her stay with the Utku was, after all, temporary and also because – despite her background in anthropology – she unconsciously treated the results of her own affective socialization as her “own nature” (Briggs, 1970: 117).

Unlike the anthropologist who could afford to follow her ‘nature’, immigrants and exiles rarely have a choice. To ‘fit in’ in the new affective community and to be ‘readable’ in new terms, they have to internalize new emotional assumptions and embodied affective practices. To date, only one study has examined how bilinguals reconcile competing emotion management norms. Novin and associates (2012) administered anger regulation strategy questionnaires to Moroccan and Dutch adolescents and compared their answers with those given by bicultural Moroccan–Dutch adolescents in the Netherlands. The findings revealed that in the context of peer-conflict, Dutch adolescents reported acting out (e.g., “I say something nasty to the person who made me angry”) more frequently than Moroccan teenagers. Bicultural adolescents patterned with their Dutch peers and differed from the Moroccans in the use of acting out, anger verbalization (e.g., “I talk to the person who made me angry”), and anger reflection (e.g., “I keep thinking about what happened”). Only anger diversion (e.g., “I try to forget what happened”) was reported more frequently by Dutch adolescents. In bilinguals, a higher degree of identification with Dutch culture predicted more uses of anger diversion. These findings, however, are limited to self-reports about peer-conflict – it remains to be seen how teenagers actually talk in such situations, whether they display a more Moroccan-like style in the context of family interactions and whether their preferences and styles are influenced by the language of the interaction.

We also lack longitudinal studies of affective (re-)socialization in the L2 – for now, our understanding relies on studies of L2 socialization in general (e.g.,

Fogle, 2012; Vitanova, 2010) and on self-reports in the form of questionnaires, interviews, and autobiographies (Besemeres & Wierzbicka, 2007; Burck, 2005; De Courtivron, 2003; Dewaele, 2010; Kim & Starks, 2008; Kramsch, 2009; Lesser, 2004; Pavlenko, 2005; Simon-Maeda, 2011). Many of these reflections come from translingual writers, professional linguists, and language teachers who, by virtue of their involvement with languages, are particularly attentive to the subtle nuances of linguistic expression. Well-known linguist Anna Wierzbicka (1997), for instance, recalls that when she moved to Australia from Poland she felt the pressure to adjust her affective style in order to accommodate the more restrained norms dominant in her new emotional community:

I had to learn to ‘calm down’, to become less ‘sharp’ and less ‘blunt’, less ‘excitable’, less ‘extreme’ in my judgments, more ‘tactful’ in their expression. I had to learn the use of Anglo understatement (instead of more hyperbolic and more emphatic Polish ways of speaking). I had to learn to avoid sounding ‘dogmatic’, ‘argumentative’, ‘emotional.’ (p. 119)

Similar pressures were experienced years later by Wierzbicka’s Russian student Anna Gladkova (2007), who vividly describes the many emotional misunderstandings she faced:

I once got rather emotionally confused as one of a group saying goodbye to our colleague and friend Cliff Goddard, who had come to work at our department for several weeks. Three of us from our department watched him pack his backpack. There were a few words about the expected long drive, a short ‘Bye!’ and then he was walking down the corridor. For me it was so emotionally empty – no hugs, no kisses, no reminder to drive safely as a way of showing care, no warm wishes for the time we will not see each other, no words confirming when we will next meet (something that I would expect in a similar situation in Russia). (p. 143)

In Russia, until recently, mobility and travel were limited, as a consequence, verbal and non-verbal practices of *proshchanie* [farewell] with friends and family members are more elaborate, involving, depending on the extent of separation, hugging, kissing, warm wishes, making a cross sign, giving small gifts *na proshchanie* [for the parting], and sitting down for a few minutes in a ritual of *posidet’ na dorozhku* [to sit down for a moment for the (little) road (for good luck)]. Like Gladkova (2007), I have frequently participated in this ritual – to this day, my grandmother insists on it every time I leave Kiev to return to Philadelphia. Having embarked on a new life in the US, I have also experienced the affective readjustments so eloquently described by Hoffman (1989), Wierzbicka (1997) and a fellow Russian-speaker Gladkova (2007):

I learned to sound positive and to express my negative feelings as little as possible. I noticed that in Australia I hardly ever heard people complaining about their headaches, whereas in Russia one cannot get through a single day without hearing such complaints on the bus, at work or at home. In Russia I did not even think of them as

'complaints', but rather as an integral part of life. ... Learning to tone down my manner of expression was more difficult. In Russian it is good to show one's emotional involvement in everything one does. The strong expressions I used sometimes met with silence or disapproving looks which would make me understand that I had said too much. In describing my impressions of travels in Australia or films I watched I dwelt too much on what exactly I felt at different moments. I noticed that this quality of mine which was perfectly acceptable in the Russian-speaking community would be perceived as unusual among Australians, who use fewer words when talking about their emotions. (p. 141)

Gladkova's (2007) comments reveal readjustment on all levels of affect interpretation and display, from backchanneling, which required new means of signaling involvement with the interlocutor, to speech acts, where she had to adjust the frequency of complaints, a common speech act in Russia (Ries, 1997), to narrative elaboration, where she had to readjust her 'excessive' focus on her own emotional experiences. The mechanisms regulating the process were disapproval and misunderstandings triggered by her reliance on L1 Russian pragmatics:

When wanting to show my closeness and appreciation of a person I would start dropping the unnecessary (at least for me then) English 'politeness' terms of 'would you' and 'could you' and use a straight imperative and then realize that it was inappropriate. ... At other times, I would forget about the need to keep asking whether someone would prefer to do something on his or her own rather than doing it 'to keep me company' – *za kompaniiu*, as we say in Russian. Similarly, my desire to express my friendly feelings to others by making it clear I want to keep them company would be perceived by English speakers as a lack of initiative and overdependence (Gladkova, 2007: 142)

The process of affective re-socialization is also an embodied practice. Hoffman (1989) describes how affective cues she picked up from Canadians forced her to adjust the loudness and tone of voice, body language and gestures, even interpersonal distances:

My mother says I'm becoming "English." This hurts me, because I know she means I'm becoming cold. I'm no colder than I've ever been, but I'm learning to be less demonstrative. I learn this from a teacher who ... tells me to "sit on my hands and then try talking." I learn my new reserve from people who take a step back when we talk, because I'm standing too close, crowding them. ... I learn restraint from Penny, who looks offended when I shake her by the arm in excitement, as if my gesture had been one of aggression instead of friendliness. I learn it from a girl who pulls away when I hook my arm through hers as we walk down the street – this movement of friendly intimacy is an embarrassment to her. ... I'm more careful about what I say, how loud I laugh, whether I give vent to grief. (p. 146)

Once internalized, new affective practices may become entrenched, and an American, Andrea Simon-Maeda (2011), who lives in Japan with her Japanese husband, catches herself

backchanneling with *hai* (yes) or *soo da ne* (right), and gesturing in a Japanese fashion during conversations with people in the United States. (p. 43)

Given cross-linguistic and cross-cultural variation in the norms of emotional expression, it is not surprising that the process of affective re-socialization does not proceed in a single direction: some L2 users may become more restrained and self-controlled, while others may see the L2 as enabling greater freedom of emotional expression. For instance, a multilingual participant in Burck's (2004) study, Di-Yin, stated that in mainland China she was socialized to suppress anger, while in English she perceived no such need:

Speaking English helps me be more aggressive ... in Chinese culture, being angry you should suppress it. So it's much easier to express it in English. So even if I don't need to express it, sometimes I keep it to myself, nevertheless I feel it in English. (pp. 322–323)

Similar opinions were expressed by Korean–English bilinguals in the study by Kim and Starks (2008) and by some of the BEQ respondents:

It is easier for me to express things emotionally in English since culturally open expression is condoned. In Japanese culture people are less open with their feelings and expression is not as open. You learn to read subtle signs and signals which may not be verbal. For example it is easier to scold someone in English because the expressions are more direct. In Japanese scolding may be done through distance-creating acts rather than verbal scolding. (Kumiko, 40, L1 Japanese, L2 English)

In the context of different emotion norms, the re-routing of the trajectory of feeling may function similarly to other instances of L2 influence and lead to misunderstanding and sometimes even conflict with members of the L1 emotional community. Hoffman's (1989) mother accuses her daughter of 'becoming cold', while the relatives of a Japanese–English bilingual Kyoko Mori (1997) feel that she had gotten 'softer' during her two decades in the US:

When I do see my relatives, my behavior unfortunately confirms their misunderstanding that I am still a "sensitive" person. Having adopted American ways, I can't always refrain from crying if I am with people I know well and trust. For a Japanese person to cry in a private situation, even in front of family, would indicate a suffering so great as to defy politeness, self-control, perseverance, and everything she has been taught. My relatives see my tears and conclude that I must be suffering from unspeakable hurt. On the same trips when I astonish strangers by appearing "hard and dry", I alarm my family by being "wet and soft" (p. 195)

These comments show that the multiplicity of ways in which affect can be displayed is both a blessing and a bane for bi- and multilingual speakers, because in cross-cultural encounters affective mismatches and misunderstandings are more frequently blamed on personalities than on cross-linguistic influence and different assumptions about normativity of affective styles.

7.3.3.3 Chagall's affective styles Such affective mismatch is also evident in the relationship between Chagall and his French-speaking British companion Virginia Haggard (1986), whose memoirs suggest that the differences in French and Yiddish affective styles observed by Wulschlager (2008) were only skin deep. In everyday interaction in French, Chagall displayed many verbal and non-verbal behaviors common for Russian- and Yiddish-speaking communities, from the penchant for complaints and diminutives (e.g., *Idochka*, *Virginichka*) to the fear of admitting happiness:

the better things were, the more Marc complained. He never dared to admit that he was happy, it would be inviting misfortune. And sometimes he even went to the extent of marring his happiness by fussing and complaining, perhaps from a guilty fear of being too fortunate. Paradoxically, he was never really happy unless he was worrying about something. I often saw him literally wring his hands in anguish over some seemingly trivial thing, the outward sign of a deep anxiety. (Haggard, 1986: 39–40)

Chagall also maintained other embodied Russian practices, such as the ritual of *posidet' na dorozhku* [to sit down for a moment for the (little) road (for good luck)]:

There was one superstitious habit Marc had which he bade me to observe along with him. Before departing on a journey we always had to sit down for one minute. As we took off, he would heave a sigh of satisfaction and expectation, mixed with a slight apprehension that would only disappear once we were well on our way. (Haggard, 1986: 139)

The fears and anxieties that underlie these affective practices are not, by any means, idiosyncratic reflections of the mysterious Russian or Jewish 'soul'. To understand them, we have to place the emotional lives of Russian Jews in the context of oppressive regimes, turbulent historic events, and the unprecedentedly high (by Western standards) mortality rates of nineteenth- and twentieth-century Russia, torn by wars, revolutions, political purges, famines, epidemics, crime, poverty, and, in the case of Jews, pogroms, anti-Semitism, the dissolution of the traditional *shtetl* life and the Holocaust (Merridale, 2000; Plamper et al., 2010; Ries, 1997). Chagall, for one, had good reasons to be melancholy, far beyond the melancholy attitude of the Silver Age which he undoubtedly absorbed (Plamper et al., 2010; Steinberg, 2008). These attitudes were foreign to Haggard, who internalized the Anglo ideology of 'positive thinking'. Aware of this emotional incompatibility, Chagall often complained to friends about her optimism and "uncomplicated attitude to life" (Wulschlager, 2008: 447). At times, these complaints rang a self-deprecating note, as in the letter he wrote in Yiddish to his close friends, the Opatoshu family: "Dovid [his son with Haggard –A.P.] is as beautiful as his mother, who always laughs and is happy, I get ashamed of my Jewish sadness" (translated from Yiddish in Harshav, 2004: 612).

