The conceptual motivation of aspect*

Teenie Matlock
University of California, Merced

Aspect expresses information about how events unfold in time. In English, imperfective aspect is known to widen the temporal scope of the event described, but little is known about how such imperfective descriptions are processed or what motivates their use. This chapter investigates the conceptual impact of aspect, especially imperfective descriptions of past events, and argues that it shapes our understanding of events, and that its use and function is motivated by our everyday experience of perceiving and simulating events.

Keywords: event construal, imperfective aspect, inference, perfective aspect, simulation

1. Introduction

Descriptions of past events are frequent in everyday communication. There is a simple reason for this. People spend a good deal of time reporting what they have done, where they have been, and what they have seen. For thousands of years, people have been reporting their actions through pictograms, oral histories, diaries, email, blogs, and more. Given the need to report events, it is no surprise then that human language has evolved special conventions for describing past events. One such mechanism is linguistic aspect.

Aspect as a grammatical form is used to convey information about how events unfold in time, including whether they are short or long in duration, whether they are

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continuous or repeated, and whether or not they are completed.[1] A common aspectual distinction observed in many languages is that between *perfective* versus *imperfective* processes. Perfective aspect emphasizes the completion or entirety of an event, and imperfective aspect emphasizes its ongoingness. In English, perfective aspect is realized by using the simple tense form, as in *Maria studied linguistics*, and imperfective aspect is realized by using the progressive form, as in *Maria was studying linguistics*. Some languages overtly mark this difference, precisely, with aspectual markers affixed to verbs. In those languages, there is often a clear and unambiguous distinction regarding the use of the two forms. (For an in-depth discussion of aspect and how it varies across languages, see Comrie 1976 and Dahl 1985.)

In English, imperfective aspect can be used to describe a situation that was not finished prior to the time of reporting. It may also be used to describe a situation that is known to have finished. In talking to a friend about a concert, for instance, a person may state either of the following: *The pianist was performing last night* or *The pianist performed last night*. The former may imply that the pianist did not finish performing, but not necessarily. She may have been whisked away by an ambulance after fainting during the first piece, or she may have played the entire program as well as an encore before stepping off the stage and calling it a night.[2] This aspectual vagueness is generally not problematic for English speakers because local linguistic and social context disambiguate. Imperfective aspect is also used by English speakers to temporally frame other events. For instance, in describing an evening at the symphony to a friend, I might say, *While the pianist was performing Jeux d'Eau, a cell phone rang* or *When the pianist was performing Jeux d'Eau, somebody in the third row started snoring*. (See Brinton 1988 as well as Radden & Dirven 2007 for comprehensive discussion of English aspect.)

Aspect is widely discussed in linguistics. Much attention is given to how it interacts with other linguistic systems, including tense and verb semantics, its diachronic development, and the way it varies from language to language. Some psycholinguistic work investigates aspect, but the number and scope of studies in this area is fairly limited, the reason being that aspect is difficult to study experimentally. There are several reasons for this difficulty, including the following. First, aspect varies in form and function from language to language. Some languages have a clear distinction between imperfective and perfective descriptions, and others do not. Second, terminology for labeling aspectual forms is inconsistent. Consequently, the same form can be categorized in different ways. Third, aspectual notions can be marked grammatically, lexically, or both. For instance, in English, one can say *He was sleeping all night*, where

1. Unlike some of the more traditional work on aspect, in this chapter, *event* and *action* are used fairly liberally. They can refer to processes and situations.

2. There are of course cases in which the imperfective is not used by English speakers to describe completed past events. When and when not to use imperfective aspect can be driven by local linguistic context, shared knowledge of the speaker and listener, and verb semantics, such as telicity.

imperfective aspect extends the event, or *He continued to sleep all night*, where the word *continue* extends the event. Fourth, the nature of the event can determine which aspectual form is appropriate. It would be odd, for example, to say that you were popping a balloon for two minutes but fine to state that you were deflating one for two minutes. Fifth, the pragmatics of the situation figures into the interpretation of aspect. (For detailed discussion of aspect and some challenges in characterizing or classifying it, see Comrie 1976 and Croft 2009.)

