The Genesis of Syntactic Complexity

T. Givón

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Diachrony, ontogeny, neuro-cognition, evolution

T. Givón
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and Kees Vaes, the most supportive editor.

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Preface

It took a while to convince myself that I was ready for this book. In a way, I have been writing it for most of my linguistic life. In the beginning it all seemed disarmingly simple, with Chomsky's *Aspects* (1965) and Haj Ross's *Constraints on Variables in Syntax* (1967), and all languages marching in lockstep to the Generative drumbeat. Then came my long immersion in description and diversity, first Bantu and Africa and the puzzle of serial-verb constructions; then Semitic, the baffling typological melange of Amharic and the diachrony of Hebrew subordinate clauses; then Sherpa and Bikolano and the extreme nominalization of Ute; then serial-verbs again and the grand clause-chaining systems of New Guinea; then the extreme finiteness of Tolowa Athabaskan. The more I saw the phenomenology, the more complex it seems and the harder to reduce to abstract generalities.

A running argument with Andy Pawley and a chance conversation with Joan Bresnan led me to attempt a more coherent treatment of complex predications. Later on, an invitation to a symposium at Rice University allowed me to explore the diachronic underpinning of syntactic complexity more systematically. By then, it seemed clear that a mere-synchronic typology was nothing but diachrony shorn of its deep explanatory roots, an exercise in self-imposed blindness. This turns out to be in line with ideas suggested earlier by Joe Greenberg and, ultimately, by Hermann Paul. As in bio-evolution, it became increasingly clear, today's extant grammatical structures and their mind-blowing diversity were best understood and explained through tracing the developmental pathways that gave them rise.

The idea that the three grand developmental trends – diachrony, ontogeny and evolution – had something to do with each other is hardly novel. I have visited it twice before, in *On Understanding Grammar* (1979) and *Mind, Code and Context* (1989). Unimpeachable work in evolutionary biology, as recapitulated recently by Fernald and White (2000), supports the mutual relevance of everyday adaptive behavior, lifetime learning and skill acquisition, ontogeny, and evolution. Two bodies of work in linguistics have convinced me that it was possible to make sense of the tantalizing analogies between language diachrony, language ontogeny and language evolution. The first was Bernd Heine and Tania Kuteva's *The Genesis of Grammar* (2007). The second was a fresh look at the work of four *Grand Dames* of child language studies in the 1970's — Sue Ervin-Tripp, Lois Bloom, Melissa Bowerman and Eli Ochs. What seemed to emerge out of their cumulative work is the theme of gradual incrementation of grammatical complexity, firmly embedded in and motivated by the adaptive demands of the communicative ecology. Holger Diessel's (2005) work on the acquisition complex constructions

and subsequent conversations with Brian MacWhinney came just in the nick of time, prompting me to go back to the CHILDES data base and take a fresh look for myself.

Over the years, linguists have tended to view neuro-cognition as a handy field for testing their formal hypotheses. This has led to decades of a distorted research agenda, where linguistic theorizing absolved itself from seeking guidance, inspiration and biological constraints from cognitive neuroscience. And where neuro-linguistics acquiesced with its subordination to formal theorizing. I have attempted here to sketch out an alternative, whereby what the cognitive psychologists and the neurologists know about the workings and evolution of mind and brain would serve to constrain our theory-building. In this, David Geary's *The Origin of Mind* (2005), a tour-de-force of evolutionary psychology, proved most helpful. Equally stimulating was the vast literature on *Theory of Mind* launched by Premack and Woodruff (1978), which led me to a more precise understanding of the adaptive niche of grammar.

Despite forty-odd years in linguistics, I have remained a biologist at heart, in the humble gradualistic, adaptive-functional, variationist tradition of Aristotle, Darwin and Ernst Mayr. One of the things that puzzled me about linguistics from the very start was its fatal attraction to structuralism, whereby description or its formalization seemed to supplant explanation. This dark specter still bedevils the best of us, functionalists and formalists alike, impelling us to seek inappropriate models in physics, mathematics and computer science. And it has obscured from us the true mother discipline of the study of mind, behavior and diversity — biology. In this connection, it may be useful to recall Aristotle's original criterion for life — the *anima*, the purposive soul. What I have attempted to do here, as elsewhere, is to point out the fundamental unity of the disciplines that study life, and the essential connectivity of *Homo sapiens* to its long chain of bio-cultural antecedents. In this, I have been inspired by the work of animal ethologists such as Frans de Waal (1983, 2001), and Dorothy Cheyney and Richard Seyfarth (1990, 2007).

Many people have helped me along the way, contributing repeatedly to the gradual development of my thinking on the genesis of syntactic complexity. Their generous help and encouragement are acknowledged throughout the book. One paradoxical figure has loomed over the discussion from the very start — Noam Chomsky. He is the one responsible for my early and lasting interest in syntax. In a perverse way, he is also responsible for my decision to write this book now rather than later. It was his joint article with Hauser and Fitch (2002) that got me hoppin' mad: How was it possible for someone to invoke evolution while in the same breath rejecting Darwinian adaptive selection? In homage to his oft-infuriating genius for prodding linguistics — and many other disciplines — off the dime, I am sorely tempted to dedicate this book to him.

White Cloud Ranch
Ignacio, Colorado
September 2008

PART I

Background

CHAPTER 1

Complexity

An overview

1.1 Complexity and syntax

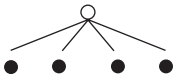
Complexity is a property of organized entities, of organisms, or systems. Individual entities, as long as they have no internal organization, are by definition maximally simple. They may become parts of an organized whole when they have some relations — or connectivity — within an organized **system**. Within an organized system, the simple entities may bear relations to the system as a whole, or to its sub-parts, or to each other. At the most abstract level, a system may be described as a **network** of nodes and connections, where the nodes stand for either the simplest entities or to more abstract, higher level sub-parts of the system, and the connections stand for the nodes' relations within the system.

As an illustration, consider (1a) below, which depicts ten simple entities with no connection to each other, thus not part of an organized system. Contrast (1a) now with (1b), where four of the simple entities partake in an organized system of the most rudimentary sort. In such a system, the individual nodes bear relations only to the system as a whole, which is then the sole abstract node.

(1) a. b.

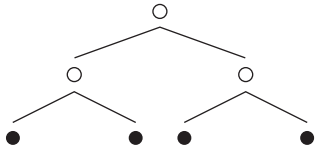
The 4-node system in (1b) may be also depicted, using a tree diagram, as a **1-level hierarchy**, with only one abstract node — or meta-level — representing the whole. That is:

(2) **1-level hierarchic system:**



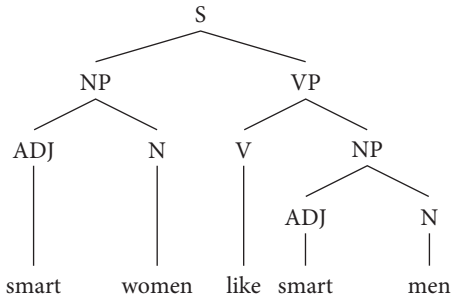
System (2) has the lowest complexity level, a 1-level hierarchy. But the same four entities may be re-organized in a more complex, **2-level hierarchy**, as in:

(3) **2-level hierarchic system**:



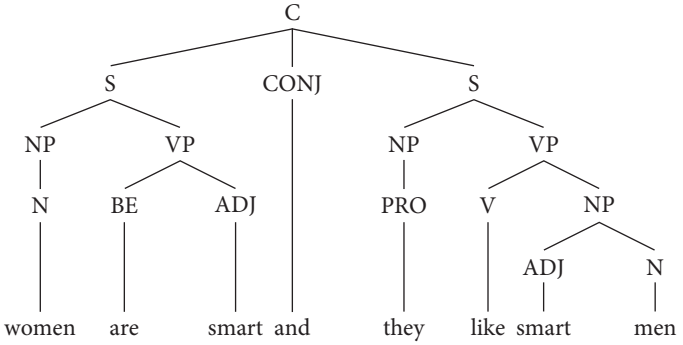
The gist of Herbert Simon's (1962) seminal work on the architecture of complexity is that increased complexity is, at the most general level, increased **hierarchic organization**; that is, an increase in the number of hierarchic levels within a system. And as Chomsky (1957) has made explicit, the syntax of a simple transitive clause can already be a 3-level hierarchy:[1]

(4) **Simple transitive clause: 3-level hierarchy**



Two or more simple clauses may be concatenated into a **clause chain**, as in:

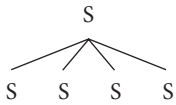
(5) **Concatenated (conjoined, chained) clauses**:



1. If the lexical words themselves are considered the terminal nodes, then (4) is, trivially, a 4-level hierarchy. But since there is no hierarchic branching below the lexical category node (N, V, ADJ), a more realistic view is that lexical category nodes are the terminal node in a 3-level hierarchic structure.

While chained clauses are definitely an **iterative** structure, whether they are embedded ('recursive') may be a matter of definition. Thus Chomsky (1957, 1965) considered them embedded under a higher node of the same type (S), thus presumably 'recursive'. That is:

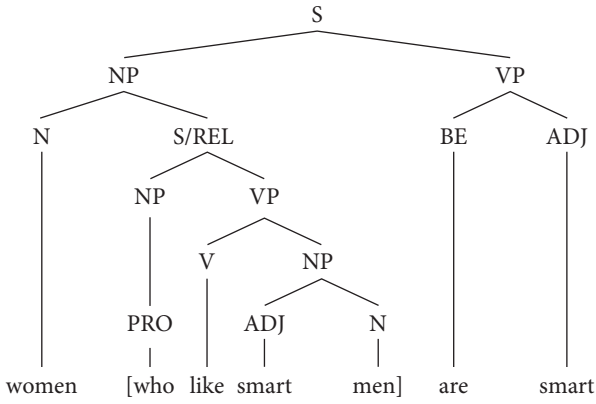
(6) **Clause chaining (conjunction)**:



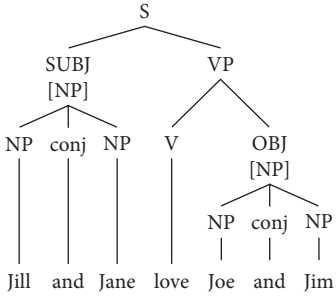
While one may have good reasons for not considering chained clauses embedded, as in (6), they still figure prominently in the genesis of syntactic complexity.

The type of syntactic complexity that concerns us most in this book involves the **embedding** of clauses inside other clauses. The two most common types of such embedding are **relative clauses** in the noun phrase and **verbal complements** in the verb phrase, as in (7a) and (7b) below. Respectively:[2]

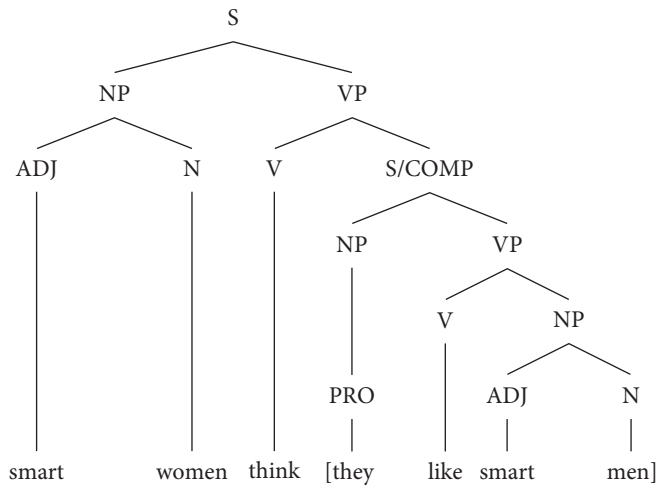
(7) a. **Embedding in the NP (REL-clause)**



2. While REL-clauses and V-complements are the most common types of recursive embedding in syntax, they are by no means the only ones. And recursive syntactic structure may also involve constituents other than the clause, e.g., noun-phrase conjunction, as in:



b. **Embedding in the VP (V-complement)**



Embedding a clause inside another clause is what Chomsky (1957, 1965) called **recursivity**; that is, a node at a lower hierarchic level being dominated by a node of the same type at a higher level. In a recent joint paper (Hauser *et al.* 2002), Chomsky and his co-authors assert that recursivity is the key feature that separates human language from pre-human communication. It is doubtful that such a statement could have made the splash it has made but for Chomsky's name being attached to it. For some rather remarkable claims were advanced in that joint paper, ostensibly about the evolution of grammar. To wit:

i. The evolution of recursivity was not subject to adaptive selection.
ii. The evolution of recursivity proceeded non-gradually and without pre-adaptations.
iii. Recursivity, a single abstract feature, is the only significant universal of human grammar, as compared to pre-human communication.
iv. By inference, what is universal in language and biology, are the *extant features* of a system, rather than the general *principles* that govern the *development* of the system, be it evolutionary, ontogenetic or diachronic.
v. Pre-human organisms (and human pre-language) do not display recursivity.

Each one of these claims is open to obvious challenges. Thus, claims (i), (ii) and (iv) are sharp departures from the standard Darwinian view of biological evolution. Claim (iii) runs in the face of the extreme richness of human-specific grammar(s) as known to descriptive linguists (see ch. 2). And claim (v) is a denial of well-known recursive organization in visual, motor, memory, neural and communicative systems — and corresponding behaviors — of pre-human

organisms and pre-linguistic humans.[3] Finally, claim (iv) is also a sharp departure from Chomsky's own view of universals of grammar.[4]

At this juncture there is no need to review in full detail Chomsky's approach to the evolution of recursivity, or of language. A detailed critique may be found in Bickerton (2008; forthcoming). Chomsky's construction-bound notion of recursivity was tacitly granted by Everett (2005), even as he purported to attack it. Everett suggested that at least one language (Piraha, an Amazonian isolate) had no embedded REL-clauses or V-complements, but performs their communicative function using paratactic functional equivalents. This claim hinges on the diachronic rise of embedded clauses out of paratactic precursors, as well as on intonational packaging of clauses. We will deal with this issue in more detail later on (ch. 4,5).

1.2 Developmental domains

The genesis of syntactic complexity, and indeed of human language, may be probed in three developmental domains:

- Diachrony (historical syntax)
- Ontogeny (language acquisition)
- Phylogeny (evolution)

Of these three, extensive data are available on the first two. The third is obviously more problematic, given the near-absence of data on the communication of hominids during the protracted period — 6–7 million year — of the separation from our nearest great-apes relatives. To some people, this paucity of data on the

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3. Bird songs; Chimpanzee drumming-and-shrieking signals; lions, wolves and chimpanzee group hunting routines; chimpanzee tool-making routines — are all striking examples of complex, hierarchic and often recursive organization of behavior, communicative or other (see ch. 12). Though of course, in non-human communication there is no isomorphic mapping between the complex syntactic signal and corresponding message units, a mapping so characteristic of human communication. That is, complex animal signals carry, mostly, simple holistic messages ('come hither', 'back off', 'food', 'predator!', etc.).

4. In a discussion of his *principles and parameters* format, Chomsky (1992) says:
"… [early generative grammar assumed that] each language is a rich and intricate system of rules that are, typically, construction particular and language particular … The principles-and-parameters approach that has developed in recent years, and that I assume here, breaks radically with that tradition … The notion of **grammatical construction** is eliminated, and with it, construction-particular rules. Constructions such as verb phrase, relative clause, passive etc. are taken to be **taxonomic artifacts**, collections of phenomena explained through the interaction of principles of UG, with the values of parameter fixed …" (1992: p. 3; bracketed material and emphases added). Recursivity is, of course, a construction-based notion.

intermediate stages of language evolution suggests a **gapped evolution** (Chomsky 1968; Hauser *et al.* 2002). To others it suggests that any discussion of the gradual evolution of human language is speculative and pointless (Slobin 2002). The approach pursued here harkens back to Givón (1979), Bickerton (1981) and Heine & Kuteva (2007), in assuming that one can gain valid insights about language evolution by inspecting the data from the two other developmental trends, diachrony and ontogeny, as well as from comparative pre-human communication and the study of pidginization, creolization and neurology.

Citing the data of language diachrony and language ontogeny in order to argue for parallel trends in language evolution is of course not free of problems. One has to argue for purported common trends, and then decide whether they are only **analogical** and suggestive, or perhaps **homologs** with **shared mechanisms**. One must also note that similarities, however striking, are never absolute. Still, such similarities do exist, and are indispensable for our understanding of language evolution; especially that the alternative is not all that attractive — giving up on a theoretical account of language evolution. Put another way, in science any hypothesis with empirical consequences is preferable to no hypothesis. For the former may be empirically falsified, while the latter is impervious to empirical testing.

1.3 Developmental trends in the genesis of syntactic complexity

1.3.1 From words to simple clauses

As noted earlier above, the syntax of simple clauses is already hierarchic, thus complex. The genesis of simple clauses in both ontogeny and evolution is of considerable interest on its own merit. At least theoretically, one could go in two directions:

- **Expansion (analysis)**: Start from an undifferentiated holistic signal and then reanalyze it as a composite of morphemes (a word), or of words (a clause).
- **Combination (synthesis)**: Start from the small units (morphemes, words) and then build up the word or clause combinatorially.

In a recent paper, Tallerman (2007) made a convincing argument that the holistic-to-analytic expansion model is implausible for language evolution. Given the data of both diachronic syntax (ch. 4,5) and child language acquisition (ch. 7,8), Tallerman's argument holds equally well for the two other developmental domains — at least in syntax. Thus regarding diachronic syntax, Heine & Kuteva (2007) have argued that the holistic-to-analytic trend is unattested:

> "… For example, there is little evidence in attested morpho-syntactic changes for hypotheses that have been proposed on the basis of what may be called the holistic (or analytic) hypothesis: On this hypothesis, early language was characterized by holistic, monomorphemic linguistic signals conveying propositional contents, and these signals are believed to have undergone a segmentation process whereby complex but unanalyzable signals were broken down into words and syntactic structures (Wray 1998, 2000; Kirby 2002; Arbib 2005: 119). While we concur with the proponents of this hypothesis (e.g., Callahan 2006) that pragmatics is a crucial factor in language change, we are not aware of any diachronic evidence to the effect that such a segmentation process can commonly be found in language change. New grammatical categories do not normally arise via the reinterpretation of complex, unanalyzed propositions; accordingly, we consider this hypothesis to be less convincing for reconstructing language evolution …" (2007: pp. 25–26)

In first-language acquisition, the child's early holistic expressions are not clause-size utterances that *code* a holistic message, but single-word utterances that *stand for* a clausal message in a highly specific context, while having a clear lexical meaning; that is, the so-called one-word stage (Bloom 1973; Scollon 1976; see ch. 10, below). Children build up the components of one-word clauses later on, not by re-analzing the single word into its sub-parts, but by adding the missing words through the two-word stage and onward (Bowerman 1973). In this process, the lexical meaning of the word, already established during the one-word stage, does not change. Rather, during the one-word stage the rest of the propositional message is inferred from the context, in close collaboration with the adult interlocutor and in supplementation by the surrounding adult turns (Ervin-Tripp 1970; Scollon 1976; Ochs *et al.* 1979; see ch. 7,8,10 below).

There is one area in child language acquisition where the holistic-to-expansion (analysis) model has been well documented — the acquisition of morphologically-complex words and, likewise, of multi-word collocation on their way to becoming complex words; that is, what MacWhinney (1982) calls 'rote learning'. But this is not the template for the rise of syntactic complexity by expansion and (re)analysis, only for the rise of some cases of **morphological complexity** (Tomasello 2000, 2003).

In diachrony, the situation is altogether unambiguous. Grammatical morphology always arises from erstwhile lexical words; so that morphological complexity arises from syntactic complexity via combination — and later condensation — of syntactic constructions (Givón 1971, 1979; Heine *et al.* 1991; Heine & Kuteva 2007; Dahl 2008; *inter alia*; see ch. 4,5 below).

1.3.2 From clauses to chains to embedded clauses

There is strong cumulative evidence that the developmental trend in the genesis of syntactic complexity, in diachrony, ontogeny, and no doubt in evolution, is primarily compositional (synthesis), following the general trend:

(8) **General trend in the genesis of syntactic complexity**:
   a. single words > simple clause
   b. simple clause > clause chains (parataxis)
   c. clause chains > complex/embedded clauses (syntaxis)

In child language development, all four stages are well documented (Bloom 1973; Bowerman 1973; Scollon 1976; Ochs *et al.* 1979; see ch. 7,8 below). In language diachrony, trends (8a) and (8b) are of course absent, since adults already use multi-propositional discourse, (clause chains). But the last stage (8c) is well documented in diachrony, as is its direction — **from parataxis to syntaxis** (Heine & Kuteva 2007; Hilpert & Koops 2006; Koops & Hilpert 2008; Pawley 2008; see ch. 4,5 below). That is, composition (synthesis) rather than expansion (analysis) is the prevalent trend. And spontaneous animal communication seldom progresses beyond stage (8a) (Tomasello & Call 1997; Savage-Rumbaugh *et al.* 1993; Pepperberg 1999).

No direct evidence exists for intermediate stages of language evolution. However, cogent arguments can be raised for the proposition that child language and language diachrony, as well as pidginization and non-human communication, could furnish relevant evidence for general phylogenetic trends. Such general trends can be extracted from the works of Bloom (1973); Bowerman (1973); Bates (1976); Scollon (1976); Bickerton (1981, 1990); Heine & Kuteva (2007), or Givón (1979, 1989, 2005) *inter alia*. They include:

(9) **General developmental trends**:
   a. Words before clauses
   b. one-word clauses before multi-word clauses
   c. Single-clause discourse before multi-clause discourse
   d. Chained clauses before subordinate/embedded clauses
   e. Nominal objects before clausal complements
   f. Single-word restrictive modifiers before clause-size modifiers
   g. Pre-grammatical (pidgin) communication before grammar
   h. Manipulative speech-acts before declaratives and interrogatives
   i. Deontic modality before epistemic modality
   j. Non-displaced spatio-temporal reference before displaced reference

These trends are discussed in considerable detail in several chapters below.

The comparative study of non-human communication (Tomasello & Call 1997; Savage-Rumbaugh *et al.* 1993; Pepperberg 1999; Rumbaugh & Washburn 2003; Cheyney & Seyfarth 1990, 2007; Zuberbühler 2000, 2001, 2002;

Crockford & Boesch 2003, 2005; *inter alia*) is consonant with the general trends in (9), furnishing evidence for the early trends (9a,b,c). All this is not to say that the similarities between — and relevance of — language diachrony and ontogeny and language evolution are a settled issue. Still, the similarities, and the shared trends (9a–j), furnish a broad theoretical and empirical context within which relevant questions may be raised. Some of those are:

- **ontogeny**: What is the interaction between genetic endowment and external input?
- **diachrony**: Is adult-initiated change, which is not genetically coded, still genetically constrained? And if so, how?
- **diversity**: Is cross-language diversity, seemingly mediated by diachrony, genetically constrained, and if so how?
- **evolution:** Can the cumulative goal-directed adaptive behaviors of individual organisms contribute to genetically-coded endowment? And if so, how?
- **parallels**: Are the parallels between the three developmental trends parallels in *product,* or in the *mechanisms* that yield the product?
- **analogy**: Are parallels between the three developmental trends merely *analogical*, or do they also involve *homology*?
- **biology**: What is the bio-genetic basis for the developmental parallels?

1.4 The neuro-cognitive basis of syntactic complexity

1.4.1 Cognition and syntactic complexity

Two related possible isomorphisms concern us here, one between language and mind, the other between mind and brain. As I will suggest further below (ch. 2), some mappings between language and mind are relatively transparent. That is, if one takes Atkinson and Shiffrin's (1968) division of the cognitive representation systems in (10) below, the translation into linguistic systems is relatively straightforward:

(10) **Cognitive representation systems**:

	Cognition		**Language/grammar**	
	System	**Units**	**System**	**Units**
a.	semantic memory	concepts	lexical semantics	words
b.	episodic memory-I	events/states	propositional semantics	clauses
c.	episodic memory-II	event chains	discourse pragmatics	clause chains

But where do complex-embedded clauses fit into this scheme? Grammar is used to code *both* levels (10b) and (10c) of episodic representation, and it does so by separating the task, roughly, into two parts (see ch. 2, below):

- simple-clause grammar (event structure)
- complex-clause grammar (communicative intent)

The latter part, the grammar of complex clauses, comprises the bulk of the morpho-syntactic machinery of human language — the grammar of subordinate, non-declarative, negative, de-transitive clauses (Givón 2001). This is the part of grammar Chomsky's older formats (1957, 1965 ch. 3) treated as **transformations**. Such clause-types are much less frequent in natural discourse and more difficult to process (Givón 1995, ch. 2). With respect to such *marked* clause-types, our task is to look for neuro-cognitive differences between them and the *unmarked* simple/chained clause.

Correlations between syntactic complexity as described by the linguists and cognitive complexity as described by the psychologist is not easy to articulate. Intuitively, one would like to assume at least two syntactic-cognitive correlations, which taken together yield a third. Respectively:

(11) **Possible correlations between linguistic and cognitive complexity**:

a. **Coding**: More complex mentally-represented events are coded by more complex linguistic/syntactic structures.

b. **Processing-I**: More complex mentally-represented events require more complex mental processing operations. Therefore,

c.**Processing-II**: More complex syntactic structures require more complex mental processing operations.

To what degree such correlations are upheld by the experimental neuro-cognitive data remains to be assessed.

1.4.2 The neuro-cognition of syntactic complexity

A number of neuro-cognitive experimental studies, all within the sentence processing tradition, suggest that relative clauses are harder to process than conjoined clauses (Just *et al.* 1996; Booth *et al.* 1999, 2000; Caplan *et al.* 2006a, 2006b, *inter alia*). But the very same studies also suggest that object REL-clauses are harder to process than subject REL-clauses. What is more, the increased brain activation, thus processing difficulty, between subject REL-clauses and object REL-clauses occurs in the same brain region (IFG, Broca's area) as the increased activation between conjoined clauses and subject-REL-clauses. Put another way, the brain locus and increased activation are not specific to embedding, but rather to a more general factor of **cognitive complexity**. And further, several recent reviews of the

experimental literature on syntactic complexity (Fernández-Duque 2008; Hagoort 2008; Kaan 2008) conclude that increased activation in the IFG may not be specific to syntactic complexity, perhaps not even to grammar or language.

A second experimental tradition suggests an altogether different take on complexity. The processing of sequential information in perception, memory, and motor behavior involves **chunking**, whereby sequentially presented information that is longer than 3–4 items is re-coded into chunks of hierarchically organized units. Such chunking is strongly dependent on repeated exposure (frequency of access), so that habituated **expert** performers — typists, musicians, dancers, readers, chess players — organize and chunk their knowledge more hierarchically than novices (Chase & Simon 1973; Chase & Ericsson 1982; Schneider 1985; Gobet 2005; *inter alia*). What is more, chunked hierarchic structures are implicated in increased **automaticity** of processing, thus decreased mental effort and attentional demands (Posner & Snyder 1974; Schneider & Shiffrin 1977; Schneider 1985; Schneider & Chein 2003).

The two traditions appear to make the opposite claim about mental processing difficulty, thus presumably cognitive complexity. The first purports to show that complex clauses are harder to process; the second shows that hierarchic structures are processed more efficiently. The resolution of this apparent contradiction will be discussed further below (ch. 11).

1.4.3 Brain localization

The old Geschwind (1970) model divided the load for language processing in the cortical left hemisphere between the *pre-frontal* **Broca's area,** responsible for grammar, and the *temporal* **Wernicke's area**, responsible for meaning. The two areas were said to interact through a dense neural connector, the **arcuate fasciculus**.

An immense amount of work done since then has gradually elaborated on the pioneering lesion-based studies of Broca and Wernicke. This still-cumulating work has taken advantage of an array of sophisticated brain-imaging techniques that allowed much finer spatial resolution (PET, fMRI) and much finer temporal resolution (ERP). Both the pre-frontal and temporal sites, as well as the connecting channels, have been shown to have anatomically- and functionally-distinct submodules. Among those, the most relevant to our discussion of complexity are:

a. **A lexical-semantics circuit**: Most likely a multi-modular circuit, with a core part perhaps located in the *ventri-lateral pre-frontal cortex* (*pars orbitalis*; BA 47/12); as well as one or more temporal sites in the *posterior Superior Temporal Gyrus* (STG) and *Medial Temporal Gyrus* (MTG), with some R-parietal and other

components (Petersen *et al.* 1988; Raichle *et al.* 1993; Snyder *et al.* 1995; Posner & Pavese 1997; Abdulaev & Posner 1997; Bookheimer 2002; Badre & Wagner 2007; Martin & Chao 2001; *inter alia*); with the frontal-temporal connection via the *extreme capsule* (Schmahmann *et al.* 2007).

b. **A combinatorial propositional-semantics circuit**: Most likely a multi-modular circuit of at least two sites, one prefrontal (*pars opercularis*; fOP; BA 44) and one temporal (anterior-STG), connected via the *fasciculus uncinatus* (Posner & Pavese 1997; Abdulaev & Posner 1997; Friederici & Frisch 2000; Friederici *et al.* 2006a, 2006b; Grodzinsky & Friederici 2006; Bahlmann *et al.* 2008; Friederici 2008; Pulvermüller 2002, 2003; Pulvermüller & Assadollahi 2007).

c. **A hierarchic/complex-clause circuit**: Most likely a multi-modular circuit of two or more sites, one prefrontal (Broca's area, BA 45a/45b), the other temporal (posterior STG), connected through the *fasciculus longitudinalis superior* (Friederici & Frisch 2000; Friederici *et al.* 2006a, 2006b; Grodzinsky & Friederici 2006; Bahlmann *et al.* 2008; Friederici 2008).

In addition, several sub-modules of the *executive attention network* (Schneider & Chein 2003; Posner & Fan 2008) must also be involved in grammatical processing, as well as *working memory* and *episodic memory*. And the *cerebellum* may also be involved (Argyropoulos 2007). These topics are discussed in more detail in ch. 11.

1.5 Bio-evolutionary context

While the brain is the proper biological site of the central processors of language, the evolution of general biological design is of some interest because it sets up general patterns and principles that may govern the rise of the brain mechanisms that underlie syntactic complexity. We will discuss these principles in considerable detail later on (ch. 3, ch. 6, ch. 12), showing that, in the main, they apply equally well to the two other developmental trends — diachrony and ontogeny. Some of these general developmental principles are:

- **Graduality**: By and large, the evolution of complex biological design is gradual, going from the more simple to the more complex. And there are both low-level biochemical and higher-level adaptive reasons for this graduality. At the biochemical level, major structural jumps are chemically unstable or enzymatically incompatible. At the adaptive level, major structural jumps cannot be accommodated by the current behavioral capacities of the organism.
- **Terminal modification**: In conjunction with graduality, terminal modification reveals bio-evolution to be a tinkerer rather than an engineer. Existing structures are recruited to perform new but similar functions, simultaneously with the old

functions. Eventually structural differentiation takes place, so that a new structure emerges adjacently to the old one, and now performs the new function. Eventual re-structuring and simplification may also take place, shrinking superfluous pieces of excess structure. The end result of this complex, protracted process is, most commonly, that organs performing related functions are added at the end of the chain of a developmental sequence, near organs that perform older precursor functions.

- **Adaptive motivation**: By and large, the rise of new structures is guided by adaptive selection. What is more, the first stage involves the **functional extension** of an old structure, i.e., its recruitment to perform a related-but-not-identical function. The early stage of a biological innovation thus tends to involve **functional ambiguity** of old structures. Thus Mayr (1976) observes:

> "… the evolutionary changes that result from adaptive shifts are often initiated by a change in behavior, to be followed secondarily by a change in structure … The new habit often serves as the pacemaker that sets up the selection pressure that shifts the mean of the curve of structural variation …" (Mayr 1976: p. 106)

And further:

> "… Another entirely different and much more dramatic way by which evolutionary novelties can be acquired is a change in the function of a structure. Here an existing structure, let us say the [sensory] antenae of *Daphnia*, acquires the additional function of a swimming paddle and, under new selection pressures, becomes enlarged and modified … During a succession of functions, a structure always passes through a stage when it can simultaneously perform both jobs …" (Mayr 1997: p. 194–195)

- **Combination vs. expansion**: As noted earlier above, Tallerman (2007) argues that combination (synthesis) — the joining together of smaller simple units into a larger complex one — rather than expansion (analysis) is the only plausible model for the evolution of syntactic complexity. In language diachrony, combination seems to be the general trend, especially in the genesis of morphological and syntactic construction (see ch. 3,4,5 below).

In language ontogeny, various claims have been made about expansion-from-holistic being the proper developmental model (Tomasello 2000, 2003; Diessel 2005). In his extensive survey, MacWhinney (1982) identified a cluster of instances of expansion-from-holistic ('rote learning') in child language acquisition. Without exception, they involve either **bound morphology** or **complex words,** a generalization that had often been obscured by conservative writing systems. In the two studies below on the ontogeny of complex constructions (ch. 7,8), the developmental trend is, invariably, combination (synthesis).

In bio-evolution, numerous examples of both combination (synthesis) and expansion (analysis) are attested. What is more, the two are sometime coupled within the same complex development. Examples of combination abound. Thus, the eukaryote protozoan cell is apparently an evolutionary combination of one primitive prokaryote cell that supplied the protoplasm and nucleic acids, with three smaller prokaryote cells, in a symbiotic arrangement, with the latter three contributing the mitochondria, plastids and flagella of the resulting eukaryote cell (Margulis 1981; Sleigh 1989; Yang *et al.* 1985). The incorporation of **viruses** into the DNA/RNA of many, perhaps most, organisms is another such example.

Diploid cells with two sets of chromosomes, the current norm in higher organisms, are the combinatorial product — in both evolution and ontogeny (meiosis, sexual reproduction) — of two haploid precursor cells, each with only one set of chromosomes. And multi-cellular organisms in general began as temporarily-combined colonies of single-cell organisms.

Mitosis (normal cell division) involves both expansion and combination. The first phase, the splitting of the diploid nuclear chromosomes into two haploid clusters, and then the copying of each haploid strand, is an example of expansion. But the subsequent re-combination of the two haploid nuclei is an example of combination. Likewise, the life-cycle of many organisms, most conspicuously sexual reproduction, involves a multi-cellular stage (combination) and a mono-cellular stage whose individual cells split from the larger organism (expansion). Likewise, in the growth of tissues and organs, cell division (expansion) is coupled with cell addition (combination).

Higher up on the complexity scale, in the evolution and ontogeny of the nervous system, one could cite cases of expansion — the segmentation of the simple spinal chord; the projection of the cortex from the limbic-thalamic mid-brain. But one could also cite cases of combination, such as the joining together of erstwhile unrelated modules into a distributive network that now performs a complex higher function (executive attention, grammar, phonology; see ch. 11).

Why both the diachrony and ontogeny of syntactic complexity tilt heavily toward combination, and seem to shun expansion, is probably not due to general biological principles, but rather to more specific adaptive constraints.