Poetry is another affective practice into which he was socialized in the Russian-speaking community: “As soon as I learned how to express myself in Russian”, recalls Chagall (1960), “I began to write poetry. As naturally as breathing” (p. 93). This engagement with poetry was the norm among educated Russians in the early twentieth century and both Vygotsky and Bakhtin relied on poetic examples in their writings (e.g., Bakhtin, 1994: 62–63, 74–75; Vygotsky, 1986: 210). Chagall and his friends read, wrote, and debated poetry and their teachers in Vitebsk assigned translations of foreign poetry to spark students’ creativity (Harshav, 2003). His attachment to poetry only deepened in St. Petersburg, where Chagall’s art school was located on the first floor of Vyacheslav Ivanov’s Ivory Tower, the main gathering place of Symbolist poets. Chagall’s Russian poems written in 1909–1910 display full mastery of the Russian system of meter and rhymes; they also reflect the melancholy and decadent mood of Symbolist poetry and its poetic clichés, including the image of himself as Christ, which we see in his poem *The Painting*, cited in the opening of this chapter (Harshav, 2004; Meyer, 1964; Kamensky, 1989). Yet one cannot help but notice that in Paris Chagall was friends with many French poets, so why did he try to emulate Blok in his L2 Russian and not Cendrars in his L3 French? To finally answer this question, let us take a closer look at multilinguals’ engagement with prose and poetry.

7.4 Affective processing

7.4.1 Multilingual writing: prose versus poetry

Bi- and multilingual writers often talk about the difference between the mother tongue, seen as the true language of the heart, and languages learned later in life that feel detached from emotions (Beaujour, 1989; De Courtivron, 2003; Kellman, 2000; Kinginger, 2004; Pavlenko, 2005; Pérez Firmat, 2003). This detachment does not preclude their engagement with prose. In fact, *translingual writers*, writing in the L2 or LX, praise the freedom of linguistic estrangement or *the emancipatory detachment effect* afforded by later learned languages (Kellman, 2000). The new, ‘clean’, words and idioms are not imbued with anxieties and taboos, they do not erupt in heteroglossia of voices, images, and memories, they do not constrain the writer, do not impose. Pliable and devoid of associations, they allow new users to revisit the most traumatic memories and to talk about the dear and the painful, the holy and the profane, without throwing themselves at the mercy of the language. These words, simply speaking, do not feel as real, powerful and hurtful as those of the L1. Jerzy Kosinski, who moved to the United States from Poland at the age of 24 and became an award-winning English-language writer, stated once:

when I began speaking English, I felt freer to express myself, not just my views but my personal history, my quite private drives, all the thoughts that I would have found difficult to reveal in my mother tongue. It seemed that the languages of my childhood and adolescence – Polish and Russian – carried a sort of mental suppression. (in Teicholz, 1993: 125)

This sense of emotional detachment enabled Kosinski to write his masterpiece, *The painted bird* (1965), a semi-autobiographical graphic account of a mute boy's odyssey in World War II-ravaged Poland. In the preface, Kosinski (1976) acknowledged the role played by the L2:

as English was still new to me, I could write dispassionately, free from the emotional connotations one's native language always contains. (p. xii)

Ariel Dorfman (1998) similarly appealed to his L2 English to write an account of the traumatic events lived in L1 Spanish. It was only when he started translating the English text into Spanish that he experienced the full emotional impact of these painful memories:

I think it may have been because it was the best way of dealing with the ordeal, using the measured framework of the English words to contain the pain, to look at those circumstances in a sort of roundabout, indirect fashion. English as a sort of oblique mirror that allowed me to see events in a different (or at least tolerable) light, work through this confession, show myself, perhaps reveal myself, use the distance, treat myself as an almost fictional object. ... when, later on, I was reworking the text in Spanish, I would find myself sick and trembling, faint with anxiety, asking my book how I had dared to write this, what naked madness must I have gone through and tamed in order to finally bring out into the open such secret thoughts. (Dorfman, 2004: 212)

The emotional distance afforded by the L2 does not imply the inability to render the most subtle nuances of emotional expression. Look, for instance, at this excerpt from Nabokov's *Pnin*, where a sad Russian immigrant in America, Professor Pnin, fondly recalls his favorite line from the Russian translation of *Hamlet* and wants to check if his memory is accurate:

But where to check properly? Alas, "*Gamlet*" *Vil'yama Shekspira* ... was not represented in Waindell College Library, and whenever you were reduced to look up something in the English version, you never found this or that beautiful, noble, sonorous line that you remembered all your life from Kroneberg's text in Vengerov's splendid edition. Sad! (Nabokov, 1953: 66)

Appealing to Bakhtinian double-voicing, Nabokov masterfully uses English to convey the Russian structure, phonology and semantics of Pnin's inner speech and affective style: *alas* faithfully renders the common exclamation *uvy*, while *sad* is a perfect stand-in for the evaluative adverb *zhalko* [pity] (Besemeres, 2002). The double-voicing also extends to the content of Pnin's reflections: inviting us to laugh at the absurdity of the professor's preference

for translation over the original, Nabokov also empathizes with his attachment to the poetic sounds of the mother tongue, for it is an attachment from which Nabokov himself never managed to disengage. He tried his hand at poetry in both English and French, yet his unambiguous preference was to write poetry in Russian, and upon finishing yet another book in English, he regularly rewarded himself by ‘trysts’ with his “ruddy robust Russian muse” (Nabokov in Beaujour, 1989: 97).

In his letters and interviews, Nabokov (1990) frequently complained that his English is “a stiffish, artificial thing” (p. 106) and “an illusion, ersatz” (in Boyd, 1991: 52). Interpreting these comments literally, Pinker (1994) used Nabokov as an example of a poor L2 speaker who insisted “on writing out every word beforehand with the help of dictionaries and grammars” (p. 291). In reality, Cambridge-educated Nabokov, who spoke English from early childhood, was a brilliant lecturer and a sparkling conversationalist.⁷ His difficulties were not linguistic but emotional: he did not have the same emotional connection to English as he did to Russian and complained once in a letter to a friend: “I envy so bitterly your intimacy with English words” (in Beaujour, 1989: 214). The lack of the intimate connection is also bemoaned by other writers: María Luisa Bombal, for instance, remarked once that writing in English she never experienced the *goce íntimo* [intimate pleasure] offered to her by Spanish (Pérez Firmat, 2003: 183).

This intimate connection is a must for poetry that aims to affect us not only intellectually but also physically, for poetry “is something which is done to us, not just said to us. The meaning of its words is closely bound up with the experience of them” (Eagleton, 2007: 21). To create such experience, poets treat language both as a medium and as a material object. As a medium, it may affect us indirectly, through imagery, metaphors, and symbols that trigger associations, memories, and feelings, and as a material object it affects us directly through tone, rhythm, meter, rhyme, repetition, alliteration, and poetic diction. To deliver these effects, the poet needs a physical connection to the language in question – “the relation between word and meaning”, argues Eagleton (2007), needs to be “tighter than it is in everyday speech” (p. 21). In bi- and multilinguals, this relationship appears to be tighter in languages learned early in life, whose words are directly linked to emotional memories, as we have seen in Chapters 5 and 6. Like arguing, writing poetry in other languages rarely feels satisfying. For Irish poet Nuala Ni Dhomhnaill (2003), for instance, writing poems in English did not feel quite right:

⁷ This characterization of his conversational ability is frequent in descriptions of his former students, colleagues, and biographers (e.g., Boyd, 1991). I also confirmed it firsthand in an interview with his former student at Cornell.

Because we were the 1960s generation, Irish had at first not seemed intellectually credible in our lives, for all I loved the older poetry. I had written lots of poems in English before I was sixteen but I always felt there was something not quite right about them. Then one day, in mid-poem, I realized that what I had been writing in English were actually the melodic patterns of Irish poetry. It seemed pretty stupid not to be doing it in Irish where it belonged. I changed in mid-poem, and could see immediately that the poem was much better. I never really looked back. Now, in the throes of mental and emotional distress, I expressed myself naturally in poetry in Irish. (pp. 85–86)

Her comments reveal that at the heart of the L2 poetry ‘problem’ is not the lack of linguistic mastery but the lack of an emotional and physical connection: the same linguistic estrangement that enables self-exploration through L2 prose weakens emotional self-expression through L2 poetry. Thus, it is not surprising that even writers who write predominantly in the L2, revert to the L1 for poetry or appeal to code-switching to sneak in the L1 (Kellman, 2000; Pérez Firmat, 2003). Their attitude is summed up by the Spanish–English bilingual Felipe Alfau:

The poems I wrote in my mother tongue because poetry is too close to the heart, whereas fiction is a mental activity, an invention, something foreign, distant. (Kellman, 2000: 28)

We also see this ‘feeling for speaking’ in Todorov’s attachment to Russian poetry and in the connection to the L2 forged – via poetry – by Lerner (2002) and by Hoffman (1989):

But it’s not until many years later, not until I’ve finished graduate school successfully, and have begun to teach literature to others, that I crack the last barrier between myself and the language ... It happens as I read “The Love Song of J. Alfred Prufrock” ... My eye moves over these lines in its accustomed dry silence; and then – as if an aural door had opened of its own accord – I hear their modulations and their quiet undertones. ... I’m back within the music of the language and Eliot’s words descend on me with a sort of grace. Words become, as they were in childhood, beautiful things. (p. 186)

Compelling as they may be, writers’ autobiographic reflections are still literary productions which leave open the possibility that the emotional difference between the L1 and L2 is simply a literary trope. To determine whether it is also an experiential phenomenon not limited to writers, let us examine affective processing in bilingual speakers.

7.4.2 *Affective processing as a process of ascribing significance*

More than a century ago, Freud and his disciples noticed that some of their patients favored the L2 for anxiety-producing topics and the use of ‘obscene’ words (Ferenczi, 1916; Freud, 1893). Post World War II, this phenomenon was explored by multilingual psychoanalysts, who found that L2 use allowed

bilinguals to distance themselves from traumatic memories, while the switch to the L1 could trigger repressed memories and feelings, revealing reasons for the patients' deep-seated anxieties (Buxbaum, 1949; Greenson, 1950; Krapf, 1955).

Later clinical studies have confirmed that bi- and multilinguals may display different patterns of arousal and language disturbances (*affective reactivity*) in their respective languages: in the L1 they may appear more emotional, display increased variation in pitch, and report higher levels of anxiety and the feeling of 're-experiencing' events, while in the L2 they may appear more detached and comfortable discussing taboo topics and traumatic events (Amati-Mehler et al., 1993; Aragno & Schlachet, 1996; Javier, 1995; Movahedi, 1996; Rozensky & Gomez, 1983; Schwanberg, 2010). These studies, discussed in Chapter 5, revealed a close connection between autobiographical memories and emotions, especially in the L1, and suggested that the processing of emotional stimuli, such as memories and taboo and swearwords, depends on the languages of encoding and retrieval. These findings, in turn, inspired psycholinguists to take a closer look at affective processing in the bilingual mind.

Now, what do we mean by affective processing? You walk into a crowded room and immediately realize that the object of your dreams and desires is there – your heart starts beating faster, you have the proverbial butterflies in your stomach, you may even start sweating and become tongue tied. We are all familiar with these symptoms and in everyday interactions have no problem recognizing affective processing as detection of stimuli that trigger increased levels of arousal, be it the face of a person we are in love with or a mouse in our clothes closet. An academic definition of affective processing, however, remains elusive because emotion research still lacks consensus on the relationship between affect and cognition. Basic emotion theories see affective processing as discrete innate responses that precede cognitive judgments (Ekman & Cordaro, 2011; Izard, 2011; Panksepp & Watt, 2011). Appraisal theories see it as subjective evaluation of stimuli with respect to their relevance for the individual's goals, values, and needs that triggers changes in endocrine, autonomic and somatic nervous systems, only some of which enter consciousness and become labeled (Scherer, 2009). Constructionist theories deny the existence of 'non-affective' thought (Duncan & Barrett, 2007) and see affect as cognition, a transformation of the organism's neurophysiological and somatovisceral state (*core affect*) into experiences interpreted in terms of language-specific emotion categories (Barrett, 2009).