This chapter examines aspect and linguistic motivation. Special attention is given to the inferred meanings that arise with descriptions of past events, and what motivates the use of imperfective and perfective. Motivation is an important notion in cognitive linguistics even though language theorists have differing opinions about what it is. Simply stated, motivation provides insights into the structure, use and development of language. On one level, it concerns external influences, including culture and social prestige of a linguistic form in a speech community (see Radden & Panther 2004, for discussion). However, it also involves internal influences, including cognitive processing. The main issues here are how imperfective and perfective aspect are processed, and what inferences arise with their use. Given that imperfective aspect emphasizes the ongoing nature of situations (Frawley 1992; Narayanan 1997; Talmy 1985) and that it encourages an internal perspective (Langacker 1987; Madden & Zwaan 2003), it may cause the conceptualizer to attend closely to details related to the situation and infer that a good deal of action occurred during the given period, more than perfective aspect, which encourages external perspective. Consequently, the conceptualizer might infer that more music was played (e.g. longer concert, more pieces) when processing a statement such as *The pianist was performing last night* than with *The pianist performed last night*. Before discussing three psycholinguistic studies that investigate this possibility, some background information on event conceptualization is provided.

2. Experimental research on event construal

Cognitive scientists have used a variety of methods and approaches to study event structure. One strand of this research considers how events are conceptualized over time. In experimental work on event structure, Zacks and Tversky (2001) took up the following questions. How do people segment events? How do we know when an event ends and another starts? Where are the natural transition points in event structure? Participants in their study watched videos of everyday events, such as doing the dishes or putting together a saxophone. In doing so, they were asked to identify when a new segment started. The results revealed a good deal of consistency across experimental participants, suggesting that people conceptualize the unfolding of events in similar ways.

Other cognitive work investigates brain activation during the processing of events that are depicted in static images. In a cognitive neuroscience work on events, Kourtzi and Kanwisher (2000) addressed neurological patterns of activation while people

viewed pictures of implied motion. They were interested in whether brain areas ordinarily engaged when people are actively watching motion would also be engaged when people are simply looking at static images of people in motion. In the study, participants were placed in a functional MRI scanner,[3] where they viewed photographs of people in action or not in action, for example, a man about to hurl a discus (one arm is raised and about to release the discus) or a picture of a man simply holding a discus (arm is down). Activation was pronounced in areas associated with motion perception when participants viewed action shots (even though nobody was actually moving), much more than when they viewed non-action shots. The results suggest that people readily simulate motion from implied motion alone. In similar work, Freyd (1983) showed that when participants view a picture of a person or entity undergoing unidirectional motion (e.g. man stepping off a bus), they later judge the mover to be farther along the trajectory than it actually is. This, too, reveals that people are naturally inclined to simulate motion from the suggestion of motion.

These and other studies in cognitive science are valuable because they shed light on how people conceptualize events. They show that people consistently break down events in similar ways, and that they naturally simulate the events they are perceiving, even when the action is implied. Such work does not, however, address the linguistic forms that people use when they talk about events. Language is known to influence how situations are perceived (see Richardson & Matlock 2007, for experimental work that showed how spatial descriptions can dramatically influence the way people visually process spatial scenes; see also Gibbs 2006 for general discussion of language and embodied cognition). Thus, it is important to consider how linguistic details can influence cognitive processing, including how people construe events when listening to or uttering event descriptions. How do the descriptions influence the way events are construed in time? Are these events continuous? Are they repeated, and if so, at regular intervals? Are they completed? Adequately understanding how event construal requires close attention to details of linguistic forms used to describe events, including grammatical aspect. In turn, it is also important to consider how cognitive processing can influence the understanding of language, including the choice of words or phrases used to describe events. The next section provides background on aspect and its role in the processing of event descriptions.