- **Similar constraints at multiple levels of development**: The evolution of the eye reveals the existence of similar developmental processes, supported by similar genetic structures, but applying at widely separated evolutionary stages. Thus, the eye of the squid and octopus is remarkably like that of vertebrates, but is nevertheless not its evolutionary homolog.

In a paper discussing the evolution of social fish behavioral patterns, Fernald & White (2000) suggest that in real-time adaptive behavior, ontogeny and phylogeny

share a single mechanism, through which individual adaptive behavior influences genetic accretion:

> "… Behavior can and does influence specific aspects of brain structure and function over **three different time frames**. A causal link is easy to establish on an **evolutionary time scale** because selective forces of the ecological niche of the animal typically are reflected in the body shape, sensory and motor systems, and behavior. Similarly, on a **developmental time scale**, behavior acts in concert with the environment to establish structural changes in the brain that influence an organism throughout its lifetime. Surprisingly, there currently is evidence that in **real time, social behavior** also causes changes in the brain in adult animals …" (Fernald & White 2000: p. 1193; emphases added)

While the study in question concerns the adaptive behavior of social fish, its relevance to the three developmental trends discussed here is considerable. Real-time communicative behavior by individuals may be the common denominator of all three developmental trends in language — evolution, ontogeny and diachrony. In the first, behavior interacts with genetic mutations. In the second, it interacts with the genetically pre-set ('innate') developmental sequence. In the third, behavior does not interact directly with genes, but rather with the automating, habituating , skill-acquiring learning brain, that in turn interacts with genetic mutations during selection (Hinton & Nowlan 1987; Givón 1989). And it is the real-time adaptive behavior by individual speakers during communication that is the engine of diachronic change. This is in line with the so-called **Baldwin effect** (Baldwin 1896), as well as with **niche construction** and **genetic assimilation** (Waddington 1942, 1953; Deacon 2008).

To cite Ernst Mayr again:

> "… Many if not most acquisitions of new structures in the course of evolution can be ascribed to selectional forces by newly-acquired behaviors (Mayr 1960). Behavior, thus, plays an important role as the pace-maker of evolutionary change …." (Mayr 1982: p. 612)

One objection to using the data of child language acquisition and language diachrony to construct hypotheses about language evolution has been that they represent starkly different evolutionary stages of the human brain, that of, respectively, immature modern humans, adult modern humans, and various pre-modern hominids (Slobin 2002). Since cases like the squid/human eye are common in biology (Tublitz 2008), and since the principles articulated by Baldwin (1898); Waddington (1942, 1953); Mayr (1982) and Fernald & White (2000) are widely attested in biology, perhaps this argument can be resolved on more substantive empirical and theoretical grounds. And perhaps, as Karl Popper (1934) said about scientific hypotheses, *by their fruit thou shall know them*.

CHAPTER 2

The adaptive approach to grammar

2.1 General orientation

This chapter outlines the functional-adaptive approach to grammar, an approach that is biological in the grand tradition of Aristotle and Darwin. We owe to Aristotle the observation, revolutionary in his time, that extant biological structures are functionally motivated. We owe to Darwin the elucidation, equally revolutionary in his time, of the mechanism that makes it possible for extant biological structures to perform their functions — adaptive selected evolution. It would thus make little sense to talk about the genesis of syntactic complexity, a central component of grammar, outside a functional-adaptive framework. For the three developmental trends relevant to syntactic complexity — diachrony, ontogeny, and evolution — are equally driven by adaptive pressures.

Language is, by all accounts, one of the defining characteristics of *Homo sapiens*. It is deployed in a wide range of adaptive contexts: social interaction, cultural transmission, education, literature, theater, music, humor and play, love and war. Of this rich array of useful applications, one may single out two core adaptive functions that make all the rest possible: the mental representation, and communication of information.

Mental representation is an affair of the individual mind striving to code, make sense of, interpret and construct 'reality', be it external, mental or social.[1] **Communication** is primarily an interactive affair of two (or more) minds exchanging mentally-represented information; or, as is often the case, negotiating and constructing it jointly. Of these two core functions of language, mental representation is ontogenetically and phylogenetically older. It is also logically prior: one can represent information in the mind/brain, often automatically and sub-consciously, without necessarily intending to communicate it. But one cannot intentionally communicate information that is not first represented in the mind.

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1. Geary (2005) divides human mental representation, I think rather perceptively, into three mega-domains: *folk physics*, *folk biology* and *folk psychology*; to which *folk socio-culture* could perhaps be added, since it is not clear it should be wholly subsumed under folk psychology.

Mental representation is as old as biological organisms. At whatever level of complexity, organisms depend for their survival on sorting out the myriad *tokens* of **experience** into much fewer, adaptively-significant *types* ('categories'). They then tailor their **behavior** to the relevant adaptive value of those tokens, depending on the tokens' membership in their respective types (Givón 2005, ch. 2).

Communication is as old as social organisms, and perhaps even older in one important domain — sexual reproduction. All social species communicate, at the very least about a restricted range of adaptively-relevant domains: Mating, foraging, territorial control, social rank, aggression, shelter and rearing of the young. Pre-human communication seldom exceeds this range (Cheyney & Seyfarth 2007).

Homo sapiens, in diverging from the great apes line, has expanded immensely the extent to which its survival depends on communication, doing so along two parallel tracks:

- **Functionally**, extending the range of adaptive domains (topics) of communication; and
- **structurally**, creating a vastly more elaborate instrument of communication — language.

Biology has been an unabashedly functional-adaptive discipline ever since Aristotle, who, in his *De Partibus Animalium*, observed that in biological design as in the design of man-made instruments, the exhaustive description of extant structures makes no sense by itself, unless it refers to their functions. Put another way, biological design is driven by a *teleology*. The theoretical account of this teleology, the resolution of the mystery of how structures and functions become paired, had to wait over two millennia for Darwin. Still, Aristotle remains the true father of the adaptive approach to the study of living organisms.

Somewhat paradoxically, Aristotle was also the father of an influential non-adaptive approach to language, **structuralism**. In the opening paragraph of his *De Interpretatione*, Aristotle asserts that external reality is faithfully (iconically) mirrored by the mind; but that the mapping from mind to language is arbitrary. This latter observation was based on the diversity of sound sequences that can code roughly-the-same concepts (God = Deus = Allah = Watan Tanka = Núumaroghomapgat, etc.). However, in another book, *The Categories*, Aristotle implies a non-arbitrary ('iconic') mapping between propositional logic (meaning) and grammar (form).

A similar equivocation may be seen in Plato's *Cratylus*, where Cratylus argues for an Aristotelian arbitrary relation between words and meanings (*nomos*), while Socrates argues for a natural, isomorphic mapping between form and meaning (*physis*).

Ever since Plato and Aristotle, linguists and philosophers have been seesawing between a functionalist (adaptive, motivated) and structuralist (arbitrary) view of language. Towering figures in the history of functionalism in linguistics are W. von

Humboldt, H. Paul, E. Sapir and O. Jespersen. Towering figures in the history of structuralism in linguistics are F. de Saussure, L. Bloomfield and N. Chomsky.

Most relevant to syntax, and thus to syntactic complexity, are the intriguing internal contradiction between structuralism and functionalism found in Chomsky's *Aspects* (1965). In ch. 2, in outlining semantically-relevant 'deep structure', Chomsky concedes that *that* part of grammar, **propositional-semantic representation**, is a motivated mapping between form and meaning. In ch. 3, in stark contrast, Chomsky suggests the opposite about transformed 'surface structures': that they have no obvious adaptive-functional motivation, mapping at best onto *stylistics*. In other words, the adaptively-motivated part of grammar is representation, not communication.

The reason Chomsky could have made such a statement in all innocence, thus trivializing the great variety of syntactic ('surface') structures that may code the very same propositional-semantic ('deep') meaning, may be found in another chapter of *Aspects*, ch. 1, where the Platonic notion of **competence** (Plato's *eidon* 'essence'; Saussure's *langue* 'the system') is elaborated. 'Competence' licenses the assumption of *uniformity* of grammatical knowledge across speakers, and the *infallibility* of the native's intuition, thus in turn the methodology of studying introspected single clauses in isolation, detached from their adaptive-communicative context.

As it turns out, the adaptive motivation for using 'transformed' structures can only be discovered through the study of their use in **communicative context**. But natural communication was discounted as relevant evidence in ch. 1 of *Aspects*, because of its presumed contamination by **performance** (the processor; Saussure's *parole* 'actual speech').

In this context, one may view Chomsky's latest distinction (Hauser *et al.* 2002), between broad language faculty (FLB) and narrow language faculty (FLN), as a natural outgrowth of the split between ch. 2 and ch. 3 of *Aspects,* respectively. FLB is conceded adaptive-selectional motivation — mental representation ('deep structure') — and thus normal Darwinian evolution. FLN, now reduced to a single feature of grammar, *recursivity*, is viewed as a non-adaptive, non-selected mystery, the product of some non-Darwinian process; that is, an arbitrary 'surface structure'.

2.2 Representation and communication

As noted above, the two core adaptive functions of human language are the **representation** and **communication** of information (knowledge, experience). We may take it for granted, given the overwhelming evidence from animal communication, child language development and neurology (Geary 2005; Cheyney & Seyfarth

2007; Carter 1974; Givon 2002, ch. 4,5), that cognitive representation preceded communication in evolution, is present in pre-human species, and is a developmental pre-requisite to language acquisition. What human communication added to the pre-existing cognitive representation system are two specific communicative codes — **phonology** and **grammar**.

Cognitive psychologists have long recognized three major systems of mental representation in the human mind/brain (Atkinson & Shiffrin 1968). The linguistic equivalents of these three systems are sufficiently transparent.

(1) **Major cognitive representational systems**:

Cognitive label	Linguistic equivalent
• permanent semantic memory	the mental lexicon
• episodic memory	the current text
• working memory and attention	the current speech situation

Not only are these three types of mental representation recognized for their specific cognitive-behavioral properties, but also for their specific brain localization (ch. 11). In the next sections I will discuss the three briefly.

a. **Semantic memory**

Semantic memory is the *mental lexicon*, a long-term repository of relatively stable concepts of *types* of entities (nouns), of states or qualities (adjectives), and of events or actions (verbs). It is thus the repository of the our culturally-shared view of the external, mental and social world. The mental lexicon is most likely organized as a network of conceptual nodes and connections (Givón 2005, ch. 3), within which semantically-related word-nodes automatically activate each other ('spreading activation'; Swinney 1979).

In addition to the more abstract core of this semantic network in the left prefrontal cortex (Posner & Pavese 1997; Abdulaev & Posner 1997; Martin & Chao 2001; Badre & Wagner 2007), more concrete sensory, motor and affective brain loci are also automatically activated by words with concrete — visual, auditory, olfactory, savory, tactile, motor or affective — meanings (Caramazza & Mahon 2006; Pulvermüller 1999; Hauk *et al*. 2004; González *et al.* 2006; Pulvermüller & Hauk 2006). Semantic memory is *cross modal* (linguistic, visual, auditory, etc.; Humphreys & Riddoch eds 1987) with multiple input channels, of which the linguistic input channel was but the latest evolutionary addition (Givón 1995, ch. 9).

b. **Episodic memory**

Episodic ('declarative') memory is the long-term repository of **propositional information** about unique events, states or specific individuals, all known to us through life-time experience; or of their concatenations in longer chunks of **coherent**

discourse (Kintsch & van Dijk 1978; Gernsbacher 1990; Ericsson & Kintsch 1995; Kintsch 1994; Givón 1995, ch. 8). Information comes into episodic memory via either non-linguistic (sensory) or linguistic channels, and is then kept first in a temporary malleable sub-cortical processor (*hippocampus* and the *amygdala;* Squire 1987; Petri & Mishkin 1994; Ericsson & Kintsch 1995). Information that merits longer-term, more stable representation is transferred later to a frontal-cortical locus (Squire 1987).

c. **Working memory and attention**

Working memory represents what is available in the mind for immediate attentional activation. It thus overlaps partially with the attentional system (Schneider & Chein 2003; Posner & Fan 2008). Working memory is a limited storage-and-processing buffer of small capacity and short duration, where material is kept in temporary storage pending further processing decisions. It has a cross-modal conscious component that interacts with the *executive attention* (Gathercole & Baddeley 1993; Schneider & Chein 2003; Posner & Fan 2008), as well as several modality-specific non-conscious components (visual, auditory, tactile, etc; Gathercole & Baddeley 1993). In language processing, working memory is an important buffer where short chunks of information are represented verbatim, pending further processing decisions (Gernsbacher 1990).

2.3 Human language as a combinatorial system

The most well-entrenched idea about the function of grammar, long licensed by linguists and adopted uncritically by others, is that grammar is a set of rules that govern the combination of words and morphemes into propositions ('clauses'). This mis-perception about grammar's adaptive niche is only natural, given two ubiquitous habits of linguists: (i) a methodology that studies clauses/propositions in isolation from their natural communicative context, and is thus dependent on Chomsky's (1965) notion of c*ompetence*. And (ii) a theoretical perspective that emphasizes event frames ('argument structure') at the expense of communicative intent. As noted above, the most cogent articulation of these habits may be found in Chomsky's *Aspects* (1965, ch. 2), where *deep structure* (event frames) receive a coherent functional characterization ('logical-semantic structure').

Chomsky's 'deep structure' turns out to be the most common, and semantically most transparent, type of syntactic structure found in natural communication: the *main, declarative, affirmative, active* clause. This clause-type is rightly recognized as the foundation of our study of the combinatorial-hierarchic structure of clauses/propositions, couched in terms of **phrase structure rules**. In contrast, the function of the much more numerous types of 'transformed' syntactic structures ('surface

structures') was left moot, at best a matter of 'stylistics' (Chomsky 1965, ch. 3). But it is in the study of this much larger set of syntactic structures, and in particular of their distribution in natural text, that one finds the most revealing clues to the adaptive-communicative function of grammar.

Chomsky's distinction between simple ('deep structure' = 'unmarked') and complex ('transformed' = 'marked') clauses remains fundamental to our understanding of syntax. One may thus classify syntactic clause-types as follows (Givón 1995, 2001):

(2)

Simple (unmarked)	**Complex (marked)**	**Typical clause types**
main	subordinate	REL-clause, V-comp. ADV-clause
declarative	non-declarative	imperative, interrogative
affirmative	negative	negative
active-transitive	de-transitive	passive, antipassive, inverse
default topic/focus	marked topic/focus	L-dislocation, cleft

As an illustration of how the same simple clause ('deep structure') may be transformed into multiple complex 'surface structures', consider:

(3)
a. **Simple**: Marla saw John
b. **REL-clause (subj.)**: The woman [who saw John] …
c. **REL-clause (obj.)**: The man [Marla saw] …
d. **V-complement (modality)**: Marla wanted [to see John]
e. **V-complement (manipulation)**: Betty told Marla [to see John]
f. **V-complement (cognition)**: Betty knew [that Marla saw John]
g. **ADV-clause (temporal)**: When Marla saw John, …
h. **Imperative**: Go see John, Marla!
i. **Interrogative (y/n)**: Did Marla see John?
j. **Interrogative (WH-subj)**: Who saw John?
k. **Interrogative (WH-obj.)**: Who did Marla see?
l. **Negative**: Marla didn't see John.
m. **Passive**: John was seen (by Marla).
n. **Antipassive**: Marla doesn't see.
o. **Inverse (Y- movement)**: *John* Marla saw (later).
p. **L-dislocation (subj.)**: As for Marla, she saw John (later).
q. **L-dislocation (obj.)**: As for John, Marla saw him (later).
r. **Cleft-focus (subj.)**: It was *Marla* who saw John.
s. **Cleft-focus (obj.)**: It was *John* that Marla saw.

While the communicative motivation for some of the syntactic variations in (3) is accessible to conscious introspection — non-declarative speech acts (3h,i,j,k); negatives (3l) — the motivation for the others remains relatively opaque, and requires an empirical study of natural communication.

In terms of usage frequency in face-to-face communication, the simple clause-type is statistically predominant, at the level of 90%-95%, underscoring its privileged informational status. Not surprisingly, it is also cognitively easier to process (Givón 1995, ch. 2).

The combinatorial relation between **lexical semantics**, **propositional information** and **multi-propositional coherence**, and the privileged role of grammar in coding multi-propositional coherence, may be illustrated with the following simple example. Consider first the set of lexical words in (4) below:

(4) **Lexical concepts (words)**:

a.	eventually	b.	police	c.	conclude
d.	dancer	e.	drive	f.	insane
g.	director	h.	proposition	i.	lewdly
j.	shoot	k.	gun	l.	smuggle
m.	theater	n.	night	o.	before

We understand the meaning of these words regardless of the propositions in which they may be embedded in actual communication, presumably through some prototypical network activation in semantic memory (Swinney 1979).

With the addition of appropriate grammatical morphology (boldfaced below), we can combine the lexical words in (4) into coherent simple propositions, as in (5) below:

(5) **Propositions (clauses)**:
- a. Eventually **the** police conclud**ed that** […]
- b. [**Someone**] dr**o**ve **the** dancer insane.
- c. **The** director propositio**ned the** dancer lewdly.
- d. **The** dancer sh**o**t **the** director with **a** gun.
- e. **The** dancer smuggl**ed the** gun into **the** theater **the** night before.

We understand the meaning of these atomic propositions, albeit in a somewhat generic fashion, regardless of the communicative context in which they may be embedded — provided of course that we understand the meaning of their component words and the functions of the grammatical morphemes.

With proper adjustment of the grammatical morphology and the application of other syntactic rules, we can also combine the five simple propositions in (5) into a coherent multi-propositional discourse, as in (6):

(6) **Multi-propositional discourse**:
- a. Eventually **the** police conclud**ed that**,
- b. **having been** driv**en** insane
- c. **by the** director**'s** lewd propositio**ning**,
- d. **the** dancer sh**o**t **him** with **a** gun
- e. **which she had** smuggled into **the** theater **the** night before.

Now, if we were to re-order the connected propositions in (6) without re-adjusting their grammatical structure, the resulting discourse, as in (7) below, would be incoherent:

(7) c. **By the** director's lewd proposition**ing**
b. **having been** driv**en** insane
d. **the** dancer sh**ot him** with **a** gun
a. eventually **the** police conclud**ed tha**t
e. **which she had** smuggl**ed** into **the** theater **the** night before.

Some of the incoherence of (7) as a connected discourse is of course due to the new order itself: Events have their own real-world coherence. Normally one aims a gun and presses the trigger before one shoots the gun, and the victim falls dead only subsequently. But if we now re-adjust the grammatical form of the clauses in (7), their re-ordered sequence may yield a coherent — if different — discourse, as in the not quite as elegant but still serviceable (8):

(8) c. **Because he** proposition**ed her so** lewd**ly**
b. **and thus** drove **her** insane,
d. **the** dancer sh**ot the** director with **a** gun, **which**,
a. **as the** police eventually conclud**ed**,
e. **she had** smuggl**ed** into **the** theater **the** night before.

As this simple-minded example demonstrates, it is the communicative coherence requirements of multi-propositional discourse, rather than the combinatorial semantic demands of atomic propositions, that motivate our specific grammatical packaging of the same 'deep structures'. Functionally-oriented grammarians have been fond of saying that grammar is therefore determined by the *discourse context*. As I will suggest below, discourse context is but a methodological/heuristic stand-in for something else, something more profound — the speaker's communicative intent; that is, the speaker's mental representation of the interlocutor's relevant shifting mental states during communication.

2.4 Grammar

2.4.1 Preliminaries

Grammar is no doubt the latest evolutionary addition to the machinery that supports human communication (Givón 1979, 2002, 2005; Lieberman 1984; Bickerton 1981, 1990; Li 2002; Cheney & Seyfarth 2007). While the evolutionary argument remains necessarily conjectural, it is supported by a coherent body of converging evidence.

In language ontogeny, children acquire the lexicon first, using it in pre-grammatical communication before acquiring grammar (Bloom 1973; Bowerman 1973; Scollon 1976; Givón 1979, 1990; Bickerton 1981, 1990; see ch. 6,7,8,10, below). Likewise, natural second language acquisition by adults follows a similar course; but without formal instruction it most commonly stops short of grammaticalization, remaining at the **pidgin** stage (Bickerton 1981, 1990; Bickerton & Odo 1976; Selinker 1972; Schumann 1978; Givón 1979, 1990; see ch. 9,10, below).

A well-coded lexicon can be acquired by many non-human species (Premack 1971; Gardner & Gardner 1971; Terrace 1985; Savage-Rumbaugh *et al.* 1993; Savage-Rumbaugh & Lewin 1994; Pepperberg 1999; Tomasello & Call 1997; Cheney & Seyfarth 1990, 2007; *inter alia*). This reinforces the suggestion that the neuro-cognitive structures that underlie semantic memory are old, pre-human and pre-linguistic (Givón 1995, 2002, chs 4,5; Geary 2005; Cheney & Seyfarth 2007).

In contrast, the communicative use of grammar in non-human species has never been clearly demonstrated. Nor has much success been reported in teaching grammar to non-human species (Premack 1971; Terrace 1985; Tomasello & Call 1997; Pepperberg 1999; Givón & Savage-Rumbaugh 2008). Grammar as we know it, however gradually evolved, seems to be a uniquely human capacity.

2.4.2 Grammar as structure

As a symbolic code, grammar is much more complex and abstract than the sensory-motor phonological code of the lexicon. At its most concrete, grammar's primary signal combines four major coding devices:[2]

(9) **Primary grammar-coding devices**:
- Morphology
- Intonation:
  - clause-level melodic contours
  - word-level stress or tone
- Rhythmics:
  - pace or length
  - pauses
- Sequential order of words or morphemes

2. The first-order formal properties cited here are relatively concrete and perceptually accessible. More abstract approaches to syntax may reject some of those, including the entire notion of syntactic construction (Chomsky 1992), and may count other abstract properties not mentioned here.

Some of these primary coding devices (morphology, intonation) are more concrete, relying on the same sensory-motor machinery that codes the lexicon. But these concrete devices are integrated into a complex system with the more abstract elements (rhythmics, sequential order) that are no doubt second- or third-order mental constructs.

The most concrete element of the grammatical code, grammatical morphology, is a diachronic derivative of lexical words (Givón 1971, 1979; Traugott & Heine eds 1991; Heine *et al.* 1991; Hopper & Traugott 1993; Bybee *et al.* 1994; see ch. 3, below).

From the primary grammar-coding devices in (9), several more abstract elements of grammatical organization are inferred. Some of the more central of these are:

(10) **More abstract elements of grammatical organization**:
- Hierarchic constituency
- Grammatical relations (subject, object)
- Syntactic categories (noun, verb, adjective; noun phrase, verb phrase)
- Scope and relevance relations (operator-operand, noun-modifier, subject-predicate)
- Government and control relations (co-reference, finiteness)

The structural elements in (9) and (10) combine together to create the various grammatical **constructions** (clause-types; see (2), (3) above). And it is such constructions, with their attendant morphology, that most directly maps onto various communicative functions.

2.4.3 Grammar as function

The adaptive function of grammar comes into sharp relief when one notes that humans can, in some developmental, social or neurological contexts, communicate without grammar. In such contexts, we use the well-coded lexicon together with some rudimentary rules. That is, we use **pre-grammatical pidgin communication** (Bloom 1973; Bowerman 1973; Scollon 1976; Bickerton 1981, 1990; Bickerton & Odo 1976; Selinker 1972; Schumann 1976, 1978, 1985; Andersen 1979; Givón 1979, 1990; see ch. 9,10, below).

The structural and functional differences between pre-grammatical and grammatical communication may be summarized as follows (Givón 1979, 1989):

(11) **Pre-grammatical vs. grammatical communication**

	Properties	Grammatical	Pre-grammatical
	Structural:		
a.	**morphology**	abundant	absent
b.	**constructions**	complex, embedded, hierarchic	simple, conjoined, non-hierarchic
c.	**word**-order	grammatical (subj/obj)	pragmatic (topic/comment)
d.	**Pauses**:	fewer, shorter	copious, longer
	Functional:		
e.	**processing speed**	fast	slow
f.	**mental effort**:	effortless	laborious
g.	**error rate**:	lower	higher
h.	**context dependence**:	lower	higher
i.	**processing mode**:	automated	attended
j.	**development**:	later	earlier
k.	**consciousness**:	sub-conscious	more conscious

The heavy dependency of pidgin communication on the lexicon tallies with the fact that the lexicon is acquired before grammar in both first and second language acquisition, as well as with the fact that more abstract vocabulary is the diachronic precursor of grammatical morphology (see ch. 3,12). Pre-grammatical children, adult second language pidgin speakers and agrammatic aphasics comprehend and produce coherent multi-propositional discourse, albeit at slower speeds and higher error rates than those characteristic of grammatical communication (see ch. 9,10 below). The identification of grammar with a more automated, subconscious, speeded-up processing system has been suggested in Givón (1979, 1989), Blumstein & Milberg (1983), Lieberman (1984), Pulvermüller (2003), Pulvermüller & Shtyrov (2003), Shtyrov *et al.* (2003), and Pulvermüller *et al.* (2008). Phonology, the other human communicative code, is likewise highly automated and subconscious.

2.5 Grammar and other minds

"A context is a psychological construct"

(Sperber & Wilson 1986: 15)

"Mind reading pervades language"

(Cheney & Seyfarth 2007: 244)

We noted earlier above that the adaptive function of grammar is to code the communicative function — or discourse context — of propositions/clause. But the notion of context-as-text is only a methodological heuristic. To begin with, context is not an objective entity but rather a mental construct, depending on judgements of relevance (Sperber & Wilson 1986). Further, what the use of grammar is sensitive to, what grammar is adapted to do, is highly specific. It is adapted to represent — systematically, in the mind of the speaker-hearer — the constantly shifting epistemic and deontic mental states that the interlocutor is presumed to hold during ongoing communication. In other words, grammar is a code adapted for the **mental representation of other minds**, what is currently known in cognitive neuroscience as **theory of mind**.

Communicating without a theory of mind is either implausible or inordinately slow, cumbersome and error prone, a message implicit in Grice's (1968/1975) influential paper on the pragmatics of communication. As Cheney and Seyfarth put it more recently (2007), *mind reading pervades language*. An extensive treatment of this subject may be found in (Givón 2005). For the purpose of this chapter, a few illustrations will suffice.[3]

2.5.1 Mental models of epistemic states

The first example is taken from the grammar of referential coherence ('reference tracking'), a functional domain of the grammar that involves a large number of constructions and grammatical morphologies (Givón 2005, ch. 5). Consider the mid-discourse narrative in (12) below:

(12) a. There was **this** man **standing near the bar**,
b. but we ignored **him** and went on across the room,
c. where **another man** was playing the pinball machine.
d. **We** sat down and ordered a beer.
e. **The bar tender** took his time,
f. I guess **he** was busy.
g. So **we** just sat there waiting,
h. when all of a sudden **the man standing next to the bar** got up and screamed.

3. The literature on 'theory of mind' is vast, multi-disciplinary and growing exponentially, going back to Premack & Woodruff's (1978) original contribution. For some of the discussion, see Baron-Cohen (1995, 2000); Byrne & Whiten (eds 1988); Cheney & Seyfarth (2007; ch. 10); Decety & Sommerville (2003); Decety & Jackson (2006); Gopnik & Wellman (1992); Heyes (1998); Leslie & Frith (1988); Frith & Frith (2003); Malle *et al.* (eds 2000); Melzoff & Prinz (eds 2002); Povinelli & Preuss (1995); Tomasello *et al.* (2005); Wellman (1990); Whiten (ed. 1991).

In marking 'man', introduced for the first time in (12a), with the indefinite 'this', the speaker cues the hearer that s/he doesn't expect him/her to have an extant *episodic-memory* trace of the referent. In coding the same referent with the anaphoric pronoun 'him' in (12b), the speaker assumes that the referent is not only accessible, but is still *currently activated* in the hearer's mind; that is, the referent is still under *focal attention*.

Another referent is introduced for the first time in (12c), this time with the indefinite marker 'another'. In using the first-person pronoun 'we' in (12d), next, the speaker assumes that his/her own referential identity is accessible to the hearer from the immediate speech situation, thus is still activated in *working memory/ attention*. 'The bar tender' is introduced for the first time in (12e) but still marked as *definite*. This is so because the prior discourse had activated 'bar', which then remained activated in the hearer's *working memory* by the persistence of the narrated situation. 'Bar tender' is an automatically-activated connected node in the lexical frame 'bar', thus a consequence of the cultural specificity of *semantic memory*. In continuing with the anaphoric pronoun 'he' in (12f), the speaker again assumes that the referent is both accessible and currently activated in the hearer's *focal attention*. And in using the first-person pronoun 'we' in (12g), the speaker assumes that his own identity is still accessible to the hearer in the *current speech situation*, i.e., *working memory*.

Finally, the man introduced earlier in (12a,b), and then left out for five intervening clauses, is re-introduced in (12h). The use of a *definite* article suggests that the speaker assumes that this referent is still accessible in the hearer's *episodic memory*. But the hearer's memory search is not going to be simple: Another man has been mentioned in the intervening discourse (12c) as 'playing the pinball machine'. Both referents are assumed to still be accessible in the hearer's *episodic memory*, and would thus compete for the simple definite description 'the man'. To differentiate between the two, a *restrictive relative clause* is used, matching 'standing next to the bar' in (12h) with 'there was this man standing near the bar' in (12a). In using this grammatical cue, the speaker reveals his/her assumption that the hearer still has a trace of both the referent and the proposition in (12a) in their *episodic memory*.

2.5.2 Mental models of deontic states

Example (12) above reveals another important feature of our presumption of access to other minds: Our mental models of the mind of the interlocutor shift constantly from one clause to the next during ongoing communication. As speakers release more information, they constantly update what they assume that the hearer knows; that is, they update their mental model of the hearer's constantly

shifting *epistemic* (belief) states. In this section we will see that speakers also construct and update running mental models of the hearer's constantly shifting *deontic* (intentional) states.

The deontic (and epistemic) states we will consider here are coded by the cluster of grammatical sub-systems that mark **propositional modalities** (Givón 2005, ch. 6). The most conspicuous of these sub-systems, and the easiest to illustrate, is the grammar of *speech-acts*.

The study of speech-acts has traditionally centered on a set of *felicity conditions* ('use conventions') associated with declarative, imperative, interrogative, and other speech-acts. These conventions have an illustrious antecedence in post-Wittgensteinean philosophy and linguistics (Austin 1962; Searle 1970; Grice 1968/1975; Cole & Morgan eds 1975; *inter alia*). They are also known as *conventional implicatures* (Levinson 2000).

As an illustration, consider the following, somewhat schematic but still plausible, dialogue between speakers A and B:

(13) A-i: So she got up and left.
B-i: You didn't stop her?
A-ii: Would you?
B-ii: I don't know. Where was she sitting?
A-iii: Why?
B-iii: Never mind, just tell me.

In the first conversational turn (13A-i), speaker A executes a *declarative* speech-act, which involves, roughly, the following presuppositions about hearer B's then-current mental states (in addition to the speaker's own mental states):

(14) a. **Speaker's beliefs about hearer's epistemic state**:
- Speaker believes hearer doesn't know proposition (13A-i).
- Speaker believes hearer believes that speaker speaks with authority about proposition (13A-i).

b. **Speaker's beliefs about hearer's deontic state**:
- Speaker believes hearer is well-disposed toward the speaker communicating to him/her proposition (13A-i).

c. **Speaker's own epistemic state**:
- Speaker believes he/she knows in proposition (13A-i).

d. **Speaker's own deontic state**:
- Speaker intends to inform hearer of proposition (13A-i).

In the next turn (13B-i), B, the speaker now executes an *interrogative* speech-act (yes/no question), which involves, roughly, the following presuppositions about hearer A's then-current mental states (as well as the speaker's own):

(15) a. **Speaker's beliefs about hearer's epistemic state**:
- Speaker believes hearer knows the declarative proposition underlying question (12B-i).
- Speaker believes hearer knows speaker does not know that proposition.

b. **Speaker's beliefs about hearer's deontic state**:
- Speaker believes hearer is willing to share their knowledge of that proposition.

c. **Speaker's own epistemic state**:
- Speaker is not certain of the epistemic status of the proposition underlying (13B-i).

d. **Speaker's own deontic state**:
- Speaker would like hearer to share their knowledge with him/her.

In turn (13Biii), lastly, speaker B executes a *manipulative* speech-act, which involves, roughly, the following presuppositions about hearer A's current mental states (as well as the speaker's own):

(16) a. **Speaker's beliefs about hearer's epistemic state**:
- The speaker believes the hearer knows that the desired event ('You tell me') is yet unrealized.

b. **Speaker's beliefs about hearer's deontic state**:
- Speaker believes hearer is capable of acting so as to bring about the desired event.
- Speaker believes he hearer is well-disposed toward acting to bring about the desired event.

c. **Speaker's own epistemic state**:
- Speaker believes the desired event ('You tell me') is yet unrealized.

d. **Speaker's own deontic state**:
- Speaker would like the event ('You tell me') to come about.

At every new turn in the conversation (13), not only do the speaker's own belief-and-intention states change, but also his/her mental representation of the hearer's belief-and-intention states. And one would assume that a similar fast-paced adjustment also occurs in the mind of the hearer.

2.6 The adaptive ecology of human communication

The rise of the two symbolic codes unique to human communication, phonology and grammar, is but an adaptive response to three more profound changes in the ecology of human communication. These changes are part and parcel of the adaptive context that motivated the rise of human language, and are in turn themselves motivated by various aspects of human cultural evolution.

a. **Spatio-temporally displaced reference**
Both early childhood communication and pre-human communication are heavily weighted towards here-and-now, you-and-I, and this-or-that referents accessible in the shared *immediate speech situation*. When all referents are equally accessible to all participants in the shared speech situation, the lexical coding of the *type* of referent is superfluous. Mere pointing (deixis), that is, orientating the interlocutor towards **joint attention** to the referent, will suffice.

Mature human communication is, in contrast, heavily tilted towards spatio-temporally displaced referents, be they individuals, objects, states or events. This is reflected first in the lopsided use-frequencies of displaced reference. But it is also reflected in the fact that much of our grammatical machinery is dedicated to communicating about displaced referents, states and events (Givón 2001; see ch. 7,8 below).

Referents in the shared immediate speech situation are mentally represented in the *working memory/attention* system. Such representation shifts — with motion and attention — from one moment to the next, and is thus temporally unstable. In contrast, displaced referents are more likely to be representated in *episodic memory*, as either memories of past experience or future projections, plans or imaginations. Compared to working memory, episodic memory is a much more stable mental representation. And this temporal stability may have contributed toward the objectivization of verbally-coded referents, including the **mental predicates** — 'think', 'know', 'see', 'understand', 'want', 'be able' — so central to the representation of other minds (see ch. 7, below).