In the discussion that follows, I will define *affective processing* as somatovisceral responses triggered by automatic appraisal of verbal stimuli, which may not register as subjective feelings at the level of higher cognition. This definition is grounded in appraisal theory (Scherer, 2009) and the choice is not accidental. The differentiation between some aspects of cognitive and affective processes – shared by appraisal and basic emotion theories – allows us to compare

semantic and affective processing in bilinguals' languages. In turn, the view of affective processing as a subjective process driven by individuals' needs, goals, and linguistic and cultural categories – shared by appraisal and constructionist theories, albeit at different levels of categorization – allows us to explain why not all potentially emotion-inducing stimuli automatically trigger affective processing: the emotional meaning of the stimulus emerges in a situated process, where its perceived emotional content and relevance are shaped by the interplay of informational, contextual, and individual factors (Brosch et al., 2010; Eder et al., 2007). Since you and I may not be in love with the same person nor share the same basic fears – I, for one, dislike mice but am indifferent to spiders – we may vary in the patterns and strength of responses to stimuli in our environment. Stimuli may also lose emotionality – the person whose appearance triggered an array of feelings in us just a year ago today may elicit nothing but indifference.

Affective processing may involve a variety of stimuli. The focus of this discussion will be on *verbal stimuli*, such as words, phrases, or autobiographical memories transformed into narratives. Consistent with the definition of affective processing above, *emotional* or *emotion-laden* verbal stimuli will be viewed as stimuli that elicit *heightened arousal*, seen in somatovisceral responses, such as increased heart rate or skin conductance, and *perceptual prioritization*, seen in cognitive responses, such as preferential selection from a perceptual temporal stream (i.e., ascription of significance), heightened recall and, in the case of taboo and swearwords, interference with the processing of other stimuli (Brosch et al., 2010).

The studies to date show that emotion-laden words, in particular taboo and aversive words, elicit higher levels of autonomic arousal, are remembered better, and extracted more rapidly under suboptimal conditions than neutral words (Bowers & Pleydell-Pearce, 2011; Manning & Melchiori, 1974; Talmi & Moscovitch, 2004; for a review, see Brosch et al., 2010). The question asked in research with bilingual speakers is whether bilinguals process verbal stimuli similarly in their respective languages and, if not, what factors might affect differential processing? In what follows, I will provide a selective overview of this research. Given that word ratings are a form of introspection likely to reflect cognitive judgments, I will not discuss rating studies *per se* and will consider ratings only in the context of findings from other tasks. Nor will I discuss the findings of the few neuroimaging studies that addressed the question, because their results, so far, have been contradictory (for a more comprehensive review, see Pavlenko, 2012b).

7.4.3 Automaticity of affective processing in L1 and L2

To examine automaticity of affective processing, psycholinguists commonly adopt two types of tasks. In Emotional Stroop tasks, participants are asked to identify the print color of emotion-laden (e.g., *shit* in blue ink) and neutral

(e.g., *table* in red ink) words, with the expectation that perceptual prioritization of emotional stimuli will slow down response times (*interference effects*). In lexical decision (i.e., word/non-word) tasks, congruent conditions (e.g., negative-negative) are expected to facilitate processing and lead to faster reaction times than non-congruent conditions (e.g., negative-positive) (*affective priming effects*).

To examine interference effects, Colbeck and Bowers (2012) used the Rapid Serial Visual Presentation task, where words are presented rapidly and sequentially: the first word is a neutral or taboo word and the second is a color word. Participants have to identify the color word and to ignore other words. However, when participants search for two targets within 500 ms of each other, the accuracy in reporting the second word is reduced, due to interference or the so-called *attentional blink*, which is magnified by taboo words. L1 English speakers in the study displayed significantly higher error rates in the taboo condition than Chinese–English bilinguals performing the task in the L2. These results were reanalyzed including only participants who could define all taboo words in the debriefing task, yet the same pattern was maintained, leading the authors to argue that in this automatic processing condition the reduced emotionality of the L2 diminished interference, providing a processing advantage.

To examine the effects of congruence, Segalowitz and associates (2008) developed the Implicit Affect Association Task, where participants had to categorize noun phrases (e.g., *a gentle child*, *the ugly boy*) as ‘positive’ or ‘negative’. These lexical items were alternated with pictures of facial expressions, which they had to categorize as ‘sad’ or ‘happy’ and with pictures of objects they had to categorize as ‘whole’ or ‘broken’. In the congruent condition, the same reaction time panel was used for ‘positive’, ‘happy’ and ‘whole’ objects and in the incongruent condition the same panel was used for ‘positive’ expressions and ‘sad’ faces (or ‘broken’ objects). To examine the general efficiency of the L2 lexical access, the researchers used the Animacy Judgment Task, where participants categorized concrete nouns as ‘living’ or ‘non-living’ items. Comparisons of L1 and L2 reaction times allowed researchers to create an index of L2 lexical access for each participant. The L2 interference effect for affectively valenced words was significantly smaller than the L1 effect, suggesting that the processing of affective valence in the weaker L2 is less automatic than in the L1. No correlation was found between overall skills of L2 lexical access and the processing of affective valence, leading the authors to argue that this skill may be separate from general word recognition.

To distinguish between semantic and affective priming, Degner and associates (2012) used the priming paradigm with German–French and French–German bilinguals in Germany. Semantic priming effects were observed in both groups and both languages, while affective priming was observed in the L1 in both groups and in the L2 of French–German bilinguals. These

Table 7.2 *Affective processing in bilingual speakers*

Studies	Languages	Participants	Tasks & stimuli	Findings
Harris et al. (2003)	L1 Turkish L2 English	32 late Turkish–English bilinguals in the US (AoA > 12 yrs, AoAr range 16–31 yrs, mean LoR = 4 yrs, range 1 – 15 yrs)	Rating of childhood reprimands and neutral, positive, negative, and taboo words, in visual and auditory modalities, with concurrent measurement of SCR	Order of acquisition effects: higher SCRs elicited by L1 taboo words and childhood reprimands
Harris (2004)	L1 Spanish L2 English	15 early Spanish–English bilinguals, dominant in L2 English (mean AoAr = 3.1 yrs; mean AoA = 3.7 yrs; mean LoR = 16.2 yrs) 21 childhood Spanish–English bilinguals, dominant in L1 Spanish (mean AoAr = 17.9 yrs; mean AoA = 7.9 yrs; mean LoR = 2.4 yrs)	<i>Tasks:</i> word rating, with concurrent measurement of SCR <i>Stimuli:</i> childhood reprimands, taboo words, endearments, insults and neutral words	AoA effects: in childhood bilinguals higher SCRs elicited by L1 childhood reprimands CoA and language dominance effects: highest SCRs in both groups elicited by taboo words in L2 English
Dewaele (2004a,b, 2006b, 2008, 2010)	75 different L1s, L2/LX English	2004a,b: 1,039 bi- and multilinguals 2006b, 2008: 1,464 bi- and multilinguals 2010: 1,579 bi- and multilinguals ages 16–73 yrs	<i>Tasks:</i> BEQ	Perceptions of language emotionality and language choices for emotional expression are influenced by order of acquisition, language dominance, AoA, CoA, general frequency of language use, the size of interlocutor network and self-rated proficiency
Segalowitz et al. (2008)	L1 English L2 French	48 English-French bilinguals, dominant in L1 English (mean age 25.7 yrs, range 20 – 54 yrs)	<i>Tasks:</i> Animacy Judgment Task, Implicit Affect Association Task (IAAT) <i>Stimuli:</i> 72 nouns, 32 adjectives combined with nouns into noun phrases, 48 pictures	Order of acquisition effects: greater interference in L1

Table 7.2 (cont.)

Studies	Languages	Participants	Tasks & stimuli	Findings
Caldwell-Harris & Ayçiçeği-Dinn (2009)	L1 Turkish L2 English	70 Turkish–English bilinguals in Turkey, dominant in L1 Turkish, AoA > 12 yrs	<i>Tasks</i> : rating of emotional words and phrases, with concurrent measurement of SCR <i>Stimuli</i> : endearments, reprimands, insults, and neutral phrases in both languages	Order of acquisition effects: higher SCR elicited by L1 Turkish stimuli
Puntoni et al. (2009)	L1/L2 Dutch L1/L2 French L3 English	64 trilinguals in Belgium with French and Dutch as either L1 or L2 and L3 English (mean age = 25.5)	<i>Tasks</i> : rating of emotional intensity (task carried out in English) <i>Stimuli</i> : advertising slogans in L1 and L2	Order of acquisition effects: L1 slogans rated as more emotional (no L1 advantage for originality)
Caldwell-Harris et al. (2011)	L1 Mandarin L2 English	64 Mandarin–English bilinguals, ages 18–28yrs, AoA 0–15 yrs, AoAr 0–24 yrs, LoR 0–23 yrs	<i>Tasks</i> : rating of Mandarin and English phrases, with concurrent measurement of SCR, interviews <i>Stimuli</i> : neutral phrases, endearments, insults, reprimands, and taboo phrases, modified version of the BEQ	AoA effects: early bilinguals judged both languages as emotional, late bilinguals judged the L1 Mandarin to be more emotional Preference for L2 English for emotional expression (taboo words, anger, I love you)
Eilola & Havelka (2011)	L1 English L1 Greek L2 English	32 L1 speakers of English, mean age = 23.5 yrs 31 childhood Greek–English bilinguals in the UK, mean age = 23.4 yrs, mean AoA = 8.4 yrs, mean LoR = 2.5 yrs	<i>Tasks</i> : Emotional Stroop task, SCL measurement <i>Stimuli</i> : neutral, positive, negative, and taboo words	Order of acquisition and CoA effects: similar interference in L1 and L2; lower sensitivity to L2 taboo words (in SCL)

Caldwell-Harris et al. (2012)	L1/L2 Russian L1/L2 English	64 participants: 23 childhood Russian–English bilinguals in the US, AoA < 10 yrs 21 late Russian–English bilinguals in the US, AoA > 10 yrs 20 English–Russian bilinguals in the US who learned Russian as FL or L2	Tasks: modified version of the BEQ	Order of acquisition, CoA and AoA effects: perceived emotionality of Russian lowest in FL and L2 learners of Russian and highest in late Russian–English bilinguals; in childhood bilinguals negative affect stronger in L1 Russian, positive affect stronger in L2 English
Colbeck & Bowers (2012)	L1 English L1 Chinese L2 English	19 L1 speakers of English, ages 19–34 yrs 20 Chinese–English bilinguals in the UK, ages 18–34 yrs	Tasks: Rapid Search Visual Presentation (RSVP) task Stimuli: taboo and neutral English words	Order of acquisition effects: lower sensitivity to L2 taboo words
Degner et al. (2012)	L1/L2 French L1/L2 German	21 German–French bilinguals (mean AoA = 10.8 yrs) 20 French–German bilinguals (mean AoA = 12.3 yrs)	Tasks: affective priming task (presented as word categorization task), semantic priming task (presented as lexical decision task) Stimuli: non-words, positive and negative words in French and German	Order of acquisition and frequency effects: L1 advantage in speed of processing, semantic priming effects in L1 and L2, affective priming effects in L1, L2 affective priming effects influenced by the frequency of L2 use
Keysar et al. (2012)	L1 English L2 Japanese L2 French L2 Spanish L1 Korean L2 English	Study 1 121 L1 English learners of FL Japanese in the US (mean age = 22 yrs, AoA = 17 yrs) 144 L1 Korean learners of FL English in Korea (mean age = 23 yrs, AoA = 12 yrs)	Study 1 Asian disease task, with choices presented in a gain frame (if you choose medicine A, X people will be saved) and in a loss frame (if you choose medicine A, X people will die), randomly performed in either L1 or L2	Order of acquisition, AoA and CoA effects: Study 1 Framing bias (i.e., asymmetrical preference in the gain-frame condition) in the L1 but not in the L2

Table 7.2 (cont.)