3. Experimental research on aspect

Aspect has received extensive attention in linguistics, but it has been given relatively little attention in psycholinguistics. Much of the experimental work on aspect and event construal has been conducted in the area of narrative comprehension. In these

3. Functional magnetic imaging is used to measure signal changes in the brain that arise with shifts in neural activity.

studies, participants are required to read a short passage and then make a timed yes-no decision about a target sentence related to the passage. Often the aim is to study how people create and update situation models from linguistic descriptions about events. Simply stated, situation models are imagined spatial domains that "contain" people, objects, and events (see Morrow & Clark 1988; Morrow 1985; Zwaan, Radvansky & Graesser 1995). In Magliano and Schleich (2000), participants read stories about situations described with either imperfective or perfective aspect. Later they were later asked questions pertaining to the events they had read. In brief, in the first two experiments, people were more likely to infer that events were still happening when they had read imperfective descriptions than they were when they had read perfective descriptions. These results were consistent with linguistic characterizations of imperfective and perfective aspect: The former highlights ongoing elements of an event, and the latter, completion. More compelling was Magliano and Schleich's (2000) third experiment, where imperfective descriptions resulted in better memory for event details than did perfective descriptions. The result suggests that people allot more attention to interpreting imperfective event descriptions.

In similar work on aspect and situation models, Morrow (1990) asked participants to read about a protagonist who moved from one room to another (e.g. *walked* or *was walking*) and then answer questions about the location of the protagonist. With perfective descriptions of movement, participants often judged the protagonist to be in the second room, but with imperfective descriptions, they tended to judge that the protagonist was en route to the second room. Similar results were found in a novel computer- mouse-tracking study by Anderson, Matlock, Fausey, and Spivey (2008). Participants were shown a scene that included a path that terminated at a destination (e.g. a school). Outside the scene was a static silhouette figure, such as a man jogging. While looking at the scene, participants were presented with a spoken sentence describing the movement of the protagonist. At that time they were to click on the character and place it in the scene to match the description. Both the imperfective and perfective descriptions included a variety of translational motion verbs, such as *jog, ride,* and *hike* and a *to* + location phrase about the destination. These descriptions also included a conjoined clause that was intended to draw some degree of attention to the destination.[4] Examples of the motion descriptions used in this study included *Tom **was jogging** to the woods and then stretched when he got there* (imperfective) and *Tom **jogged** to the woods and then stretched when he got there* (perfective). On average, people were slower to drag the character to the destination when they were listening to imperfective motion descriptions (versus perfective). The results suggest that slower

4. This was done to lower the probability that participants would infer that the character did not reach the destination with imperfective descriptions. The concern was that participants might drop the character on the path if they made this inference. Note that even with a clear destination point, a few participants did drop the character on the path with the imperfective. However, the trend of slower motion along the path was still evident.

movement with processing imperfective aspect reflects greater attention to the process of movement to a destination.

Finally, in a study by Madden and Zwaan (2003), participants were presented with drawings of actions that were in progress or completed (e.g. somebody building a fire or sitting next to a fire right after having made it) and asked whether imperfective or perfective descriptions matched. Participants were reliably quicker to match perfective descriptions with pictures of completed actions (versus incomplete actions), but they did not vary much at all when matching imperfective sentences with pictures of complete or incomplete action. Based on the results, Madden and Zwaan (2003) concluded that the imperfective provided an internal viewpoint, which allowed people to pay attention to details of the action and simulate the motion and that the perfective encouraged an external viewpoint such that the people readily imagine the end state of the action. (For related work on the processing of aspect, see Ferretti, Kutas & McRae 2007; Madden & Therriault 2009; Madden & Ferretti 2009.) Together these studies suggest that people attend more to the ongoing process of an event with imperfective descriptions than with perfective descriptions. They also suggest an internal perspective with imperfective aspect, and an external perspective with perfective aspect. Are there other fruitful issues to consider around the processing of aspect and its role in event construal? What about amount of action conceptualized in listening or uttering events? Will more action be inferred with the imperfective because it focuses on the process and because people naturally mentally simulate actions when processing event descriptions (see Matlock 2004)? Could this ability motivate the way people use and understand aspect in everyday language?