The rise of the human lexical-phonological code may now be understood as an adaptation designed to accommodate the shift from non-displaced to displaced reference in human communication. When the adaptively-relevant topics of communication became, increasingly, temporally- and spatially-displaced, embedded in remembered past or projected future, pointing (deixis) ceased to be a viable tool of referent identification. Coding the mental lexicon became an adaptive necessity.

b. **Declarative speech-acts**
Spontaneous pre-human communication is confined almost exclusively to *manipulative* speech-acts (Tomasello & Call 1997; Savage-Rumbaugh *et al.* 1993;

Pepperberg 1999; Cheyney & Seyfarth 2007), a tendency also observed in early childhood communication (Carter 1974; Bates *et al.* 1975, 1979; see ch. 7,8, below). In striking contrast, mature human communication is tilted heavily, at the use-frequency level, toward *declarative* speech-acts (Givón 1995, ch. 2; see ch. 7,8 below); and the bulk of the grammatical machinery of human language is invested in coding declarative speech-acts (Givón 2001).

The emergence of declarative speech-acts may have enhanced the liberation of epistemic mental predicates from their erstwhile subordination to deontic predicates (Premack & Woodruff 1978). And the separate and more explicit representation of epistemic mental states ('think', 'know', 'see, 'understand" etc.) may have, in turn, contributed towards heightened consciousness of *mental framing* operations, first those pertaining to one's own mental states, then by extension those pertaining to the mental states of others.[4]

The emergence of declarative communication also points toward the increasing adaptive relevance of displaced reference. Manipulative speech-acts are confined primarily to here-and-now, you-and-I, this-and-that — i.e., to the immediate speech situation; that is, to primarily what is represented in working memory and current focal attention. Declarative and interrogative speech-acts, on the other hand, are utterly superfluous when the referents are equally available to both interlocutors here-and-now. Why bother to tell another person about states of affairs s/he already knows? Why bother to ask them if you already know what they know?

It is the emergence of displaced reference as the more prevalent topic of communication that endowed declarative and interrogatives speech acts with their adaptive motivation: They are designed to carry the load of reporting (and asking) about inaccessible referents and past or future events that are not available to all interlocutors at the speech situation. Displaced reference creates an **informational**

4. Premack & Woodruff (1978) suggest that the mental representation of epistemic states was a later addition to the representation of deontic states. However, the intentional 'I'd like to eat the apple' presupposes the two epistemic states, (i) the presupposed factual current state 'I haven't yet eaten the apple', and the asserted intended future state 'I will eat the apple'. As in diachrony, where epistemic senses develops later out of deontic ones, evolution simply liberates the epistemic from its earlier subservience to the deontic. The relation between the two is thus a one-way conditional: DEONT ⊃ EPIST, but not vice versa. In diachronic terms, this is 'liberation' or 'bleaching'. Likewise, in child acquisition of propositional modalities, deontic modalities are acquired earlier than epistemic ones (Diessel 2005; see ch. 7, below), and epistemic uses are often 'liberated' from earlier deontic uses. And in the few lexical signals of natural pre-human communication, such as mating or predator calls, the usage is always manipulative (deontic), never truly referential (epistemic; Cheney & Seyfarth 1990, 2007; Boesch 2002a, 2002b; Zuberbühler 2000, 2001, 2002).

imbalance in the erstwhile intimate social unit, and declarative and interrogative speech-acts are an adaptive response to such an imbalance.

c. **Multi-propositional discourse**

Both early childhood and non-human primate communication are overwhelmingly mono-propositional (Tomasello & Call 1997; Savage-Rumbaugh *et al.* 1983; Cheyney & Seyfarth 2007; Bloom 1973; Carter 1974; Scollon 1976; Bates *et al.* 1975, 1979; see ch. 7,8, below). In contrast, mature human communication is, at the use-frequency level, overwhelmingly multi-propositional. This is also reflected in the fact that the bulk of the machinery of grammar is invested in coding multi-propositional, cross-clausal coherence (Givón 2001).

As noted above, grammar codes, primarily, the speakers mental representation of the interlocutor's presumed epistemic and deontic states during ongoing communication. The high automaticity of grammar may mean that the evolution of grammatical communication was motivated, at least in part, by the strong adaptive pressure of having to deal with a high frequency of **perspective shifting** (MacWhinney 2002, 2008). The frequency of such shifting in adult humans is perhaps an order-of-magnitude higher (or more) than that of pre-human communication.

One may view the rise of multi-propositional discourse as but the next step in the rise of declarative communication. As the volume of adaptively-relevant information about displaced referents became greater, the faster and more streamlined processing of such information became more pressing, especially in terms of the constant perspective-shifting involved in the processing of larger stretches of coherent discourse. The rise of grammar may be thus viewed as an adaptive response to the need to process this explosive amount of declarative, multi-propositional information.

2.7 Cultural evolution

I will not discuss here human cultural evolution in full detail (see ch. 12). The relevant social organization of hominids during their separate 6-million year evolution was superficially not all that different from that of the social great apes (gorillas, chimpanzees, bonobos). Such social organization of foraging groups may be characterized as the **society of intimates** (Givón 2002, ch. 7), one that was genetically, technologically, occupationally, geographically — and most important, informationally — relatively stable and homogeneous. Within such a society, most relevant *generic* information is shared among all group members, and most communicatively-relevant *specific* information is shared s*ituationally*.

As noted above, the rise of well-coded lexicon and grammar suggests an explosive growth in hominids' dependence on adaptively-relevant information that was *not* uniformly distributed across the group. While the expansion of the group's foraging range must have been part of such an informational explosion, it was probably not the only factor. Many single-cause scenarios for this hominid informational explosion, thus for language evolution, have been suggested. Most of these scenarios are reductive, focusing on a single adaptive factor, be it sexual selection (Darwin 1871; Miller 2001), descent from the trees, move to the savanna, bipedism, expanding foraging range, omnivorous feeding, tool-making (Greenfield 1991), social grooming (Dunbar 1992), group identity (Knight 1998), increased group size (Dunbar 1992), big-game hunting (Washburn & Lancaster 1968), big-game scavenging (Bickerton 2005), pre-hunt consultation (Számadó 2008), laryngeal retraction (Lieberman 1984) or theory of mind (Dunbar 1998; Tomasello *et al.* 2005). A more realistic scenario would, I believe, be complex, multi-variant and **co-evolutionary**. A comprehensive discussion may be found in de Waal (2001); Geary (2005); Számadó & Szathmáry (2006) or Cheney & Seyfarth (2007).

Whatever the ultimate causal factors may be, they must account for the shifts in adaptive-communicative ecology, most specifically for the increased adaptive relevance of un-shared, spatio-temporally displaced, declarative information.

PART II

Diachrony

CHAPTER 3

The diachrony of grammar

3.1 Diachrony and evolution*

In biology, one takes it for granted that the way extant organisms are today, and the current distribution of their staggering cross-species variety, is explained most coherently by the two developmental processes that brought them up to this point — *phylogenesis* (evolution) and *ontogenesis* (embryology). This is how Darwinian evolutionary theory interprets the cumulative descriptive and classificatory data gleaned during the preceding 2000-odd years of systematic study of living organisms, from Aristotle to Linaeus.

In linguistics, in a rather striking analogy, three major developmental trends have jointly fashioned the way language — and languages — are now:

- **Evolution**: The descent of the language capacity of the human species
- **Ontogenesis**: The emergence of language in children
- **Diachrony**: The historical development of particular languages

Of these three, diachrony is a uniquely human phenomenon, a cumulative historical accretion through cultural transmission. What is more, diachrony has the most direct causal bearing on the shape of any particular language, and thus on the diversity of human languages.

While seemingly unprecedented in biology, language diachrony nonetheless recapitulates many of the general features of biological evolution. This may be summed up in the following observations:

- Today's micro-variation within the species/language engenders, at least potentially, tomorrow's macro-variation across species/languages.
- Conversely, today's starkly diverse extant species, genera, families, and phyla in biology, or starkly diverse languages, dialects and language families, can be traced back to earlier variation at lower taxonomic levels (sub-species, sub-dialects).

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*I am indebted to Bernard Comrie, Bernd Heine, Matt Shibatani and Werner Abraham and the participants in the *Second Workshops on Passives and Grammatical Relations* at the University of Sonora, Hermosillo, November 2004, for helpful comments on earlier versions of the diachronic discussion. The application of diachrony to language evolution remains largely unexplored and, to some, controversial (Slobin 2002). To others, however, it is all too obvious (Heine & Kuteva 2007).

- Consequently, gradual step-by-step *micro-variation* can yield, over time, stark and seemingly unbridgeable gaps of *macro-variation* among extant species or languages.
- The process of change itself, the invisible teleological hand that guides the ever-shifting but still roughly-isomorphic matching of structures and functions, is driven by adaptive selection, i.e., by functional-adaptive pressures.
- The accretion of adaptively-driven changes in temporal order can lead, over time, to considerable restructuring and arbitrary structure-function mapping, thus to seemingly non-adaptive *relic features* ('excess structure', 'spandrels').
- Universal principles do not control observed surface features directly, but rather control the developmental processes that, in turn, give rise to observed surface features.

Six general principles seem to exert control on both language diachrony and biological evolution:

- Graduality of change
- Adaptive-selectional motivation
- Functional change and ambiguity before structural change and specialization
- Terminal addition of new structures to older ones
- Local causation (but global consequences).
- Uni-directionality of change

In one major respect, diachrony and evolution part ways — on the issue of **genetic coding.** In biology, the cumulative adaptive-behavioral experimentation of organisms over time does not directly cumulate in their surface structural features (phenotype); it does so only when adaptive behavior meets random **mutation** and **recombination** during the process of selection. The useful lessons of behavior then cumulate in a hard-wired fashion in the DNA (genotype), insuring that future generations may benefit from the adaptive experience of past generations; and that new generations won't have to start every time from the amoeba. Put another way, **innateness** is but the salutary consequence of, and testimony to, adaptively-driven evolution.

In contrast, in diachrony, the everyday adaptive communicative experimentation of adult speakers cumulates in the linguistic structures they engender and constantly tamper with, but without any genetic coding. Rather, **cultural transmission** is the main instrument of passing on adaptively-driven language change to future generations. This means that the process of **attrition** — erosion, elimination, simplification and loss — in language diachrony is starkly different from the corresponding process of simplification and restructuring in biological evolution.

In biology, due to genetic coding, evolutionary changes are neigh irreversible. Organs may be simplified, reduced or altogether eliminated in extant adult structures. But the process of both their innovation and elimination is still coded,

in that order, in both the genome and, consequently, in ontogenesis (Gould 1977).[1] Whales do not skip their terrestrial-mammalian genes and embryology because they are now back in the water with the fish. Both their genome and their embryology bear testimony to, first, their emergence from the water and, later, their subsequent return.

In contrast, the adaptive-communicative experimentation of adult speakers lasts only as long as culturally-transmitted structures persist. Some fossil structures, in particularly morphology (Givón 1971, 1979), may persist for millennia and serve, if judiciously used, for the reconstruction of earlier stages of syntactic structure (Givón 2000). But in the absence of hard-wired genetic and ontogenetic coding, the **attrition** of linguistic structures may proceed to its ultimate, eroding first morphology and then syntactic constructions to the point of utter functional inefficacy. This leads, in due course, to the eventual **renovation** of morpho-syntactic structure. New structures are recruited to pick up the slack and the **grammaticalization cycle** starts over again (Givón 1979). But the diachronic cycle is not a reversal of directionality, only the termination of one unidirectional process and the re-starting of another in the same general direction. At the point of re-starting, speakers — thus 'the language' — may chose to pursue other structural options for performing the same communicative function(s). This is where a language, or a functional domain within a language, may change its structural phenotype.

Since we have virtually no direct fossil evidence of prior stages of hominid communication, the topic of language evolution remains controversial. Yet true understanding of human language will never be possible without an evolutionary account. To some extent, and with a measure of caution, the two well-documented developmental trends that are accessible to us — language diachrony and language ontogeny — can furnish us with coherent clues about possible evolutionary scenarios. As could the study of second language acquisition and pidginization (Givón 1979, 2002, 2005; Bickerton 1981, 1990; Heine & Kuteva 2007).

3.2 Diachronic change, typological diversity and language universals

To the naked eye, both the linguist's and the lay person's, the diversity of human languages seems immense and unconstrained, at first glance defying any attempt

1. To a large extent, the genome in biology codes the developmental sequence, i.e., ontogeny, and only through it the ensuing mature structure.

to posit meaningful universals. As noted in chapter 2, the argument about whether features of human language are universal, and thus by implication **motivated**, genetically transmitted, biologically evolved and **innate**; or idiosyncratic, and thus by implication **arbitrary**, non-evolved or genetically coded and only **culturally transmitted**, harkens back to both Plato (*Cratylus*, *Meno*, *Phaedo*) and Aristotle (*De Interpretatione*, *The Categories*).

Many fine linguists, especially those who followed the structuralist dogma of arbitrariness (Saussure, Bloomfield), expressed strong doubts about language universals, believing in unconstrained cross-language diversity. Thus, consider what Bloomfield (1933) had to say on the subject:

> "… North of Mexico alone there are dozens of totally unrelated groups of languages, presenting the most varied types of structures. In the stress of recording utterly strange forms of speech, one soon learns that philosophical presuppositions were only an hindrance … The only useful generalizations about language are inductive generalizations …" (1933: pp. 19–20)

Other structuralists, like Chomsky, have opted for an extreme version of universality and innateness, by extracting from the vast and varied phenomenology of language few features that are sufficiently abstract, so that one could say they are shared by all human languages. This gambit echoes both Plato's *eidon* ('essence') and Saussure's *langue* ('system').[2]

A more balanced empirical approach to language universals, perhaps best exemplified in the works of Hermann Paul (1890) and Joseph Greenberg (1969, 1978, 1979), adopts a middle-ground biological perspective, whereby both diversity and universals are acknowledged. Indeed, the two are closely intertwined, and the balance between them is mediated by developmental processes, most conspicuously diachrony. Thus, specific features of both phonology and grammar may vary considerably across languages, and the accretion of such variation may lead to a seemingly staggering cross-language diversity. But within each functional domain, the structural-typological variation is severely constrained — say up to 5–7 major types of structure that may code the same communicative function in most languages.

Structural-typological cross-language diversity within each functional domain is mediated by general adaptive principles, which in turn manifest themselves through the three relevant developmental trends — language evolution, child language acquisition and, most germane to our discussion here, diachronic change. As in biology, language universals are not just a set of observable traits attested in

2. Chomsky's (1992) *Minimalist Program* is perhaps the epitome of such an approach.

all languages (constructions, morphemes). Rather, they are a set of general *principles* that control development and thus the genesis of extant structural traits.

3.3 Case study: The diachronic typology of passive clauses

3.3.1 Preliminaries

I have chosen to illustrate the role of diachrony in mediating the balance between syntactic-typological universality and diversity with a case study of the diachronic typology of passive clauses. For one thing, many passive constructions arise diachronically as complex constructions. For another, the passive (de-transitive) functional domain is rich and complex, illustrating the interplay between adaptive motivation, synchronic micro- and macro-variation, and diachronic change. I will begin by posing a question that is reasonably concrete and construction-specific: Are the relational properties (GRs) of passive clauses predictable, and if so on what grounds?

One answer, following Comrie (2004/2008), is *yes* — but a *yes* that leaves one somewhat perplexed, since it is done a by preemptive fiat. That is, if one defines the passive clause by purely structural means as "that type of construction, as in Latin or English, where the agent is marked as *oblique* and the patient/topic as *nominative*", then the question I have just posed becomes moot or even silly. However, as Keenan (1975) has noted, the display of nominative properties by the patient/topic of the passive may be a matter of degree even in Latin. What is more, as I have pointed out elsewhere (Givón 1981; ed. 1994a, 1995, 2001, ch. 13; 2002, ch. 6), there are good reasons for suggesting that the purely structural definition of syntactic constructions *in general* is untenable. Rather, a typology of any syntactic construction, including the passive, requires a functional definition of syntactically-coded domains.

A necessary corollary to the functional-domain approach to syntactic typology, in this case of passive clauses, is that a diachronic account best predicts the structural properties of such clauses. This is so because by and large such properties follow, at least initially, from the structural properties of the diachronic source from which a construction arises. From a functional-adaptive perspective, the diachronic underpinnings of syntactic typology closely parallel the evolutionary underpinnings of extant biological diversity.

3.3.2 The typology of passive constructions

One can define a passive clause functionally as "the clause-type whereby the agent of the corresponding active is radically de-topicalized, and the patient becomes, by

default, the topical argument". If one subscribes to such a definition, then a theoretically revealing cross-linguistic typology of passive clauses should be, ideally, the list of the most common major clause-types that conform to this functional definition. For the purpose of the discussion here, I will consider six major types from this list (Givón ed. 1994a, 1995, 2001, 2002).[3]

A. **The adjectival-stative passive**
In some languages, as in the English BE-passive, a passive clause arises diachronically from, and still resembles structurally, a predicate-adjective construction, as in:

(1) a. **Passive**: It was broken (by someone)
b. **Perfect-resultative**: It has been broken
c. **Adjectival-stative**: It is broken
d. **Predicate-adjective**: It is big

B. **The reflexive passive**
In some languages, as exemplified in the English GET-passive, a passive clause arises diachronically from, and still resembles structurally, a reflexive middle-voice construction, as in (Givón & Yang 1994):

(2) a. **Causative**:
Mary got them to fire John
b. **Causative with passive complement**:
Mary got John (to be) fired
c. **Reflexive-causative (passive complement)**:
Mary got herself fired
d. **GET-passive**:
Mary got fired

C. **The serial-verb adversive passives**
In some languages, the passive clause arises diachronically from, and still resembles structurally, an adversive serial-verb construction. In the process of grammaticalization, an adversive serial verb such as 'suffer' first becomes the grammaticalized marker of an adversive passive, as in Mandarin Chinese, Japanese, Thai or Vietnamese. Such

3. Many other types can be found in Haspelmath (1990). The question of what constitutes a 'major' type is not uncontroversial, not only here but in taxonomy in general. As Aristotle noted long ago, and as Ernst Mayr reaffirmed more recently, all taxonomies of natural phenomena are logically arbitrary but pragmatically motivated, depending as they do on the purpose or perspective of the taxonomist (Givón 2005, ch. 1).

a construction may later expand its functional scope to become a generalized passive, as in Mandarin (Li & Thompson 1981):

(3) a. **Adversive passive (older)**:
ta **bei** (gongsi) chezi-le
s/he **suffer** (company) fire-PERF
'S/he was fired (by the company)'
(lit.: 'S/he suffered (when) the company fired her')

b. **Generalized passive (newer)**:
sheng-cheng **bei** jiefang-le
province-capital PASS liberate-PERF
'the provincial capital was liberated'
(lit.: 'the provincial capital suffered (when someone) liberated it')

D. **The VP-nominalization passive**
In some languages, such as Ute, a passive clause may arise diachronically from, and still resembles structurally, a nominalized verb phrase construction, as in Ute (Givón 1980a):[4]

(4) a. **Passive**:
múusa-chi paxá-**ta**-pʉga
cat-OBJ kill-**PASS**-REM
'The cat was killed'

b. **Verb-phrase nominalization**:
múusa-paxá-**ta** ka-'áy-wa-t 'ura-'ay
cat-kill-**NOM** NEG-good-NEG-NOM be-IMM
'Cat-killing is not good'

E. **The Left-dislocation-cum-impersonal-subject passive**
In some languages, such as Kimbundu, a passive construction may arise diachronically from, and still resembles structurally, a blend of L-dislocation with the impersonal subject construction with the pronoun 'they', as in:

(5) a. **Passive**:
Nzua **a**-**mu**-mono (kwa meme)
John **they**-**him**-saw by me
'John was seen by me'
(lit.: 'John, they saw him by me')

4. A similar development of a nominalization into an agent-suppressing passive may be seen in modern Dutch (Kirsner 1976), where it involves an existential-presentative construction.

b. **L-dislocation with full-NP subject**:
Nzua, aana **a-mu**-mono
John children **they-him**-saw
'John, the children saw him'

c. **L-dislocation with pronominal subject**:
Nzua, **a-mu**-mono
John **they-him**-saw
i. **Anaphoric active**: 'John, they saw him'
ii. **Impersonal passive**: 'John, he was seen'

F. **The zero-anaphora passive**

Finally, in many languages the passive clause arises from, and still structurally resembles, the active clause with a highly-topical, referring, anaphoric agent; that is, from a clause with a *zero anaphoric* agent. Thus in Sherpa:

(6) a. **Non-anaphoric agent of active**:
ti mi-ti-gi chenyi chaq-sung
DEF man-DEF-ERG cup/ABS break-PAST/EVID
'The man broke the cup'

b. **Anaphoric agent**:
chenyi chaq-sung
cup/ABS break-PAST/EVID
i. **Active interpretation**: 'S/he broke the cup'
ii. **Passive interpretation**: 'The cup was broken', 'Someone broke the cup'

What gave rise to such typological diversity of passive constructions is the fact that each passive type A through F arises diachronically from a different source construction. But this is only possible because each source construction shares some functional features with the passive as defined above. In other words, all these source constructions exhibit a partial *functional similarity* — or *functional overlap* — with the passive clause. This functional similarity is summarized below for each of the six types.

Type A: The adjectival-resultative construction in English, like a typical passive, is agentless, and its subject is thus, by default, a topicalized patient.

Type B: The GET-causative-reflexive in English, much like the passive, has a non-distinct agent-patient single argument that is, by default, also its topicalized patient.

Type C: The Mandarin adversive serial-verb clause has a topicalized patient and, most commonly, also a de-topicalized or altogether missing agent.

Type D: The Ute VP nominalization, like a typical passive, is agentless and (by default) topicalizes the surviving non-agent argument.

Type E: The Kimbundu L-dislocation clause, much like the passive, has a topicalized patient; and the impersonal 'they' construction has a de-topicalized non-referring agent.

Type F: Somewhat more difficult to press into this explanatory mold is the zero-anaphoric passive of Sherpa. This is because the anaphoric zero agent of its source construction is highly referring and topical, while the zero agent of the structurally-identical passive is neither referring nor topical. However, one may as well note, first, that the very same is also true for *antipassives*, where a zero-coded object may be either the anaphoric topical patient of the active, or a non-referring, non-topical patient of the antipassive. For both the passive and antipassive, thus, there is a functional similarity between the two seemingly-disparate uses of zero arguments: Unexpressed information in general is prompted by two major cognitive-functional factors: (a) predictability; and (b) irrelevance (Givón 1983a, 1988a).

Functional similarity — or partial functional overlap — is one crucial precondition for the diachronic extension from a source domain into a target domain. And it is the functional definition of *both* source and target domains that makes grammaticalization pathways as predictable as they are.

In the early stage of grammaticalization, the same structure performs two similar but non-identical functions, the old and the new. Here again, diachronic change in language closely parallels biological evolution, where early-stage functional re-analysis of organs is considered a major component of the evolutionary mechanism. In this connection, Ernst Mayr cites no less an authority than Darwin:

> "… By far the most important principle in the interpretation of the origin of new structures is that of the "change of function" … Darwin recognized quite clearly that the possibility for a change of function usually depends on two prerequisites. The first of these is that a structure or an organ can *simultaneously perform two functions*: "Numerous cases could be given amongst the lower animals of the same organ performing at the same time wholly distinct functions" … The other is the principle of *duplication*: "Again, two distinct organs, or the same organ under two different forms, may simultaneously perform in the same individual the same function, and this is an extremely important means of transition" …" (Mayr 1976: pp. 97–98; italics added)

3.3.3 Early vs. late stages of grammaticalization

The early stages of grammaticalization are characterized by *functional ambiguity*. This is because functional re-analysis is the first step in diachronic change, be it

syntactic or lexical. Functional re-analysis takes place instantaneously, as a spontaneous adaptive experimentation by individual speakers during communication, when speakers extend the use of old constructions (and words) to novel contexts. Structural re-adjustment, re-analysis and simplification eventually follows, giving rise to more precise ('iconic') coding of the newer vs. older functions as two distinct constructions. Such re-analysis often occurs much later in the diachronic cycle, and is subject to different constraints (Givón 1971, 1975a, ed. 1997a; Heine *et al.* 1991; Traugott & Heine eds 1991; Hopper & Traugott 1993; Bybee *et al.* 1994; *inter alia*). In this respect too, there is a strong similarity between diachronic change and biological evolution (see quote from Mayr 1976, above). This similarity can also be extended, with obvious caveats, to early vs. late ontogeny and neuro-cognitive development, as summarized in (7) below:

(7) **Time-course of functional vs. structural change**:

	Time course	
Parameter	**Early**	**Late**
evolution:	adaptive behavior	genetic change
diachrony:	functional extension	structural change
ontogenesis:	plasticity	rigidification
attention:	conscious	automated
processor:	soft-wired	hard-wired

The six passive constructions discussed above are diachronically relatively young.[5] In five out of the six types, the very same basic construction still performs both the pre-passive (source) and the passive (target) function, although one can see some optional added or subtracted elements. And it is often the surrounding context, marked below in parentheses, that facilitates the old vs. new interpretation. Thus, respectively:

(8) **English adjectival passive (A)**:
   a. **Resultative-adjectival**:
      (When we looked last night) the window was (already) broken.
   b. **Passive**:
      The window was broken (by a burglar late last night).

5. 'Early' is of course a relative matter in diachrony. Given the notorious conservatism of morpho-syntactic structure (except intonation!), functionally ambiguous structures and their attendant non-iconicity may persist for centuries with little re-structuring (Givón 1979, ch. 6).

(9) **English GET-passive (B)**:

a. **Reflexive**:
(She didn't like Phoenix, so) she got herself transferred to Atlanta.

b. **Adversive-passive**:
She got fired (by her boss for insubordination)

(10) **Ute VP-nominalization passive (D)**:

a. **Nominalization**:
múusachi paqxa-ta-'u ka-'ay-wa-t 'ura-pʉga
cat/OBJ kill–3 NOM/POSS NEG-good-NEG-NOM be-REM
'His/her killing (of) the cat was bad'

b. **Passive**:
múusachi paqxa-ta-pʉgay-'u (kʉaw)
cat/OBJ kill-PASS-REM-3/OBJ (yesterday)
'The cat was killed'

(11) **Kimbundu L-dislocation/impersonal passive (E)**:

a. **Active, anaphoric agent**:
Nzua, (aana) **a-mu**-mono
John (children) **they-him**-saw
'As for John, the children saw him'

b. **Passive, impersonal agent**:
Nzua **a-mu**-mona (kwa-mene)
John **they-him**-saw by-1SG
'John was seen (by me)'

(12) **Sherpa zero-anaphora passive (F)**:

a. **Active, anaphoric agent**:
chenyi chaqx-sung (, ti miti-gi)
cup/ABS break-PAST/EVID DEF-man-ERG
'he broke the cup (, the man did)'

b. **Passive, impersonal agent**:
chenyi chaqx-sung
cup break-PAST/EVID
'The cup was broken', 'Someone broke the cup'

The lone exception here is the serial-verb passive of Mandarin Chinese (type C; (3) above). The initial functional ambiguity here was between a clause-chain (source) and a single event (goal) interpretation. The diachronic change involved

here is a type of *clause union,* whereby the two erstwhile chained-event clauses are re-interpreted as a single-event serial-verb clause (see ch. 4, below). The earliest re-structuring step here is intonational, the subtle but ubiquitous merger of two intonation contours into one (see ch. 4).

3.3.4 Grammatical relations in the passive clause

Let us turn now to the structural aspects of the diachronic rise of passive constructions, focusing on the relational properties (GRs) in the various passive clause-types A-F above. We have already noted that while their synchronic functions as passives are similar, those diverse structures still reflect — most conspicuously when they are diachronically young — the structural design features of their respective diachronic sources. This is a direct consequence of what was noted above — that in diachronic change, much like in biological evolution, structural re-adjustment invariably lags behind functional innovation.

The most general typological feature of the passives discussed above is the distinction between promotional and non-promotional passives. That is, whether the non-agent topic of the passive clause is or is not its **grammatical subject**. But this feature is entirely predictable from the relational properties of the source construction: The passive types A, B, C above are all **promotional** passives — because their topical patient was already the grammatical subject in the source construction. Types D, E, F, on the other hand, are all **non-promotional** passives — because their topical patient was coded as the grammatical object in the respective source construction. Structural re-analysis has not yet tampered with the structural features of these relatively-young passive constructions. Their grammatical relations are still marked as in the source construction. In the next section we will look at the structural re-analysis of the relational properties of more mature — diachronically older — passive clauses.

The fact that the relational properties of passive constructions, at least at the early stages of grammaticalization, reflect faithfully the relational properties of their source constructions, is as vivid a demonstration as one could offer of why a purely structural definition of syntactic constructions, *a la* Comrie (2004/2008), is untenable. For it will lead us to consider three of the six passive types discussed above as "true passives", the other three as "not really passives". What is more, since the other structural properties of the six passive clauses reflect, rather faithfully, their source constructions, classifying the six constructions by structural similarity would mean that they are all more similar to their source constructions than to any "real passive". In other words, defining syntactic domains by purely-structural means is a rather hopeless enterprise.

3.3.5 Structural re-analysis: Early vs. late-stage grammaticalization

Once structural re-analysis begins, the diachronic predictability of the structural properties of passive clauses can, of course, be offset and gradually obliterated. Constructions sooner or later enter their more mature, mid-life phase in the cycle of grammaticalization. In this section I will illustrate this with three examples. Two involve a late-stage change from non-promotional to promotional passive. The third involves change in the opposite direction.

3.3.5.1 Reversion to nominative subject in the Lunda passive

As noted above, the Kimbundu passive (type E, see (5) above) arises from the conflation of two de-transitive constructions both of which leave the patient coded in a non-nominative case, the same as in the corresponding active. This remains, presumably, the relational situation in the resulting non-promotional passive of Kimbundu. In a closely related language, Lunda-Ndembu, the very same passive construction also exists. However, a more detailed analysis of the relational properties of this passive, particularly the behavior-and-control ('governed') properties of the two main arguments (agent and patient), reveals a gradual if so far only partial shift of subject properties to the patient-topic of the passive (Givón & Kawasha 2001). These facts conform to Haspelmath's (1999) observation that in diachronic change, behavior-and-control properties are much less conservative than morphological properties ('overt-coding' properties; Keenan 1975, 1976). Similar observations were also made in Givón (1995, ch. 6).

3.3.5.2 Reversion to nominative in the Guarijío and Tarahumara passive

Félix-Armendáriz (2004) reports a promotional passive in Guarijío, i.e., one in which the non-agent topic of the passive clause is its grammatical subject. The passive suffix *-tu* in Guarijío is most likely a cognate of the Ute passive suffix *-ta*, and most likely an old nominalization marker (Medina-Murillo 2004). What is more, the promotional passive in Guarijío allows an overt oblique agent, something that is not possible in the Ute passive, and indeed is atypical in non-promotional passives. Thus:

(13) a. owéru wicho-ré wakirá
Women wash-PFV clothes
'The women washed the clothes'

b. wicho-ré-**tu** wakirá (owéru-e)
wash-PFV-**PASS** clothes women-INSTR
'The clothes were washed (by the women)'

A similar situation is reported in Tarahumara (Valdez-Jara 2004), a closely related language with the related passive suffix *-ru*. In Tarahumara, however, the

agent is inadmissible in the passive clause, making the Tarahumara passive more conservative; that is, more like the Ute impersonal, non-promotional passive. Thus:

(14) a. mué-ka nechí choná-re
you-ENF me/OBJ hit-PERF
'You hit me'

b. né-ka choná-**ru**-re
I-ENF hit-**PASS**-PERF
'I was hit (*by you)'

While absolute proof is not available, the most likely interpretation of the Guarijío-Tarahumara data is that the *-tu-*/*-ru-*marked passive arose from a nominalized clause as, to begin with, a *non-promotional* agent-suppressing passive, as in Ute. In both languages, the passive was later restructured as promotional. But only in Guarijío did the change move further, allowing the overt appearance of an oblique agent. The late acquisition of an oblique agent by a promotional passive is well documented in English and elsewhere (see also Chamoreau 2004).

3.3.5.3 Retreat from nominative in the Spanish reflexive-passive

As noted in the discussion of the English GET-passive (type B), one would predict from general considerations that a reflexive-derived passive would be *promotional*, given the universal trend to preserve the subject and delete the object in reflexive clauses. This is indeed true in other reflexive-derived passives, as in Semitic, Modern Greek (Manney 1998, 2000), Russian, Polish, etc. The Spanish *se*-marked impersonal passive is thus an anomaly, in that its most common current form is *non-promotional.* But this is a relatively late development in Spanish.

The marker *se-* was originally the reflexive — then also reciprocal — pronoun, going back to the Latin *sui*. Thus (Monge 1955; citing from the *Quixote*):

(15) a. **Reflexive**:
se armó de todas sus armas
REF arm/3s with all his weapons
'he armed himself with all his weapons'

b. **Reciprocal**:
donde **se** combatían
where RECIP fight/IMPF/3P
'where they fought each other'

Four important features of Spanish syntax conspired in the eventual re-analysis of the *se*-marked reflexive into a non-promotional passive. First, the existence of an

impersonal-subject construction, with neutral 3rd person plural agreement, roughly like the still extant:

(16) le-vi**eron** en la calle
3s/OBJ-saw/**3P** in the street
'They saw him in the street' (anaphoric)
'He was seen in the street' (impersonal-passive)

Second, the *se*-marked reflexive also evolved into a middle-voice construction, as in:

(17) a. **Active**:
quebraron las ventanas
broke/3P the windows
'they broke the windows'

b. **Middle-voice or impersonal passive**:
se-quebraron las ventanas
REFL-broke/3P the windows
'the windows were broken' (passive)
'the windows broke' (middle)

Third, word-order flexibility in Spanish allows placing the subject after the verb. In a VO language, the word-order difference between subject and object is thus neutralized:

(18) a. **VO order, active**:
curaron los caballos
cure/PAST/3P the horses
'They cured the horses'

b. **VS order, middle**:
se-curaron los caballos
REF-cure/PAST/3P the horses
'The horses got well'

Fourth, in earlier times, human objects in Spanish did not require the dative preposition *a*-, nowadays an obligatory human direct-object marker. Thus (Marín 1989a, 1989b; cited from *El Poema de Mio Cid*):

(19) a. veremos vuestra mugier
see/FUT/1P your woman
'We will see your wife'

b. veré **a** la mugier
see/FUT/1S **DAT** the woman
'I will see (my) wife'

The difference between subject and object was thus neutralized in early Spanish in terms of both word-order and case-marking.