Studies	Languages	Participants	Tasks & stimuli	Findings
Simcox et al. (2012)	Spanish English	103 L1 English learners of L2 French in France (mean age = 23 yrs, AoA = 16 yrs)	Study 2	Study 2
		84 L1 English learners of FL Spanish in the US (mean age = 19 yrs, AoA = 12 yrs)	Judgments of bets with high and low stakes, presented in L1 or L2	Loss aversion in the L1 but not in the L2
		Study 2	Study 3	Study 3
		146 L1 Korean learners of FL English in Korea (mean age = 23 yrs, AoA = 12 yrs)	Judgments of bets with real cash presented in L1 or L2	Higher willingness to take bets in the L2
		Study 3		
Simcox et al. (2012)	Spanish English	54 L1 English learners of FL Spanish in the US (mean age = 19 yrs, AoA = 13 yrs)		
		48 participants, ages 18–39 (mean age = 22.3 yrs)	Task: reading aloud of taboo and neutral words	Language dominance effects: processing efficiency and SCRs greater in English, the dominant language
		mean AoA of Spanish = 2.2, range 0–15 yrs	Stimuli: taboo and neutral words in English and Spanish	
		mean AoA of English = 4.2, range 0 – 18 yrs		

effects were related to intensity of language use, which was much higher for L1 French speakers living in Germany. Multiple regression analysis showed that only participants who frequently used the L2 – regardless of whether it was French or German – displayed affective priming effects in the L2, while participants with low usage showed no effects. These findings suggested that processing of affective valence may be a skill separate from general lexical processing and more automatic in the L1 and that frequent L2 use may increase its automaticity.

7.4.4 *Autonomic arousal in L1 and L2*

Another line of research focuses on the physiological markers of *autonomic arousal*, such as heart rate, activation of smile or frown muscles, and electrical conductivity of the skin. Our skin is particularly sensitive to threatening and relevant stimuli – these stimuli increase the level of adrenaline in the blood and lead to sweating, which increases electrical conductivity of the skin (*electrodermal reactivity*), measured via fingertip electrodes. A transient increase that occurs 1 to 1.5 seconds after stimulus presentation is commonly referred to as the *skin conductance response* (SCR) (Harris, 2004). In monolingual English speakers, threatening stimuli – including taboo and anxiety-related words (e.g., *fuck*) – consistently elicit higher SCRs than euphemisms (e.g., *f-word*) and neutral words (Bowers & Pleydell-Pearce, 2011; Manning & Melchiori, 1974).

Harris and associates (2003) investigated electrodermal reactivity in bilingual speakers. The researchers asked late Turkish–English bilinguals to rate the pleasantness of neutral, positive, negative, and taboo words and childhood reprimands, in visual and auditory modalities, while recording electrodermal reactivity. SCRs elicited by L1 Turkish words were stronger than those elicited by L2 English, with the highest SCRs elicited by L1 Turkish taboo words. The largest difference between the two languages occurred between childhood reprimands. This finding was linked to socialization experiences and verbal conditioning where parental reprimands become associated with fear or anxiety. During the debriefing session several participants mentioned that they could hear, in their mind, Turkish family members addressing reprimands to them. Caldwell-Harris and Ayçiçeği-Dinn (2009) replicated these findings with Turkish–English bilinguals in Turkey. They found that, in the absence of taboo words (eliminated to elicit larger and more equal SCRs), SCRs elicited by the L1 Turkish stimuli were higher across all conditions, with the L1-L2 difference largest for childhood reprimands.

In a study with Spanish–English bilinguals, Harris (2004) found that early bilinguals displayed similar SCRs in both languages, while in childhood bilinguals, L1 Spanish reprimands elicited higher SCRs. Yet the difference between the L1 and L2 was weaker than in Turkish–English bilinguals, because

Spanish–English bilinguals had started learning L2 English earlier, spent more time in the US and were more proficient in English. The highest SCRs in both groups of Spanish–English bilinguals were elicited by taboo words in L2 English, which showed that the L1 advantage can be overridden by the shift in language dominance. Language dominance effects were also identified by Simcox and associates (2012) in speakers bilingual in English and Spanish who were dominant in English but differed in AoA and language acquisition trajectories. The researchers found that in English taboo words elicited greater processing efficiency or perceptual prioritization (seen in reaction times) and higher SCRs than neutral words, while in Spanish there were no differences between taboo and neutral words.

To compare the results of different tasks, Eilola and Havelka (2011) combined Emotional and Taboo Stroop tasks with measurements of the *skin conductance level* (SCL), taken to reflect overall levels of emotional arousal. They found that L1 English speakers and Greek–English bilinguals displayed similar levels of interference in response to taboo words in English. At the same time, L1 English speakers displayed elevated SCL in response to negative and taboo words and L2 speakers did not. These findings raised a possibility that processing of emotion-laden words involves two subprocesses – automatic access of affective valence (semantic processing) and automatic triggering of heightened levels of autonomic arousal (affective processing) and that late bilinguals may pattern with L1 speakers in the first case and differ in the second.

7.4.5 *Factors influencing affective processing in bi-and multilingual speakers*

To identify factors that affect bilingual affective processing, Dewaele (2004a,b, 2006b, 2008, 2010) analyzed responses to the BEQ questionnaire (Dewaele & Pavlenko, 2001–2003). Statistical analyses revealed four factors that influenced language emotionality ratings: order of acquisition, language dominance, AoA and CoA. The order of acquisition privileged the L1, with the emotionality of other languages decreasing gradually. L1 taboo and swearwords were rated as significantly more emotional and nearly half of the respondents judged the sentence “I love you” to have greater emotional weight in the L1. Additional evidence of the order of acquisition effects comes from the open-ended comments: some members of bilingual couples, for instance, noted that in heated arguments they may revert to the L1 in which their spouses had limited proficiency or none at all and explained this switch by the satisfaction of using the language that felt ‘natural’ (Dewaele, 2010; Pavlenko, 2005). Internal satisfaction was also cited as a factor in the choice of L1 for positive affect, in particular with children, with affective connotations linked to speakers’ own childhood experiences (Pavlenko, 2004b, 2005). Order of acquisition effects

were also documented by Puntoni and associates (2009), who asked Dutch–French–English trilinguals to rate the emotional intensity of advertising slogans presented in French and Dutch (e.g., “Build something together with your child. You will never outgrow our toys”). The results showed that L1 slogans were rated as significantly more emotional.

The ratings of the L2 are also affected by the AoA, with early learners more likely to perceive the L2 and its words as emotional and to express anger in the L2 (Dewaele, 2006b, 2010). Keysar and associates (2012) examined the effects of such differential emotionality on decision-making in post-puberty FL learners. In Experiment 1, participants were presented with the same choices in a gain frame (e.g., if you choose medicine A, X people will be saved) and in a loss frame (e.g., if you choose medicine A, X people will die). The results revealed the framing effects (i.e., asymmetrical preferences in the gain-frame condition) in the L1 but not in the L2. Experiments 2 and 3 tested loss aversion preferences in betting conditions and found that bilingual speakers were more willing to take bets in the L2. The reduced framing biases and loss aversion were attributed to the decreased emotionality of processing of the L2 learned after puberty.

Given the fact that most participants in the study were FL learners, these findings also support Dewaele’s (2010) argument about the effects of the CoA: words and languages learned in naturalistic and mixed contexts are perceived as more emotional and are more likely to be used than those learned in instructed contexts. The CoA and AoA effects were replicated in studies that used a modified version of the BEQ with Mandarin–English and Russian–English bilinguals (Caldwell-Harris et al., 2011, 2012). The fourth factor identified by Dewaele (2010) is language dominance and the frequency of language use: the L1 is more frequently used for emotional expression by L1-dominant respondents, less frequently by those dominant in L1 and LX and significantly less frequently by those dominant in LX. The effects of language dominance on affective processing were also documented by Simcox and associates (2012).

Yet the influence of mediating factors is by no means straightforward. Dewaele (2004a, 2010) identified two intriguing dissociations in the BEQ responses. In the L1, the perceived emotionality of taboo and swearwords was rated higher than the perceived emotionality of the language itself and in subsequent languages taboo and swearwords were rated significantly lower than the languages. This dissociation suggests that different ratings tap into different sources of cognitive judgments: ratings of emotional weight of taboo and swearwords may be grounded in embodied perceptions and ratings of language emotionality in language attitudes and ideologies.

The second dissociation involves dominance effects: a shift in language dominance and L1 attrition influence the frequency of L1 use for emotional

expression but not the perceived emotionality of the language or of its taboo and swearwords. This dissociation suggests that language choice for emotional expression cannot be taken as a straightforward index of language emotionality. As seen in bilinguals in therapy and translingual writers, at times, L2 users favor a less emotional language that allows them to control their own emotions and to avoid guilt associated with L1 taboo and swearwords or anxiety associated with L1 expressions of love.

7.4.6 *Chagall and the language of poetry*

Together, these findings present us with three converging patterns of results. The first pattern, known as the *L1 advantage effect*, involves increased automaticity of L1 affective processing, seen in greater perceptual prioritization of L1 emotional stimuli (Degner et al., 2012; Segalowitz et al., 2008) and heightened electrodermal reactivity in response to L1 stimuli (Caldwell-Harris & Ayçiçeği-Dinn, 2009; Eilola & Havelka, 2011; Harris et al., 2003). This heightened reactivity is consistent with self-reports by bi- and multilingual speakers (Burck, 2004, 2005; Caldwell-Harris et al., 2011, 2012; Dewaele, 2004a,b, 2010; Kim & Starks, 2008; Kramsch, 2009; Pavlenko, 2004b, 2005), judgments made by customers in advertising contexts (Puntoni et al., 2009), and language choices made by patients in therapy (Amati-Mehler et al., 1993; Aragno & Schlachet, 1996; Rozensky & Gomez, 1983; Schwanberg, 2010).

The concurrent *L2 advantage effect* refers to decreased automaticity of affective processing in languages learned later in life, seen in reduction of interference effects (Colbeck & Bowers, 2012; Segalowitz et al., 2008), lowered electrodermal reactivity (Caldwell-Harris & Ayçiçeği-Dinn, 2009; Eilola & Havelka, 2011; Harris et al., 2003), and disappearance of framing effects and loss aversion preferences (Keysar et al., 2012). The decreased sensitivity to L2 emotional words, in particular taboo and swearwords, and the phenomenon of ‘disembodied cognition’ are consistent with self-reports by bi- and multilingual speakers (Caldwell-Harris et al., 2011, 2012; Dewaele, 2004a,b, 2010; Pavlenko, 2004b, 2005), translingual writers (Kellman 2000; Kinginger, 2004; Pavlenko, 2005) and bi- and multilingual patients (Amati-Mehler et al., 1993; Aragno & Schlachet, 1996; Javier, 1995; Movahedi, 1996; Rozensky & Gomez, 1983).

These two patterns suggest that not only ‘thinking for speaking’ but also ‘feeling for speaking’ may differ in bilinguals’ languages. The third pattern of results identifies two types of factors that affect differential ‘feeling for speaking’: *age effects* (order of acquisition, AoA) and *context effects* (CoA, frequency of use, language dominance). While L1 advantage is common in languages

learned early in life, combined effects of age and context may give rise to perceptual prioritization and autonomic arousal in the L2/LX learned in late childhood or adolescence in the context of immersion, especially if the speakers shifted dominance to the L2/LX or use it frequently (Caldwell-Harris et al., 2011, 2012; Degner et al., 2012; Dewaele, 2004a,b, 2006b, 2010; Harris, 2004; Simcox et al., 2012). In fact, emotional stimuli – including poetry – encountered during adolescence, the period of increased emotional sensitivity, may have enduring formative effects because affective processing in adolescents differs from that in children and adults in terms of attentional bias, perception of word emotionality, and inhibitory ability, which is lower in adolescents than in adults (Meuter & Buckley, 2008).