4. New experiments on aspect and event construal

Three studies investigate amount of action conceptualized with imperfective and perfective event descriptions. In Study 1, participants were given a sentence with an adverbial clause that contained a perfective or imperfective description and asked to complete the sentence. In two other studies, they were given a perfective or imperfective description of an event and asked a question about the action described. In Study 2, they were asked about number of objects affected by an action. In Study 3, they were asked about amount of time transpired with an unbounded action.

Study 1: Sentence completion task

A sentence completion task was designed to investigate how much action would be conceptualized in processing descriptions of past events with imperfective and perfective aspect. The task was completed by 351 undergraduate students at University of California, Merced, who volunteered for extra credit in a cognitive science, political science, or psychology course. Participants in the imperfective condition were asked to complete a sentence that began with the adverbial clause *When John was walking to*

school, and participants in the perfective condition were asked to complete a sentence that started with the adverbial clause *When John walked to school*. These clauses were followed by a blank line, where each participant provided a response. In this and the other studies reported in this chapter, the task was included in a booklet of unrelated surveys that were distributed to participants, who had five days to finish these tasks.

After all responses were collected, all responses (i.e. main clauses) were inspected. Thirteen responses were removed because they were not well-formed, for instance, *When John walked to school,* ***bananas*** or *When John was walking to school,* ***and everyone said nice shirt***. Removing these infelicitous data left a set of 338 responses (96% of the original set).

Three analyses were then conducted to investigate the amount of action that participants conceptualized. One investigated how many actions were included in the main clauses across participants. To measure this, the author and one other individual coded the responses. A clause such as *he tripped* counted as one action, and a clause such as *he tripped and fell* counted as two actions. Two coders agreed on 98% of the items initially, and came to agreement on 100% of the items after discussion.

An initial analysis examined which aspectual form participants provided in their main clauses. Nearly all participants (99%) wrote down perfective verbs. The second and main analysis targeted amount of action conceptualized. This required comparing the average number of actions generated by participants in the two conditions. Most participants (85%) wrote down a single action, for instance, *he saw a girl* or *he tripped*, but some participants wrote down multiple actions, for instance, *he tripped over a stick, and cracked his head open on a rock* or *he helped an elderly lady cross the street*. (Note that of all descriptions with multiple actions, 99% had two actions, and 1% had three actions.) Of the 287 main clauses that included only one action, about 48% appeared in the sentences that began with *When John was walking to school* (imperfective) and 52%, with *When John walked to school* (perfective). Of the 51 main clauses with multiple actions, 69% appeared in sentences starting with imperfective information, and 31% appeared in sentences starting with perfective information. The analysis reveals that imperfective aspect yielded proportionally more actions per main clause than did perfective aspect. A chi-square test of significance showed a reliable effect ($\chi^2(1) = 7.56$, $p = .006$, Pearson, two-tailed). The results, which are graphically depicted in Figure 1, suggest that imperfective aspect can cause people to conceptualize more action than perfective aspect.

The next two analyses in Study 1 examined two types of everyday actions that appeared in participants' responses. The intent was to compare the frequency of translational motion verbs and perception verbs in the imperfective and perfective conditions. Both are basic, familiar actions that can require a relatively long time to do or imagine. One analysis examined motion verbs, such as *trip, slip*, and *go*, and the other, perception verbs, such as *see* and *watch*.