These four factors conspired to neutralize the reflexive, middle-voice and impersonal-passive interpretation of the *se*-marked clause in a period prior to the obligatory *a*- marking of human objects. Thus:

(20) **se**-cur-**aron** los brujos
REF-cure/PAST-**3P** the sorcerers
a. **Reflexive**: 'The sorcerers cured themselves'
b. **Middle**: 'The sorcerers got well'
c. **Passive**: 'The sorcerers were cured'

Eventually, a non-promotional impersonal-passive construction evolved, with the topic-of-passive marked as *object*, and a neutral 3rd-person singular verb agreement, as in (21a) below. But a promotional variant of the *se*-marked passive survives to this day with plural subjects, as in (21b):

(21) a. **Impersonal non-promotional passive**:
se-curó **a** los brujos
REF-cure/**3S** DAT the sorcerer
'Someone cured the sorcerers'

b. **Promotional passive or middle**:
se-venden bien los apartamentos
REF-sell/3P well the apartments
'Apartments sell well' (middle)
'Apartments are sold well' (passive)

The use of an oblique agent in the *se*-marked passive in Spanish is odd to this day, although the beginning of such a pattern can be seen in both the promotional and the impersonal passive, respectively (De Mello 1978):

(22) a. **Promotional *se*-passive**:
las pirámides **se**-construyeron por esclavos
the pyramids REF-constructed/3P by/with slaves
'The pyramids were constructed by/with slaves'

b. **Non-promotional ('impersonal') *se*-passive**:
se-destruyó a la nación por los malos gobernantes
REF-destroyed/3S DAT the nation by the bad rulers
'The nation was destroyed by the bad rulers'

The ambiguity of *por*, either 'because' or 'by', no doubt facilitated this development.

3.4 Syntactic change and the genesis of grammatical morphology

The intimate connection between syntactic change and **morphogenesis** is often ignored or under-emphasized in diachronic studies. Both grammatical and derivational morphemes arise from the re-analysis of **lexical words**. The resulting grammatical morphemes are both part of the marking system of syntactic constructions (see ch. 2 above) and the product of particular syntactic configuration during their genesis. Broadly, thus, syntactic structures gives rise to morphological structures, and syntactic complexity can eventually engender morphological complexity. This topic is treated extensively in the next two chapters, as well as in ch. 12. At this juncture, I will illustrate the rise of grammatical morphology with a few simple examples.

Notice first that four of the passive constructions whose diachronic genesis was discussed above, types A, B, C, D, arose from syntactically-complex source configurations. In the process, the condensation of the complex construction gave rise to grammatical morphology that then became part of the marking system of the resulting passive clause. Thus (schematically):

(23) a. **'be'-passive (English):**
The glass **was** [broken] >
The glass **was**-broken (by someone)

b. **Reflexive-passive (English)**:
Mary **got** herself [fired] >
Mary **got**-fired (by her boss)

c. **Serial-adversive passive (Mandarin)**:
She **suffered** (when) [(someone) fired her] >
She **suffered**-firing (by someone)

d. **Nominalization passive (Ute)**:
[The cat killing] **was** >
The cat kill-**was**

In all four cases, a syntactically complex two-predicate precursor yields a morphologically complex passive clause, where one of the erstwhile predicates has **grammaticalized** to become the morpheme marking the passive construction, most commonly affixed to the passive verb.

Consider next the rise of a causative construction in English, in the course of which the erstwhile main verb becomes the causative prefix, now marking the verb of the new causative construction:

(24) She **let** him [go] >
She **let**-go of him

Consider, lastly, the use of locative head nouns in English to renovate locative prepositions:

(25) The **top** [of the house] is crumbling >
She threw it **on-top-of** the house

In sum:

- grammatical morphemes are an integral part of syntactic constructions;
- the diachronic genesis of these two aspects of grammar is intertwined (Givón 1971, 1979);
- syntactic complexity is often the precursor of morphological complexity;
- the two types of grammatical complexity often counterbalance each other in sharing the cognitive-communicative load of language.

3.5 Methodological aspects of diachronic reconstruction

A note is perhaps in order concerning the methods most commonly used in the reconstruction of diachronic morpho-syntactic change. There are three useful methods for reconstructing historical morpho-syntactic development:

i. The study of **historical records** of contiguous developmental stages;
ii. The study of **synchronic variation**, i.e., of co-existing related constructions;
iii. The study of surviving 'relic' clues for the purpose if **internal reconstruction**.

While method (i) is considered the most reliable, it is not without problems. To begin with, the historical records often skip crucial intermediate stages and variants. Further, they are typically edited written records, while diachronic change takes place, overwhelmingly, in the spoken language. More to the point, in most languages of the world written historical records do not exist, or they don't cover particular syntactic developments.

Method (ii) is the sweetest for elucidating the detailed mechanisms of change, and sweeter yet when combined with method (i) (see e.g., Hilpert & Koops 2006; Koops & Hilpert 2008). But you have to catch the language at the right developmental stage, which is largely a game of chance.

Method (iii) is bold, speculative and theory dependent (Givón 2000). It must be practiced with care but should not be shunned, for often it is the only one available. In the present study (chs 4,5), I have attempted to avail myself of all three, relying more heavily — of necessity — on a mix of (ii) and (iii).

One may as well note that these three methods have close analogs in evolutionary biology. Method (i) is reminiscent of the paleontologist's study of contiguous geological strata. Method (ii) resembles the study of the synchronic distribution of

closely-related extant sub-species and variants. And method (iii) is reminiscent of the detailed anatomical analysis of a single organism for the purpose of trying to understand its evolutionary history.

One traditional method is least useful in reconstructing the detailed mechanisms of diachronic morpho-syntactic change — the **comparative method.** Unless applied to closely-related dialects or variants, it is better suited for reconstructing proto-forms, rather than the detailed mechanism of gradual change. It is thus primarily a method applied to macro-variation, whereas to understand the process of change one must study micro-variation.

3.6 Conclusion

3.6.1 Diachronic determination of synchronic traits

The relational properties of passive clauses seem to reflect faithfully, at least in the early stages of grammaticalization, the relational properties of their source constructions. There is nothing surprising about this observation, nor anything particularly unique to the passive. Structural similarity — and functional overlap — between source and target constructions is standard fare in early-stage diachronic change, as it is in the early stages of bio-evolution.

Late-stage restructuring is not only possible but often inevitable. This is the way two related but distinct functions conspire, gradually, to also be coded by *syntactically* distinct structures. The acquisition of oblique agent-of-passive in many erstwhile agent-suppressing passive constructions, whether promotional or non-promotional to begin with, is one such late change. But functionally such agented passives are probably *inverse* rather than passive constructions (Shibatani 1988a; Hidalgo 1994; Givón ed. 1994a). Late changes in the relational properties of the passive clause are instances of restructuring.

There remains an intriguing fact that, in a way, redeems Comrie's (2004/2008) contention that the Latin-type promotional passive — with a nominative non-agent topic though *not* with an overt agent[6] — is in some sense the idealized syntactic prototype of the passive clause. But the reasons for this are functional rather than structural. The nominative subject of simple clauses is most commonly their *topical* argument. While this generalization is not absolute, it is statistically powerful (Givón ed. 1994a, ed. 1997a). The eventual — and often gradual — acquisition of subject properties by the non-agent topic of erstwhile non-promotional passives

6. As noted by Shibatani (1988a), the functional prototype of the passive is agent-suppressing. A clause with an oblique agent is thus more likely to function as an inverse (Hidalgo 1994).

is an expression of this generalization, perhaps driven by the most powerful handmaiden analogy can marshal — the power of high usage frequency.

3.6.2 Change, variation and adaptive selection

In biological evolution, behavioral and genetic micro-variation at the individual and sub-species level, mediated by adaptive selection, eventually engenders macro-variation at higher taxonomic levels. In diachronic change, communicative-behavioral micro-variation at the individual and social level, mediated by adaptive-communicative selection, eventually engenders typological macro-variation at the dialect, language, and family levels. In both developmental trends, variation is both the mother and daughter of change. In both, functional-adaptive selection is the ubiquitous midwife.

CHAPTER 4

Multiple routes to clause union

The diachrony of complex verb phrases*

4.1 Introduction

This chapter proceeds from two main premises:

- That complex predicates are better viewed in the broader context of syntactic complexity; that is, syntactically complex clauses and cognitively complex events.
- That a synchronic typology, of whatever syntactic domain, can only make sense from a diachronic perspective; that is, as a typology of the diachronic pathways that gave rise to the extant synchronic types (ch. 3).

I will begin by outlining the two main diachronic pathways through which complex verb phrases — thus eventually clause union — may arise: clause **embedding** (complementation) and clause **chaining** (conjunction). For each of these two, the syntactic properties of the resultant complex clause are in large part predictable from its diachronic source.

Once the two main diachronic pathways to complex verb phrases have been described, I will turn to consider a number of well-known instances of complex predications. To the extent possible, I will try to determine whether these synchronic types fit within the proposed two-way diachronic typology, and to what extent, if any, the typology may need to be expanded or enriched to accommodate more types or sub-types. Along the way it will become necessary to treat one typological parameter that often intersects with the typology of complex clauses — **finiteness**.

*I have benefitted immensely from comments on earlier versions of this chapter from Bernd Heine, Keren Rice, Andy Pawley, Östen Dahl, and participants in the 2006 Rice Symposium on Complex Predicates, and the 2008 Rice Symposium on Syntactic Complexity.

The term 'complex clause', much like 'complex event', begs for some definition, however cursory. Following an earlier discussion (Givón 1991b), I will suggest that a good point of departure could be to assume the following:

(1) **Preliminary definition of complex clauses**:
   a. A clause, whether simple or complex, must fall under a **single intonation contour**.
   b. A complex clause must contain **multiple lexical predicates**.

Both definitions (1a) and (1b) are to be taken as one-way conditional implications. That is, if a clause is simple, it must fall under a single intonation contour, but not vice versa (1a). So that some expressions that fall under a single intonation contour may not be considered clauses, e.g., short interjections or other predicateless expressions.[1] In the same vein, if a clause is complex, it must have multiple predicates falling under a single intonation contour, but not vice versa (1b). So that some clauses with multiple lexical predicates may not be syntactically complex, but rather morphologically or lexically complex.

One should note, lastly, that the sense of **clause union** used here is diachronic, so that the two main diachronic pathways that yield complex verb phrases are also the two main diachronic routes to clause union.[2]

4.2 Preliminaries

4.2.1 Grammaticalization, co-lexicalization and clause union

Clause union has been traditionally discussed almost exclusively within the context of morphological causativization, but is in fact a much broader phenomenon. Semantically first, a wide range of syntactic-semantic configurations can be the diachronic precursors to clause-union. The common denominator to all types of clause-union is either the **grammaticalization** or **co-lexicalization** of one of the two predicates of the two precursor clauses. In cases where clause union arises from embedding (our Type-A, below), if the main verb grammaticalizes or co-lexicalizes semantically, it most often also grammaticalizes or co-lexicalizes

1. An event clause in natural connected discourse need not contain an explicit lexical predicate, although when it doesn't, one is most often implicit and recoverable from the context. For an extensive discussion, see ch. 10, as well as Chafe (1994) and Givón (2002, ch. 3). See ch. 10.

2. The term 'clause union' was used initially in the early 1970s context of Relational Grammar, in a purely synchronic sense, dependent as it was on the notion of 'syntactic transformation'.

syntactically; that is, it becomes an affix on the erstwhile complement verb.[3] In cases where a complex verb phrase arises from clause chaining (our Type-B, below), full syntactic clause-union is less common, even when it can be shown that the precursor two events have merged cognitively/semantically.

Some of the more common semantic configurations that serve as precursors to clause-union of either main type are illustrated in (3) below. Their great functional diversity also illustrates the fact that the same type of syntactically complex clause may arise through diverse adaptive-communicative motivations.

(3) **Common products of clause union**:

a. **Causativization**: (co-lexicalization)
She **let**-go of his hand

b. **Tense-aspect-modal auxiliaries**: (grammaticalization)
He **will**-eat the apple
They **have**-eaten their supper

c. **Evidentials**: (grammaticalization)
They **say** she's quitting
I **hear** she's quitting
Suppose she quits?

d. **Directionals**: (grammaticalization)[4]
em tromwey sospan I-**go**
she threw.away pot PRED-**go**
'She threw the saucepan away'

e. **Cognate object**: (grammaticalization)
She **made/took** a left turn

f. **Ideophone**: (co-lexicalization)
It **went** kapow!

g. **Resultative verb construction**: (co-lexicalization)
She **shot** him dead.

h. **Passive** (grammaticalization)
It **was** discovered by the police.

i. **Cleft** (grammaticalization)
It **was** Mary who discovered it.

3. This affixation of one verb to another is sometimes called 'predicate raising'.

4. Tok Pisin (Givón 1991b), here this is a serial-verb construction.

j. **WH-question** (grammaticalization)
It **was** who that you saw?

k. **Co-verb constructions:** (grammaticalization, co-lexicalization)[5]
liri-ma nga-**ya**-naggi munybaban
swim-ASP I-**go**-PAST other.side
'I swam to the other side'

l. **Case-marking verb serialization**:[6]
mo **fi** ade ge naka
I **took** machete cut wood
'I cut the wood **with** a machete'

The reason why clause union has always appeared so conspicuous in morphological causatives (3a) is first because morphological causatives involve co-lexicalization of the two precursor verbs ('predicate raising'). And second, because the causative main verb in such constructions is transitive, and thus takes a direct object (the manipulee). When the complement verb is also transitive, competition arises for the direct-object slot in the merged clause, between the manipulee of the main verb and the patient of the complement. For whatever reason, such competition has always got linguists' juices flowing.[7]

4.2.2 Functional and structural dimensions of clause union

4.2.2.1 Event integration and clause union: The Complementation scale

Perhaps the best illustration of the functional and structural features of clause union, and how the two run in parallel ('are isomorphic'), is the complementation scale found in embedding languages such as English (Givón 1980b, 2001, ch. 12). At the top of the scale one finds morphological causatives with maximal clause-union and co-lexicalization. At the bottom are direct-quote complements

5. Wagiman (Wilson 1999). While recognized syntactically as a *co-verb* construction, the semantic configuration here is that of *directional*, thus akin to (3d) above.

6. Yoruba (Givón 1975).

7. This competition is part of the process of merging two sets of grammatical relations in the precursor clauses into a single set in the merged complex clause. Comrie (1976) has attempted to deal with this competition via a mechanical syntactic hierarchy. Both Shibatani (1976b) and Cole (1977/1984) have shown that the competition is resolved on semantic grounds.

of utterance verbs, falling under a separate intonation contour. The transition between the two extremes is gradual both semantically and syntactically.

(4) **The complementation scale** (Givón 2001)

Semantic scale of verbs		**Syntax of COMP-clause**
a.	She **let-go** of the knife	CO-LEXICALIZED COMP
b.	She **made** him **shave**	
c.	She **let** him **go** home	BARE-STEM COMP
d.	She **had** him **arrested**	
e.	She **caused** him **to switch** jobs	INFINITIVE COMP
f.	She **told** him **to leave**	
g.	She **asked** him **to leave**	
h.	She **allowed** him **to leave**	
i.	She **wanted** him **to leave**	
j.	She'**d like** him **to leave**	
k.	She'**d like for** him **to leave**	FOR-TO COMP
l.	She **suggested** that he **leave**	SUBJUNCTIVE COMP
m.	She **wished** that he **would leave**	
n.	She **agreed** that he **should leave**	
o.	She **knew** that he **had left**	
p.	She **said** that he **might leave** later	INDIR. QUOTE COMP
q.	She **said**: "He **will leave** later"	DIR. QUOTE COMP

The semantic gradation of event integration in (4) is indeed fine, but may nonetheless be subsumed under three major features:

(5) **Main semantic features of event integration**:
   i. **Referential integration**: The sharing of referents between the two events
   ii. **Temporal integration**: Simultaneity or direct temporal adjacency of the two events
   iii. **Spatial integration**: The sharing of the same location between the two events

Other widely-discussed features, such as successful (vs. unrealized) causation, intentional (vs. accidental) causation or direct (vs. indirect) causation, are relevant primarily because they imply, directly or indirectly, either co-temporality or co-spatiality of the two events (Givón 2001, ch. 12).

Syntactically, the seven syntactic forms of English complements in (4) represent a fine gradation, made possible by the interaction of the following structural features:

(6) **Main syntactic devices that code clause-union:**
   a. **Expression of the co-referent argument**: zero vs. present
   b. **Grammatical relations:** Integrated single set vs. two distinct sets
   c. **Adjacency of the two verbs**: co-lexicalization vs. separation
   d. **Finite verb morphology**: presence vs. absence on the complement verb
   e. **Adjacency of the two clauses**: presence vs. absence of a complementizer
   f. **Intonation contours**: joint vs. separate

4.2.2.2 Finiteness[8]

Even a cursory look at the complementation scale (4) and the structural devices used to affect clause-union (6) would suggest a strong involvement of **finiteness** — provided one recognizes finiteness as a feature of the whole clause rather than of just the verb. Thus, the most merged complement clause at the top of scale (4) has zero subjects (4a), no independent main-clause-like set of GRs (4b), co-lexicalized verbs (4c) and non-finite verb morphology (4d), all prominent features of clausal non-finiteness. The phenomenon of finiteness — and especially its converse, non-finiteness — is best illustrated in embedding, nominalizing languages, whose subordinate clauses are often fully or partially nominalized.

4.2.2.2.1 Finiteness and nominalization

As a syntactic rather than merely morphological process, nominalization may be characterized as follows:

(7) **Nominalization as a syntactic process**:
   Nominalization is the process via which a finite **verbal clause** — either in its entirety or only the subject-less **verb phrase** — is converted into a **noun phrase**.

A verbal clause is nominalized most commonly when it occupies a prototypical nominal position/function — subject, direct object, indirect object or nominal predicate — within another clause. The syntactic structure of the NP that arises

8. The discussion of finiteness here is based on Givón (2001, vol. II), mostly on various sections of chs 11 (noun phrases), 12 (verbal complements), 14 (relative clauses) and 18 (clause chaining).

through nominalization reflects, most commonly, the structure of its precursor verbal clause — minus the adjustments that come with nominalization.

Within the nominalized NP, the erstwhile verb assumes the syntactic role of **head noun**, while other clausal constituents — subjects, objects, verbal complements or adverbs — assume the roles of various **modifiers**. Nominalization is thus best described as a **syntactic adjustment** from the finite verbal-clause prototype to the nominal (NP) prototype (Hopper & Thompson 1984; Givón 2001, ch. 2). The major components of such adjustment, at the extreme end, are:

(8) **Adjustment from the prototype finite verbal clause to the prototype noun phrase**:
   a. The verb becomes a head noun.
   b. The verb acquires *nominal* morphology.
   c. The verb loses tense-aspect-modal marking.
   d. The verb loses pronominal agreement marking.
   e. The subject and/or object assume genitive case-marking.
   f. Determiners may be added.
   g. Adverbs are converted into adjectives.

A simple example will illustrate the general pattern emerging out of (8), contrasting the finite clause in (9a) below with its nominalized version (9b):

(9) a. **Finite verbal clause**:
   She **knew** mathematics extensively

   b. **Non-finite nominalized clause**:
   Her extensive **knowledge** of mathematics

It is of course not an accident that finiteness has been treated traditionally as a property of verbs, since four of its salient features (8a,b,c,d) pertain to the verb. But the rest of the features (8e,f,g) pertain to other constituents of the clause. Finiteness is thus an aggregate grammatical feature of clauses. And its converse, non-finiteness, is an aggregate grammatical feature of NPs derived — historically, transformationally or analogically, depending on one's theoretical perspective — from verbal clauses.[9]

The traditional approach also treats finiteness as a discrete, either-or feature. But since the finite prototype (or its non-finite converse) is an aggregate of many

9. Most of the syntactic relations between clauses that were taken to be synchronic 'transformations' in Harris (1956) and Chomsky (1957, 1965) turn out to have at least some diachronic reality. This is analogous to Chomsky & Halle's (1968) *Sound Patterns* turning out to be, primarily, a recapitulation of the history of English phonology.

features, finiteness is at least in principle a matter of degree. This has been already seen in the complementation scale in (4). Another illustration of this gradation may be seen in (10) below:

(10) **Scalarity of finiteness**:

	Least finite
a.	Her good **knowledge** of math (helped a lot)
b.	Her **knowing** math well (helped)
c.	**For** her **to know** math so well (surely helped)
d.	She wanted **to know** math well.
e.	**Having known** math well since highschool, she …
f.	**Knowing** math as well as she did, she …
g.	He wished that she **would know** math better.
h.	Had she studied harder, she **would have known** math better.
i.	She knew math well.
	Most finite

4.2.2.2.2 Nominalizing vs. finite languages

The broadest cross-language typological distinction in finiteness is the seeming chasm between extreme nominalizing and extreme finite languages. In the first type, all subordinate clauses are nominalized, at least historically. Only main clauses display fully finite structure. In the second, no clause-type at all is nominalized, and all clause-types are fully finite. I will illustrate these two extreme types in order.

A. **Extreme nominalizing (embedding) languages**

While most languages can nominalize clauses at least to some extent, some languages practice nominalization to the extreme, so that all their subordinate clauses are nominalized to some degree, and are thus non-finite. Tibeto-Burman (Watters 1998), Turkic, Carib (Gildea 1998), Quechuan (Weber 1996), Gorokan languages of the Papuan Highlands (Thurman 1978) and No. Uto-Aztecan are conspicuous examples of this type. I will illustrate this extreme type with data from Ute (Numic, Uto-Aztecan). The three most conspicuous telltale signs of clause nominalization in Ute are:

- genitive case-marking on the subject
- nominal suffix on the verb
- object case-marking on the entire clause

Compare the finite verbal clause (11a) with its various nominalized counterparts (Givón 1980a, 1993a):

(11) a. **Finite clause**:
ta'wach yoghovʉch-i pakha-qa-'u
man/SUBJ coyote-OBJ kill-PERF-he/him
'The man killed the coyote'

b. **Nominalized clause as subject of main clause**:
ta'wach-**i** yoghovʉch-i pakha-qa-**na** ka-'ay-wa-t
man-GEN coyote-OBJ kill-PERF-NOM/SUBJ NEG-good-NEG-NOM
'ura-'ay
be-IMM
'That the man killed the coyote is bad'
(Hist.: '*The man's past-killing (of) the coyote* is bad')

c. **Nominalized complement of cognition verb**:
mamach pucucugwa-pʉga ta'wach-**i** yoghovʉch-i
woman/SUBJ know-REM man-GEN coyote-OBJ
pakha-pʉga-**na**-**y**
kill-REM-NOM-OBJ
'The woman knew that the man (had) killed the coyote'
(Hist.: 'The woman knew *the man's killing (of) the coyote*')

d. **Object REL-clause**:
yoghovʉch [ta'wach-**i** pakha-pʉga-**na**] …
coyote/SUBJ [man-GEN kill-REM-NOM/OBJ]
'the coyote that the man killed …'
(Hist.: 'The coyote *of the man's killing* ...')

e. **Subject REL-clause**:
ta'wach [yoghovʉch-i pakha-qa-**t**] …
man/SUBJ [coyote-OBJ kill-PERF-NOM/SUBJ]
'The man *who killed the coyote* …'
(Hist.: The *coyote-killer* man …)

f. **Complement of modality verb**:
na'acich yoghovʉch-i pakha-vaa-**ch** 'ásti'i-pʉgay-'u
girl/SUBJ coyote-OBJ/GEN kill-IRR-NOM want-REM-she
'The girl wanted *to kill the coyote*'
(Hist.: 'The girl wanted coyote-killing')

g. **Complement of manipulation verb**:
mamach na'acich-i yoghovʉch-i pakha-**vaa**-**ku** máy-pʉga
woman/SUBJ girl-OBJ coyote-OBJ/GEN kill-IRR-NOM/DS tell-REM
'The woman told the girl *to kill the coyote*'
(Hist.: 'the woman told the girl (to do) coyote-killing')

h. **'If'/'when'-ADV clause:**
ta'wach-**i** kani-naagh yʉga-**khw**, …
man-GEN house-in enter-SUB
'When the man entered/enters the house …'
(Lit.: '*(upon) the man's entering the house*, …)

B. **Extreme finite ('non-embedding') languages**

At the other end of the typological divide one finds languages in which all clause types are finite, including, in some languages, even lexical nominalizations. Iroquois (Mithun 1991), So. Arawak and Athabaskan languages are conspicuous examples of this type. But many serial-verb languages are just as radically finite (e.g., Senufu, Niger-Congo, Carlson 1994). I will illustrate this type with data from Tolowa Athabaskan.

Consider first verb complements in Tolowa, which are all finite with, tense-aspect-modality and pronominal affixes matching the prototype main-clause pattern (Bommelyn 1997; Bommelyn & Givón 1998):

(12) a. **Main clause (IMPERF):**
nn-tʉ-sh-'ɻ́
2s-TH-1s-observe
'I observe you'

b. **Main clause (PERF)**:
nn-tee-s-ii-'ɻ́-'
2s-TH-PERF-1s-observe-PERF
'I observed you'

c. **V-complement (implicative, IMPERF)**:
nn-tʉ-sh-'ɻ́ xa-sh-tɬ-sri
2s-THM-1s-observe INCEP-1s-L-do
'I begin to observe you'
(Lit.: 'I begin-do I observe you')

d. **V-complement (implicative, PERF-PERF)**:
nn-tee-s-ii-'ɻ́-' xaa-gh-íi-ɬ-srɻ́
2s-TH-PERF-1s-observe-PERF INCEP-PERF-1s-L-make/PERF
'I began to observe you'
(Lit.: 'I began-did I observed you')

e. **V-complement (non-implicative, IMPERF-IMPERF)**:
nn-tʉ-sh-'ɻ́ '-uu-sh-tɬ-te
2s-TH-1s-observe TH-DES-1s-L-want
'I want to observe you'
(Lit.: 'I want I observe you')

f. **V-complement (non-implicative, PERF-IMPERF)**:
nn-tʉ-sh-'į́ 'aa-w-íi-l-te
2s-TH-1s-observe TH-DES/PERF-1s-L-want
'I wanted to observe you (but maybe didn't)'
(Lit.: 'I wanted I observe you')

g. **V-complement (non-implicative, PERF-PERF)**:
nn-tee-s-ii-'-'į́ 'aa-w-íi-ɬ-te
2s-TH-PERF-1s-observe-PERF TH-DES/PERF-1s-L-want
'I wanted to observe you (and I did)'
(Lit.: 'I wanted I observed you')

While some restrictions constrain the distribution of aspectual-modal combinations in (12), complement clauses display the very same finite structure as main clauses.

Relative clauses in Tolowa are just as finite, involving no subordinating morpheme but mere juxtaposition (Valenzuela 1996; L. Bommelyn, i.p.c.):

(13) a. **Main clause**:
tr'ą́ą́xe Ø-s-ii-ts'ʉms
woman 3s-PERF-1s-kiss
'I kissed the woman'

b. **Main clause**:
tr'ą́ą́xe te-s-Ø-ch'a
woman TH-PERF-3s-leave
'The woman left'

c. **SUBJ REL-clause**:
tr'ą́ą́xe [Ø-s-ii-ts'ʉms] te-s-ch'a
woman [3s-PERF-1s-kiss] TH-PERF-leave
'The woman *I kissed* left'
(Hist.: 'I kissed the woman, (and) she left')

d. **Main clause**:
tr'ą́ą́xe ch'ʉsne yʉ-s-Ø-ts'ʉms
woman man TR-PERF-3s-kiss
'The woman kissed the man'

e. **OBJ REL-clause**:
ch'ʉsne [Tr'ą́ą́xe yʉ-s-Ø-ts'ʉms] te-s-ch'a
man [woman TR-PERF-3s-kiss] TH-PERF-away
'The man *the woman kissed* left'
(Hist.: 'The man, the woman kissed him, (and) he left')

Adverbial clauses are just as finite; and often the adverbial subordinator itself is historically a finite serial-verbal construction (Hennesy 1996; L. Bommelyn i.p.c.):

(14) daach'ʉstɬna-'ʉn' naa-s-ee-ya, ch'ąą-[n]-t'a'
store-to MOV-PERF-1S-go AWAY-REV-fly/PERF

nąą-[n]-nʉ-sh-ch'a
MOV-REV-PERF-1S-go.away

'After I went to the store, I came back (home)'
(Lit.: 'I went to the store, then flying away I came back (home)')

The extreme finiteness of Tolowa syntax is underscored most conspicuously by lexical nominalizations, which display full finite structure. Only in some agent nominalizations does one find an (optional) nominalizing suffix. And if the verb is transitive, the now-extinct old antipassive ('impersonal object') prefix is used. Thus (Givón 2000):

(15) a. **ch'**-u-ɬ-ch'ak-**ne**
AP-CON-L-pinch-NOM
'hawk' ('he pinches things')

b. k'waą'n'-**ch'**-uu-le'
ON-**AP**-CON-stick
'mosquito' ('he sticks something on')

In object/patient nominalization, the old de-transitive ('D-classifier') prefix is used:

(16) a. tʉ-**d**-k'ʉsh
TH-**D**-pull
'bow' ('one pulls it')

b. ye'-na-y-**d**-tr'ʉsh
under-MOV-TR-**D**-wear
'underwear' ('one wears it under')

c. tʉ-**d**-ɬ-xʉt
TH-**D**-L-gulp
'water' ('one gulps it')

And in oblique nominalizations of three-argument verbs, both the antipassive and de-transitive prefixes may be used:

(17) a. mɨt-**ch'ɨ**-**d**-ɬ-ts'a'ś
WITH-**AP**-**D**-L-whip
'whip' ('one whips things with it')

b. mį́'-**ch'ɨ**-ghɨ-**d**-ɬ-t'e'sr
IN-**AP**-PERF-**D**-L-write
'book' ('one writes things in it')

c. k'wt-gee-na-'-**d**-'a
ON-UP-MOV-**AP**-**D**-say
'altar' ('one says things on it')

4.3 Two diachronic routes to clause-union

4.3.1 Preamble

In this section we will examine the two main diachronic pathways to clause-union. The first one involves the embedding of a clause into the verb phrase as a **verb complement**, so that both main and complement clause now fall under a single intonation contour. In this type of complex VP, the complement event is treated analogically as a **nominal object** of the main clause. This syntactic metaphor is not just a convenient simile, but is supported by the fact that in all languages the verbs that take embedded complements — 'see', 'hear', 'feel'; 'want', 'finish', 'start'; 'make', 'tell', 'know', 'remember', 'say' etc. — also, overwhelmingly, take nominal objects. What is more, these verbs started historically as simple transitive verbs (Heine & Kuteva 2007). On occasion one may even find hybrid transitional constructions where both nominal object and verbal complements appear in the same clause (Givón 1991b; see section 4.6 below).

The second pathway involves the condensation of a **clause chain** into a single serial-verb clause. The resultant complex event is treated here as the syntactic analog of **clausal conjunction**. As noted earlier above, the first pathway leads to a much more complete clause union. In the second, the resultant complex clause, most typically with **serial verbs**, often displays only partial clause-union.

Four typological caveats need to be noted at this point:

- Under some syntactic conditions — most conspicuously when the two (or more) verbs are adjacent and morphologically unmarked — complete clause-union may be achieved in serial-verb clauses.
- The distinction between a nominalizing vs. finite language does not always coincide 100% with the distinction between embedding vs. chaining languages, respectively. There is a substantial correlation between the two features, but it is not absolute.

- A language may be predominantly embedding or chaining, but still have some construction of the opposite type.
- Finally, the syntactic differences between the two major types of clause union need not imply parallel semantic differences in event integration (as suggested by Pawley 1976, 1987). Rather, these syntactic differences are the synchronic typological consequences of the different diachronic pathways.

4.3.2 Clause-union in equi-subject (SS) configurations

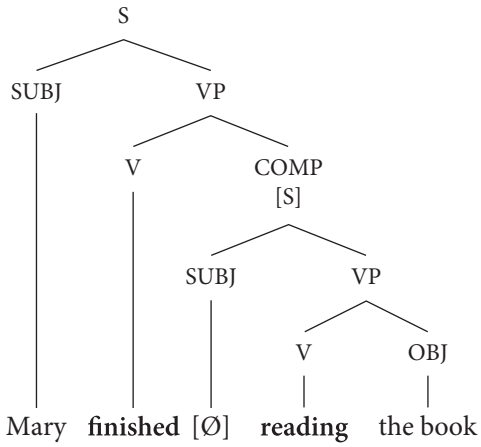
4.3.2.1 Verb adjacency and co-lexicalization

A. **Embedding languages**
As noted earlier above, clause union in equi-subject (SS) configurations is the main diachronic venue of grammaticalized tense-aspect-modality markers (3b), directionals (3d,h), cognate object constructions(3e), ideophone clauses (3f), resultative clauses (3g) and co-verb constructions (3k). In embedding languages, complements in such a configuration are treated analogically as nominal objects of the transitive main verb. The main verb in such configurations retains the finite inflections, such as tense-aspect-modality and pronominal affixes. The complement verb is either partially or fully nominalized, exhibiting less-finite or non-finite morphology. When full clause union occurs, the grammaticalized main verb contributes all its finite marking to the co-lexicalized compound verb.

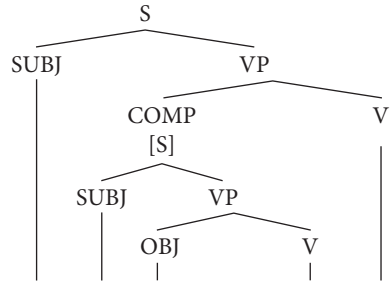
In both VO and OV languages, SS-complementation places the complement verb directly adjacent to the main verb, thus facilitating co-lexicalization and full clause-union. Thus, compare the VO complementation pattern of English (18a) with the OV pattern of Ute (18b):

(18) **Equi-subject (SS) clause-union in embedding languages**:

a. **English (VO)**



b. **Ute (OV)** (Givón 1980b):



Mary [Ø] po'oqwatɨ-**puni'ni-maku**-kwa
Mary book/OBJ **look.at-finish**-PERF
'Mary finished reading the book'

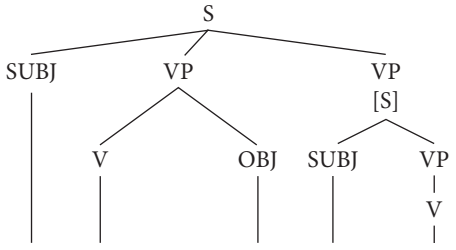
When the main verb ('finish') grammaticalizes as a perfect aspect, it becomes — at least initially — a finite auxiliary that remains, morpho-syntactically, the main verb of the complex two-verb clause. This is the case in English (18a). Eventually, if that auxiliary grammaticalizes more fully, it becomes a prefix on the complement verb in a VO language, or a suffix in an OV language. With cliticization, the erstwhile auxiliary now brings along all its finite morphology to the complex main verb, as is the case in Ute (18b).