These findings provide us with new insights into Chagall's engagement with poetry. The many decades of living in France undoubtedly strengthened Chagall's connection to French. When Blaise Cendrars died in 1961, Chagall wrote: "His poems, I love them like my native town, like my past, like the sunlight. His spirit and his colors lie on my palette, they wail and weep." (Meyer, 1964: 145). This enjoyment, however, was insufficient for him to write his own French poetry – the language acquired at the age of 24 did not provide emotional access and relief. In contrast, Russian acquired in his adolescent years did offer this emotional connection, as did his mother tongue Yiddish. The connection to Yiddish may have temporarily weakened in his youth, when Chagall shifted to Russian as the language of everyday interaction. With time, Russian became the language of his inner speech and autobiographical memory and assumed many emotional functions in Chagall's life: with Bella, it was the language of love, with Ida, the language of parenting, and with many friends, the language of intimacy. It is not surprising then that from Chagall's early years in St. Petersburg it was the language of poetry. It was also the language of anger that allowed Chagall to 'vent his feelings', as recalled by Haggard (1986):

One day in the dining room at Riverside Drive a violent quarrel broke out between Marc and Ida. Russian is a particularly expressive language for quarreling and the scene was quite theatrical. (pp. 53–54)

It was only in 1935, when the artist was nearing fifty, that an encounter with Vilna's vibrant secular Yiddish culture triggered his own and Bella's nostalgia for the past and a desire to use the intimate language of their childhood as a literary medium. From then on he wrote poetry in both languages, and some topics may have been more emotional in Yiddish than in Russian, as seen in an apology he made to a friend in a letter about the situation of Jews in the USSR in 1970: "Forgive me for writing in Russian. Especially about such terrible problem ... one cannot write in Yiddish" (translated from Yiddish by Harshav, 2004: 938).

7.5 Language effects in the bilingual body: ‘feeling for speaking’

In his treatise on numbers, Butterworth (2000) argues that numbers “are something about us, an intrinsic part of human nature, like the ability to see colors, or *schadenfreude*” (p. 4). Alas, this analogy does not work any better for emotions than it does for colors and numbers because it fails to recognize that emotion words are, above all, *words* – like all words, they display cross-linguistic variation, effects of language change, shifts in meaning, and cognitive restructuring. Gradually internalized in the process of affective socialization, emotion categories allow us to group, categorize, and interpret our inner experiences and phenomena in the outer world in ways comprehensible to other members of our emotional community but not necessarily to others. Whorfian effects in emotion research are found in learned scholars who reify a recently invented term *emotion* as ‘natural’, treat emotions as inner states, consistent with their morphosyntactic encoding in English, and use a distinction between *emotions*, *feelings*, and *affect*, peculiar to English, and an idiosyncratic set of everyday English emotion words as technical terms (for extended critiques see Kagan, 2007, 2012; Lutz, 1986, 1988; Russell, 2005; Wierzbicka, 1986). One critic of this approach, James Russell (2005), argues that emotions require, rather than provide, explanation and likens them to constellations of stars:

I doubt that emotion is an entity, like Venus, waiting to be discovered. Anger, fear, shame, and the rest are more like constellations of stars. Like constellations, emotions are something we plainly see. Yet, the ancient Greeks, Chinese, and Egyptians all saw different constellations in the same sky. Although there were similarities, there were telling differences. It turned out that it was not good science to ask how many constellations there are really. Although, constellations are perceptually salient and even useful as memory aids in celestial navigation, they are ultimately not an interesting level of analysis for science. Constellations have no explanatory power in astronomy. (p. 27)

The studies discussed here show that, in order to accomplish intersubjectivity with their interlocutors, bi- and multilingual speakers rearrange these constellations in the process of L2 socialization and use, readjusting the ways in which they categorize, interpret, and express emotions. On the level of the lexicon, L2 learners restructure emotion categories, shift prototypes, readjust category boundaries, and internalize categories that do not have equivalents in the L1, such as the English *frustration* or Greek *stenahoria*. In the process, some categories, like the L1 Russian term *perezhivat*, may fall out of use and others, such as the L2 English *excitement*, become more salient as interpretations of everyday experience. On the level of cognitive appraisal, L2 learners who want to ‘fit in’ readjust the salience and importance of particular cues and the ways in which they appraise and process emotional stimuli (e.g., Degner et al., 2012; Harris, 2004).

Readjustment and restructuring also affect emotion displays. In the area of vocal expression, the changes may affect the tone, loudness, and variation in pitch, as well as the links between particular vocal cues and emotional meanings. In the area of morphosyntax, L2 learners may internalize new structural preferences: Russian–English bilinguals, for instance, shift from verbs, favored in Russian, to adjectives common in English. In discourse, they may need to internalize new affective repertoires and patterns of emotional expression, such as Russian or Spanish diminutives. They may also need to reduce the frequency of particular speech acts, such as complaints, and increase the frequency of others, such as compliments. And in narrative construction, they may need to adjust the focus on emotions as a means of evaluation and elaboration. They may also need to adjust their emotion regulation and display on a physical level, in terms of interpersonal distances, body language, gestures, facial expressions, loudness, and pitch. These findings contradict the claims that foreign emotion words are immediately recognizable (Pinker, 1997) and facial expressions of unfamiliar tribes easily interpretable (Ekman, 2003) and take us further in understanding why multilinguals, like Cristina Kotchemidova (2000), are perceived and perceive themselves as embodying multiple selves:

Speaking Russian, I tend to use diminutives because they are typical of the culture and somehow expected in the language. I suppose this makes me look more emotional and sentimental than I normally am. Am I misrepresenting myself? Surprisingly enough, I *do* feel somewhat emotional and sentimental when I'm speaking Russian. ... just using appropriate words, I look reserved in English, rational in French, affected in Italian... (p. 130)

While all humans share the same neurophysiological 'hardware' and experiences of love and loss, childbirth and death, we may not share the referents of 'emotion' terms: different communities may inhabit distinct emotional worlds and interpret the 'same' emotional events through distinct categories, embedded in different discourses and moral and social orders, even in the case of something as 'basic' as maternal love (e.g., Dureau, 2012). Basic emotion scholars interpret such differences as superficial variation in the norms of emotion regulation and display. For the followers of Ekman (2003), Damasio (1999, 2003), and Izard (2009), L2 learners' and bilinguals' experiences are irrelevant to the search for universals of human experience.

If, however, one follows Briggs (1970) and Lutz (1988), interpretations of exaggerated facial expressions and vocal cues, and identification of neurophysiological correlates of affective processing scratch only the surface of human experience, without revealing anything of substance about the emotional lives of different communities. Studies with bi- and multilinguals, on the other hand, add to this body of knowledge by pointing to affective mismatches as one of the key causes in cross-cultural miscommunication and one

of the key challenges in the process of L2 learning and use. Reminding us that language is situated not only in the mind but also in the body, they reveal a phenomenon invisible in 'monolingual' research, namely, differential emotionality – or 'feeling for speaking' – in bi- and multilinguals' languages, and it is this phenomenon that is at the heart of experiential relativity and a perception of 'different selves.'

8 The bilingual mind and what it tells us about language and cognition

Some renegade thoughts

For my purposes ... the ultimate validity of the Sapir-Whorf hypothesis is irrelevant. What is crucial is that many bilinguals relate to their languages in ways that enact some version of this hypothesis. What may not be true for Spanish and English in any objectively demonstrable way may be true for an individual's apprehension of Spanish and English.

Pérez Firmat, 2003: 13

Spanish–English bilingual writer and scholar Gustavo Pérez Firmat (2003) urges us to cease worrying about the empirical validity of the SWH, because it is immaterial to bilinguals' lives – what matters is its ecological validity. I agree and in the preceding chapters I have tried to pinpoint the sources of such experiential relativity, from language tagging in autobiographical memory, to the change in the language of inner speech and interpretive frames, to differences in affective processing. But I will also do one better and argue that there is no such thing as 'the ultimate validity of the Sapir-Whorf hypothesis'. I apologize to those who expected me to take a stand on the SWH and to occupy a recognizable position: 'for', 'against', or 'rationally in the middle'. I refuse to play this game and to accept the narrow and binary terms of engagement articulated by Brown and Lenneberg, for I do not find them either interesting or meaningful. The SWH 'as we know it' is a phantom, if not a fraud, that has little to do with the questions and concerns that preoccupied Sapir and Whorf. It is also a pattern of habitual thought, an implicit agreement on certain terms of engagement that is begging to be disrupted because it fails to address the very question it purports to address, namely, the implications of our dependence on languages as semiotic tools. The paradigm change, prompted by bilingual and evolutionary turns in cognitive science, requires a fresh re-reading of Humboldt, Sapir, and Whorf – and possibly also Vygotsky and Bakhtin – and reconsideration of 'Whorfian effects' of three kinds.

8.1 Whorfian effects of the first kind: the illusion of seamless concord

Polish–English bilingual Eva Hoffman (2003) nostalgically recalls the childhood feeling of harmony when "Polish words described the world effortlessly",

even though “this sense of seamless concord was shot through with an element of illusion” (p. 52). The L2 learning process chips away at this harmony, disrupts the links between the signifier and the signified and makes bilinguals like Hoffman, Nabokov, or Triolet feel out of sync. The monolingual condition, on the other hand, perpetuates this illusion and it was Whorf’s concern about the illusory objectivity of one’s own language that made him so objectionable to so many academics. Fishman (1960) had his finger on the problem when he noted that Whorf impugns our objectivity and rationality:

When Whorf says that “there is a precarious dependence of all we know upon linguistic tools which themselves are largely unknown or unnoticed,” he hits all of us where it hurts most – at the foundations of our certainty in our scientific findings. (p. 326)

Throughout this book, I have argued that Whorfian effects par excellence are found not in some far-away exotic tribe but on the pages of academic journals, among scholars who treat ‘color’ and ‘number’ as natural properties of the material world, attribute ‘emotions’ to inhabitants of the animal world, and equate the English lexicon with ‘the language of thought’, adopting English terms – that lack translation equivalents in many languages – to describe ‘thinking for thinking’ and ‘feeling for feeling’ (e.g., Bloom & Keil, 2001; Fodor, 1975; Pinker, 1994, 2007: 81–82). Future research can tell us more about the sources of this effect, one of which appears to be the superior strength of the links between L1 words and their multi-modal representations. As to disrupting it, I do not believe for a moment that making bilingualism an academic requirement would offer an automatic release from the hegemony of English as an interpretive lens. At the heart of ‘Whorfian effects’ in academia are patterns of habitual thought in academic fields, an issue to which I will return at the end of this chapter.

8.2 Whorfian effects of the second kind: thought insofar as it is linguistic

Nicholas Evans (2010), a field linguist who specializes in Aboriginal languages of Australia, recalls that when he began learning Kayardild he had “to reprogram” his mind in order “to pay constant attention to the points of the compass” (p. 41):

I suddenly had to add a whole new channel of ongoing attention to how I thought about space. I needed to use “absolute reckoning”, orienting to the points of the compass for every waking moment, if I was to follow what was being said, and talk in a way that people would understand. ... [The Kayardild] virtually never think, imagine, or even dream without orienting their mental scenes to the compass. ... One aspect of speaking Kayardild, then, is learning that the landscape is more important and objective than you are. ... It is not that I never thought by compass before learning Kayardild. Sometimes

I had needed to do it, in occasional boy-scout mode, when orienteering, or navigating a city with a grid layout. ... But the experience of speaking Kayardild was something quite different – an incessant need always to know the compass directions, and always to attend to them, or face an embarrassment equivalent to not knowing my wife’s name, or not noticing whether you are male or female. (Evans, 2010: 163–165)

For me, this description offers a perfect illustration of the Whorfian ([1940a] 2012) thesis that “users of markedly different grammars are pointed by their grammars towards different types of observations” (p. 282–283), which arose out of his learning of Hopi where, in order to use aspect, he was required “to notice and observe the vibratory phenomena” (Whorf, [1936b] 2012: 71). I am fully aware that most scholars would disagree, firstly because of the ‘soft’ and ‘anecdotal’ nature of such evidence and secondly, because of its focus on language and not on ‘language effects on non-linguistic cognition’, an oxymoron if ever I saw one.

In the view adopted here, the most harmful – and most assiduously perpetuated – aspect of the Brown and Lenneberg legacy is that only ‘language effects on non-linguistic cognition’ are ‘important’ and ‘interesting’, while ‘language effects on language’ are ‘trivial’ and ‘banal’. This assumption, in conjunction with the belief that such effects are best demonstrated in the lab, gave rise to a self-defeating line of inquiry where ‘language effects on non-linguistic cognition’ are generated in clever experiments that have little to do with habitual thought, and are then opposed by critics who argue that the tasks involved linguistic cognition after all. This search has not been completely fruitless: the findings of Thierry and associates (2009), for instance, constitute compelling evidence of such effects. Yet minor effects on pre-attentive perception do not address the issue central to Sapir and Whorf, namely thought insofar as it is linguistic.