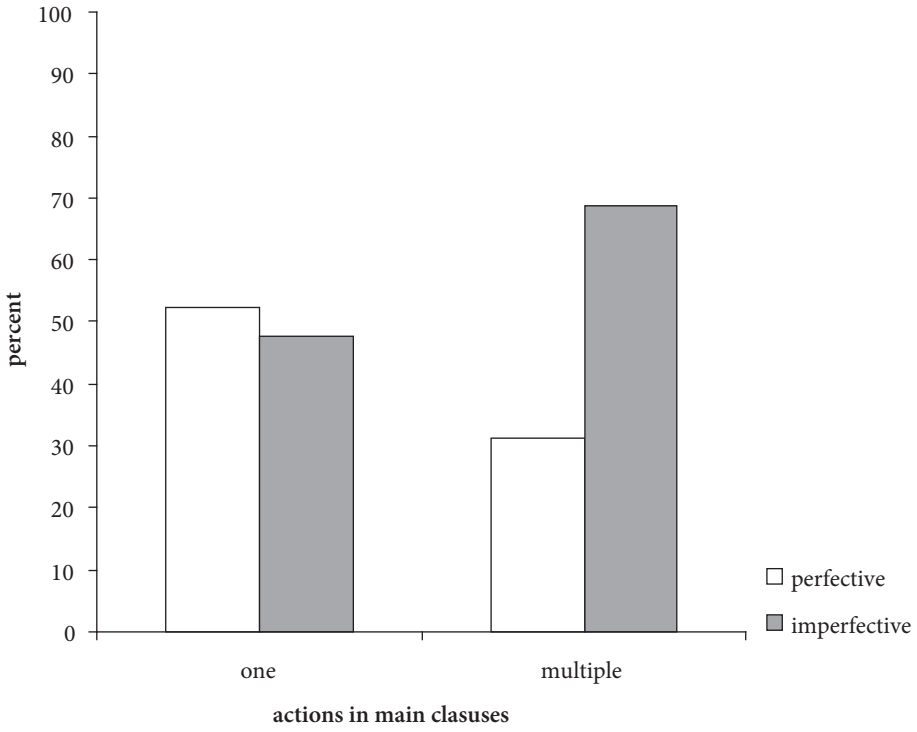

Figure 1. In Study 1, more action was conceptualized with imperfective aspect.

Of the 287 participants who wrote down one action, 32% provided a translational motion event (68% did not). About 60% of all these motion events appeared in the responses provided by participants in the imperfective condition, and about 40% appeared in the responses provided by participants in the perfective condition. The results, reliable according to a chi-square test of significance, ($\chi^2(1) = 8.62$, $p = .003$), show that imperfective information was more likely to include translational motion verbs than was perfective information. Of the participants who generated a single action, about 19% provided a perception verb (81% did not). Approximately 62% wrote imperfective responses, and 38% wrote perfective responses. The results, reliable according to a chi-square test of significance ($\chi^2(1) = 5.41$, $p = .02$), indicate that imperfective information was more likely to lead to responses with perception verbs than was perfective information.

Together, the results suggest that people conceptualize more action when they process imperfective descriptions of events than when they process perfective descriptions of events. Closer analysis showed that this is true of both translational motion verbs and perception verbs, two frequently used verb types. Critically, such differences were not the result of more lexical items in the main clauses that participants provided when they

were completing imperfective adverbial clauses. People differed little in the number of words they wrote down. If anything, there was a trend toward more words in the perfective condition (M = 5.28, SD = 2.1) than in the imperfective condition (M = 4.88, SD = 2.37) ($t(336) = -1.64$, $p = .10$). Nor were the differences the result of varied amounts of agency. In both conditions, many people wrote down agentive responses, precisely, clauses with the nominative subject *he*, which co-referred to the animate agent *John* in the adverbial clause (85% in the imperfective condition, 87% in the perfective condition). The chi-square test of significance was not reliable, ($\chi^2(1) = .43$, $p = .51$).