B. **Serial-verb languages**

In serial-verb languages, two major factors conspire against complete clause-union. First, the precursor chained structure quite often prevents verb adjacency, scattering object nominals between verbs. One or more of the verbs in the clause may grammaticalize or co-lexicalize semantically, but it is not adjacent to another verb. As an illustration of this, compare the SS-complementation of the embedding languages in (18a,b) above with the serial-verb languages Saramaccan (VO) and Supyire (OV) in (19a,b) below:

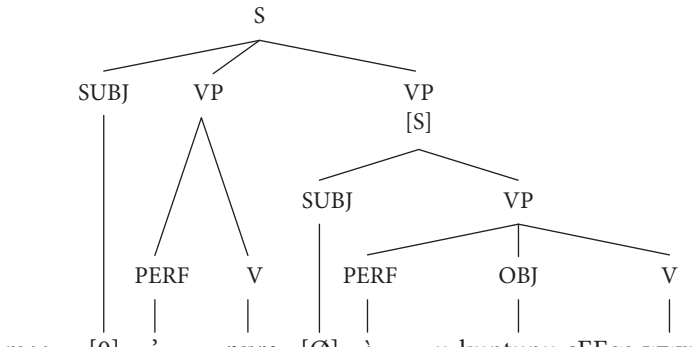
(19) **Equi-subject (SS) clause-union in serial-verb languages**:

a. **Saramaccan** (VO; Byrne 1987):



a bi-**fefi** di-wosu [Ø] **kaba**
he TNS-**paint** the-house **finish**
'He finished painting the house'
(Hist.: 'He painted the house and finished')

b. **Supyire** (OV; Carlson 1994):



When ‘finish’ in (19a) and ‘return’ in (19b) grammaticalize as aspect markers, they often have no adjacent main verb to cliticize to.

4.3.2.2 Finiteness gradients and grammaticalization

A second factor that conspires to subvert full clause-union in serial-verb languages is the lack of clear finiteness gradients among the verbs in the serial clause. As noted above, the syntactic configuration that gives rise to clause-union in embedding languages is structured by analogy with the V-OBJ configuration of the simple clause. In such constructions, the main verb retains all finite verbal features, while the complement verb is nominalized or is less-finite. When clause-union occurs in such languages, the grammaticalized main verb — now co-lexicalized with the complement verb — contributes all its finite inflections to the new complex lexical verb. As an illustration of this, consider the Spanish auxiliaries in (20) below.

(20) a. **se**-**lo**-est-**amos** explicando
DAT/3S-ACC/3**sm**-be-**1P** explain/PART/PROG
‘We are explaining it to him/her’

b. **se**-**lo**-h-**an** dado
DAT/3S-ACC/3**sf**-have-**3P** give/PART/PERF
‘They have given it to her/him’

In serial-verb languages, often the verbs in the precursor chain are of equal finiteness. When such a chain is condensed into a serial clause, the verbs in the condensed clause likewise are of equal finiteness. What is more, even in languages where finite verbal morphology had consolidated on a single verb in the precursor

chain — and thus on single verb in the resulting serial clause — the most-finite verb could just easily be either the one that is de-semanticized and grammaticalized, or the one that retains its lexical-semantic function. As an example consider Miskitu (OV), where the grammaticalized verb may be the finite chain-final/clause-final one, as in 'go' in (21a), or the non-finite chain-medial/clause-medial one, as in 'join' in (21b); (Hale 1991):

(21) a. Baha usus-ka pali-i **wa-n**
that buzzard-CNS fly-INF **go-PAST/3**
'That buzzard flew **away**'
Hist.: 'The buzzard flying, it went'

b. Yang nani ulta kum maki-i **bangwh-i** s-na
1 PL house one build-INF **join-INF** be-1
'We are building a house **together**'
Hist.: 'We building a house, joining, we are'

In Akan (Benue-Kwa; Niger-Congo), the verbs in the precursor chain or the condensed serial clause may be of equal finiteness, as in (22a). Or the grammaticalized verb may be non-finite (22b); (Osam 1997):

(22) a. Kofi soa-a adaka-no **ko-o** skuul
Kofi carry-PAST box-the **go-PAST** school
'Kofi carried the box **to** school'

b. Kofi **de** abaa-no hwe-e abofra-no
Kofi **take** stick-the whip-PAST child-the
'Kofi whipped the child **with** the stick'

The conflation of both factors — verb dispersal and lack of single locus of finite morphology — renders clause-union in serial-verb languages much more problematic, as compared to embedding languages.[10]

4.3.3 Clause-union in switch-subject (DS) configurations

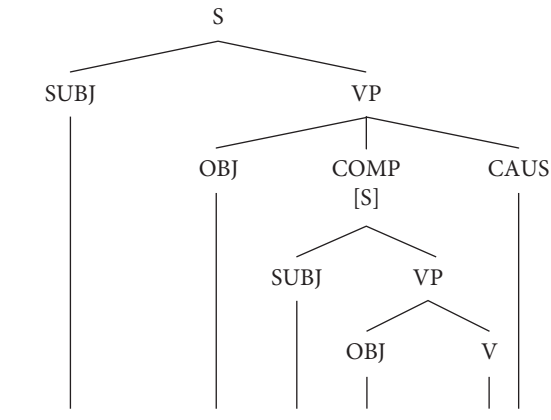
A. **Embedding languages**

Switch-subject (DS) clause union involves a family of causative or resultative constructions, where the subject/agent of the complement verb is co-referent with the object/manipulee of the main verb, with main verbs such as 'make', 'cause', 'force' , 'tell' or 'let'. In embedding languages, finite marking again

10. Since the intervening object (causee) is highly topical, often anaphoric and thus marked as verb inflection or zero, its 'intervention' between the two verbs is often illusory. Verb dispersal in serial-verb languages is thus not an absolute barrier to clause-union.

gravitates to the main verb, leaving the complement verb nominalized or less-finite. In an OV language, the main causative verb in DS complementation of this type winds up adjacent to the complement verb. This makes co-lexicalization and full clause-union only a matter of time — provided the main verb is high enough on the complementation scale, as is the case with the causative construction in Ute (Givón 1980a):

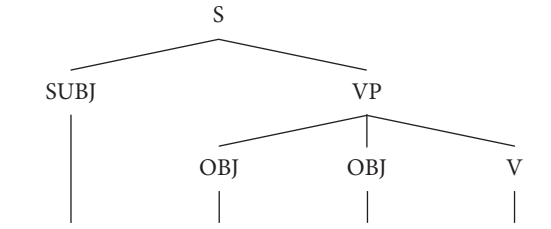
(23)



mamach ta'wach-i [Ø] tʉkuavi **cíira-ti**-kyay-'u
woman/SUBJ man/OBJ meat/OBJ **fry-CAUS**-ANT-him/her
'The woman made the man fry the meat'

The syntactic structure in (23) is probably too abstract or 'historical', since full clause-union and co-lexicalization leaves a complex bi-transitive verb with two objects — one the causee, the other the patient of 'fry'. A more realistic synchronic structure is thus (Givón 1980a):

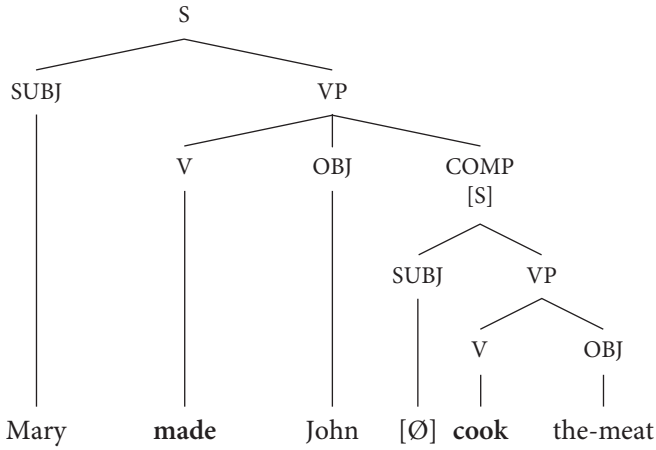
(24)



mamach ta'wach-i tʉkuavi **cíira-ti**-kyay-'u
woman/SUBJ man/OBJ meat/OBJ **fry-CAUS**-ANT-3sAN
'The woman made the man fry the meat'

In a VO language such as English, it appears first that there is no automatic verb adjacency in DS-complementation, since the object of the main verb intervenes between the two verbs:

(25)



Over time, however, a VO language can affect predicate raising and co-lexicalization in such a construction, as in Spanish:

(26) María se-la-**hizo** **comer** la manzana a Juan
Mary him-it-**make/PRET/3s** **eat/INF** the apple DAT John
'Mary made John eat the apple'

B. **Serial-verb languages**

Because of the dispersal of verbs among objects, serial-verb languages often fail to achieve full co-lexicalization (6c). Their objects often intersperse with their respective verbs as distinct VPs, so that several objects in the serial clause may bear the same GR — each to its own verb (6b) (Osam 1997). And finite morphology often fails to concentrate in a single verb (6d).

The only structural that device verb-serializing languages use consistently to indicate clause integration is the most universal and iconic one — intonation; so that the multi-verb serial clause falls under a unified intonation contour, with neither pause nor a subordinator (6f) (see Mithun 2008).

Thus, consider the serial resultative (DS) constructions in:

(27) a. **Akan** (VO; Osam 1997):
Esi **yi-i** tam-no **fi-i** pon-no-don
Esi **take-PAST** cloth-the **leave-PAST** table-the-on
'Esi took the cloth **off** the table'
(Hist.: 'Esi took the cloth and **it** left the table')

b. **Miskitu** (OV; Hale 1991):
Yang truk-kum **atk-ri** **wa-n**
I truck-a **sell-DS/1** **go-PAST**/3
'I sold the truck away'
(Hist.: 'I sold the truck and **it** went away')

c. **Tok Pisin** (VO; Givón 1991b):
… em layt nau paya **i-kamap** …
she light now fire PRED-**come.up**
'… She lights the fire …'
(Hist.: 'She lights the fire and **it** comes up')

d. **Tok Pisin** (VO; Givón 1991b):
… em tromwey sospan **i-go** …
she threw.away saucepan PRED-**go**
'She threw the saucepan away'
(Hist.: 'She threw the saucepan and **it** went away')

e. **Kalam** (OV; Givón 1991b):
… mon **d-angiy-ek** **yin-ip** …
wood **take-light-PAST/SEQ/DS/3s** **burn-PERF/3s**
'… She lights the wood …'
(Hist.: 'She takes and lights the wood and **it** burns')

In all these examples, the object of the first verb is co-referential with the subject of the second. Often the old switch-reference morphology of the precursor chain is left intact in the serial clause, as in (27b,e) above (see also sec. 4.4. below). But, by all available syntactic tests for GRs, the semantic 'subject' of the second clause is a grammatical **object** in the serial clause.

The same also applies to bona-fide causative constructions in serial-verb languages, as in:

(28) a. **Supyire** (OV; Carlson 1994):
mii à u **karima** à ngukuu **lyi**
I PERF him **force** PERF chicken **eat**
'I forced him to eat the chicken'
(Hist.: 'I forced him and **he** ate the chicken')

b. **Ijo** (OV; Williamson 1965):
woni u mie-**ni** indi die-**mi**
we him make-ASP fish share-ASP
'We made him share the fish'
(Hist.: 'We made him and **he** shared the fish')

c. **Ijo** (OV; Williamson 1965):
ari u mie mu-**mi**
I him make go-**ASP**
'I chased him away'
(Hist.: 'I chased him and **he** went')

4.4 The transfer of finite morphology from chains to serial clauses

The morpho-syntactic properties of the serial clause are often imported wholesale from its precursor clause chain. If one catches the condensation early enough in the process, the only syntactic difference between a chain and a serial clause is their **intonational packaging** — separate clausal contours vs. a single-clause contour, respectively (Mithun 2008).

In Akan clause chains, in most tense-aspects all verbs are equally finite and carry the same tense-aspect marker. This feature is transferred intact to the condensed serial clause:

(29) a. **Clause-chain**:
Araba to-**o,** dwow, nyen-n, kyew-**e**
Araba buy-PAST yam fry-PAST sell-PAST
'Araba bought yam, fried it and sold it'

b. **Serial-V clause**:
Kofi yi-**i** tam-no fi-**i** pon-no-do
Kofi take-PAST cloth-the leave-PAST table-the-on
'Kofi took the cloth off the table'
(Hist.: 'Kofi took the cloth, and it left the table')

If the clause-chaining system has chain-medial switch-reference morphology, the entire system may be transferred from the chain to the serial clause. Thus in Miskitu, the participial/infinitive suffix serves as a chain-medial SS marker, and the finite 'past' suffix as a chain-medial DS marker (Hale 1991):

(30) a. **Participle suffix as chain-medial SS marker**:
Yang ulta-ra dim-**i** kauhw-ri
I house-in enter-INF/SS fall-PAST/1
'I entered the house, and fell'
'Entering the house, I fell'

b. **Participle suffix as clause-medial SS maker**:
Baha usus-ka pali-**i** w-an
That vulture-CS fly-INF/SS go-PAST/3
'The vulture flew away'
(Hist.: 'The vulture flew, (and) it went')

c. **Past suffix as chain-medial DS marker**:
Witin sula-kum kaik-**an** plap-an
he deer-one see-PAST/3/DS run-PAST/3
'He saw the deer, (and) it ran'

d. **Past suffix as clause-medial DS marker**:
Witin sula yab-**an** plap-an
he deer make-**PAST/3/DS** run-PAST/3
'He made the deer run'
(Hist.: 'He caused the deer, (and) it ran'

Substantial re-analysis of the verbal morphology, between clause-chains and serial clauses, can also occur, and is indeed predictable if enough time elapses following the onset of clause-union. Thus for example, in Kalam (Papua-New Guinea) an extensive chain-medial verb morphology signals cataphoric SS vs. DS and simultaneous vs. sequential distinctions, as well as various tense-aspect-modal categories (Pawley 1966, 1976, 1987), as in (31a) below. But in most serial clauses, most of the clause-medial verbs are stripped of all such morphology, as in (31b) (Givón 1991b):

(31) a. **Chain-medial DS-SS morphology**:
… kikaruk am-nak-**nin**, nuk kimb-**iy**, mon kamb-ak
Chicken go-IPAST/s3-**SIM/DS** she leave-**SS** wood heap-the
yupiri-sap …
carry-PRES/3s
'… the chicken having escaped, she leaves and carries a heap of wood …'

b. **Chain final finite morphology**:
… mon tip-pang kom moch g-**ip** …
wood chop-break roll crush do-**PERF/3s**
'… he cuts-chops-rolls-crushes the wood …'

Only a few complex serial clauses in Kalam retain the chain-medial SS/DS morphology, integrating it into the structure of the complex serial clause, as in (Givón 1991b):

(32) a. **SS complements of modality verbs**:
… nying man-**ning** gi-sap …
water fill-IRR/**SS** do-PRES/3s
'… she intends to fill it with water …'
(Hist.: 'She intends and fills it with water')

b. **DS complements of causative verbs**:
'… mon d-angiy-**ek** yin-imb …
Wood take-light- **RPAST/3s/SEQ/DS** burn-PERF/3s …
'… she lights the wood …'
(Hist.: 'She takes-lights the wood and it burns')

4.5 Other types of complex predicates

Having established the broad context for the diachronic rise of complex predications, and two major diachronic pathways through which complex clauses arise, we are now in a good position to survey some of the better-known types of so-called **complex predicates**, with an eye toward understanding their diachrony.

4.5.1 Clearly serial

This type has been surveyed extensively above. What we will note briefly here is the recruitment of serial verbs for the coding of **argument structure**; that is, of case-marking. This pattern can be seen in many Kwa (Benue-Congo, Niger-Congo) languages, as in (Givón 1975a):

(33) a. iywi **awa** utsi iku (patient; Yatye)
boy **took** door shut
'The boy shut the door'

b. mo **fi** ade ge naka (instrument; Yoruba)
I **took** machete cut wood
'I cut the wood **with** the machete'

c. o **fi** ogbon ge igi (manner; Yoruba)
he **took** cleverness cut tree
'He clever-**ly** cut the tree'

d. mo so **fun** o (dative; Yoruba)
I say **give** you
'I said **to** you'

e. nam utom emi **ni** mi (benefactive; Efik)
do work this **give** me
'Do this work **for** me!'

f. o gbara **gaa** ahya (allative; Igbo)
he ran **go** market
'He ran **to** the market'

This use of serial verbs is wide-spread, and the semantics of the small group of verbs that contribute case-marking is strikingly universal: 'take' (PAT, INSTR, MANN), 'give' (DAT, BEN), 'go' (ALL) and 'come' (ABL). These are, of course, members of a slightly larger set of **the usual suspects**, verbs that are repeatedly implicated in various types of grammaticalization. Thus for example, the set 'take/have', 'be/stay/sit', 'finish', 'start, 'want', 'go' and 'come' is prominent in the grammaticalization of tense-aspect-modality.

For the purpose of the discussion here, it is important to remember that the morpho-syntax of case-marking serial clauses owes its structure largely to its diachronic precursor, the clause-chain. This is particularly striking in terms of the incomplete grammaticalization of such verbs, which often retain their formal verbal properties in spite of their new grammaticalized function (Osam 1997).

Consider the case-marking use of serial verbs in an embedding/nominalizing language, where the grammaticalization and/or co-lexicalization of the erstwhile verb can be more complete. Thus, for example, Ute derives all locative case-markers from historically-still-traceable precursor verbs. But these erstwhile verbs cliticize as noun suffixes, are in most cases phonologically reduced, and carry no discernible residue of verbal properties (Givón 1996):

(34) **De-verbal Ute post-positions**:

Post-position	Source verb
-va/-pa 'at'	-paa 'pass (through)' (morphologically defective; old)
-kwa 'to'	-kwa 'go' (morphologically defective; old)
-chux 'to' (an. obj.)'	-chugwa 'meet (an. obj.)'
-tux 'to' (inan. obj)	-tugwa 'go to'
-mana 'from'	-mana 'leave'
-caw 'Toward'	-cawi 'come to'
-naagh 'in'	-naagha 'enter'
-tarux 'on (top)'	-tarugwa 'climb'
-pa'agh 'on (top)'	-pa'agha 'ascend'
-tʉvwa 'down'	-tvwa 'descend'
-ruk 'under'	-rukwa 'descend'
-yaakwi 'down into'	-yaakwi 'descend into'
-paw 'down'	-pawi 'descend'

4.5.2 Clearly embedded

In this section we will review three well-known multi-predicate constructions, suggesting that in each case their structural properties point to a reasonably clear embedding diachronic source.

4.5.2.1 Cognate object constructions

Cognate object constructions, as they are known in English, are another type of multi-predicate clause. In such constructions, a member of a relatively small group of highly de-semanticized '**light verbs**' carries the finite verbal morphology. Such a main verb may be followed by a nominalized verb, an adjective, an adverb, or an ideophone. The group of 'light' verbs that partake in this construction is small and

contains a predictable selection of *the usual suspects*, verbs that tend to grammaticalize and/or become classificatory in many languages. In contrast, the nominalized '**heavy verbs**' that follow contain the real semantic weight of the construction, and are much more numerous. As a brief illustration, consider:

(35)
a. **Give**: give speech/talk/lecture/demonstration/performance; give a hint, give it a thought, give a kiss, give a signal, give a break, give chase, give a try, give it a shot
b. **Put**: put an end to, put some thought into, put one's mind to, put some effort into, put a question to, put to a vote, put to flight/sleep/work/good use, put in a good word
c. **Make**: make a decision/effort/attempt/try/error/suggestion/mistake/promise/pass; make a turn/circle/stop/start; make do without, make haste, make believe, make the grade,
make good time, make eyes at, make a joke, make sense
d. **Pay**: pay attention, pay heed, pay ones respect, pay a visit
e. **Throw**: throw a fit/party/question/suggestion/curve
f. **Take**: take an oath/break/leap/plunge/turn/look/leak/crap/risk; take heart, take stock of, take time to, take care of, take sick, take effect, take a stand
g. **Have**: have a feast/ball/party/cry/laugh/doubt/idea/pity; have a problem, have a second thought, have lunch, have a meeting
h. **Get**: get busy/mad/sad/happy/wild/corny/old/young (etc.); get going, get on in years, get along with, get to the point
i. **Do**: do justice to, do … out of, do good, do injury, do a disservice, do a service, do a favor, do a show, do a song, do without
j. **Go**: go nuts/mad/hungry, go well with, go too far, go fifty-fifty on the deal, go dutch, go to a lot of trouble, go against the grain, go back on one's word, go off like a rocket, go kapow!, go bang!
k. **Come**: come clean/loose/true; come to an understanding, come to blows, come to a halt, come along, come to think/believe/understand/know/realize
l. **Stand/stay**: stand accused/guilty/tall/corrected; stand to gain/loose, stand trial, stand to reason, stand close scrutiny; stay put/healthy/alive/active/alert/in touch
m. **Turn/become**: turn yellow/green/white/red/blue/hostile etc.
n. **Utterance verbs:** utter a cry/curse, say a prayer/blessing, cry uncle, sing the praise of

4.5.2.2 Ideophone constructions

An extreme case of the 'cognate-verb' construction is seen in So. Bantu languages, where hundreds of multi-predicate clauses may be built by combining a single 'light' verb — *say/do* — with so-called **ideophones** that carry a large variety of meaning, many of them manner adverbial. Many of these ideophones are etymologically related to extant lexical verb stems. Others are perhaps onomatopoeic, and many are of undetermined origin. The 'light' verb *say/do* is the only finite verb in the ideophonic construction, and the ideophones themselves carry no verbal morphology. As a brief illustration from Tswana, consider (Cole 1955):

(36) a. dithupa dine ts-arobega ts-a-**re** kgothu kgothu
stick those they-broke they-PAST-**say** ID ID
'the sticks broke going "snap" "snap"'

b. (na) a-ntse a-**re** na na na
(he) he-walking he-**say** ID ID ID
'(he) walking very softly'

c. pula e-ne entse e-**re** gwaa
rain it-fall on.ground it-**say** ID
'the rain fell heavily'

d. ba-bo-tsaya ba-bo-**re** goro fafa-tse
they-it-pour.out they-it-**say** ID on-ground
'they poured it down on the ground'

e. logadima lono lo-gaketse lo-**re** lai lai
lightning that it-fierce it-**say** ID ID
'the lightning was fierce, flashing repeatedly'

f. mme rraagwe a-mo-tshwaara a-mo-**re** thusu thusu thusu
father his he-him-caught he-him-say ID ID ID
kamoretlwa
Stick
'his father caught him and hit him swish swish swish with a stick'

g. yo-le a-didimala fela a-**re** tuu
she-be she-quiet complete she-**say** ID
'she said nothing, keeping very quiet'

4.5.2.3 Co-verb constructions

Given the last two constructions, let us consider an example of the so-called 'co-verb' construction. In Wagiman (Australia), a small group of light verbs, 45 in all, can

head complex-predicates. These verbs take the full range of finite verbal morphology, and may also stand alone in coding simple states or events. They form a closed lexical class which includes all *the usual suspects* found in the serial clauses of Benue-Kwa or the cognate-verb constructions of English (both italicized in (37) below).

(37) **The class of 'light verbs' in Wagiman** (Wilson 1999):
hit, eat, *stand*, *come*, cut, *take*, *put*, *get*, *turn/become*,
burn, step on, *be*, *become*, hear, throw, spear, *cry*, *go*, bite,
cook, dream, *cause*, name/beget, *leave/go*, lose, *make*, tell
lies, *have/keep*, follow, sew, love oneself, fuck, chase, see,
give, fear, look for, *bring*, tell off, sing, *stay*

The bulk of events/states in Wagiman are coded by combining one or more non-finite 'co-verbs', with at least one 'light' verb heading the verb phrase. Semantically, a co-verb may code an intransitive state ('be sick'), an intransitive event ('swell'), an intransitive motion ('run'), a communicative act ('talk'), a bodily function ('yawn'), a transitive event of impact ('kick') or possession ('hold'), a bi-transitive transfer event ('pour'), an environmental phenomenon ('thunder'), or a manner adverbial ('quickly'). The lexical class 'co-verb' is, as one would expect, large and wide open. In terms of finite marking, co-verbs can take one semantically-bleached 'aspectual' suffix and a number of derivational suffixes. For some illustrative examples of these constructions, consider (Wilson 1999):

(38) a. liri-ma nga-**ya**-naggi munybaban
swim-ASP I-**go**-PAST other.side
'I swam to the other side'

b. bewh-ma nga-**bu**-ni boran
cross-ASP I-**hit**-PAST river
'I crossed the river'

c. guk-ga nga-**ge**-na gahan warri-buga?
sleep-ASP I-**put**-PAST that child-PL
'did you put the children to sleep?'

d. ngarrmen lem **du**-ng
hollow.log be/PRFV **3s/cut**-PAST/PFV
'it entered the hollow log'

e. gabarn-na wek-ga ga-**ra**-n
quickly-ASP swallow-**ASP** 3S-**throw**-PAST/PFV
'he swallowed it quickly'

The suggestion that the semantically-heavy 'co-verbs' arose as embedded complements is strengthened by their pre-light-verb position, given the incipient — or at least reconstructable — OV order in Australian language.

4.5.3 Complex multi-stem verbal word

We come now to the more difficult cases, where multiple stems are co-lexicalized into a single verbal word. Some of these constructions may be too old to allow reconstruction of their diachronic source. But in some cases the diachronic pathway may still be transparent.

4.5.3.1 Pre-verbal incorporation of post-positions in Rama

In some languages, the incorporation of adpositions into the verb is a diachronically recent and still ongoing process, so that the governing mechanism can be still observed. One such case has been seen in Rama (Chibchan), described by Craig & Hale (1987) and Craig (1991). In this language, post-positional phrases that code various indirect objects may either follow or precede the verb. When they precede it, the object noun may be zeroed out, in contexts of either anaphoricity or, more commonly, non-referentiality or non-topicality (antipassive).[11] The remaining post-position, sitting adjacent to the verb, then cliticizes as a verbal prefix. Thus consider:

(39) a. ngang an-tangi Juan-**ya**
bed they-gave John-DAT
'they gave the bed to John'

b. ngang Juan-**ya** an-tangi
bed John-DAT they-gave
'they gave John a bed'

c. Rama **ya**-an-tangi
Rama DAT-they-gave
'they gave (it/something) to some Rama person'

d. ngang **ya**-an-tangi
bed DAT-they-gave
'they gave (him) a bed'

Many of the post-positions involved here turn out to have a verbal etymology, so that ultimately their incorporation may be viewed as a type of multi-predicate construction. Rama is presently an embedding OV language. But related Chibchan and Misumalpan languages show a considerable presence of serial-verb constructions (Hale 1991; Young & Givón 1990). Given the strong finiteness gradient between the main verb and the incorporated ex-verbal stem, the source of the

11. A text-based functional study by Tibbitts (1995) strongly suggests the latter.

incorporated post-positions may have been pre-verbal clausal complements. But this conclusion is not absolutely firm, and the construction could have also arisen from clause-chaining.

4.5.3.2 Pre-verbal incorporated preposition in Romance and Germanic

Pre-verbal incorporated adpositions can be found all over Germanic and Romance, where prepositions have been incorporated as verb prefixes much like in Rama. This occurred, presumably, under the same typological (SOV word-order) and functional conditions as in Rama (zeroed indirect-objects, most likely non-referential/antipassive). By way of illustration, consider the Latin-derived abstract prepositional verbs in English, all in one way or another metaphoric extensions of concrete, often spatial expressions:

(40) **Prepositional prefixes in Latin-derived verbs (English)**:

Suggested old concrete meaning					
'close'	'hold'	'build'	'call'	'press'	
in-clude	main-tain	con-struct	ex-claim	ex-press	
ex-clude	ob-tain	de-struct	de-claim	im-press	
pre-clude	de-tain	in-struct	re-claim	de-press	
con-clude	re-tain	ob-struct	pro-claim	re-press	
se-clude	per-tain	Re-struct(ure)	ac-claim	com-press	
oc-clude	con-tain		pro-claim	op-press	
	at-tain		dis-claim	sup-press	
	enter-tain		de-claim		
	abs-tain				
'carry'	'bend'	'pull'	'breathe'	'form'	'throw'
com-port	ex-tend	ex-tract	in-spire	re-form	e(x)-ject
ex-port	in-tend	de-tract	ex-spire	in-form	in-ject
im-port	con-tend	re-tract	re-spire	de-form	ob-ject
de-port	dis-tend	con-tract	con-spire	con-form	re-ject
re-port	at-tend	at-tract	a(d)-spire		de-ject
		sub-tract	per-spire		pro-ject
					tra-ject(ory)

Since the original process in Latin is rather old, no firm verbal etymology for the preposition may be available, although many possible connections between prepositions and old verb stems can be suggested. Still, given that old Latin was an embedding, nominalizing OV language, the pre-verbal position of incorporated

prepositions suggests that this construction may have arisen initially through an embedding pattern, in analogy with the object-verb construction.

One may as well note that the same process of incorporation still goes on in English. However, in conformance with the current VO order, prepositions are incorporated post-verbally, yielding the so-called verb-particle construction:

(41) **Post-verbal incorporated prepositions in English**

a. The window broke
b. The meeting broke **up** (early)
c. Her car broke **down** (on the freeway)
d. Her skin broke **out** (in a rash)
e. He turned (and left)
f. (So finally) he turns **up** (in Las Vegas)
g. They turned **in** (for the night)
h. It turned **out** (that she was right)
i. She worked (hard)
k. It worked **out** (just fine)
l. They worked **out** (in the gym)
m. He worked **up** a sweat
n. They broke the furniture
o. She broke **up** their engagement
p. They broke him **in** (gradually)
q. He broke it **down** (for them into small pieces)
r. He turned the key
s. He turned the key **over** (to her)
t. They turned her **down** (for the job)
u. She turned **in** her report
v. They shut the door
w. She shut him **up**
x. They shut the plant **down**
y. We shut them **out** completely
z. He shut the water **off**.

These stranded prepositions in English, while semantically part of the verb, have not yet formally co-lexicalized with the verb. For one thing, they still retain their lexical stress. For another, in many contexts they are not adjacent to the verb, so that the order variation V-OBJ-PREP vs. V-PREP-OBJ is attested and functionally significant (Chen 1986). The syntactic pattern of this incorporation probably follows established Germanic patterns (pre-verbal in the old OV Germanic dialects).

4.5.3.3 Incorporated objects, instruments, adverbs and verbs in No. Uto Aztecan

Nominal objects, instruments and manner adverbs can incorporate into verbs. Over time, such a process may yield complex multi-stem verbal words that are on occasion also discontinuous, stranding non-lexical elements between other parts of the compound verbal stem. As an illustration of how incorporation may over time yield complex 'bi-partite' verbs, consider No. Paiute, (Thornes 1996; Delancey 1999a, 1999b):

(42) a. ka-tʉ-pongosa **ma**-tabui-na (*ma-* 'hand')
ACC-POSS-arrow **hand**-create-ASP
'(they) hand-made their arrows'

b. tʉ-tama-ma o-**gʉ**-pada-na (*g-* 'bite')
POSS-teeth-INST 3-**bite**-bend-ASP
'(they) bend it by biting with their teeth'

c. i-kaazi **to**-noyoi (*to-* 'fist')
my-car **fist**-move
'(you) push my car'

d. dʉ-**gu**-hani (*gu-* 'fire')
my/ASP-**fire**-prepare
'(s/he) cooks for me'

e. **ta**-hani (*ta-* 'foot')
foot-prepare
'herd (sheep/cattle)'

f. **ku**-**pi**-suki (*ku-* 'fire', *pi-* 'back')
fire-**back**-warm
'warm one's back at the fire'

g. **pa**-**ko**-**ma**-ma'i (*pa-* 'water', *ko-* 'face', *ma-* 'hand')
water-**face**-**hand**-wash
'wash one's face'

h. **tsa**-noyoi (*tsa-* 'grasp')
grasp-move
'pull'

i. i-giki-kuba **wi**-ni-u (*wi-* 'long')
my-foot-on **long**-step-ASP
'(s/he) stepped on my foot'

j. kosso-kimaba a-**tsi**-kwini-ki (*tsi-* 'sharp')
fire-beside ??-**sharp**-stand/PL-ASP
'stick (the sticks) along the fire'

While many of the affixes involved are too old to determine their etymology, it is most likely that they have been derived through the incorporation of nouns, adjectives or verbs into formerly-simple verbs. In Ute, a related Numic language, the same pattern of pre-verbal incorporation is synchronically productive as, among other things, an antipassive with non-referring objects or instruments, a semantic pattern reminiscent of Rama and Latin/English, above. Thus (Givón 1980a):

(43) **Object-incorporation antipassive in Ute**:

a. **Active-transitive**:
ta'wach kwanach-**i** pakha-pʉga
man/SUBJ eagle-OBJ/**AN** kill-REM
'The man killed the eagle'

b. **Antipassive**:
ta'wach **kwana**-pakha-pʉga
man/SUBJ **eagle**-kill-HAB
'The man killed eagles'
'The man did some eagle-killing'

Object incorporation is also used in Ute nominalizations, which have the same object-suppressing antipassive flavor as their English counterparts:

(44) a. **Agent nominalization**:
ta'wach kwana-pakha-mi-**t** 'ura-'ay
man/SUBJ eagle-kill-HAB-**NOM** be-IMM
'The man is an eagle-killer'
(⊃ He kills eagles in general)

b. **Action (VP) nominalization**:
kwana-pakha-**ta** ka-'ay-wa-t 'ura-'ay
eagle-kill-NOM **NEG**-good-NEG-NOM be-IMM
'Eagle-killing is bad'
(⊃ 'the killing of eagles in general')

This pre-verbal incorporation pattern is also productive in Ute with semantically-appropriate verbs, adjectives, adverbs and instruments, as in (Givón 1980a):

(45) a. **sakʉ**-paghay-'way
limp-walk-IMM
's/he limp-walks'

b. **mama**-paghay-'way
woman-walk-IMM
'he walks like a woman'

c. **wii**-pakha-ux-kway-'u
knife-kill-ASP-REM-him/her
's/he killed him with a knife'

d. **'átʉ**-may-pgʉa
well/good-speak-REM
's/he spoke well, eloquently'

The antipassive object-incorporation pattern requires no invocation of pathway to complexity beyond the OV order of No. Uto-Aztecan. This pattern may have been later extended, analogically, to incorporated verbs. These are extreme nominalizing/embedding languages, and the OV, embedding pathway is thus strongly implicated. The bare-stem, non-finite, status of the incorporated verbs conforms to this pattern.