The studies discussed in this book reveal ‘Whorfian effects’ in all cognitive processes fully or partially mediated by language: categorical perception, numerical, temporal and spatial cognition, event construal, narration, interpretive framing, self-mediation (inner speech), recall, and autobiographical memory. Going beyond ‘thinking for speaking’ to the interaction with the self, these effects are not simple ‘statistical probabilities’ – rather, as argued by Slobin (1991, 1996), they arise in the process of language use in communicative contexts, where obligatory categories direct attention to and increase the perceptual salience of the relevant features, shaping stabilized patterns of co-activation and preference, triggered subsequently by the same contexts.

These studies also show that the effects of ‘language on language’ are only ‘trivial and banal’ if we consider them in monolingual speakers who cannot help but behave like native speakers of their L1s (and even then the effects could be pretty interesting). They become even more intriguing when we go back to Humboldt’s, Sapir’s and Whorf’s idea of L2 learning as a way to

transcend the boundaries of the L1 and try to understand when and why such effects persist and how they may be destabilized. What is unique about the bilingual mind is the fact that not all languages of bi- and multilinguals function as a form of cognition – performance in one language may display influences from interpretive categories of another. It is precisely the dissociability of linguistic forms from their social, cultural, and historic associations that makes the study of language and cognition in bi- and multilingual speakers such a promising enterprise.

8.3 Whorfian effects of the third kind: destabilization of language effects

8.3.1 L2 learning and the deconstruction of equivalence

In the 1990s, two researchers noticed that Spanish-speaking immigrants in New York City replaced the word *edificio* [building] in L1 Spanish with the term *bildin*, borrowed from L2 English (Otheguy & Garcia, 1993). This replacement was counterintuitive because the terms *edificio* and *building* are translation equivalents designating a larger dwelling, distinct from a smaller *casa* [house]. The interviews revealed that the new arrivals experienced a cognitive dissonance – or in Kuhn’s ([1962] 2012) terms, perceived an anomaly – when they learned that in the US two- and three-story buildings are called *houses*, whereas in Latin America they would be called *edificios*. In turn, the imposing tall structures that greeted them upon arrival in New York City were unlike any *edificio* they had encountered at home. To accommodate these differences, the smaller structures became *casas* in their speech and the larger ones *los bildin* or *los bildenes*, whereas the word *edificio* was reserved for two- and three-story dwellings back in Latin America. The terms also had different connotations for them: *los edificios* were “small, well-kept structures that inspire admiration and respect,” and *los bildin* were “large structures that inspire repugnance and fear” (Otheguy & Garcia, 1993: 147).

This case study shows how the seamless concord between one’s language and the material world may shatter in the encounter with a new world whose realities and categories are not equivalent to those of the L1. The severity of the encounter may range from almost imperceptible (for students in the FL classroom) to perceptible yet safe and amusing (for tourists) to utterly destabilizing (for immigrants and refugees), yet the need for reorientation is always there, requiring us to remap everything, from the material world to our own bodies. So, how do we learn to assign significance and to impose a new order on “a kaleidoscopic flux of impressions”?

Traditional theories of L2 learning and models of the bilingual lexicon do not offer us much guidance because they assume that L1 and L2 words are

translation equivalents linked to a unitary ‘non-linguistic’ store, grounded in ‘the same’ material world. In this view, the bilingual mind makes only two adaptations in the L2 learning process: first, we need to learn new combinations of sounds that ‘stand for’ the same objects and then, to increase the processing speed, we need to link these translation equivalents directly to concepts, rather than to their L1 counterparts (e.g., Kroll & Stewart, 1994). Such models lack both predictive and explanatory power. They fail to predict that L2 learners may experience a cognitive dissonance trying to map new words onto ‘old’ concepts, like the Spanish-speaking immigrants who could not link the English term *building* to the preexisting category of *edificio*. These models also fail to explain how L2 learners resolve this cognitive dissonance: in the case discussed here, the solution involved a three-way distinction between *las casas*, *los edificios*, and *los bildin*.

The evidence of restructuring, documented across all domains discussed in this book, suggests that in the process of L2 learning the mind needs to make additional adaptations that have not been taken into consideration in traditional L2 learning theories, nor in the views that assume a preexisting ‘mentalese’ or ‘language of thought’. To accomplish intersubjectivity with speakers of the target language, we need to learn how the new combinations of sounds ‘cut nature up’ and ‘organize it into concepts’ or, at least, when, how, and where the new system differs from that encoded in our L1 (see also Evans, 2010: 56–65). Then we need to develop sensitivity to new features, structures, ways of segmenting events and roles assigned to event participants, and then their detection, processing and lexicalization have to become automatic. The pursuit of target-like competence and intersubjectivity thus becomes the process of reorganizing ‘a kaleidoscopic flux of impressions’.

8.3.2 L2 learning as cognitive restructuring

The first stage of the L2 learning process is a stage at which no restructuring is evident and the speaker continues to follow L1 patterns while speaking the L2. This stage is commonly known as *L1 influence on the L2*, with L2 interpreted widely as all subsequent or additional languages. Alternatively, it may be described as ‘thinking and feeling in L1 for seeing, speaking, feeling, and gesturing in the L2’, with the proviso that such performance is not necessarily an outcome of conscious translation – the speakers themselves may be unaware of any influences.

To date, evidence of L1 influence has been identified in categorization of color (Ervin, 1962), objects and substances (Athanasopoulos, 2006; Athanasopoulos & Kasai, 2008; Cook et al., 2006; Graham & Belnap, 1986), emotions (Pavlenko, 2008; Pavlenko & Driagina, 2007) and motion events (Finkbeiner et al., 2002), in speech, gestures, and memory for motion and posture (Berthele,

2012; Brown & Gullberg, 2008, 2011; Cadierno, 2004, 2010; Filipovič, 2011; Gor et al., 2009; Gullberg, 2011; Hasko, 2009, 2010b; Hendriks et al., 2008; Hendriks & Hickmann, 2011; Larrañaga et al., 2011; Lemmens & Perez, 2010), in event construal (Schmiedtová & Sahonenko, 2008; Schmiedtová et al., 2011; von Stutterheim, 2003; von Stutterheim & Carroll, 2006), in the use of spatial frames of reference (Levinson, 2003), and in autobiographical narration (Gale, 1995; Holmes, 1998; McCabe & Bliss, 2003).

Restructuring proper begins with *destabilization*, seen in the cases where speakers diverge from the L1 pattern in order to accommodate or approximate the divergent pattern of the L2. This process may result in internalization of new categories, co-existence or maintenance of respective patterns, convergence, L2 influence on L1, and attrition. These outcomes are well attested in the studies of structural aspects of language yet they are still relatively new when it comes to semantic and conceptual categories (Jarvis & Pavlenko, 2008).

In contexts where the two languages differ in obligatory categories or patterns of preference, *internalization* involves appropriation of L2 categories, frames of reference, and patterns of preference, and changes (increase or reduction) of selective attention to particular features and distinctions. In Chapter 6, I have illustrated internalization of L2 categories through my own study of *privacy* (Pavlenko, 2003); it has also been documented in lexicalization of color (Caskey-Sirmons & Hickerson, 1977; Ervin, 1961; Jernudd & White, 1983; Lenneberg & Roberts, 1956; MacLaury, 1997; Vartanov & Nguyen, 1995) and emotions (Panayiotou, 2004a,b; Pavlenko, 2008; Pavlenko & Driagina, 2007), categorization and memory for objects (Athanasopoulos, 2006; Athanasopoulos & Kasai, 2008) and attention to the boundary-crossing constraint in motion (Daller et al., 2011). This process should not be confused with internalization of L2 inner speech, where spontaneous playback (the *din* phenomenon) and overt or covert rehearsal may take place in the L2, while categorization of the 'kaleidoscopic flux of impressions' will still rely on the L1 and, in the use of the L2, display L1 influence on L2.

Co-existence refers to the maintenance of two or more sets of language-appropriate categories, frames of reference, and patterns of preference and selective attention. To date, co-existence of language-specific patterns of preference in bi- and multilingual speakers has been documented in the domains of color (Jernudd & White, 1983; Saunders & Van Brakel, 1997), shape (Barner et al., 2009), emotions (Alvarado & Jameson, 2011; Stepanova Sachs & Coley, 2006), and event construals (Bylund, 2011a), narration of autobiographical memories (Koven, 1998, 2001, 2007; Marian & Kaushanskaya, 2004; Wang et al., 2010) and attribution and use of interpretive frames (Chen & Bond, 2010; Ervin-Tripp, 1964; Hong et al., 2000; Hull, 1996; Luna et al., 2008; Panayiotou, 2004a; Ralston et al., 1995; Ross et al., 2002; Trafimow et al., 1997; Verkuyten & Pouliasi, 2002, 2006).

Another possible outcome of restructuring involves *convergence* of L1 and L2 categories, perspectives, or frames of reference, with bilinguals performing differently from speakers of both the L1 and the L2 in a way often termed 'in-between' performance. To date, convergence has been documented in studies of color (Caskey-Sirmons & Hickerson, 1977; Jameson & Alvarado, 2003) and object categorization (Ameel et al., 2005, 2009; Athanasopoulos, 2007; Malt & Ameel, 2011), motion talk and gestures (Brown & Gullberg, 2008, 2011; Daller et al., 2011; Hohenstein et al., 2006; Wolff & Ventura, 2009), event segmentation (Bylund, 2011a,b), and preferences for spatial frames (Levinson, 2003). This performance may reflect two distinct phenomena. In bilinguals living in the L2 context it is commonly interpreted as ongoing restructuring or bidirectional influence (e.g., Hohenstein et al., 2006; Wolff & Ventura, 2009), while in bilinguals residing in language-contact zones it may reflect the categories that have already stabilized in the process of language change (stabilized convergence), triggered by the need to reduce the cognitive load of maintaining two distinct patterns (e.g., Ameel et al., 2005, 2009; Silva-Corvalan, 2008).

The need to reduce the cognitive load may also result in *L2 influence on L1* categories, frames of reference, or patterns of selective attention or preference. To date, L2 influence on L1 has been documented in categorization of color (Alvarado & Jameson, 2002; Iijima et al., 1982; Jameson & Alvarado, 2003; Lenneberg & Roberts, 1956; MacLaury, 1997), objects (Pavlenko & Malt, 2011), and emotions (Stepanova Sachs & Coley, 2006), lexicalization of motion (Daller et al., 2011; Hohenstein et al., 2006; Papafragou et al., 2008; Wolff & Ventura, 2009), attention to endpoints in event construals (Bylund, 2009; Bylund & Jarvis, 2011), sensitivity to temporal contours of events (Chen et al., 2012), the choice of spatial frames of reference (Wassmann & Dasen, 1998), and narrative styles (Disbray, 2008; Eickelkamp, 2008).

Attrition of categories or patterns of preference is commonly seen in the weakening of obligatory contrasts in the domain of color (Andrews, 1994; Athanasopoulos, 2009; Athanasopoulos et al., 2010, 2011; Caskey-Sirmons & Hickerson, 1977; Pavlenko, 2012a) and de-activation of interpretive categories in the domains of emotions (Ben-Rafael, 2004; Pavlenko, 2002c), motion (Kaufman, 2001) and space, with absolute frames of reference, for instance, disappearing from Guugu Yimithirr in speakers dominant in English (Haviland, 1993, 1998; Levinson, 1997, 2003). Unfortunately, the findings to date do not always allow us to differentiate between L2 influence on L1 and L1 attrition, or between L1 attrition and incomplete acquisition (e.g., Andrews, 1994; Gor et al., 2009; Kaufman, 2001; Pavlenko, 2010, 2012a). To document an actual shift in speakers' performance and provide convincing evidence of attrition of stabilized patterns of preference (or absence thereof), future studies need to adopt longitudinal designs.