This was only one task, an open-ended task that required participants to complete a sentence. Would a similar effect be obtained in other, more controlled studies? In the two studies that follow, participants were required to make estimates about actions, including estimates about number of goals completed with telic action descriptions and number of hours transpired with atelic action descriptions. Telic actions have a built-in end point, and atelic actions do not.

Study 2: Telic events

A total of 88 students enrolled in an introductory cognitive science course at University of California, Merced, read a sentence about a set of actions described with imperfective or perfective aspect, namely, *John was painting houses last summer* or *John painted houses last summer*, and then answered the question, *How many houses?* Painting a house is a telic action because it involves a goal that must be realized (i.e. a house that has been painted).

Prior to an analysis that compared mean responses in the two conditions, data from seven participants were removed because of uninformative answers such as "don't know" or "??". Overall, participants estimated that eight more houses were painted when the action was described with imperfective aspect ($M = 22.01$, $SD = 17.3$) versus perfective aspect (M = 13.58, SD = 11.78) ($t(80) = 2.59$, $p = .01$), as shown in Figure 2. This difference suggests that more painting activity was conceptualized with imperfective descriptions, critically, even when the time period was held constant across the two conditions ("last summer").

So far, we have investigated the conceptualization of telic events, including motion to a specific destination (Study 1), and painting houses (Study 2). Would a similar effect be observed with atelic situations?

Study 3: Atelic events

Study 2 explored the role of aspect in the comprehension of bounded events. Painting houses involves a set of discrete events, each one with a goal that is to be realized. What about events that are inherently unbounded (i.e. on-going with no clear end point), such as driving? Will imperfective aspect have a similar effect? Study 3 tests this possibility.

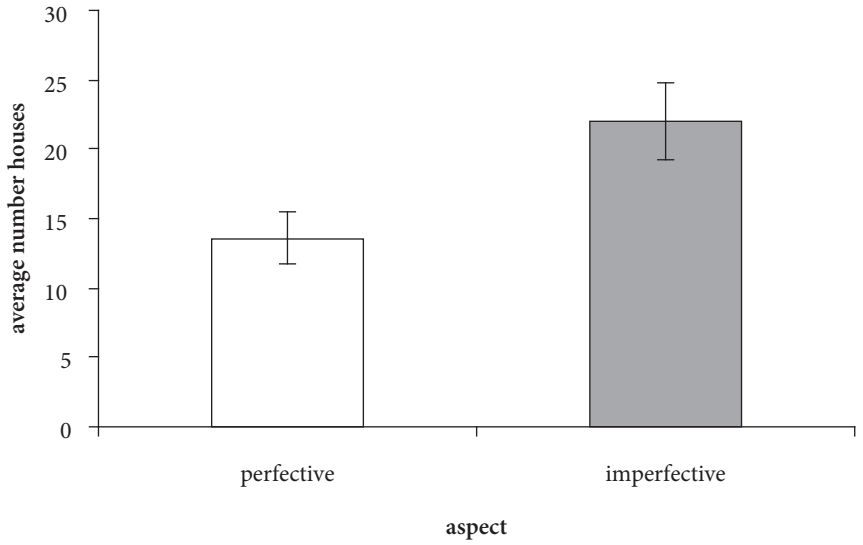

Figure 2. In Study 2, estimates for houses painted were higher with imperfective aspect

Participants were the same 88 individuals who volunteered for Study 2. They read an imperfective sentence about driving, *John was driving last weekend*, or a perfective sentence about driving, *John drove last weekend,* and then answered the question *How long (number of minutes or hours)*? The task for this study appeared as a separate question below the question about painting houses that was used in Study 2. Other, unrelated questions, for instance, a filler task that involved estimating amount of money in a drawer, appeared below the questions used for Study 1 and Study 2. Participants were presented with either only imperfective forms or only perfective forms for consistency. After data from four individuals who gave uninformative responses were discarded, scores were calculated for the remaining 84 individuals by averaging driving time estimates. As shown in Figure 3, driving time was about nine hours longer with imperfective ($M = 20.75$, $SD = 21.32$) than with perfective ($M = 11.78$, $SD = 14.15$) ($t(83) = 2.28$, $p = .03$). These results are consistent with Study 1 and Study 2. More action was conceptualized with the imperfective.