4.5.3.4 Pre-verbal incorporated 'adverbial' stems in Athabaskan

In Athabaskan languages, the lexical verb-sense is obtained from combinations of old verb stems with 'adverbial' prefixes. The latter may have begun their life as verbs, but then grammaticalized as post-positions and eventually incorporated into the verbal word (Underriner 1997; Givón 2000), much like in Rama or Latin. As an illustration of many of the adverbial prefixes with a single verb-stem, consider Tolowa Athabaskan, where the oldest of these prefixes (*-na-* 'motion') can be augmented by more recent ones, many of them with clear verbal etymology (Bommelyn 1997; Givón 2000):

(46)	a.	na-ɬ-da MOV-L-run	's/he runs'	(*-na* 'move around')
	b.	**waa**-na-ɬ-da	's/e runs that-a-way'	(*-wa* 'go')
	c.	**yaa**-ɬ-da	's/he runs through (it)'	(*-ya* 'go')
	d.	**daa**-na-ɬ-da	's/he runs into (it)'	(*-da* 'sit/live')
	e.	**k'wee**-na-ɬ-da	's/he is running behind (it)'	
	f.	**tr'ee**-na-ɬ-da	's/he runs down'	
	g.	**see**-na-ɬ-da	's/he runs up'	
	h.	**tee**-na-ɬ-da	's/he runs under water'	
	i.	**yee**-na-ɬ-da	's/he runs under (it)'	
	j.	**ch'aa**-ɬ-ms	's/he runs off (road)'	(*-ch'a* 'leave')
	k.	**ɬee**-na-y'-ɬ-da	'we-2 run together'	(-ɬ- reciprocal)
	l.	ɬ-**ch'aa**-**na**-ɬ-da	's/he runs apart'	
	m.	**taa**-na-ɬ-da	's/he runs outward'	(*-ta* 'push away')
	n.	**'ee**-**na**-ɬ-da	's/he runs in a circle'	
	o.	**k'wʉt**-**na**-ɬ-da	's/he runs upon (it)'	
	p.	**ts'ee**-na-ɬ-da	'she runs out there'	
	q.	**gee**-na-ɬ-da	's/he runs away'	
	r.	**xaa**-na-ɬ-da	's/he begins to run'	(*-xa* 'lift up')

The diachronic pathway through which the Athabaskan incorporation pattern arose is not altogether clear. On the one hand, Athabaskan languages are extremely finite, non-nominalizing and non-embedding. Still, it is not yet clear if serial-verb clauses — the intermediate stage of the condensation in the alternative pathway — can be found in Tolowa. Since clause-chaining is a universal phenomenon across all typologies, the initial stage of this pathway is, at least in principle, always available. However, Rice (2006) has argued that the slot in which the Athabaskan 'adverbial prefixes' incorporate is a nominal slot, and that the incorporated ex-verbal stems have a *nominal* form. This suggests that in spite of their highly non-finite syntax, Athabaskan languages created these complex predicates via the embedding-nominalizing route (type A).

4.6 Final reflections

The two major diachronic pathways that give rise to complex predications can both lead, at least potentially, to co-lexicalization, and thus to morphologically complex verbal words. The dispersal of verbs among objects in serial clauses certainly lowers the probability of such an outcome in serial-verb languages. But as the Kalam data show, this is far from absolute. My own suspicion is that Kalam serial clauses with multiple bare verb stems represent a more advanced diachronic stage, where serial verbs have by and large been stripped bare of their finite morphology (Pawley 2008). In contrast, the serial constructions in both Miskitu and Akan are probably diachronically younger, so that much of the verbal morphology found in clause chains is still extant in serial clauses.

The discussion thus far may have left the impression that only in verb-serializing languages (type B) does one start the diachronic process of assembling complex VPs from a two-clause paratactic construction. This is a misleading impression, since complex clauses in embedding languages in all likelihood also arise through the **condensation** of paratactic two-clause precursors, where in the early stage the main and the complement clause fell under separate intonation contours (Heine & Kuteva 2007). In both major pathways, thus, the process of creating complex clauses and eventually complex predicates begins with two-clause parataxis, proceeds through the intermediate stage of complex-embedded clause under a merged intonation contour, and often ends in co-lexicalization and morphologically-complex verbal words (Dahl 2004).

The distribution of finite marking is a methodological heuristic tool that makes it possible to reconstruct the diachronic pathway, be it nominalizing/embedding or clause-chaining, in the absence of written records. In the final stage of condensation, that of morphologically-complex verbal words, the telltale signs

of diachrony have been largely zeroed out, so that reconstructing the diachronic pathway that led to complex verbal words is much harder.

The two main diachronic pathways to complex VPs can be thus summarized schematically as in:

(47)

	Stage:	**Embedded pathway**:	**Clause-chain pathway**:
i.	**paratactic source**:	paratactic main+COMP	main+chained COMP
ii.	**complex clause**:	embedded main+COMP	serial-verb clause
iii.	**complex word**:	complex verbal word	complex verbal word

As an example of the early paratactic **hybrid constructions** that can lead to a syntactic, embedded V-complement construction, consider V-complements in Biblical Hebrew, where the parataxis-to-syntaxis process remained endemic across a diachronic continuum spanning over 1,000 years. Two patterns may lead to such condensation, one in Early Biblical Hebrew, the other in Late Biblical Hebrew. In both the main-clause verb takes a nominal object. In the first pattern (48a), the clause-chaining source of the complement clause is transparent. In the second (48b), a paratactic REL-clause structure is implicated (Givón 1991c):

(48) a. va-yar' 'elohim 'et kol 'asher' ʕasa, **ve**-hine ṭov
and saw God ACC all REL made **and**-lo good
'And God saw all that he had done that it was good'
(Lit.: 'And God saw all that he had done, **and** lo it was good')
[Genesis, 1.31]

b. 'al ti-r'u-ni **she**-'ani sḥarḥoret
NEG you-see-me **REL**-I swarthy/sf
'Don't see me that I am swarthy'
(Hist.: 'Don't see me, **who** am swarthy') [Song of Songs, 1.6]

Since pronouns cannot take restrictive REL-clauses, the only plausible source for the complement in (48b) is a paratactic, **non-restrictive** clause.

Similar examples of condensation of V-complement construction from parataxis to syntaxis in embedding languages can be found in Germanic (Heine & Kuteva 2007), where again an earlier paratactic configuration, with the verb taking both a nominal and a clausal object and the two source clauses falling under separate intonation contour, eventually condenses into a complex clause under a single intonation contour. That is, schematically:

(49) a. I want **it**, to do it > I want to do it

b. She knew **that**, he did it > She knew that he did it.

In Ute, an extreme nominalizing language, alternation between the syntactic and paratactic versions of verb complements can still be found synchronically, as in:

(50) a. **Paratactic verb complement**:
mamach pucucugwa-pʉga-**ax**, **'uru** ta'wach-**i**
woman/SUBJ know-REL-**it** **that**/OBJ man-GEN
yoghovʉch-i pakha-pʉga-**na**-**y**
coyote-OBJ kill-REL-**NOM**-OBJ
'The woman knew **it**, that the man (had) killed the coyote'
(Hist.: 'The woman knew **it**, **that** *the man's killing (of) the coyote*')

b. **Syntactic verb complement**:
mamach pucucugwa-pʉga ta'wach-**i** yoghovʉch-i
woman/SUBJ know-REL man-GEN coyote-OBJ
pakha-pʉga-**na**-**y**
kill-REM-**NOM**-OBJ
'The woman knew that the man (had) killed the coyote'
(Hist.: 'The woman knew *the man's killing (of) the coyote*')

Similar alternations can be found in early child language (see ch. 7). And likewise, embedded restrictive relative clauses, whether finite or nominalized, also arise from earlier paratactic, non-restrictive clauses falling under a separate intonation contour (see ch. 5).

Lastly, both stages of condensation along both diachronic pathways — syntacticization (embedding) and lexicalization — are driven by functional imperatives, and are thus sensitive to usage frequency. This is the real significance of our list of *the usual suspects*, that ubiquitous small group of verbs whose usage frequency, even before grammaticalization, is conspicuously high in all languages. These are the verbs that retain old ('irregular') forms long after such forms have been leveled out in the rest of the verbal lexicon (Zipf 1935). These are the verbs that often become classificatory, generic, grammaticalized, 'light' (de-semanticized), and thus operators on other ('operand') predicates. Through whatever pathway, these high-frequency verbs partake disproportionally in multi-predicate combinations that code complex events. But it is their initial lexical meaning — general, classificatory, cognitively and communicatively central — that lends them their ubiquity.

CHAPTER 5

The diachrony of relative clauses

Syntactic complexity in the noun phrase*

5.1 Introduction

In chapter 4, above, I suggested that the diachrony of complex verb phrases, and eventually of clause-union, proceeds through the following three steps:

(1) **Diachronic steps in the rise of complex predications**:
   a. *Parataxis*: The two clauses are packed under separate intonation contours.
   b. *Syntaxis*: The two clauses are condensed under a single intonation contour.
   c. *Lexis*: The two verbs co-lexicalize into a single word.[1]

I further suggested that this general trend overrides the considerable typological variation found in the diachrony of complex VPs, so that both major diachronic-typological pathways — from clause chaining (conjunction) and from embedding (subordination) — still conform to the general trend in (1). In this chapter I will show that the diachrony of relative clauses follows at least the first two general steps (1a,b), regardless of typological distinctions.

In earlier forays into the typology of REL-clauses (e.g., Givón 2001), not enough emphasis was placed on more general **syntactic** diachronic trends. While outlining a diachronically-oriented typology of REL-clauses, my focus remained on the rise of the morphology used to mark the case-role of the missing co-referent argument, or on the REL-subordinator morpheme (Heine & Kuteva 2007). This yielded a set of 7–8 major synchronic types without further grouping into mega-types. In this chapter I would like to outline a more comprehensive typology of the diachronic pathways that give rise to REL-clauses.

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1. In the case of complex VPs (head verb plus a COMP clause), the product is a new lexical verb. In the case of complex NPs (head noun plus a REL-clause), the product, if obtained, is a new lexical noun.

5.2 From clause-chaining to embedding

In earlier discussions of REL-clauses, I called this pathway, attested in serial-verb languages all over the world, the *non-embedding* strategy. More accurately, the early paratactic stage of this pathway involves two chained clauses, each under its own intonation contour. But in almost all languages that employ this strategy, one can find a co-existing syntactic ('condensed', 'embedded') variant, where the REL-clause already falls under a single, merged intonation contour with the main clause (Mithun 2006, 2007a, 2007b, 2008). In many such cases, no further restructuring has been done, beyond the change in intonational packaging.

I will illustrate this diachronic route to embedded REL-clauses first with examples from Bambara (Mendeic; Niger-Congo), with the data originally due to Charles Bird (1968) and Ibrahima Coulibaly (i.p.c.). Consider first the paratactic, un-embedded variants, where the demonstrative *min* 'that' modifies the co-referent noun inside the would-be REL-clause (2a–e). One could consider *min* the REL-clause marker, but it is still used in the language as a demonstrative modifier or demonstrative pronoun, and its position in the clause is still compatible with the original use:

(2) a. **Unembedded, pre-posed** (SUBJ-**rel,** OBJ-**main**):
cɛ **min** ye muru san, n ye **o** ye.
man **REL** PAST knife buy I PAST **him** see
'The man *who* bought the knife, I saw him.'
(Hist.: '*That* man bought the knife, I saw him.')

b. **Unembedded, post-posed** (SUBJ-**rel,** OBJ-**main**):
n ye **o** ye, cɛ **min** ye muru san.
I PAST **him** see man **REL** PAST knife buy
'I saw him, the man *who* bought the knife.'
(Hist.: 'I saw him, *that* man bought the knife.')

c. **Unembedded, pre-posed** (OBJ-**rel,** OBJ-**main**):
n ye so **min** ye, cɛ be **o** dyɔ.
I PAST house **REL** see man PROG **it** build
'The house *that* I saw, the man is building it.'
(Hist.: 'I saw that house, the man is building it.')

d. **Unembedded, post-posed** (OBJ-**rel,** OBJ-**main**):
cɛ be **o** dyɔ, n ye so **min** ye.
man PROG **it** build I PAST house **REL** see
'The man is building it, the house *that* I saw.'
(Hist.: 'The man is building it, I saw *that* house.')

e. **Unembedded, extraposed**:
cɛ ye muru san, n ye **min** ye.
man PAST knife buy I PAST **REL** see
'The man bought the knife, *that one* I saw'.
('Hist.: 'The man bought the knife, I saw that one (the knife)'.)

No reordering of elements occurs in such unembedded REL-clauses. Both the anaphoric pronoun *o* ('s/he', 'it') and the demonstrative *min* ('that') are used the way they are used in normal clause-chaining in discourse. But Bambara can also place the two clauses under a joint intonation contour, in a configuration that is clearly an early form of embedding. This latter relativization strategy is much less common, involving the placement of the entire 'relative' clause at the location inside the main clause where the head-noun should have been (Bird 1968):

(3) a. **Simple (main) clause**:
n ye cɛ ye.
I PAST man see
'I saw the man'.

b. **With REL-clause**:
n ye [cɛ **min** [Ø] ye muru san] ye.
I PAST [man **REL** PAST knife buy] see
'I saw the man *who* bought the knife'.
(Hist.: 'I, *that* man bought the knife , saw (him)'.)

Finally, the anaphoric pronoun may be dropped altogether, yielding a structure that looks like an extraposed REL-clause with a missing co-referent argument. But still, the transition from (4b) to (4c) below involves no re-ordering, only merger of the intonation contours and loss of the anaphoric pronoun (Bird 1968):

(4) a. **Simple (main) clause**:
cɛ ye muru san.
man PAST knife buy
'The man bought the knife'.

b. **Chained (paratactic) configuration**:
n ye cɛ **min** ye, **o** ye muru san.
I PAST man REL see **he** PAST knife buy
'The man that I saw, he bought the knife'.
(Hist.: 'I saw that man, he bought the knife'.)

c. **With REL-clause**:
n ye cɛ **min** ye [ø] ye muru san.
I PAST man **REL** see [ø] PAST knife buy
'The man that I saw bought the knife'.
(Hist.: 'I saw that man, [he] bought the knife'.)

A similar relativization pattern is found in Supyire (Senufu; Niger-Congo), another clause-chaining, verb-serializing SOV language. An erstwhile demonstrative pronoun has become the generalized REL-clause suffix, while a full-size demonstrative pronoun is often used inside the REL-clause, as in Bambara. Thus, note the paratactic patterns in (5a,b) below (with tone-marking missing; Carlson 1994):

(5) a. **SUBJ REL-clause**:
Nami **ŋge-mu** u a pa-**ge**, mii a mye
man **DEM-REL** he PERF come **REL** I PERF see
'The man who came, I saw (him)'

b. **OBJ REL-clause**:
Nami **ŋge-mu** mii a ŋye-**ge**, u a pa
man **DEM-REL** I PERF see-REL he PERF come
'The man I saw, he came'

One REL-clause type, which Carlson (1994: pp. 513–514) calls 'semi-embedded', represents the beginning of a syntactic — embedded — pattern:

(6) a. Ka pi i bage e u a titige-**ke**,
and they NARR house.DEF in he PERF descend-**REL**
'Then they the house in which he had descended,

b. ka pi i **kuru** cyee mii na
and they NARR **that** show me to
then they showed *that-one* to me'.

In (6a), a chunk of the main clause ('Then they …') is given before the pre-posed REL-clause. That chunk is then recapitulated in the full main clause in (6b), where the co-referent noun is marked with an emphatic resumptive pronoun.

Another language with a remarkably similar clause-chaining source of REL-clauses is Hittite (Justus-Raman 1973; Justus 1976). In Old Hittite both clauses, in a paratactic (chained) pattern, are marked by a conjunction. Thus (Robert 2006):

(7) a. **nu** **ku**-it LUGAL-uš teez-zi, **nu** apaa-at karap-zi
CONJ **REL**-ACC king–NOM say-3S **CONJ** that-ACC luzzi do-3S
'Whatever the king says, that the luzzi shall perform'.

b. ku-u-ša-ta-**ma** **ku**-it píddaa-i, **na**-aš-kan šameen-zi
bride-price-PTC-**CONJ** **REL**-ACC give-3S CONJ-he-PTC forfeit-3S
'What(ever) bride-price he gave, he forfeits (it)'.

The conjunction may be dropped from the first clause, yielding an emphatic focus:

(8) **ku**-iš pa-apreez-zi, **nu** apaa-aš-pat gín
REL-NOM be-impure-3S **CONJ** that-one-NOM-PRT shekel/ACC
ku.babbar paa-i
silver give-3S
'Whoever is impure, *that very man* shall give (three?) silver shekels'.

And the second conjunction may also be dropped:

(9) pa-apreez-zi **ku**-iš, 3 gín ku.babbar paa-i
be-impure-3S **REL**-NOM three shekel silver pay-3S
'The one who is impure, (he) pay three silver shekels'.

The case-marked *ku-* inside the REL-clause is analogous to the Bambara *min*, and was probably a demonstrative determiner, used naturally as a demonstrative pronoun (see also German, further below). One pre-posed paratactic REL-clause may be followed by more than one main ('resumptive') clause, in a typical clause-chaining pattern (Robert 2006):

(10) a. lu-meš Ubaru, lu-aš **ku**-iš lugal-wa-aš pé-ra-an eeš-zi,
men-NOM Ubaru man-NOM **REL**-NOM king-GEN in-front be-3S
'Men of Ubaru, whatever man *that* is in front of the king,

b. **ne** šaraa ţieę-enzi,
CONJ upward step-3P
they step forward,

c. **nu** aappa tie-nzi,
CONJ backward step-3P
then (they) step backward,

d. **ne** araanda.
CONJ stand.3P
and then (they) stand'.

To drive home how typical a clause-chaining pattern this is, consider the following example from Chuave (Gorokan, East Highlands, Papua-New Guinea), a typical clause-chaining serial-verb language. In this language, all presuppositional

clauses, including restrictive REL-clauses, are nominalized, and could only come at the chain-initial position (Thurman 1978):

(11) a. gan moi-n-**g**-u-a,
child be-he-**NOM**-him-PERF
'The child who is here,

b. Gomia tei awi d-i.
Gomia there send leave-IMPF
send (him) away to Gomia'.

What Robert (2006) argues about the presence vs. absence of the conjunction in Hittite, and its connection to the diachronic evolution of Hittite REL-clauses, is worth citing:

> "… The distinction between sentences with both [conjunctions] and sentences with neither points to a structural distinction between adjoined [paratactic] and embedded [syntactic] relative clauses. After Old Hittite, it is no longer necessary for the resumptive [main] clause to include either both resumption [explicit anaphoric pronouns] and conjunction …" (2006: p. 17).

Robert notes that there is a strong association between the presence of a conjunction in the main ('resumptive') clause and the presence of an explicit anaphoric ('resumptive') pronoun there. While we have no documented indication of the intonation contours of the clauses,[2] it is reasonable to assume that what Robert (2006) describes is a drift from an old paratactic clause-chaining pattern, with the main ('resumptive') clause marked by both a conjunction and an anaphoric ('resumptive') pronoun, to a later syntactic-embedded pattern, where both the conjunction and pronoun are dispensed with. And I think it is a safe bet that the intonation contours merged in the process, such merger being the earliest sign of embedding (Mithun 2006, 2007a, 2007b, 2008).

One may as well note, lastly, that the clause-chaining source for REL-clauses is universal, and can be found — with a discerning eye for informal oral discourse — in just about any spoken language. As an example, consider the following exchange between a mother and her 2 yr. 9 months-old daughter. At this early age, the child produces not a single bona-fide adult-like REL-clause (Diessel 2005), and her mother produces virtually none either during their conversations. But the paratactic precursor of the REL-clause is already there, often spread across a two-person turn, as in (Nina, CHILDES data-base; see ch. 7,8, below):

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2. The original Hittite texts marked no intonation-relevant punctuation, which was added to them by various transcribers and editors.

(12) MOT: They both are wearing earrings.
And what else is this dolly wearing?
NIN: A blouse like **that one**.
Louise gave me **that one**. (p. 42, Nina-III; age ca. 2;8)

The use of the demonstrative pronoun ('that one') by Nina is reminiscent of paratactic REL-clauses in Bambara and Hittite. The communicative goal, given clearly in the context and negotiated over successive-adult-child turns, is that of *identifying a referent* by citing an event in which it was a participant, the standard communicative motivation for using restrictive REL-clauses. But the construction is spread *paratactically* over two adjacent turns and three intonational clauses. In tightly-edited written English, the writer would have merged the mother's and daughter's contributions into:

(13) She is wearing a blouse like *the one Louise gave me.*

5.3 From parenthetical non-restrictive to embedded REL-clauses

The second clear parataxis-to-syntaxis pathway that yields embedded REL-clauses can be illustrated by the extant synchronic variation in present-day German. While this construction is rather old,[3] all its intermediate precursors are still preserved as synchronic variants. Its genesis may be thus reconstructed as follows:

- The Y-movement construction, with case-marked stressed demonstrative pronoun, is still extant.
- It was inserted post-nominally as an 'after-thought', with an intonation break, thus yielding a **non-restrictive** REL-clause.
- The intonation contours were then merged and the demonstrative de-stressed, yielding a **restrictive** REL-clause.

As a schematic illustration, consider (Theo Vennemann, Charlotte Zahn, Christa Toedter and Tania Kuteva, i.p.c.; see also Heine & Kuteva 2007):

(14) a. **Simple clause:**

Martin	hat	**dem**	Mann	**das**	Buch	gegeben
M.	has	**the/**DAT	man	**the/**ACC	book	given

'Martin gave the book to the man.'

3. Luther's translation of the bible, ca. 1500's, has the same REL-clause structure as in Modern German. This structure may date back to 1,000 or even 800 AD.

b. **Y-movement clause–NOM**:
DER hat das Buch dem Mann gegeben
THAT/NOM has the/ACC book the/DAT man given
'**THAT one** gave the book to the man'.

c. **Y-movement clause-ACC:**
DAS hat Martin dem Mann gegeben
THAT/ACC has Martin the/DAT man given
'**THAT one** Martin gave to the Man'.

d. **Y-movement-DAT**:
DEM hat Martin das Buch gegeben
THAT/DAT has Martin the/ACC book given
'**To THAT one** Martin gave the book'.

(15) **Non-restrictive (parenthetical) REL-clauses:**

a. **Nominative:**
Ich kenne die Frau, **DIE** hat dem Mann
I know the woman, THAT/NOM has the/DAT man

das Buch gegeben.
the/ACC book given

'I know the woman, **the one** who gave the book to the man'.
(Hist.: 'I know the woman. **THAT one** gave the book to the man').

b. **Accusative**:
Ich kenne das Buch, **DAS** hat Martin dem
I know the book, THAT/ACC has Martin the/DAT

Mann gegeben.
man given

'I know the book, **the one that** Martin gave to the man'.
(Hist.: 'I know the book. **THAT one** Martin gave to the man').

c. **Dative**:
Ich kenne den Mann, **DEM** hat Martin
I know the/ACC man, THAT/DAT has Martin

das Buch gegeben.
the/ACC book given

'I know the man, **the one that** Martin gave the book to'.
(Hist.: 'I know the man. **THAT one** Martin gave the book to').

By removing the intonation break (and thus, in the written language, the conservative comma), de-stressing the demonstrative pronoun, and a minor adjustment to a non-contrastive word-order, the set of non-restrictive REL-clauses in (15) is turned into the corresponding restrictive REL-clauses. Respectively (and ignoring here the fact that in written German a comma must separate even restrictive REL-clauses, no doubt a relic of the older paratactic pattern):

(16) **Restrictive REL-clauses:**

a. **Nominative:**

Ich	kenne	die	Frau	**die**	dem	Mann	das
I	know	the	woman	**that/NOM**	the/DAT	man	the/ACC

Buch	gegeben	hat.
book	given	has

'I know the woman **who** gave the book to the man'.

b. **Accusative**:

Ich	kenne	das	Buch	**das**	Martin	dem	Mann
I	know	the	book	**that/ACC**	Martin	the/DAT	man

gegeben	hat.
given	has

'I know the book **that** Martin gave to the man'.

c. **Dative**:

Ich	kenne	den	Mann	**dem**	Martin	das	Buch
I	know	the/ACC	man	**that/DAT**	Martin	the/ACC	book

gegeben	hat
given	has

'I know the man **to whom** Martin gave the book'.

The same pathway is found in other Germanic languages (Old Norse, Old English; Heine & Kuteva 2007, ch. 5). In other languages, this pattern in whole or part may be used to augment an existing REL-clause structure. Thus for example, in informal spoken Israeli Hebrew, one finds the following demonstrative-marked headless REL-clauses invading the regular Rel-clause paradigm:

(17) a. **Standard OBJ REL-clause**:

Ha-'ish	**she**-pagash-ti	'oto	'etmol …
the-man	REL-met-1S	him	yesterday

'the man I met yesterday …'

b. **Standard headless OBJ REL-clause**:
zé **she**-pagash-ti 'oto 'etmol …
DEM REL-met-1s him yesterday
'the one I met yesterday …'

c. **Standard non-restrictive OBJ REL-clause**:
ha-'ish, **zé** **she**-pagash-ti 'oto 'etmol, ….
the-man DEM REL-met-1s him yesterday
'the man, the one I met yesterday, …'

d. **Non-standard condensation to restrictive OBJ REL-clause**:
ha'ish **ze-she**-pagash-ti 'oto 'etmol ….
the-man DEM–REL-met-1s him yesterday
'the man I met yesterday …'

As in German, the demonstrative (*ze*) in Hebrew is de-stressed when the non-restrictive (paratactic) REL-clause (17c) is condensed into the restrictive (syntactic) REL-clause (17d). So while the source of the parenthetical clause is different, the condensation pattern — here from parenthetical non-restrictive to restrictive — is the same.

The naturalness of selecting the clause-type to be used as the parenthetical (non-restrictive) portion of the paratactic construction is roughly this: It must *topicalize* the preceding co-referent ('head') noun. The Y-movement construction is certainly such a device (Givón 2001, ch. 15). The headless REL-clause of Hebrew carries the same topicalizing function (as do all REL-clauses).

The use of the stressed demonstrative is almost entirely predicted from the conflation of two necessary attributes of such constructions:

- The co-referent element must be *anaphoric*.
- The co-referent element has to be *contrastive*/*emphatic*.

The stressed demonstrative is rather well suited for this function (Linde 1979), so it is not an accident that it is found widely in languages of diverse types, in the clause-chaining and verb-serializing Bambara and Hittite, as in the more embedding and nominalizing German and Hebrew. The only languages it is less-likely to be found in are zero-anaphora languages like Japanese.

5.4 Are nominalized REL-clauses a separate diachronic pathway?

As noted in chapter 4, above, in many language families — Turkic, Cariban, Bodic (Tibeto-Burman), No. Uto-Aztecan, Sumerian, to cite only a few — all subordinate clauses are nominalized, at least historically. Such structures may re-acquire finite

properties over time (Givón 1994b; Watters 1998), but the morphology retains, for a long time, the telltale marks — clear fossil evidence — of the earlier nominalized status. Does the process that creates such structures conform to our parataxis-to-syntaxis prediction? And does it represent a distinct third major diachronic pathway for the genesis of embedded REL-clauses?

To illustrate how such a pathway can be reconstructed, I will cite the nominalized REL-clauses of Ute (Numic, Uto-Aztecan). Ute marks consistently the case distinction of subject (nominative) vs. non-subject (object, genitive, oblique). The verb in subject REL-clauses is marked with the subject nominalizing suffix *t(ʉ)*. The verb in object REL-clauses is marked with the non-subject nominalizing suffix *-na*, and the subject then appears in the *genitive* case. In indirect-object REL-clauses, the subordinator *pʉ* carries the relevant post-position. Thus (Givón 1980a):

(18) a. **Main clause**:
mamach tʉpʉych-i tʉka'na-pʉ-**vwan** wacʉ-ka
woman/SUBJ rock-OBJ table-OBJ-**on** put-PERF
'The woman put the rock on the table'.

b. **Restrictive REL-clause (SUBJ)**:
mamach tʉpʉych-i tʉka'na-pʉ-**vwan** wacʉ-ka-**t** …
woman/SUBJ rock-OBJ table-OBJ-**on** put-PERF-**NOM**
'the woman who put the rock on the table …'
(Hist.: 'the woman putter of rock on the table …')

c. **Non-restrictive REL-clause (SUBJ):**
mamach, 'ú tʉpʉych-i tʉka'na-pʉ-**vwan** wacʉ-ka-**t**, …
woman/SUBJ that/SUBJ rock-OBJ table-OBJ-**on** put-PERF-**NOM**
'the woman, that one who put the rock on the table, …'
(Hist.: 'the woman, that putter of rock on the table, …')

d. **Restrictive REL-clause (OBJ):**
tʉpʉy-chi mamach-**i** tʉka'na-pʉ-**vwan** wacʉ-ka-**n(a)** …
rock/SUBJ woman-**GEN** table-OBJ-**on** put-PERF-**NOM**
'the rock that the woman put on the table …'
(Hist.: 'the rock of the woman's putting on the table, …')

e. **Non-restrictive REL-clause: OBJ:**
tʉpʉy-ch, 'uru mamach-**i** tʉka'na-pʉ-**vwan** wacʉ-ka-**n(a)**, …
rock/SUBJ that/OBJ woman-**GEN** table-OBJ-**on** put-PERF-**NOM**
'the rock, that one that the woman put on the table, …'
(Hist.: 'the rock, that of the woman's putting on the table, …')

f. **Restrictive REL-clause (indirect OBJ):**
tʉka'na-p **pʉ**-vwan mamach-**i** tʉpʉy-ci wacʉ-ka-**n(a)** …
table-SUBJ **REL**-on woman-**GEN** rock-OBJ put-ANT-**NOM**
'the table on which the woman put a rock …'
(Hist.: 'the table of the woman's putting the rock on …')

g. **Non-restrictive REL-clause (indirect OBJ):**
tʉka'na-p, 'uru **pʉ**-vwan mamach-**i** tʉpʉy-ci
table-SUBJ that/OBL **REL**-on woman-**GEN** rock-OBJ
wacʉ-ka-**n(a)**, …
put-ANT-**NOM**
'the table, that one on which the woman put a rock, …'
(Hist.: 'the table, that of the woman's putting the rock on, …')

Of the two nominalizing verb-suffixes, the subject nominalizer *-tʉ* is still used synchronically to mark lexical subject nominalizations. In combination with the old passive/perfect marker *-ka-*, it can also be used to mark some direct-object (technically subject-of-passive) nominalizations. Thus (Givón 1980a, 1988b):

(19) a. **Main clause**:
ta'wach 'u pʊ'ʊ-mi
man/SUBJ the/SUBJ write-HAB
'The man writes'.

b. **Subject nominalization:**
'ú ta'wach pʊ'ʊ-mi-**t** 'ura'-'ay
that/SUBJ man/SUBJ write-HAB-**NOM** be-PRES
'That man is a writer.'

c. **Object (subject-of-passive) nominalization**:
'ích-'ara pʊ'ʊ-kwa-**t** 'ura-'ay
this/SUBJ-be write-PASS-**NOM** be-PRES
'This is a book'.

The Ute REL-clause data fits our scenario of parataxis-to-syntaxis rather well. The non-restrictive REL-clauses still function synchronically as nominalized clauses (or headless REL-clauses), as in:

(20) a. **Subject**:
'ú tʉpʉychi tʉka'na-pʉ-**vwan** wacʉ-ka-**t**
that/SUBJ rock/OBJ table-OBJ-**on** put-PERF-**NOM**
tʉgʉv-n 'ura-'ay
friend-my be-PRES
'The one who put the rock on the table is my friend'.
(Hist.: 'That [putter of the-rock on the table] is my friend')

b. **Object**:
'uru mamach-**i** tʉka'na-pʉ-**vwan** wacʉ-ka-**n(a)**
that/OBJ woman/**GEN** table-OBJ-**on** put-PERF-**NOM**
tʉpʉych 'ura-'ay
rock be-PRES
'The (thing) that the woman put on the table is a rock'.
(Hist.: 'That [(thing) of the woman's putting on the table] is a rock'.)

c. **Indirect object**:
'uru **pʉ**-vwan mamach-**i** tʉpʉy-ci wacʉ-ka-**n(a)**
that/OBL **REL**-on woman/**GEN** rock-OBJ put-ANT-**NOM**
tʉka'nap 'ura-'ay
table be-PRES
'The (thing) that the woman put a rock on is a table'
(Hist.: 'That [(thing) of the-woman's putting the rock on] is a table').

Just as in German or Hebrew, all it takes in Ute to move from non-restrictive (paratactic) to restrictive (syntactic/embedded) REL-clause is merger of the intonation contours. We may thus subsume the nominalized REL-clause pattern of Ute, at least in principle, under our second parataxis-to-syntaxis diachronic pathway: from parenthetical non-restrictive to restrictive REL-clause.

In a nominalizing language, the etymological source of the nominalizers may perhaps shed some light on the evolution of nominalized REL-clauses. In general, nominalizers are most commonly derived from *head nouns* in noun compounds. This is, for example, the etymology of the nominalizing suffix in English 'free-*dom*' (Old Gothic *tuom* 'judgement') or 'child-*hood*' (Old Gothic *heituz* 'quality'). In Lhasa Tibetan, four nominalizing suffixes are used in relativization: *-mkhan* for actor; *-sa* for locative (and, by extension, dative-benefactive); *-yag* (the 'default' suffix) for patient and instrumental (in the non-perfective), and *-pa* for non-actor or patient (in the perfective).

In lexical nominalizations in Tibetan, *-mkhan* (historically 'teacher' or 'expert') is used in many actor derivations, and *-sa* (historically 'earth', 'ground', thus by extension 'place') in locative derivations. Thus (Delancey 1988):

(21) a. **Actor/subject derivation**:
s'i'n-**mkhan** 'carpenter'
wood-expert

b. **Place derivation**:
yod-**sa** 'place of residence'
live-place

Much like 'free-*dom*' and 'child-*hood*' in English, the Tibetan noun suffixes ('nominal classifiers') in (21) are originally the head nouns in noun compounds. The use of these suffixes in relativization can be seen in (Mazoudon 1978; DeLancey 1988):

(22) a. **Actor REL-clause**:
stag gsod-**mkhan** mi …
tiger kill-NOM man
'the man who killed the tiger …'
(Hist.: 'the tiger kill-**expert** man …')

b. **Locative REL-clause**:
kho sdod-**sa**-'i khan.pa …
he/ABS live-NOM-GEN house
'the house where he lives …'
(Hist.: 'his living-**place** house …')

c. **Instrument REL-clause**:
kho-s stag gsod-**yag**-gi mem.da …
he-ERG tiger kill-NOM-GEN gun
'the gun with which he killed the tiger …'
(Hist.: 'his tiger killing-**tool** gun …')

d. **Patient REL-clause**:
kho-s bsad-**pa**-'i stag …
he-ERG kill-NOM-GEN tiger
'the tiger that he killed …'
(hist.: 'his killing-**victim(?)** tiger …')

A very similar 4-way division of lexical nominalizations used in REL-clause formation is reported for Yaqui (No. Uto-Aztecan, Álvarez-González 2007), with the divisions being subject/agent, generalized non-subject, object/patient and locative.