8.3.3 *Predictors of cognitive restructuring in the bilingual mind*

The studies to date identify nine predictors of cognitive restructuring, which can be divided into three categories: (1) age effects, (2) context effects, and (3) language effects.

8.3.3.1 *Age effects in cognitive restructuring* The age of L2 acquisition (AoA), often operationalized as the age of arrival in the L2 environment, was shown to predict the maintenance of L1 patterns, approximation of L2 patterns, and L2 influence on L1. Early (AoA 1–6 yrs) and childhood bilinguals (AoA 7–12 yrs), who experience a shift in dominance from the L1 to the L2, may experience incomplete L1 acquisition and, as a result, diverge from L1 patterns, approximate L2 patterns of preference, and display L2 influence on L1. To date, AoA effects have been documented in categorization of colors (Andrews, 1994; Pavlenko, 2012a) and objects (Malt & Sloman, 2003; Pavlenko & Malt, 2011) and in motion and event construal (Bylund, 2009; Bylund & Jarvis, 2011; Gor et al., 2009; Hohenstein et al., 2006; Kaufman, 2001; Pavlenko, 2010; Pavlenko & Volynsky, 2012). AoA effects have also been documented in language choice for inner speech and mental calculation (Dewaele, 2004a, 2006a, 2009; Larsen et al., 2002; Noël & Fias, 1998; Vaid & Menon, 2000) and automaticity of affective processing, seen in greater perceptual prioritization and heightened electrodermal reactivity in response to L1 emotional stimuli (Caldwell-Harris & Ayçiçeği-Dinn, 2009; Dewaele, 2010; Eilola & Havelka, 2011; Harris et al., 2003; Keysar et al., 2012).

These effects led Bylund (2009, 2011b) to suggest that there is a point around puberty when L1 categorization patterns become more stable and susceptibility to L2 influence decreases. At the same time, he acknowledged that while AoA may affect the *degree* of susceptibility or resistance to restructuring, it does not guarantee impermeability to L2 influence. Studies that document internalization of L2 categories (Pavlenko, 2003), L2 influence on L1 categorization patterns (Pavlenko & Malt, 2011) and the shift to L2 as the language of inner speech (Dewaele, 2006a; Larsen et al., 2002) in adult or late bilinguals suggest that we maintain some degree of brain plasticity throughout our lives. There are also a few studies that failed to identify AoA effects, be it in L1 Spanish motion talk of Spanish–English bilinguals (Hohenstein et al., 2006) or in event segmentation of Spanish–Swedish bilinguals (Bylund, 2011a,b), suggesting that some domains and categories may be more susceptible to age effects than others.

While suggestive, the findings to date are limited by the focus on late bilinguals and the lack of differentiation between the age of L2 acquisition and the age of arrival in the L2 context. Most importantly, there is still a dearth of theories that explain when, how, and why maturation may constrain cognitive

restructuring. An alternative possibility is that restructuring is shaped not – or at least not only – by maturation but also by the context and frequency of language use.

8.3.3.2 Context effects in cognitive restructuring The CoA, or the context of L2 acquisition, is an important predictor of L2 restructuring. The studies to date show that FL learning in the classroom may constrain cognitive restructuring, while immersion in the L2 context increases automaticity of affective processing (Degner et al., 2012; Harris, 2004) and facilitates restructuring in the lexicalization of emotions (Pavlenko, 2002a, Pavlenko & Driagina, 2007) and locative trajectories (Daller et al., 2011), adoption of L2 for inner speech (Dewaele, 2006a; Vaid & Menon, 2000) and internalization of new interpretive frames (Luna et al., 2008; McCrae et al., 1998; Pavlenko, 2003). These effects have been linked to the multi-modality of language processing in context, which strengthens the links between words and their context-specific referents (Jared et al., 2013) and to integration of linguistic forms with autobiographical memories (Larsen et al., 2002; Marian & Kaushanskaya, 2004, 2007; Marian & Neisser, 2000; Matsumoto & Stanny, 2006; Schrauf & Rubin, 1998, 2000, 2004).

The third predictor of cognitive restructuring is the LoE, or the length of L2 exposure, commonly understood as the length of residence in the target-language environment. To date, the LoE was found to predict approximation of L2 patterns in the domains of color (Athanasopoulos, 2009; Athanasopoulos et al., 2010) and objects (Cook et al., 2006; Malt & Sloman, 2003), in perception of causality (Wolff & Ventura, 2009), and in language use for inner speech (Vaid & Menon, 2000). These studies show that the beginning of restructuring may vary according to the domain and the languages involved: English–Russian bilinguals diverged from the L1 English pattern of causality description after six months in Russia (Wolff & Ventura, 2009), Greek–English bilinguals displayed the effects of L2 English on L1 Greek color categorization after two years in the UK (Athanasopoulos, 2009; Athanasopoulos et al., 2010) and Japanese–English bilinguals displayed a shift in patterns of object categorization after three years in the UK (Cook et al., 2006).

The endpoint of restructuring – if one even exists – may vary by learner, language domain and language combination. In the case of causality, Russian–English bilinguals began to approximate the L2 English pattern after seven to eight years of residence in the US (Wolff & Ventura, 2009). In the naming of artifacts, approximation of the L2 English pattern increased as a function of years of immersion, but even the most advanced speakers with LoE in the US of ten years or more were not fully target-like (Malt & Sloman, 2003). It is also possible that after ten or so years, LoE ceases to be an important predictor: studies by Bylund (2009, 2011a) and Bylund and Jarvis (2011) identified no

effects of LoE on either endpoint encoding or segmentation of events in participants who had lived in Sweden for longer than twelve years.

Together, these findings suggest that language use in context plays a central role in cognitive restructuring by drawing L2 users' attention to relevant distinctions and features and by increasing their perceptual salience and the co-activation of linguistic forms and multi-modal representations of their referents. At the same time, FL learning does not preclude some degree of restructuring, in particular in the case of obligatory categories.

8.3.3.3 *Language effects in cognitive restructuring* The CoA and the LoE are, in turn, related to some of what I provisionally call *language effects*, namely frequency of language use, language dominance, and language proficiency. Self-reported frequency of language use correlates with the choice of that language for inner speech (Dewaele, 2006a), while frequency of L2 use may affect the maintenance of L1 patterns as seen in the domain of color (Athanasopoulos et al., 2011). At the same time, Bylund (2011a,b) found no influence of frequency of L1 use on endpoint encoding. He acknowledges that this finding may be due to the reliance on self-reports and that is a weakness of the other studies as well. To date, however, no other reliable measures have been put forth to substitute or at least supplement self-reports on the frequency of language use. Frequency of language use is also related to self-perception of language dominance. The studies to date have identified (self-reported) language dominance as a predictor of language choice for inner speech, emotional expression, and mental calculation (Dewaele, 2004a, 2006a, 2010; Vaid & Menon, 2000) and lexicalization of locative trajectories (Daller et al., 2011).

The sixth predictor of cognitive restructuring is language proficiency. Several studies demonstrated that advanced – and sometimes intermediate – L2 speakers approximate L2 patterns of color and object categorization (Athanasopoulos, 2006, 2007; Athanasopoulos & Kasai, 2008; Graham & Belnap, 1986; Malt & Sloman, 2003), talk and gestures about motion (Brown & Gullberg, 2008, 2010, 2011; Gor et al., 2009; Vermeulen & Kellerman, 1998), and selective attention to temporal contours of events (Chen et al., 2012). Language proficiency was also a predictor of language choice for encoding of autobiographical memories (Matsumoto & Stanny, 2006) and inner speech in the L2 or LX (Dewaele, 2006a; Guerrero, 2005; Larsen et al., 2002). The difficulty in drawing any conclusive results regarding proficiency lies in the fact that many studies rely on self-reports and studies that do use formal measures rely on different measures of proficiency. An additional predictor is domain-specific proficiency. Athanasopoulos and Kasai (2008) found that bilinguals' number-marking competence correlated with their object categorization preferences, while Bylund and Jarvis (2011) showed a correlation between bilinguals' capacity to detect L1 aspectual errors and their endpoint encoding preferences.

The last set of predictors involves more fine-grained – and as a result less examined – factors, such as the type of required adjustment, the level of processing, and the domain. The study of the type of adjustment requires a symmetrical design where the two languages appear both as the L1 and as the L2 and participants are matched on the key characteristics, including AoA, CoA, and LoE. The few studies that implemented such designs suggest that directionality and the type of required adjustment do matter. Thus, von Stutterheim (2003) demonstrated that L1 German learners of L2 English approximated the target-language pattern of endpoint encoding and the focus on ongoingness, while L1 English learners of L2 German did not. This difference suggests that the adjustment required of L1 English learners of L2 German, namely increased attention to endpoints, may be more challenging than the reverse adjustment required of L1 German learners of L2 English. Schmiedtová and associates (2011) also point to the importance of the transparency and prominence of the new category: the English progressive is formally encoded and perceptually prominent, while the German holistic perspective is not. At the same time, difficulties may persist in any kind of adjustment (Gullberg, 2011).

Last but not least, even in a single group of speakers, patterns of restructuring may vary by individual, by domain and by level of processing. In my own studies, the same Russian–English bilinguals maintained L1 patterns in motion categorization but displayed L2 influence on L1 in lexicalization of emotions (Pavlenko, 2002a, 2010). In Bylund's (2011a,b) studies, Spanish–Swedish bilinguals displayed different patterns of performance in event segmentation (convergence) and temporal structuring (co-existence). He tentatively explained these findings through different levels of processing: temporal structuring is a microplanning process, where maintenance of linguistic conventions is desirable if not obligatory, while event segmentation is a more general macroplanning process, where convergence could provide an economic solution. These explanations suggest that future studies need to consider additional predictors of restructuring, such as linguistic transparency and complexity, the frequency or salience of particular categories in the input, and differences in affective processing.

8.4 Where to from here? The bilingual turn in academic research

Every self-respecting academic book has to end with a section along the lines of “Where to from here?” and I did not want this one to be a disappointment. Yet let me acknowledge from the start that it is not my goal to move the inquiry on language and cognition ‘forward’ if only because I agree with Kuhn ([1962] 2012), who considers the metaphor of science as ongoing march forward to be utterly misleading. My goal was to convince at least a few readers to move ‘away’ from the deeply familiar – yet inherently flawed – terms of engagement

articulated for us by Brown and Lenneberg, to ‘backtrack’ towards the questions posited by Sapir and Whorf and to adopt more realistic terms of engagement with the relationship between language(s) and thought that take into consideration language evolution, contact, and change, and the undeniable bi- and multilingualism of the majority of the world’s population.