Discussion

Three experimental studies investigated aspect in descriptions of past events. The results suggest that imperfective aspect leads people to infer more action than perfective aspect does. The imperfective caused participants to think about more action in general in Study 1. It resulted in estimates about more completed actions (houses painted) in Study 2. It encouraged thought about longer duration of actions (hours driving) in Study 3. In all cases, nothing objectively changed about the situation itself. What changed was the aspectual form, which had consequences for event construal.

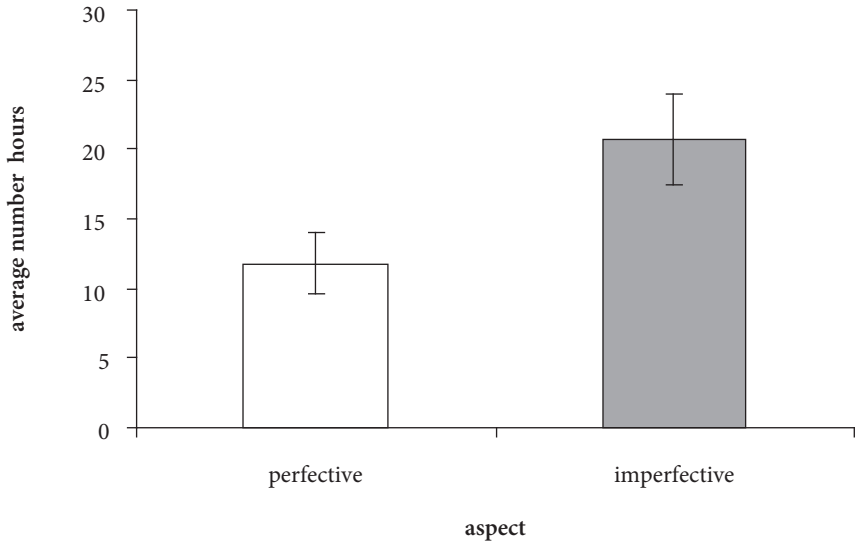

Figure 3. In Study 3, estimates for driving time were higher with imperfective aspect

Initially, these results may seem unremarkable given the semantics of imperfective aspect. It is known to "stretch" the time window in which actions occur (see Frawley 1992, for instance). This naturally means a larger time window for action. Note, however, that in two of the studies reported here participants were given a specific time frame (Study 2 and 3) and in both cases, differences still arose. Moreover, similar effects were obtained in other studies, including Anderson, Matlock, Fausey, and Spivey (2008), the computer mouse-tracking study mentioned above. Similar results have also been obtained by Matlock and Fausey (in progress), in which one study tested whether people would conceptualize more state changes in objects when reading about actions described with imperfective aspect than they would when reading about actions described with perfective aspect. Participants were presented with a picture of 16 identical objects arranged in a four by four grid, such as 16 wine glasses, and asked to read an imperfective or perfective sentence, such as *Last night Tom was spilling some of the drinks at the dinner party* and *Last night Tom spilled some of the drinks at the dinner party.* They were then instructed to put an "x" on the objects that were described by the sentence. This would allow an assessment of which objects were believed to have undergone a state change. Overall, participants put an "x" on more objects with imperfective descriptions than with perfective ones, even though both forms were temporally framed by "Last night".