What the Tibetan data above suggest, I think, is that there is no binding correlation between the nominalization case-recoverability strategy and the non-restrictive paratactic pathway to embedded REL-clauses. Tibetan is a rather classical clause-chaining SOV language. What is more, like related languages in the Bodic region, and like many other clause-chaining languages, chain-medial clauses in Tibetan are typically non-finite (Givón 2001, ch. 18). A clause-chaining source of restrictive REL-clauses is thus very likely here. What is more, the pre-nominal position of Tibetan REL-clauses makes the non-restrictive pathway to

embedded REL-clauses much less plausible, because non-restrictive REL-clauses are parenthetical *after-thought* devices that most commonly *follow* the head noun regardless of word-order type.

Given what we have seen above, I would like to raise some questions about the genesis of Japanese REL-clauses. REL-clauses in Japanese, as in many other zero-anaphora languages, involve the *zero-marking strategy*, with the missing co-referent argument in the REL-clause left unmarked, and its case-role presumably computed from event/verb-type and what arguments are present or missing. Historically, restrictive REL-clauses in Japanese were marked with a nominalizer on the verb, one that was distinct from the chain-medial 'con-verb' marker. Thus (Shibatani 2007; i.p.c.):

(23) a. **Finite, chain-final:**
mizu nagar-**u**.
water flow-FIN
'Water flows'.

b. **Non-finite, chain-medial**:
mizu nagar-**e** …
water flow-MED
'Water flows and …'

c. **Nominalized clause:**
mizu-**no** nagar-**u-ru**
water-GEN flow-FIN-NOM
'the water's flow(ing)'

d. **Old nominalized restrictive REL-clause**:
[nagar-**u-ru**] mizu …
flow-FIN-NOM water
'water that flows'; 'flowing water'

e. **Modern unmarked restrictive-REL clause**:
[onna-ni tegami-o kaita] otoko-wa Kobe-ni ikimashita.
woman-DAT letter-OBJ wrote man-TOP Kobe-LOC went
'The man who wrote the letter to the woman went to Kobe'.

But what was the paratactic source, if any, of the restrictive REL-clause in Japanese? Its pre-nominal position precludes a non-restrictive source. And indeed, a parenthetical non-restrictive (REL-) clause may be constructed in Japanese — following the head noun. But Shibatani (i.p.c.) notes that the relativization pattern

in (23e) may also be interpreted as non-restrictive — provided the head is a proper name. Thus (Shibatani, i.p.c.):

(24) **POST-nominal non-restrictive REL-clause**:
(Boku-ga) Taroo-ni atta, tokolo-de (kare-wa) onna-ni
(I-SUBJ) Taroo-DAT saw [linker]-CV (he-TOP) woman-DAT
tegami-o kaita
letter-OBJ sent
'I saw Taro, who (by the way) sent a letter to the woman'.

A similar situation may be seen in Mandarin (Sino-Tibetan, Li & Thompson 1981) and Lahu (Tibeto-Burman, Matisoff 1972). In the former, restrictive REL-clauses are pre-nominal and marked with a nominalizer, while post-nominal clauses of at least two distinct functions are not nominalized. In the latter, both the pre-nominal and post-nominal REL-clauses are historically nominalized. Since the pre-nominal REL-clauses could not come from a non-restrictive source, do they come from clause-chaining?

The situation seen in Chuave (11) and in many other New-Guinea Highlands languages also has some bearing on this issue. In Chuave, REL-clauses, like other subordinate clauses, are nominalized, and must appear chain-initial — thus *pre-posed* vis-a-vis both the main clause and the head noun. But they are still paratactic, i.e., appear under a separate intonation contour, a situation that makes perfect sense only in the context of the clause-chaining system of such languages. We will discuss this directly below.

5.5 Word-order typology and the diachronic source of REL-clauses

In light of the discussion above, it would be useful to consider the pre-nominal restrictive REL-clauses of Mandarin Chinese and Lahu. Earlier on, I have tended to interpret the pre-nominal position of the REL-clause in Mandarin, an otherwise rigid SVO language with characteristic SE Asia clause-chaining and verb serialization, as a relic of earlier, Tibetan-type SOV syntax. Restrictive REL-clauses in Mandarin are marked by the clause-final nominalizer *-de*, as in (Li & Thomson 1981):

(25) a. **Subject nominalization**:
mài qìche **de** dàbàn dou shì hâo rén
sell car NOM majority all be good person
'Car sellers are mostly good people'.

b. **Object nominalization**:
mài gêi Lîsì **de** shì zuì guì **de**
sell to L. NOM be most expensive NOM
'What is sold to Lisi is the most expensive'.

c. **Subject REL-clause:**
jintian yíng **de** rén yùnqì hâo
today win NOM person luck good
'The people who won today had good luck'.

d. **Object REL-clause**:
jintian yíng **de** qián fù fáng-zu
today win NOM money pay house-rent
'The money (we) won today goes to pay the house rent'.

There is another type of REL-clause in Mandarin, however, the so-called 'descriptive clause' (Li & Thompson 1981). It is post-nominal, and is used in *presentative* constructions with referring-indefinite head nouns. Its paratactic clause-chaining source is transparent, and embedding involves just the merger of two intonation contours (Charles Li, i.p.c.):

(26) a. **Paratactic clause-chain source**:
wo you yi-ge meimei, xihuan kan dianyin
I have one-CL sister like see movie
'I have a sister, she likes to see movies'.

b. **Syntactic presentative construction with post-nominal REL-clause:**
wo you yi-ge meimei xihuan kan dianyin
I have one-CL sister like see movie
'I have a sister who likes to see movies'.

A functional equivalent of non-restrictive REL-clauses also exists in Mandarin. It is post-nominal (or extraposed), and is structurally indistinguishable from the chained-clause pattern in (26a) (Charles Li, i.p.c.). Given that both clauses are equally asserted in such a construction, rather than presupposed, and given the zero-anaphora of Mandarin, this pattern is indeed predictable.

In Lahu, a clause-chaining, verb-serializing SOV Tibeto-Burman language, a pre-posed nominalized clause, marked with the clause-final nominalizer *-ve,* can function in two capacities. With an intonation break between the two clauses (parataxis), the construction is interpreted as a V-complement, as in (27a-i) below. Without the intonation break, it is interpreted as a *pre-nominal* restrictive REL-clause, as in (27a-ii).

But another pattern also exists in Lahu, where the nominalized clause, still pre-posed, has the following two interpretations: With an inter-clausal intonation break (parataxis), the nominalized construction is interpreted as an ADV-clause, as in (27b-i). Without the intonation break (syntaxis), it is interpreted as a *post-nominal* restrictive REL-clause, as in (27b-ii), given that the head noun originally belongs to the second clause in the paratactic sequence. Thus compare (Matisoff 1972; tone marking omitted):

(27) a. **Pre-posed REL-clause:** (Matisoff 1972: 253)

te-qha-te-lɔ	shi-**ve** (,)	a-pi-qu	shi-e-yo	
whole- village-CO	know-NOM (,)	old-lady	die-AWAY-DECL	

i. **V-COMP**: 'What the whole village knows is, **tha**t the old woman has died'.

ii. **REL-clause**: 'The woman [**who** the who village knew] has died'.

b. **Post-posed REL-clause**: (Matisoff 1972: 254)

shui-cɛ	ma-mu-**ve** (,)	ka'	thu	ba	phɛ'ɔ
tree	NEG-high-NOM (,)	even	chop	throw	may-EMPH

i. ADV-clause: '**Even though** the trees are not high, you may chop (them) down'

ii. **REL-clause**: 'You may chop down even the trees [**that** are not high]'.

Either way, the paratactic clause-chaining source of the restrictive REL-clause is transparent.

One may now suggest that the position of the restrictive REL-clause in Mandarin (SVO) and Lahu (SOV) vis-a-vis the head noun has nothing to do with word-order typology. Both pre-posed and post-posed REL-clauses are possible in both languages, and both arise from amenable paratactic patterns. Likewise, the Tibetan nominalized pre-nominal REL-clauses probably arose through the same paratactic diachronic pathway — clause chaining — as those of Mandarin and Lahu.

In the same vein, nominalized REL-clauses in Ute, a fairly classical SOV language till recently, are post-nominal not in violation of Greenbergian universals, but rather because they arose through the non-restrictive ('parenthetical') paratactic channel. And this channel was equally available in German during a largely-VO (or free word order) period. Nominalization as a case-recoverability strategy thus correlates neither with word-order type nor with a specific paratactic source of restrictive REL-clause. It distributes independently of these two typological features.

Whether the pre-nominal REL-clauses of Japanese conform to the Mandarin-Lahu diachronic trend remains to be seen. But one may suggest two possible

precursor paratactic patterns for nominalized REL-clauses, with the nominalized modifying clause either preceding or following the head noun. Schematically:

(28) a. **Post-nominal**: That woman, **the bread-baker**, is my aunt.
b. **Pre-nominal**: **The bread-baker**, that woman, is my aunt.

The paratactic patterns in (28) are fundamentally indistinguishable from the non-restrictive patterns seen in sec. 5.3 above. What they explain, I think, is how a head noun and a nominalized clause got together in a complex syntactic construction. Such explanation is indeed necessary. Deutscher (2000, 2001, 2008), in his description of Akkadian REL-clauses, has noted that strong evidence supports the nominalized origin of such embedded clauses. He then suggested that the nominalized clause must have transformed itself *directly* into a REL-clause. That is (schematically):

(29) a. **Subject NOM > Subject REL-clause:**
[the tiger-killer] left > the [tiger-killer] **man** left ('The man who killed the tiger left')

b. **Object NOM > Object REL-clause:**
[the man's killing] left > the [man's killing] **tiger** left ('The tiger the man killed left')

However, since the semantic head noun — subject in (29a) and object in (29b) — is absent in the suggested precursor nominalized clauses, it is not clear how the **headless** nominalizations by themselves could have come to modify head nouns. The paratactic patterns suggested in (28) make such a transition plausible and natural.

A by-product of this discussion is, I think, that the oft-cited Greenbergian correlation between SOV word-order and pre-nominal REL-clauses is a typological accident, due to the high correlation between the SOV order and clause-chaining. And this correlation is, in turn, due to the high synchronic — and most likely also diachronic (Givón 1979, ch. 7) — prevalence of the SOV word-order, often with its peculiar clause-chaining type whereby chain-medial clauses are non-finite, and what passes in other languages for subordinate clauses are often paratactic and pre-posed to the chain-initial position (Givón 2001, ch. 18).

5.6 Cleft and WH-questions

Cleft constructions are said to have a REL-clause tucked under the same intonation contour, following a contrasted-stressed noun (Schachter 1971). But in many

languages the data exist to suggest that this syntactic construction is a condensation of an earlier paratactic one, where the REL-clause was packaged under a separate intonation contour. What is more, in some languages the same can be shown for WH-questions. As an illustration, consider Kihungan (Bantu, Takizala 1972; Givón 2001, ch. 15):

(30) a. **Main clause**:
Kipes **ka**-swiimin kit
K. **3**s-buy-PAST chair
'Kipes bought a chair'.

b. **Restrictive REL-clause**:
kit ki **a**-swiim-in Kipes …
chair DEM **3**s/**REL**-buy-PAST K.
'the chair that Kipes bought …'

c. **Non-restrictive REL-clause**:
kit, ki **a**-swiim-in Kipes …
chair DEM **3**s/**REL**-buy-PAST K.
'the chair, the one that Kipes bought …'

d. **Syntactic cleft**:
kwe **kít** ki **a**-swiim-in Kipes
be **chair** DEM **3**s/**REL**-buy-PAST K.
'It's a CHAIR that Kipes bought'.

e. **Paratactic (non-restrictive) cleft**:
kwe kít, (kiim) ki **a**-swiim-in Kipes
be chair thing DEM **3**s/REL-buy-PAST K.
'It's a CHAIR, (the thing) that Kipes bought'.

f. **Syntactic WH-question**:
(kwe) kí (ki) **a**-swiim-in Kipes?
(be) what (DEM) **3**s/**REL**-buy-PAST K.
'What did Kipes buy?'
(Lit.: '(It's) WHAT (that) Kipes bought?')

g. **Paratactic (non-restrictive) WH-question**:
kwe **kí**, (kiim) ki **a**-swiim-in Kipes?
be **what** (thing) DEM **3**s/**REL**-buy-LAST K.
'It's WHAT, (the thing) that Kipes bought?'

Presumably, Kihungan already had restrictive REL-clauses before recruiting them to fashion cleft and WH-question constructions. In a way, however, the parataxis-to-syntaxis trajectory of the latter two underscores the diachrony of REL-clauses.

5.7 WH pronouns as REL-pronouns: A third pathway

One type of relativization strategy has yet to be discussed, the use of WH pronouns to signal the case-role of the missing co-referent argument inside the REL-clause. In English, some of those can only appear as 'headless' constructions, and some may be subsumed under 'adverbials'. Thus:

(31)
a. **Subject**: The woman **who** left …
b. **Direct object (inanimate)**: **What** they found there was …
c. **Direct object (human)**: The woman **whom** he chose …
d. **Indirect object (human)**: The woman **to whom** he talked …
e. **Location**: The house **where** he lived …
f. **Reason**: The reason **why** she couldn't do it …
g. **Time**: The year **when** he died …
h. **Manner**: **How** he did it was by …

As Heine & Kuteva (2007) note, this relativization strategy has a protracted history, with the immediate antecedent being probably **WH-question complements** of cognition-perception-utterance verbs, a construction that exhibits a considerable semantic overlap with REL-clauses. Most C-P-U verbs can also take a nominal object, historically probably before they began taking a clausal complement (see ch. 4); so that a considerable semantic overlap between the V-complement and a REL-clause meaning is possible, one that could serve as the *analogical bridge* for spreading the pattern. Thus consider:

(32)

	Verb complement	REL-clause
a.	She didn't know **who** did it.	She didn't know **the person** who did it.
b.	He couldn't think **where** it was.	He couldn't think of **the place** where it was.
c.	Then she saw **how** to solve it.	Then she saw **the way** how to solve it.
d.	He never told her **why** he left.	He never told her **the reason** why he left.

The plausibility of such a diachronic change is enhanced by the observation that almost all languages have WH verb complements, but only a small subset have WH relative pronouns. And further, no language that has the latter lacks the former. That is:

If WH relative pronoun, then WH verb complement

This is a classical diachronic-typological one-way conditional implication. But how did a WH-question get embedded in such V-complement? The most likely answer is that the precursor must have been paratactic, with the complement being a *bona fide* **question speech-act**, as in:

(33) a. Do you know? **Who** did it?
b. Think! **Where** is it?
c. Did you see? **How** did they solve it?
d. Did you ask him? **Why** did he leave?

Similar paratactic constructions are seen in child acquisition of WH-complements, where they are spread across consecutive child-adult or adult-child turns, such as e.g., (see ch. 7, below):

(34) a. Who broke it?
I don't know.
b. Do you know?
Who did it?

The paratactic source of the complex construction may thus pertain not to the target construction, but rather to its precursor in a **grammaticalization chain** (Heine 1992).

Quite a few languages, lastly, must have embarked on this process but then stopped in mid-paradigm, using only one WH-pronoun as the subordinator for all REL-clauses — invariably the *locative* 'where'. This is the pattern in Modern Greek (*pou*), spoken Southern German (*wo*), or Krio (*we*).

5.8 Conclusion

The 7–8 major relativization strategies identified earlier (Givón 2001) focused on the rise of the grammatical morphemes that mark the co-referent argument inside the REL-clause. The first five types were listed as:

i. The non-embedding strategy (Bambara, Supyire, Hittite)
ii. The zero-anaphora strategy (Mandarin, Lau, Japanese)
iii. The case-marked demonstrative-pronoun strategy (German)
iv. The nominalizing strategy (Ute, Tibetan)
v. The WH-pronoun strategy (English)

What the data discussed in this chapter suggest is that the languages that employ these five strategies fit rather snugly into one of three paratactic mega-pathways that give rise to embedded REL- clauses:

- The clause-chaining pathway (Bambara, Supyire, Hittite, Mandarin, Lahu, Japanese, Tibetan)
- The non-restrictive parenthetical pathway (German, Ute)
- The WH-question paratactic pathway (English).

A language may also utilize more than one diachronic pathway, as in Lahu and Mandarin, deriving pre-nominal REL-clauses from one and post-nominal REL-clauses from another.

One more type, the Philippine verb-coding strategy (vi), may have arisen from a nominalized source (Shibatani 2008), as in Ute or Japanese. Since Philippine languages have post-nominal REL-clauses, it is likely that they developed their restrictive REL-clause through the non-restrictive pathway.

Another case-role recoverability type, the Hebrew resumptive-anaphoric pronoun strategy (vii), has a long history, with the current pattern replacing an older one whereby REL-clauses were nominalized (Givón 1991d). The use of simple anaphoric pronouns in Hebrew relativization, combined with the post-nominal position of REL-clauses, are both compatible with the non-restrictive (parenthetical) pathway.[4]

Much more corroborative evidence needs to be unearthed and considered. But all three major well-attested pathways seem to follow the parataxis-to-syntaxis trend. The fact that at the very start, the syntacticization of REL-clauses, just like of V-complements, involves the merger of intonation contours (Mithun 2006, 2007a, 2007b, 2008) is consistent with known patterns of early grammaticalization of words, where the first overt signal of grammaticalization is **de-stressing**. But a subtle signal should not be taken to mean the absence of any signal.[5]

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4. In Biblical Hebrew, the later finite relativization pattern with the generalized REL-subordinator *'asher* was preceded by an earlier layer of nominalized REL-clauses (Givón 1991d). The etymology of *'asher* may go back to *'athar* 'place' (R. Hetzron, in personal communication). If so, there may have been a spreading of the pattern from a nominalized locative REL-clause to the entire case paradigm, a phenomenon also attested in spoken Greek (*pou* 'where'), spoken Southern German (*wo* 'where') and Krio (*we* 'where').

5. In a recent paper, Everett (2005) has asserted that his Amazonian language, Piraha, has no embedded clauses. In support he cites Piraha clause-chaining constructions that 'function as' REL-clause, very much like Bambara, Supyire, Hittite, Mandarin or Lahu, but are 'not embedded'. As further support for his claim of non-embedding, he cites other clause-chaining serial-verb languages (Pawley 1987; Matisoff 1969). At face value, this seems to be an early stage of grammaticalization (Givón 1991c; Mithun 2006, 2007a, 2007b, 2008). Only a text-distribution study of intonation contours would tell whether Piraha has already advanced beyond the earliest paratactic stage, like Bambara, or has not.

A final point concerns possible cognitive correlates of the two developmental steps I suggested at the outset:

- from paratactic to syntactic complexity; and
- from syntactic to lexical/morphological complexity.

In the heyday of Generative Semantics, and before Shibatani's (1972) paper on the semantics of causatives, both condensation steps were considered trivial, a matter of mere surface structure. Causative clause-union was a prime example cited by proponents of GS:

(35) a. **Paratactic**: She **let** him, and he **went**.
b. **Syntactic**: She **let** him **go**.
c. **Co-lexicalized**: She **let-go** of him.

The processing speed of lexical words (35c) is ca. 250 msecs per word, relying heavily on automated ('spreading') activation of semantic networks. The processing speed of a single syntactic clauses (35b) is ca. 1–2 secs per clause. And the processing speed of two chained clauses (35a) is at least twice that, or ca. 2–4 sec. in natural oral discourse. The level of semantic complexity varies only in subtle ways from (35a) to (35b) to (35c). But the processing speed varies significantly. The two steps of structural condensation, parataxis-to-syntaxis and syntaxis-to-lexis, involve not only the transfer of complexity from syntax to lexicon (Dahl 2004), but also a significant increase in processing speed, and thus presumably in automaticity. While this is probably not the primary adaptive motivation for the rise of embedded clauses,[6] hierarchic structure is, in general, part of the mechanism of increased automaticity.

6. The study of the acquisition of complex constructions by children (ch. 7,8 below) suggests that the primary motivation for the rise of both V-complements and REL-clauses is communicative rather than cognitive. The subsequent condensation into hierarchic structure, and the presumed increase in automaticity, are thus secondary developments, perhaps even an epiphenomenon.

PART III

Ontogeny

CHAPTER 6

Child language acquisition

6.1 Preliminaries

The topic of child language acquisition is immense, and it is not my intention to cover it here in full detail. Rather, this chapter will serve as an introduction to the growth of language complexity in the early stages of child communication (0–5 years). Within this context, one could then discuss the ontogeny of syntactic complexity in more detail.

As noted earlier (ch. 1), a number of general trends may be observed in the development of child communication, trends which may be summarized as:

(1) **Major trends in language ontogeny of language**:
   a. cognitive representation before coded communication
   b. lexicon before grammar
   c. one-word clauses before two- or three-word clauses
   d. mono-propositional before multi-propositional discourse
   e. pre-grammatical pidgin before grammaticalized language
   f. paratactic (chained) clauses before syntactic (embedded) clauses
   g. non-displaced reference before displaced reference
   h. manipulative speech-acts before declaratives and interrogatives
   i. deontic modality before epistemic modality
   j. pragmatic (context-dependent) before syntactic (automated) processing.

Trends (1b–f) are a skeletal outline of the growth of **structural complexity** during child language acquisition. Trends (1g–j) pertain to changes in the **communicative ecology** during the course of child language acquisition. We will deal with the latter first.

6.2 Communicative ecology

The social ecology of early childhood, be it within the nuclear or extended family, is reminiscent in many ways of the cultural milieu of primates and early hominids, the so-called **society of intimates**, whose most salient characteristics are (Givón 2002, ch. 9):

- small-size social unit
- restricted territorial range

- genetic homogeneity
- cultural homogeneity
- informational homogeneity
- kin-based social cooperation
- informal consensual leadership

Of these seven characteristics, the social milieu of early childhood diverges in only two:

- information: there is a strong **informational imbalance** between child and adult.
- consensual leadership: there is a strong **power imbalance** between child and adult.

Of these two, however, the informational imbalance between child and adult is offset to quite a degree by the way adult interlocutors pitch the level of their informational and communicative complexity to the child's level ('down-shifting'; see ch. 7,8).

As noted above, the communicative ecology of early childhood — up to 1;6 — is surprisingly like that of primate communication:

- Speech-acts are initially **manipulative** (Carter 1974; Bates *et al.* 1979); informative (declarative, interrogative) speech-acts appear later.
- Consequently, understanding other minds (ToM) is initially **deontic**; epistemic ToM arises later (Premack & Woodruff 1978; Tomasello & Call 1997; Meltzoff 1999; Tomasello *et al.* 2005; Cheyney & Seyfarth 2007).
- Spatio-temporal reference is primarily **non-displaced** (here-and now, you-and-I, this-and-that); displaced reference develops later.
- Conversational turns are most typically **mono-clausal,** and discourse coherence is **mono-propositional** (Bloom 1973; Scollon 1976)
- Communication is heavily **context-dependent** (pragmatic, attended); well-coded lexicon and rule-governed (automated) syntactic processing develop later (Bates 1976; Givón 1979, ch. 5,7).

These features of the communicative ecology are not accidental but rather are strongly correlated, and it is their gradual shift between the ages of 1 and 3–5 years that motivates the rise of adult-like well-coded communication — lexicon (phonology) and morpho-syntax (grammar) — as it must have done in language evolution.

6.3 Early lexicon and the one-word stage

By the time children begin to produce lexical words, around the age of 1, they have gone through a great number of the developmental prerequisites for well-coded communication:

- An extensive organization of the spatio-temporal world of objects, space, motion, states, events, agents and causation; i.e., the so-called **sensory-motor period** (Carter 1974).

- An extensive **socialization** with intimate others, and a rudimentary understanding of some social-communicative conventions, as well as motivation (Bates 1976).
- A beginning, however rudimentary and implicit, of **Theory of Mind,** at least in so far as understanding their own intentions and beliefs (Meltzoff 1999).
- A firm command of manipulative speech-acts and their use-conventions;
- Some rudimentary command, however passive, of declarative speech-acts, beginning with pointing and joint attention routines.

When the first words arrive, their use in the so-called **one-word stage** is already communicative, not merely referential, even though the early words are predominantly nouns (Bloom 1973; Scollon 1976; Givón 1979, ch. 7). But the interpretation of single-word utterances as clauses (propositions) is heavily dependent on the immediate communicative context, as well as on the surrounding conversational turns of the adults (Ervin-Tripp 1970; Scollon 1976; Ochs *et al.* 1979).

I will illustrate this mode of communication with a few example from the CHILDES transcripts (MacWhinney & Snow 1985; see ch. 7,8):

(2) **One-word interactive communication**:

a. MOT: What does the cow say Nomi?
NAO: Moo.
MOT: Moo. [Naomi; age 1;2]

b. MOT: What's that, Nomi? What's that?
NAO: Kitty.
MOT: Kitty [Naomi; age 1;2]

c. MOT: Are you going to give them to me?
NAO: Here. (giving) [Naomi; age 1;2]

d. MOT: Doggie.
NAO: Me … me!
MOT: No, I don't think you want any apple juice now
[Naomi; age 1;6]

e. NIN: More. (requests other pictures)
MOT: What is tiny rabbit doing?
NIN: Open.
MOT: Okay.
NIN: More book. (requests another book)
MOT: Okay, do you want to get another book?
NIN: Yeah.
MOT: Okay. [Nina; age 1;11]

f. MOT: Do you want to find another book with a rabbit in it?
NIN: Here. [pointing to book]
MOT: Here's another book. [Nina; age 1;11]

g. EVE: Napkin.
MOT: Oh, do you **want** a napkin too? [Eve; age 1;8]

h. EVE: Bottle.
MOT: What?
EVE: Eve …
MOT: Do you **want** to taste it? [Eve; age 1;8]

6.4 Pre-grammatical pidgin communication: The two-word stage

The two-word stage (Bowerman 1973), kicking in gradually from ca. age 1;6, represents a departure not only in increased utterance length but also in the length of child turns: from mono-propositional turns with the discourse coherence and continuity supplied by the surrounding adult turns, as in (2) above, to coherent multi-clause turns by the child herself. This mode of communication is largely devoid of morpho-syntactic devices, such as grammatical morphology or distinct syntactic constructions (Bowerman 1973; MacWhinney 1982). It may thus be characterized as **pre-grammatical pidgin** communication.

As an illustration of two-word clauses with single-clause turns consider (3) below. The child shifts the topic from one turn to the next, while the adult struggles to maintain discourse continuity/coherence (Naomi; age 2;2):

(3) [Context: discussing objects in the immediate environment]
NAO: Baby **ball**.
MOT: Baby has a ball.
NAO: Got [???]. Got [???].
MOT: What?
NAO: Got **shoe**.
MOT: Got show, yeah. Yes. The baby has a dress on.
NAO: **Jacket** on.
MOT: And a jacket on, right.
CHI: **Shoes** on.
MOT: Yes, Daddy has shoes on.
NAO: **Knee**.
MOT: Yeah. Daddy has knees. Where is the baby's **elbow**?
NAO: Elbow.

MOT: Do you know where the elbow is?
NAO: Elbow [pointing to Daddy's **head**].
MOT: No, that's Daddy's head.

Contrast this now with (4) below, where the same child five months later produces a 13-clause turn, taking charge of topic continuity to the point of discouraging the adult's intervention (Naomi, age ca. 2;7):

(4) [Context: playing in the bathtub]
FAT: That's so you can slide down and get your hair rinsed.
NAO: Oh. Whoopsie. I slided down for real fun. And isn't that nice? All the friends except **Froggy** and Pogo. **Froggy** and Pogo live next doors. **They** live next door and little. **Froggy** says "here I go [???]". 'at['s] all. So **he** just swam under everything. Until one day. [???]. All the people ran in **his** house. And **he** most of all [???].
FAT: Most of all what, Nomi?
NAO: I wasn't talking to you.

At this stage, the child is of course still capable of engaging in short-turn back-and-forth discourse, superficially similar to that in (3) above. However, such one-clause turns tend to exhibit much higher **cross-turn collaborative coherence,** characteristic of adult conversation (Chafe 1997; Ervin-Tripp & Küntay 1997). Thus consider (Naomi, age ca. 2;7):

(5) [Context: Imaginary play with a doll]
NAO: Um also, she um also she had **chicken pox**.
MOT: **Chicken pox**!
NAO: [???].
MOT: She **itching**?
NAO: **Uh-huh**.
MOT: Oh, you still have the **chicken pox**.
NAO: **Oh yeah**.
MOT: And such a **young baby** too.
NAO: She's only **two**.
MOT: Yeah. She must feel a lot better now.
NAO: She still has **chicken pox**.
MOT: Uh-huh.
NAO: Are you cold?

The child's fluent multi-propositional discourse at this stge is not all that different from the spoken adult norm, where clauses — intonation units — tend to be no longer

than **2–3 words per clause** (Givón 1975b, 1995, ch. 8; Chafe 1994). Though of course, child pre-grammatical pidgin lacks well marked morpho-syntactic constructions.

From the perspective of understanding the genesis of complex clauses, this stage of fluent, coherent multi-propositional discourse is extremely important since — in ontogeny as in diachrony — this paratactic mode of clause-chaining is the precursor of complex embedded clauses.

6.5 Complex-embedded clauses

The next two chapters deal with the acquisition of two types of complex clauses, V-complements, which are acquired earlier (ca. age 1;8–2;9), and restrictive REL-clauses, acquired much later (ca. age 3;0–5;0). The two types of embedded clauses are acquired at different ages, under different communicative ecologies, in a different manner, and under different adaptive-communicative pressures. Their syntactic end products are also starkly different, so much so that the question arises whether syntactic complexity — embedding, recursivity — is a meaningful theoretical construct rather than an *epiphenomenon*, a by-product of something else, something more profound.

6.6 Combination vs. expansion

In the context of the acquisition of complex-embedded clauses, the question of the developmental trend — **combinatorial** (synthesis) vs. **expansion** (analysis) — comes back into the fore. The two studies presented in the next two chapters point decidedly toward the combinatorial, as does the subsequent study in ch. 10. The most consistent exception to this trend involves *rote learning* of morphologically complex words, including high-frequency multi-word collocations (MacWhinney 1982). Such complex lexical items are often learned first holistically (Tomasello 2000, 2003) before being re-analyzed into component parts. But this in no way characterizes the acquisition of syntactic constructions.

CHAPTER 7

The ontogeny of complex verb phrases:
How children learn to negotiate fact and desire

7.1 Overview*

The acquisition by children of complex verb-phrases (V-complement constructions) has been studied recently in two ground-breaking works, Diessel & Tomasello (2001) and Diessel (2005). Among their many findings, four closely-related observations concern us most here. They may be summarized as follows:

i. In the early stage of child use of V-complement constructions, the main verb acts as a grammaticalized modal operator, epistemic or deontic, on the complement clause.
ii. Consequently, V-complement constructions in early childhood are acquired *holistically*, as *single propositions* whose semantic focus is on the complement clause.
iii. Only later do children develop the use of V-complement constructions as a two-proposition construction, the presumed adult norm, in which each clause carries its own semantic weight.
iv. Syntactically too, the child acquires complex VPs initially as *simplex* single-clause constructions, and only later re-analyzes them — by expansion — as *complex* two-clause constructions.

Diessel and Tomasello's observation (iv), if it holds, implies that the ontogeny of complex VPs proceeds in the exact opposite direction from their diachrony. That is, as seen earlier (ch. 4,5), the main trend in the diachrony of complex clauses is for a paratactic two-clause configuration, falling under two separate intonation contours, to undergo **combination** ('condensation') and become a complex clause under a single intonation contour.

While taking the findings of Diessel and Tomasello as an important point of departure, I will suggest here that there is a way in which the essentially-semantic

*I am indebted to Holger Diessel for his work, which inspired this study, as well as for generous comments on earlier versions of the manuscript. I am also greatly indebted to Brian MacWhinney for use of the CHILDES data base, as well as for many stimulating comments.

observations (i) and (ii) above can be granted without necessarily subscribing to the essentially-syntactic (iv). As for observation (iii), its specificity to children — as against adults — bears re-examining.

The main thrust of my argument concerning Diessel and Tomasello's observation (iv) harkens back to a body of work that is by now, deservedly, part of the acquisitional canon; that is, Ervin-Tripp (1970); Scollon (1976) and Ochs *et al.* (1979). Those works suggest that in the early stages of child communication, between 1–2 years, both propositions (semantics) and clauses (syntax) are distributed over multiple child-adult or adult-child conversational turns. And that such cross-turn **shared constructions** are the true precursors of the single-turn clauses that emerge in subsequent stages of child communication.[1] To quote Ochs *et al.*'s (1979) conclusions:

> "… caretaker and child *together* construct a single proposition. We suggest that a child may learn how to articulate propositions through such a mechanism. That is, she may learn how to encode propositions by participating in a sequence in which she contributes a component of the proposition … We may ask: To what extent is a child able to encode the proposition he wishes to convey in a single utterance? … Which dimension of the utterance context (verbal and/or nonverbal) does the child exploit … ? …" (1979: pp. 267–268)

In this chapter, I hope to show that cross-turn shared constructions are copiously present in the early stages of acquisition of complex VPs, and should be considered as their developmental precursors. Much of the seeming discrepancy between Diesel and Tomasello's observations and my own hinges on a simple point of methodology. Diessel and Tomasello tracked down the first appearance in the child's use of canonic adult-like complex V-complement clauses, such as:

(1) a. DEONTIC: I **want** to eat the apple. (⊃ please give me an apple)
b. DEONTIC: **Let me** have a toy. (⊃ please give me a toy)
c. EPISTEMIC: I **know (that)** it is broken. (⊃ it is broken, I'm certain)

They noted that when the child first produces such constructions, their semantic value is simplex, so that (1a) and (1b) are simple, unitary direct manipulative speech-acts of **request**, and (1c) is a simple, unitary direct declarative speech-act of **emphatic assertion**. Only later on in development do the semantically-complex usages of such constructions emerge, most conspicuously with 3rd person subjects; as in, respectively:

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1. The cross-turn construction of clauses, propositions, but particularly discourse topics, is just as prevalent in adult communication (Chafe 1994, 1997; Ervin-Tripp & Küntay 1997; Linell & Karolija 1997; *inter alia*).

(2) a. DEONTIC: She **wanted** to eat an apple.
b. DEONTIC: He **let** her have the toy.
c. EPISTEMIC: They **knew** (that) it was broken.

In such later uses, both the main and complement propositions presumably have independent semantic values. Note, however, that the developmental transition from the early stage (1) to the later (2) is strictly semantic, and has no discernible syntactic correlates. Diessel and Tomasello's assertion (iv) thus remains unsupported.

But — do the early complex VP constructions in (1) have earlier yet **paratactic** precursors? What I propose to show here is that cross-turn sharing of complex constructions *a la* Ervin-Tripp (1970), Scollon (1976) and Ochs *et al.* (1979) is the real precursor of the early-stage child usage in (1). Such cross-turn sharing of complex structures is richly documented in the data base — the CHILDES transcripts — studied by Diessel (2005). But in order to identify such paratactic precursors, one must look not only at isolated utterances produced by the child, but at larger chunks of **multi-turn interactions** between the child and adult.