I have also tried to show that the findings to date have critical implications for our own scholarly enterprise. Attitudes towards potential ‘language effects’ on our research are the Rorschach test of academia, revealing our individual prejudices and the biases of our academic fields. On the one end of the certainty continuum are archeologists, classicists, and historians, preoccupied by ways in which constructive blindness, selection, wild extrapolation, flimsy inferences, conjecture, over-confidence, and willful misinterpretation transform an ambivalent and very limited record into ‘facts’ (Beard, 2007; but see Botha, 2009). The Director of the British Museum, Neil MacGregor (2010), is upfront about the fact that all of our efforts to restore the past through material remains are undermined by translation non-equivalence:

There is an old adage that an act of translation is always an act of betrayal. When we want to translate complex ideas from a lost culture with no written language, the situation is no better: we usually need to work our way through layers of later interpretation by people with quite different ways of thinking, and with no words designed to express alien thoughts. (p. 443)

And Assyriologist Brown (2010) reminds us that the availability of texts does not solve the problem, because we are still constrained by translation non-equivalence:

We feel we know what the texts mean, when really all we have done is to translate according to the rules of grammar and philology and apply a model co-opted from a neighboring discipline as to what, say, ‘magic’, ‘divination’, ‘witchcraft’ ‘medicine’, ‘astronomy’, or ‘numeration’ or ‘mathematics’, could possibly have entailed in ancient Iraq, anywhere between ca. 9,000 and 2,000 years ago. We sometimes take a further step, then, and use the hard-won interpretation to make suggestions as to how the ancients thought and thus, perhaps, something about human cognition. Our suggestions are then, sometimes, taken up by others with a particular interest in one aspect of cognition and repeated without sufficient regard to the robustness or fragility of the many steps that lead from an object to its interpretation. (p. 183)

On the other end of the linguistic certainty continuum are psychologists who brush aside translation non-equivalence (e.g., Hupka et al., 1999) and display confidence in their ability to interpret data from languages they do not know (e.g., Ekman, 2003), in a deep belief that “language is above all a medium in which we express our thoughts and feelings, and it mustn’t be confused with the thoughts and feelings themselves” (Pinker, 2007: 24). Anthropologists are fully aware of translation non-equivalence, yet talking about ‘working in the

local language' is, in the words of ethnographer James Clifford (1997), akin to opening a large can of worms:

Can one speak of the language, singular, as if there were only one? What does it mean to learn or use a language? How well can one learn a language in a few years? What about "stranger talk", specific kinds of discourse used with outsiders? What about many anthropologists' continuing reliance on translators and explicators for complex events, idioms and texts? (p. 22)

Instead of opening this can, anthropologists and ethnographers often treat their linguistic limitations and incompetencies as a kind of taboo. In the research on language and emotions, I was able to identify only a few ethnographies that acknowledged linguistic misunderstandings and provided sufficient information about the authors' language competencies (or lack thereof), language-learning histories, and language choices made in data collection (e.g., Briggs, 1970; Dureau, 2012; Heider, 1991; Levy, 1973; Riesman, 1977). The majority did not discuss the topics at all or summarized them in a few lines. Some even argued that "it is not given that better language faculty will necessarily improve the quality of our accounts or our understanding. There is even a danger it may have the opposite effect" (Wikan, 1993: 206). The disinclination to discuss linguistic competencies is shared by many linguists, leading Crowley (2007) to note:

The authors of most published grammars ... are surprisingly reticent about their own conversational abilities in the language in question. Perhaps this is because they are being modest, but my suspicion is that many are somewhat reluctant to let it be known too publicly that they did not manage to become very conversational in the language. (p. 56)

This lack of fluency is not considered to be a deterrent and a common mantra in linguistics is that "one does not need to be able to speak a language in order to analyze it" (Crowley, 2007: 155). This attitude is reflected in the many guides to linguistic fieldwork that introduce novice fieldworkers to the basics of data elicitation, sound- and video-recording, grant-writing, the ethics of community work, even integration of gestures and music but remain silent about the ways in which data collection and interpretation may be affected by cross-linguistic influence (e.g., Bower, 2008; Crowley, 2007; Samarin, 1967; Thieberger, 2012; Vaux & Cooper, 1999). At best, budding linguists are taught to avoid 'problematic' multilingual informants who may insert loan words or use a language different from the one the researcher is trying to elicit (Bower, 2008: 88, 112; Vaux & Cooper, 1999: 42). The study of the language to be researched is often treated as a 'waste of time' and novice fieldworkers have to be reminded that learning to speak the language "is a good idea" (Crowley, 2007: 155) and that "there are numerous advantages to being fluent in the language you are studying" (Bower, 2008: 9). And if they do not know what

precisely constitutes ‘fluency’ and how one might go about achieving this rather elusive goal, they are offered this helpful description:

Different cultures have different ideas about what constitutes fluency. In English we tend to think of it as a mastery of the collocations and idioms of the language. In Bardi someone who’s ‘fluent’ is someone who can conjugate a verb. Mastering the phonemic system with a good accent might also get you labeled as ‘fluent’ even if you can’t put a sentence together. (Bowern, 2008: 116)

Crowley (2007) is somewhat more specific in setting fluency goals for fieldworkers:

Conversational fluency might be too high a goal to set for many people, while an ability just to express greetings is surely too low a goal. Most people should probably aim for something between these two extremes. (p. 160)

Such comments show that, despite being linguists, we hold ourselves to an abysmally low standard as language learners, all the while requiring the immigrants who drive our taxis, maintain our yards, and serve our fast food to display full conversational fluency. This double standard is also apparent in my own field, North American SLA, as seen in scholars who build their whole academic careers on interpreting Bourdieu or Vygotsky, without bothering to learn either French or Russian, and then apply the ‘insights’ gained from poorly translated texts to L2 learning by others. Yet the most striking gap in linguistics is in the lack of any kind of dialog between linguists engaged in fieldwork and the study of ‘other’ languages and linguists engaged in the study of the L2 learning process. The past few decades of research in SLA seem to have passed field linguists by and one would be hard pressed to find an informed discussion – or, in many cases, any discussion – of the factors that affect L2 learning, the ultimate achievement, fluency, proficiency, and cross-linguistic influence in the guides to linguistic fieldwork.

The amount of time fieldworkers need to reach fluency – approximately six months (Crowley, 2007; Samarin, 1967) – is also strikingly different from the many years needed by other L2 learners to achieve fluency and from the decades required for native-like performance and grammaticality judgments in the L2 (Abrahamsson, 2012; Abrahamsson & Hyltenstam, 2009; Bylund et al., 2012; Ellis, 2008; Ortega, 2009). Yet the factors that constrain L2 learning and impede communication and comprehensibility for FL learners, immigrants, and refugees seem to be curiously inapplicable to fieldworkers, who are encouraged to think that “one can have an excellent understanding of the workings of a language without being able to make use of that knowledge to put a sentence together in real time” (Bowern, 2008: 9). Really?

I cannot help but disagree. My concerns are reinforced by the many errors I see in translations from Russian and in Russian examples in academic literature. Some authors cannot even get the basic facts right: Berlin and Kay

(1969), for instance, present a low-frequency word *kirpichnyj* [brick-color] as a basic Russian color term (instead of the high-frequency *oranzhevyi* [orange]) and a false cognate *purpurnyi* [blood-red] as translation of *purple* [fioletovyi], while Richards' (1998: 393) history of the calendar lists *nedelya* [week] as a Russian term for Sunday, which is actually *voskresenie*. The 'naturalness' of English categories also led some scholars to 'amend' Russian, as seen in Berlin and Kay's (1969) and MacLaury's (1997) arguments that Russian does not "really" have two basic terms for blue. Such errors may appear minor, yet they do exert their price: in the research on motion, the lumping of Russian together with English has derailed the search for 'language effects', while in Vygotskian scholarship the reliance on English translations full of errors and omissions led to distortion of Vygotsky's views.¹

The casual treatment of Russian also raises a larger concern: if we see a proliferation of errors involving one of the world's most widely spoken languages, can we trust claims made about languages spoken by small groups of people by linguists and anthropologists who studied the language for six months, or even a year or two, or by psychologists who rely on bilingual assistants and have no knowledge whatsoever of the languages spoken by the study participants?

I, for one, have my doubts and suspect that, with the passage of time and accumulation of knowledge, some 'linguistic facts' that roll from article to article like so many snowballs, may not withstand closer scrutiny and do exactly what snowballs do – melt in front of our very eyes, leaving us with a puddle of muddy water that reflects our own biases and preconceptions. The very words we have come to know and love as 'their' terms for 'colors' or 'emotions' may turn out to be nothing more than the local way of saying 'uhm'.

Now, I do not mean to imply that psychologists should work on English only or that linguists and anthropologists should cease fieldwork in 'other' languages. In fact, I deeply regret that documentation of endangered languages – a pursuit so dear to Boas, Sapir, and Whorf – has been derailed by the Chomskyan enterprise that turned linguistics into an armchair pursuit and shifted the focus away from meaning to linguistic universals. While I do not believe in 'saving' languages whose speakers no longer wish to use them, I see language documentation as the most urgent task for today's linguistics that is most likely to advance our understanding of language and cognition, language history, contact, and change² (for similar arguments, see Evans, 2010; Evans &

¹ For discussion of the sources of errors in Vygotsky's English-language texts see van der Veer & Yasnitsky (2011) and for examples of differences between Vygotsky's Russian and English texts see Kellogg & Yasnitsky (2011).

² Critics are undoubtedly right in accusing documentary linguistics of commodification and objectification of languages as products, static objects of descriptive study, yet this approach still beats the alternative, namely armchair linguistics (for suggestions on how to address these concerns, see Austin & Sallabank, 2011).

Levinson, 2009). From this perspective, the authors of fieldwork manuals criticized above should be commended for their service to the field and Australian linguistics recognized for its commitment to ‘dirty-feet linguistics’ (Crowley, 2007) and for encouraging doctoral students to document languages and write reference grammars as Ph.D. dissertations. North America is also experiencing a revival in Boasian-style language documentation, even though the field has not yet met the standard set up by Boas and Sapir, who trained native speakers to document their own languages (Austin & Sallabank, 2011; Evans, 2010; Harrison, 2007).

My key point is that researchers working in and on ‘other’ languages as well as on the languages they consider ‘their own’ need to start worrying – and continue to worry – not only about malfunctions in the recording equipment but also about ‘language effects’: the blindness to the artificial nature of the categories of our own languages, perpetuated by the illusion of the seamless concord, the limitations of the knowledge of the L2, which cannot be overcome by a year or two of language study, and the unavoidable distortion of translation. There is no magic that would allow us to overcome these ‘language effects’, yet future research can only benefit if we make our linguistic competencies and biases explicit, acknowledge the inconsistencies, reveal our concerns and outline the many delicate interpretive steps that transform the world of the Utku, the Ilongot or the Pirahã for English-language publications.

I also agree with Kagan (2012), who, in his compelling treatise on the crisis in the field of psychology, argues that psychologists should be troubled by the fact that most of the world’s research on human cognitive processes has been conducted in English by Americans on Americans, many of them college students between the ages of 17 and 25. Let me just add that even in the context of such research, psychologists need to worry about ‘language effects’, because – as shown, time and again, on the pages of this book – the treatment of bi- and multilinguals as representative speakers of their L1s has compromised validity and reliability of findings in all areas of research on language and cognition: color perception (e.g., Berlin & Kay, 1969; Heider, 1972; Laws et al., 1995; Winawer et al., 2007), object and substance categorization (e.g., Iwasaki et al., 2010; Kuo & Sera, 2009; Mazuka & Friedman, 2000), numerical cognition (e.g., Butterworth et al., 2008), motion (e.g., Loucks & Pederson, 2011; Papafragou et al., 2008), space (e.g., Munnich et al., 2001), emotions (e.g., Bryant & Barrett, 2008), and autobiographical memory (e.g., Wang, 2009).

Yet there is one issue I would not worry about and that is showing ‘language effects on non-linguistic cognition’ in the laboratory. For more than half a century we have been involved in the inquiry articulated in the binary terms of either/or, focused on the brain as a disembodied and decontextualized entity, and conducted on the terrain most comfortable for experimental psychologists with tools like the priming paradigm or Munsell color chips. While potentially

highly rewardable by prestigious publications in *Nature* or *Science*, such effects cannot be but minor and of little relevance to everyday life. The time is ripe for linguists to abandon the SWH ‘as we know it’, to cease the attempts to impress or convince Gleitman or Pinker by ‘turning the tables’ just right, and to focus on *thought insofar as it is linguistic* in the mind that is embodied, heteroglossic, and situated in context.

This inquiry has to encompass what Lucy (1996) calls *semiotic relativity*, namely the difference language makes for thought, and to address the question articulated by Evans and Levinson (2009): in the absence of ‘linguistic universals’, ‘how are we to reconcile diverse linguistic systems as the product of one cognitive system?’ (p. 445) *Pace* Hymes (1996), we also cannot lose track of the ways in which forms of linguistic difference produce linguistic inequalities.

Only research sensitive to linguistic inequalities can illuminate how ‘language effects’ come into being and how, when, and why additional language learning may destabilize ‘language effects’. This means, in simple words, that we cannot just examine how the Dani, the Pirahã, or the Kayardild ‘think’ compared to English speakers – we also need to consider how speakers of English acquire Dani, Pirahã, or Kayardild, where they draw the line, and where, how, and why they may fail to become ‘native-like’. I have a few ideas on what happens when we start learning another language – they will be the subject of my next book.

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