What do we make of these and the results reported above? Why would the imperfective give rise to a "more action" effect, especially when it can often imply that events are partial or incomplete? The answer may lie in mental simulation. Recent work in higher level cognition and language understanding has provided compelling evidence

to show that mentally simulating actions is part of everyday thinking and reasoning. It is now considered to be an important process in many aspects of human thought and communication. Simulation structures our understanding of concepts and categories (Barsalou 1999). It plays a role in mental imagery (Spivey & Geng 2001) and memory (Glenberg 1997). It helps us interpret movement in static images (Freyd 1983). It shapes our understanding of literal descriptions of transference, concrete or abstract (Glenberg & Kaschak 2002) and facilitates our understanding of time (Matlock, Ramscar & Boroditsky 2005). It facilitates problem-solving (Schwartz & Black 1999). It influences our understanding of politics (Lakoff 2008). It shapes our understanding of metaphorical motion (Matlock 2004) and metaphor in general (Gibbs & Matlock 2008). (For comprehension review of simulation in cognitive processing, see Barsalou 2009.)

The results reported and cited in this chapter bear directly on linguistic motivation and aspect in event construal. Note that people inferred more action in situations described with imperfective aspect. It is reasonable to assume that these inferences were cognitively motivated by mental simulation. That is, reading about a situation described with imperfective aspect required the speaker or listener to simulate an ongoing action, which led to inferences about more action. In this way, the imperfective appears to have the potential to influence how the content of the situation is construed. Thus, our general conceptual ability to simulate events motivates our ability to infer more action with the imperfective. Good evidence for this claim is apparent in recent developments in cognitive neuroscience. There is a biological basis for simulating action from seeing or imagining motion. For instance, brain areas associated with motor activities are naturally activated by nothing more than seeing others take action (see Gallese & Lakoff 2005; Rizzolati, Fogassi & Gallese 2002; Rizzolati & Sinigaglia 2008). And as mentioned, motion perception areas are activated from implied motion alone (Kourtzi & Kanwisher 2000; see also Winawer, Hulk & Boroditsky, in press). If people take an internal view of an ongoing situation (Madden & Zwaan 2003), this increases their subjective experience of the process and engages them in moment-to-moment processing. This simulation explanation also finds support in cognitive linguistics research, including Langacker's (1987) sequential scanning. On this view, imperfective aspect "moves" the conceptualizer through the action, from time 1 to time 2 to time N.

What next? It would be useful to further explore the parameters of aspect using experiments, including the conditions under which imperfective brings on a sense of "more action". When does it imply more space? When does it convey more time? When might it imply less? Experimental work should also examine a broader range of verbs than is currently considered in psycholinguistics. It may also be informative to explore differences in temporal distance from time of speaking, and test for possible magnitude effects (see Liberman & Trope 2003). Perhaps the "more action" effect of imperfective will diminish when event descriptions are far versus near in the past, for instance, *John was painting houses in the summer of 1979* and *John was painting houses in the summer of 2009*. It could also be illuminating to conduct experimental work on a broader range of languages. In recent years, new exciting work has investigated

imperfective and perfective in Chinese (e.g. Yap, Kawn, Yiu, Chu, Wong, Matthews, Tan, Li & Shirai 2009), Japanese (e.g. Yap, Inoue, Shirai, Matthews, Wong & Chan 2006), and a few other languages. However, far more research could be done on the psycholinguistics of aspect across languages. Last, it could be useful to extend this line of research to explore imperfective and perfective construals of future event descriptions. Much of our everyday thinking involves anticipating situations or states that are yet to come. The results could have implications for planning, estimating future outcomes, and for dreaming about the future.

5. Conclusion

There are many ways of expressing how an event unfolds in time, and aspect is critical to this process. One common way to do this is to highlight the ongoing nature of the event. Another is to spotlight the event as a whole. This chapter attempted to offer new insights on how aspect shapes the way people conceptualize events by drawing on experimental research. The results suggest that the use of grammatical forms, in this case, aspect, is cognitively motivated by our ability to simulate actions (Barsalou 2009) and our need to communicate details about past events. Research on aspect has valuable implications for the conceptualization of events as well as experimental cognitive semantics.

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