The second topic that begs re-examination is Diessel and Tomaesello's characterization of the **adult standard** for complex VPs, the benchmark children reach later in development (observation (iii) above). The adult standard — the child's presumed target construction — is viewed by Diessel and Tomasello as consisting of two semantically independent propositions, thus of two syntactic clauses. Their observations (i), and (ii) thus sets up a stark difference between early child and adult usage.

The characterization of adult complex-VPs as consisting of two independent propositions harkens back to Chomsky's (1957, 1965) early transformational grammar. This characterization was challenged head-on by Thompson (2002; see also Thompson & Mulac 1991), two studies that have more recently been themselves challenged by Boye & Harder (2007) and Newmeyer (2008). Along lines compatible with Thomson's work — but only up to a point — I would like to suggest that the adaptive-communicative motivation for recruiting epistemic and deontic main verbs into complex VP constructions is the same in both diachrony and ontogeny — the creation of a deontic or epistemic **modal envelope** on the complement proposition. In diachrony (adult) as in ontogeny (child), the use of such constructions with two independent semantic foci, as in (2) above, is a secondary late development. Such usage characterizes neither the early stages of ontogeny and diachrony, nor the bulk of everyday oral — non-academic — adult usage. But as both Boye & Harder (2007) and Newmeyer (2008) note, high frequency does not mean 100%. And when adults talk about the mental states of third persons in the past or future, epistemic and deontic verbs assume an independent semantic value.

This argument is indeed complex, involving first the diachronic development of modal expressions (Givón 1979; Hopper & Traugott 1993; Heine *et al.* 1991; Heine & Kuteva 2007). It also involves the question of what text-type, or rather what communication type, is the prototype for human language. At the very least, I will show that at the text-frequency level, the use of V-complement constructions in oral informal adult communication does not differ significantly from that of early childhood. And thus that non-academic, non-philosophical adult oral usage conforms to Diessel and Tomasello's semantic characterization of *early childhood* modal usage.

7.2 Data-base

The transcripts of child-adult communication studied here were taken from the CHILDES English data-base.[2] This is the same data-base studied by Diessel (2005), with two children (Naomi, Nina) also appearing in Diessel's (2005) 5-children sample, and one child (Eve) added. For each child, three developmental stages were selected by informal criteria. In stage-I, very few examples of complex verb phrases were found. In stage-II, more. In stage-III, many more. Approximately 60 printed pages of the CHILDES transcripts were studied for each child at each stage, aiming for contiguous single recording sessions whenever possible. Since the original transcripts on hard disk are often un-paginated, page numbers for later reference were added after the printing. In the case of Naomi's stages I and II, multiple recording sessions were combined to make up the aimed-for bulk.[3]

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2. See MacWhinney & Snow (1985). Access to the CHILDES electronic data-base was obtained courtesy of Brian MacWhinney.

3. The transcribed recording sessions for each of the three children from the CHILDES data-base studied here are as follows:

EVE:	Stage-I:	age: 1;9; date: 1–14–63; pp. 1–69;	
	Stage-II:	age: 1;10; date: 2–25–63; pp. 1–60;	
	Stage-III:	age: 2;0; date: 4–29–63; pp. 1–62;	
NAOMI:	Stage-I:	age: 1: 10: 10; date: 4–18–70; pp. 1–2;	(Naomi.11)
		age: 1: 10: 14; date 7–22–70; pp. 27–39;	(Naomi.13)
		age: 1;10;17; date: 2–25–70; pp. 40–53;	(Naomi.14)
		age: 1;10;18; date: 4–26–70; pp. 54–62;	(Naomi.15)
	Stage-II:	age: 2;0;02; date: 6–26–70; pp. 1–41;	(Naomi.35)
		age: 2;0;18; date: 6–26–70; pp. 42–62;	(Naomi.38)
	Stage-III:	age: 2;2;25; date: 9–08–70; pp. 1–52	
NINA:	Stage-I:	age: 1;11; date: 11–05–70; pp. 1–65;	(Nina01.cha)
	Stage-II:	age: 2;3;18; date: 3–07–71; pp. 1–54;	(Nina.18)
	Stage-III:	age: 2;9;26); date: 9–15–71; pp., 1–57;	(Nina.34)

7.3 Modal interaction units

7.3.1 Simple modal interactions

The use of deontic and epistemic main verbs as modal operators on complement propositions does not occur in a communicative vacuum. To appreciate how such constructions are used, one must study the communicative **goal-context** within which they are embedded. I will call these contexts in child-adult communication **modal interaction units** (MIUs). If the CHILDES transcripts are any indication, such units can be broadly classified as carrying either epistemic or deontic goals. By *epistemic* I mean "pertaining to how a person views the facts of the world, or how they view another person's view of such facts". By *deontic* I mean "pertaining to what one person wants to do, or what they want another person to do for them".

As Diessel (2005) has observed, in the early stages of child language acquisition these modalities are used in a more restricted sense, as **direct speech-acts**. That is, *epistemic*: "how *I* view the facts of the world, or how I view *your* view of such facts". And *deontic*: "what *I* want to do, or what I want *you* to do for me".

What I have done with the ca. 60 pp. of CHILDES transcripts for each of the 3 children at each of the 3 developmental stages, is isolate and extract all the MIUs — coherent chunks of diadic communication — that surround each complex VP construction (or a cluster thereof) in the text, be they deontic or epistemic. Some of these MIUs are short and simple, either purely deontic or purely epistemic. Some examples of those are:

(3) **Simple modal interactions**

a. **Deontic**: (Eve-I, p. 2)

EVE:	Napkin.	(request)
MOT:	Oh, do you **want** a napkin too?	(offer)

b. **Deontic**: (Eve-I, p. p. 3)

EVE:	Fraser blow nose, blow nose.	(request)
MOT:	Wipe your nose? **Can** you blow?	(offer)

c. **Deontic**: (Eve-I, p. 15–16)

EVE:	Bottle.	(request)
MOT:	What?	(request for interpretation)
EVE:	Eve …	(request)
MOT:	Do you **want** to taste it?	(offer)
	Let's see if Sarah **would like** to **have** a drink	(manipulation)
EVE:	Eve **want** some too.	(request)

d. **Epistemic**: (Eve-I, p. 57)

EVE:	Eating bread too.	(observation of facts)
MOT:	She's eating bread too, I **think**.	(quantification of facts)

e. **Epistemic**: (Eve-I, p. 59)

FAT:	What **are** you doing?	(question of facts)
EVE:	Have shower hat.	(statement of facts)
FAT:	Well, I **know** you **are** wearing a shower hat.	(quantification of facts)
EVE:	Eve wear-**ing** shower hat.	(statement of fact)

f. **Epistemic**: (Eve-I, pp. 55–56)

EVE:	Got [=dog] bark-**ing**.	(statement of fact)
RIC:	He got what?	(question; mis-communication)
EVE:	Got bark-**ing**. [x5]	(repeated statement of fact)
MOT:	There's a dog barking outside … Yeah.	(interpretation of statement)
COL:	I'm not **sure.** Yeah, I **think** it is.	(epistemic quantification)
	I'm **sure** it is.	(epistemic quantification)
	Instead of saying 'dog' she says 'got'	(resolving mis-communication)
EVE:	Got eat-**ing** bread too.	(statement of fact)

With one partial exception ('Eve **want** some too' (3c)), all the complex epistemic and deontic constructions in (3) are contributed by the adult. But whoever the contributor, these complex grammatical constructions are embedded inside a modal interaction context, an envelope within which — and through which — the two participants negotiate their deontic or epistemic goals, or resolve their epistemic or deontic conflicts. It is thus the entire multi-turn MIU that should be counted as the developmental precursor for the child's eventual acquisition of the use of these complex syntactic structures, and thus of transacting more effectively deontic and epistemic negotiations. Such verbal sophistication is almost entirely absent in our Eve-I (age 1;9), Naomi-I (age 1;10) and Nina-I (age 1;11) transcripts.

The collaborative nature of modal interactions is evident in the child's interspersed contribution, often mere fragments of the intended proposition (see also ch. 10). Thus in (3c) above, Eve first contributes the object ('bottle'), then the subject ('Eve'). Only at the very end, after the mother has interpreted the deontic goal correctly and used the appropriate deontic verb ('Do you **want** to taste it?'), does Eve produce a full proposition ('Eve **want** some

too'), albeit with a simplex use of the modal verb — nominal object rather than verbal complement.

7.3.2 Complex modal interactions

Often, especially in longer MIUs, the modal intent of the negotiation may shift in midstream. The change may involve:

- Who initiates, and thus controls, the interaction.
- Shift(s) of modality in mid-MIU by either interlocutor, from deontic to epistemic or vice versa.

The modal complexity of MIUs is more conspicuous in the later, stage-II or stage-III transcripts. Thus, consider (4) below, where the mother, rather characteristically, recruits an epistemic argument, together with its attendant modal-grammatical machinery (here two *quotative* verbs) to settle the initial deontic conflict (Naomi-III, p. 4):

(4)	NAO:	Give me a diaper.	(request = DEONT)
	MOT:	Yes, I'**ll** get you a diaper, honey.	(promise = DEONT)
		You **let go** again.	(manipulation = DEONT)
		Okay, **want** to come down and get this diaper changed?	(offer = DEONT)
	NAO:	No.	(refusal = DEONT)
	MOT:	You **told** me about it, Nomi.	(past-quotative = EPIST)
		You **said**: "Mommy change my diaper".	(past-quotative = EPIST)
	NAO:	Boom Mommy.	(utter disdain = DEONT)

But the child herself is quite capable of pulling the same trick, indeed of replying in modality-shifting kind, as in (Naomi-III, p. 51–52):

(5)	NAO:	I **want** to sit by the tape-recorder.	(request = DEONT)
	MOT:	I'm **sorry**, you're too heavy.	(regretted facts = EPIST)
		and you'**re going** to break it.	(dire prediction = EPIST)
		Why don't we do something else?	(manipulation = DEONT)
	NAO:	It's not brok-**en**!	(counter statement of facts = EPIST)
	MOT:	Well, you **are** breaking it now honey.	(counter statement of facts = EPIST)
		You **are** hurting it.	(counter statement of facts = EPIST)

Verbally helpless just 4 months earlier, Naomi has learned well, indeed from a master negotiator, the subtle art of **modal fencing**.[4] And the rapier wielded in service of one's modal goals — be they deontic or epistemic — is this relatively small group of complement-taking main verbs, the so called *modality* verbs, *manipulation* verbs, and *perception-cognition-utterance* verbs (Givón 2001; ch. 12). Eventually, the mother's modal fencing skills in (5) are too much for her daughter.

7.3.3 Boundaries of modal interaction units

Sometimes the initial boundary of the MIU is not altogether obvious, especially in cases when a long interaction precedes the complex grammatical-modal form — without the use of any complex grammatical expressions in that preceding sequence. Thus consider (6) below, a lengthy and relatively conflict-free epistemic negotiation (Nina-I, p. 3):

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4. The following example is taken out of a fictional account of an adult epistemic-modal fencing match between two characters, Momma and Mrs P.J. King (Pearson 1985; modal operators are bold-faced):
… "Pepsi Cola" she said. "Yes, I **believe** is was Pepsi Cola because **I'm near certain** it was Mr. Womble who ran the Nephi outfit". And Momma sat straight up and said, "Helen?" … But Mrs. Phillip J. King just went straight on and said, "It **had to be** Pepsi Cola. He owned the bottling plant **you know** in Burlington. **I mean** his daddy, **now I don' think** he ever owned it himself, but his daddy did and made a killing putting out Pepsi Cola until he sold the business and made another killing doing that". **Momma said** it was just a ton of money that changed hands. "She was brought up in Burlington **you know**. "But Helen", said Momma … "And **they tell me** his wife was just a gorgeous woman but not from around here … **Momma said** he went out and got one all the way from Delaware or Ohio, **she couldn't ever remember** exactly which, but **I imagine** it was Delaware since **P.J. tells me** … that Delaware is one of your urban states … and **P.J. says** there's plenty of money in Delaware mostly on account of the Duponts, and she **might have even been** a Dupont herself, anyway **I don't know** that she **wasn't** and she was **probably** from Delaware **I imagine**, which is where they all come from …" "Wasn't it cookies instead of Pepsi-Cola?" Momma wanted to know. "Didn't Mr. Alton's Daddy make those savannahs with white cream filling and those little oval shortbread cakes that came in the blue sack?" And Mrs. Phillip J. King got a little hot on account of the cream-filled savannahs and the shortbread cakes and she said to Momma, "Now Inez, he **might have** dabbled in cookies later but **I can tell you for a fact** it was Pepsi-Cola at the first because **Momma said** it was Mr. Womble at the Nehi and Mr. Foster at the Coca-Cola and Mr. Tod W. Smith at the Sundrop and Mr. Nance at the Pepsi-Cola, and **Momma herself told me** it was Pepsi-Cola that made him his money but **I don't ever recall** a whisper of cookies **passing her lips** …" …" (T.R. Pearson, *A Short History of a Small Place*, 1985, pp. 193–195)

(6)

NIN:	Big.	(statement of fact = EPIST)
MOT:	Yeah.	(agreement on facts = EPIST)
NIN:	Big crocodile.	(expanded statement of facts = EPIST)
MOT:	Big crocodile. It **sure** is.	(quantification of facts = EPIST)
NIN:	Rabbit.	(topic shift; statement of new facts = EPIST)
NIN:	Little rabbit.	(expanded statement of new facts = EPIST)
MOT:	That's a little rabbit.	(agreement on of facts = EPIST)
NIN:	On a bicycle.	(expanded statement of facts = EPIST)
MOT:	Oh, **is** the rabbit riding on the bicycle?	(challenging question of facts = EPIST)
NIN:	Yeah.	(assent of facts = EPIST)
MOT:	What **is** the rabbit doing?	(question of facts = EPIST)
EVE:	Fall down.	(statement of facts = EPIST)

The second modal interaction in (6), involving the new topic ('rabbit') and the complex expression with the progressive auxiliary ('is'), may easily be detached from the first one (topic = 'crocodile'), marked with the epistemic quantifier 'be sure', without any loss of coherence to either.

In deciding the boundaries of MIUs, a cluster of criteria were considered, most salient among them:

- *Economy*: Are one or more complex modal-grammatical expressions clustered together naturally?
- C*ontextual relevance:* Is the immediate context more relevant than the distant one? How immediate is immediate?
- *Thematic coherence*: Is the thematic thread maintained or interrupted?

When these criteria come into conflict, they must be weighed — and sometimes weighted — against each other. In this study I have elected, whenever possible, to not let modal discontinuity by itself — deontic-to-epistemic or epistemic-to-deontic shifts — be the sole motivation for positing an MIU boundary, as long as the topical thread is not broken by the modality shift. This choice, I think, is well-supported by what we have noted in (4) and (5) above about modality shifting within an MIU.

Conversely, I consider a successful topic shift by either the adult or the child as a good grounds for inserting an MIU boundary. This may be seen in Nina's abrupt shift in (6) above, from 'crocodile' to 'rabbit'. Considerations of both topical and modal coherence thus form the bulk of the motivation for packaging MIUs the way I did.

7.3.4 Identifying the child's speech-act intention

In the early stages (I, II), the child's modal intention is often left unmarked. How does one, working from the CHILDES transcripts, determine the speech-act value of the child's elliptic utterances?[5] The question can be recast as follows: How do the adult interlocutors divine, seemingly without fail, the child's modal intention?

The answer is that the adults seem to have little trouble guessing the child's modal intent, knowing the child intimately, and knowing the ongoing communicative context. To illustrate how this transpires, consider the following series of short modal interactions. Each opens with a short, rather elliptic initial modal move by the child, followed immediately by the adult's interpretation — most often accurate — of the child's speech-act intention; then often followed by the child's confirmation of the adult's modal interpretation. Thus (Eve-I):

(7)	a.	EVE:	Oh **look**, my pencil.	(request?)
		MOT:	There's one in the kitchen on the table counter.	(stating relevant facts)
			There's one in the kitchen.	(stating relevant facts)
			You **may** have that one.	(offer)
		EVE:	Write another pencil. (p. 1)	(confirmation of goal)
	b.	EVE:	Candy?	(request?)
		MOT:	Candy? I **think** not.	(rejection)
		EVE:	Candy.	(reiterated request)
		MOT:	You have animal crackers on the table. (p. 1a)	(counter offer)
	c.	EVE:	That Fraser pencil.	(statement of fact?)
		COL:	**Can** you write?	(epistemic-modal question)
		EVE:	Yeah. (p. 1a)	(epistemic confirmation)
	d.	EVE:	Mom napkin.	(request?)
		MOT:	Oh, d'you **want** a napkin too? There.	(offer)

5. Bates *et al.* (1975/1979) deemed this issue problematic, suggesting that adults often misinterpret the child's speech-act intention at an early stage. I find this to be, largely, not the case at the age range studied here (1;8–2;9).

e. EVE: **Look** Fraser napkin. (statement of facts?)
COL: Yes. You'**ve** got one. (agreement & added facts)
EVE: There. (agreement on facts)
(p. 2)

f. EVE: Fraser blow nose, blow nose. (request?)
MOT: Wipe your nose? (question on modal intent)
Can you blow? (counter offer)
That's a good girl. (reward for compliance)
(p. 3)

g. EVE: Sit Pop lap. (request?)
FAT: You don't **want** to sit on my lap now. (rejection)
Tomorrow. (counter offer)
EVE: Morrow. (acceptance of alternative)
(p. 3)

h. EVE: I put sugar in it. (offer?)
MOT: I had sugar in my coffee. (incompatible facts)
I don't **need** any more sugar. (decline offer)
(p. 4)

i. EVE: I brush-**ing**. (statement of facts?)
COL: What **are** you doing? (question of facts)
EVE: [???] brush-**ing**. (re-statement of facts)
(p. 5)

j. EVE: [???]. (uninterpretable utterance)
MOT: Do what? (request for interpreted)
EVE: Self. (request?)
MOT: What? Oh, you **want** one yourself? (offer)
EVE: Eve get a Kleenex. (restated request)
MOT: Alright, take one. (offer)
(p. 8)

k. EVE: Fall down. (statement of facts)
MOT: I **know** you fell down. (epistemic amplification of facts)
EVE: That mine. (topic change)
(p. 17)

l.	EVE:	[???] fall.	(statement of facts?)
	MOT:	It fell?	(question of epistemic intent)
		I don't **know** whether it did.	(epistemic uncertainty)
	EVE:	It [???] fall down. Fall down	(restatement of fact?)
		Be a horsie.	(topic & modality shift; request?)
	MOT:	Be a horsie. Okay.	(granting the request)
	EVE:	Be a clip-clop.	(re-stating request)

(p. 47–48)

m.	EVE:	Baby.	(statement of facts?)
	MOT:	What's Eve doing?	(question of facts)
	EVE:	Carry-**ing** a baby.	(restatement of facts)
	MOT:	Yeah.	(agreement on facts)

(p. 43)

On the relatively rare occasion when the adult's interpretation of the child's modal intent is unacceptable to the child, negotiations may ensue, and may proceed till the issue is resolved. Thus consider (Eve-I):

(8)	EVE:	Get a spoon.	(request?)
	MOT:	Hmm?	(incomprehension)
	EVE:	Got a spoon.	(statement of fact?)
	MOT:	I **forgot** a spoon?	(epistemic interpretation)
		No, you don't get a spoon.	(deontic interpretation; refusal)
		You don't **need** one.	(refusal)

(p. 4)

More often in cases of confusion, the adult responds with a question to clarify the child's modal intent. This may be seen in (7f,g,h,k,l) above, as well as in (Eve-II):

(9)	EVE:	Fraser … Fraser [???] top.	(request?)
	COL:	What do you **want** me to do?	(question about intent)
	EVE:	Take the top [off].	(re-statement of request)
		Fraser open my tinker-toy [box].	(re-statement of request)
	COL:	Okay.	(granting request)

(p. 24)

As I hope to show later on, a fine-grained qualitative analysis of these modal interaction units reveals multiple instances where complex modal-grammatical expressions are assembled collaboratively, across child-adult or adult-child conversational turns.

7.4 What counts as complex modal construction?

In his study, Diessel (2005) was rather strict about what counted as a complex verb-complement construction in the child. Consequently, several complex constructions that fit the V-complement syntactic pattern were not included; most conspicuously:

(10) a. **Serial-verb constructions**: Let's **go** (and) have supper.
Come (and) get it.

b. **Cognate-object constructions**: **Have** a drink/a seat.
Take a nap/a bath/a turn.
Make a mistake/a bad judgement.
Give a lecture/a massage.
Get a haircut/satisfaction

For the sake of completeness, the uses of such constructions by both the child and adult were included in this study.

A more pressing reason for expanding the range of relevant constructions involves the fact that almost all deontic and epistemic verbs that take clausal complements also take simple **nominal objects** (Dixon 1991; Givón 1993b, 2001). What is more, in both language diachrony (Heine & Kuteva 2007; see ch. 4) and language ontogeny, using these verbs with nominal objects precedes their use with verbal complements. At least in principle, then, such simplex uses of deontic and epistemic verbs in child language ought to be counted as potential *precursors* of the complex verbal construction. What I hope to document here is that many MIUs reveal a rather flexible boundary between the simplex and complex uses of such verbs in both child and adult. I will illustrate this with a few examples from the Nina transcripts.

Our three children use 'want' and other modal verbs with nominal objects ('want-NP') long before they use them with verbal complements ('want-to-VP'). However, in almost all the early examples of their use of 'want-NP', a clear verbal interpretation of the nominal construction is possible, and indeed natural. Thus, in the Nina-I transcripts, **20** instances of 'want-NP' were recorded, as against only **3** of 'want-to-VP'. As illustrations, consider (Nina-I):

(11) a. **'want'-NP**: **Want** toast. (⊃ 'to eat'; p. 28)
Want juice. (⊃ 'to drink'; p. 28)
Toast coming. I **want** it. (⊃ 'to eat'; p. 30)

b. **'want'-to-VP**: **Wanna** get down. (p. 49)
Want hug. (p. 51)
I **want** it hug. (p. 51)

The last blend construction in (11b) is also found as an early stage of the diachronic development of verbal complements (Givón 1991d; Heine & Kuteva 2007; Heine 2008; see ch. 4).

The text-frequency disparity between the nominal and clausal complement is somewhat reduced in the Nina-II transcripts, albeit with too small a sample: **4** 'want'-NP vs. **2** 'want-to-VP'. And it is further reduced in Nina-III transcripts: **36** 'want-NP' vs. **21** 'want-to-VP'.

The same can be said of epistemic verbs such as 'know', 'see' or 'look', although here the overall text-frequencies are much lower (Diessel 2005). Thus for example, in the Nina-I transcripts, one finds **10** instances of the child's use of 'look-at-NP' or 'look-here/there', but only **2** instances of 'look' associated with a clausal complement (Nina-I):

(12) a. **'look'-at-NP:**
Look at Mommy. (p. 49)
Look at dolly book. (p. 49)
Look at dolly book. (p. 49)
Look at dolly book. (p. 49)
Look at dolly book here. (p. 49)
Look at this. Dolly book. (p. 49)
Look at dolly book here. (p. 49)
Look at dolly. (p. 49)
Look here. (p. 49)
Look. This way. (p. 49)

b. **'look'-S**:
Look. Drink a dolly. (p. 42)
Look here's Mommy book. (p. 49)

In either complement form in the early-stage transcripts, 'look' serves as a grammaticalized epistemic direct speech-act marker of **directing attention**.

The same distributional tendencies are observed with 'see', with the bulk of the examples involving the same epistemic direct speech-act function of directing attention. Thus in the Nina-II transcripts, we find **3** examples of the child's use of 'see'-NP and only **1** of 'see'-S (Nina-II):

(13) a. **'see'-NP**:
Let Snoopy **see** him. (p. 17)
Oh, you **want** to **see** it. (p. 25)
You **see** that in there? (p. 32)

b. **'see'-S**:
See Snoopy has those feet. (p. 17)

Finally, in the Nina-III transcripts, we find not a single instance of the child's use of 'see-NP', but **4** of 'see-S' in its various versions, again with the same epistemic speech-act function of directing attention (Nina-III):

(14) **'see'-S:** **See** what this is. (p. 14)
See they knock the tree down. (p. 49)
Oh, **see** they move. (p. 15–16)
And a ribbon in her hair. **See**. (p. 43)

Similar considerations can be applied to verbs such as 'have', 'make', 'take', 'get', 'go', 'come' and others, which can be used as auxiliary main verbs in complex modal constructions, but still appear at higher frequencies with nominal or prepositional objects in the early stages. Their early use with nominal objects is again, at least potentially, a developmental precursor to their later complex-VP use, in language ontogeny as in diachrony. For these reasons, I have elected to err on the side of inclusion, counting — in both adult and child — all the instances of verbs that *can* become modal operators over verbal complements.

7.5 The communicative context: A quantitative analysis

In this section I will present four quantitative measures that probe into the general adaptive — communicative, functional, contextual — characteristics of the child-adult modal interactions studied here. In the main, this opening foray into our conversational texts reveals the essential soundness of the way Diessel and Tomasello characterize the early child use of modal expressions. What it also reveals, however is that the adult interlocutor is using the very same modal structure as the child.

7.5.1 Who takes the initiative for launching modal interaction?

As noted earlier, each of our MIUs is launched by either the child or the adult; and either can initiate modality change in mid-interaction. It was thus of interest to see who takes the initiative in launching a new modality. For this purpose, modal-initiative gestures were divided into the two broad general types, **deontic-manipulative** and **epistemic-informative.** Under deontic-manipulative, I counted all direct here-and-now manipulative speech-acts, as well as expressions of intension-to-act in the immediate future. The latter may be considered, at least in the early-stages of the CHILDES transcripts, a species of *promise* or, occasionally, *warning* or *threat*. For example, in (15a,b,c) below the modal use of 'would-like', 'can't' and 'want' are clearly manipulative. But so are the uses of 'be-gonna' and 'will' in (15d,e,f). Thus (Eve-II):

(15) a. MOT: **Would** you **like** a graham cracker? (offer)
EVE: Yeah. (p. 1) (acceptance of offer)

b.	EVE:	Sue, put my sweeper down.	(request)
	MOT:	**Can't** you do it?	(rejection & counter-request)
	EVE:	No. (p. 9)	(refusal)
c.	EVE:	Cromer … Fraser sit in chair.	(request)
	COL:	Do you **want** me to sit over there?	(offer)
	EVE:	In the chair. (p. 15)	(reconfirmed request)
d.	MOT:	**Are** you **gonna** sit at the table?	(request/invitation)
	EVE:	No. (p. 1)	(refusal)
e.	EVE:	That my box. **Look** that?	(protest; directing attention)
	MOT:	I'**m goin**' to steal your box.	(immediate intent; threat?)
	EVE:	What do-**ing**, Mom?	(question of facts; alarm?)
	MOT:	I'**m going** to use your box. (p. 5)	(immediate intent)
f.	MOT:	You lost two of them.	(statement of fact; blame)
	EVE:	[???] lost two.	(re-statement of facts)
	MOT:	I **think** I'**ll** just cut that off, Eve.	(manipulation, warning)
		It'**ll** be easier.	(softened manipulation)
		Wait a second.	(manipulation)
	EVE:	**Think** [???] cut that off. (p. 6–7)	(echo of warning; promise?)

Under epistemic-informative I grouped 'present/progressive', 'past/perfect' and 'non-immediate future'. In the children's speech, the distinction between 'present' and 'progressive', or 'past' and perfect', is not easy to demonstrate, due to lack of grammatical marking. One could of course maintain that the context — the adult's directly-preceding turn — disambiguates the distinction. Thus consider:

(16)	a.	MOT:	Who is that?	(Q-PRESS)
		EVE:	That Jim.	(PRESS)
		MOT:	What'**s** he do-**ing**?	(Q-PROG)
		EVE:	Jump-**ing** (Eve-II, p. 47–48)	(PROG)
	b.	MOT:	What **is** Mommy do-**ing**?	(Q-PROG)
		NIN:	Fix a dolly.	(PROG?)
		MOT:	**Is** she fix-**ing** up dolly? (Nina-I, p. 36)	(Q-PROG)

In (16a), the adult 'present' question is answered with the child's 'present' (unmarked) form, while the adult's 'progressive' question is answered with the child's marked 'progressive' form. In (16b), the adult's 'progressive' question is answered by the child's unmarked 'present' form, which at this stage in Nina's speech may mark either present, past, future or progressive. In context, however there is no reason to assume that the intended meaning was not 'progressive'. For the purpose of the current measurement, the difference between 'present' and 'progressive' is not all that important, given that both are sub-species of here-and-now, non-displaced temporal reference.

Either initiating an MIU or initiating a mid-MIU modality change were counted as taking modal initiative. Thus in (17) below, the child initiates the interaction and the same modality is maintained by both interlocutors throughout:

(17)	NAO:	Fix.	(request)
	MOT:	You **can** do it, honey.	(manipulation)
		You just **have** to be patient.	(manipulation)
	NAO:	Fix. Fix.	(repeated request)
	MOT:	Oh, get it in the right place	(manipulation)
		and then you **can** do it.	(manipulation)
	NAO:	Fix.	(repeated request)
	MOT:	Get it in the right place.	(manipulation)
		You don't **want** to break it.	(warning)
	NAO:	Fix. (Naomi-I, p. 22)	(request)

In (18), on the other hand, the child initiates the interaction in a deontic mode (18a), the mother shifts to the epistemic ('perfect') in (18c), then immediately back to the deontic in (18d). The child then shifts to the epistemic in (18e) and then back to the deontic in (19f), which is maintained to the end of the interaction:

(18)	a.	NAO:	More juice.	(request)
	b.	MOT:	More juice?	(clarification of request)
	c.		The juice is almost **gone**.	(EPIST, PERF)
	d.		Want some vitamins, Naomi?	(offer)
	e.	NAO:	All **gone**. All **gone**.	(EPIST, PERF)
	f.		More vitamin.	(request)
	g.	MOT:	Wait.	(manipulation)
	h.	NAO:	Sit. Juice. Mommy. I **want** it. (Naomi-I, p. 27)	(manipulation)

Tables 1–3 below summarize the overall results of who takes the initiative and in what modality, for each child at all three developmental stages.

Table 1. Modal initiator: Eve-I-II-II

	Deontic		Epistemic									
	(IMM FUT)		PROG/PRES		PAST/PFV		FUT		Total-E		Total	
Initiator	N	%	N	%	N	%	N	%	N	%	N	%
I:												
adult	31	**68.8**	11	24.4	3	6.6	/	0.0	14	**31.2**	45	100.0
child	55	**65.4**	21	25.0	9	10.7	/	0.0	30	**34.6**	84	100.0
II:												
adult	22	**56.4**	12	30.7	4	10.2	1	2.5	17	**43.6**	39	100.0
child	41	**54.6**	28	37.3	5	6.6	1	1.3	34	**45.4**	75	100.0
III:												
adult	41	**60.2**	16	23.5	10	14.7	1	1.4	27	**39.8**	68	100.0
child	40	**55.5**	29	40.2	3	4.1	/	0.0	32	**44.5**	72	100.0

Table 2. Modal initiator: Naomi-I-II-II

	Deontic		Epistemic									
	(IMM FUT)		PROG/PRES		PAST/PFV		FUT		Total-E		Total	
Initiator	N	%	N	%	N	%	N	%	N	%	N	%
I:												
adult	58	**53.2**	39	**35.7**	10	**9.1**	2	1.8	51	**46.8**	109	100.0
child	29	**34.9**	50	**60.2**	4	**4.8**	/	/	54	**65.1**	83	100.0
II:												
adult	17	**33.3**	23	45.1	11	21.5	/	/	34	**66.6**	51	100.0
child	66	**49.3**	65	48.5	3	2.2	/	/	68	**50.7**	134	100.0
III:												
adult	30	**34.1**	29	32.9	20	22.7	9	10.3	58	**65.9**	88	100.0
child	42	**46.1**	35	38.4	13	14.2	1	1.3	49	**53.9**	91	100.0

Table 3. Modal initiator: Nina-I-II-III

	Deontic		Epistemic									
	(IMM FUT)		PROG/PRES		PAST/PFV		FUT		Total-E		Total	
Initiator	N	%	N	%	N	%	N	%	N	%	N	%
I:												
adult	46	**46.4**	46	46.4	6	6.1	1	1.1	53	**53.5**	99	100.0
child	41	**39.4**	58	55.7	5	4.8	/	/	63	**60.5**	104	100.0
II:												
adult	48	**35.8**	74	55.2	10	7.4	2	1.4	86	**64.1**	134	100.0
child	88	**64.2**	46	33.5	3	2.1	/	/	49	**35.7**	137	100.0
III:												
adult	88	**41.8**	102	48.3	19	9.0	2	0.9	123	**58.2**	211	100.0
child	49	**45.8**	43	40.1	11	10.2	4	3.7	58	**54.2**	107	100.0

While the data is not amenable to inferential statistics, it appears that neither subject (Eve, Naomi, Nina) nor developmental stage (I, II, III) nor diadic participant (child vs. adult) reveal a trend. Overall, the child and adult seem to stand roughly on a par, first in terms of who takes the initiative, and second in terms of the balance between deontic and epistemic modal goals of the interaction.

7.5.2 Spatio-Temporal displacement

Early communicative modes, be they those of animals, 2nd language pidgin or early child language, are notoriously anchored in the intimate referential universe of here-and-now, you-and-I, this-and-that visible on the scene. (Carter 1974; Bates 1976; Bates *et al.* 1975/1979). Tables 4–6 below document this vividly about child communication at this early stage. Taking all MIUs in each transcript, all utterances ('clauses') bracketed by a period [.] were counted, including one-word utterances (except yes/no). The latter elliptic interjections take their semantic valuation anaphorically from the preceding utterance, and would not have significantly changed the overall results. All deontic-manipulative utterances were counted as 'immediate-future'. And again, the difference between 'progressive' and 'present' for the child is not altogether reliable.

Table 4. Temporal displacement: Eve-I-II-III

	Non-displaced (here & now)				Displaced				
	PRES	**PROG**	**IMM-FUT**	**TOT**	**PAST**	**PFV**	**FUT**	**TOT**	**% here & now**
I:									
adult	53	53	197	**303**	22	6	9	**37**	**89.1%**
child	21	51	111	**183**	19	1	0	**21**	**89.7%**
II:									
adult	94	29	94	**217**	22	16	7	**45**	**82.8%**
child	75	25	101	**201**	14	7	8	**29**	**87.3%**
III:									
adult	100	26	166	**292**	38	11	9	**58**	**83.4%**
child	38	20	136	**194**	21	4	5	**30**	**86.6%**

Table 5. Temporal displacement: Naomi-I-II-III

	Non-displaced (here & now)				Displaced				
	PRES	**PROG**	**IMM-FUT**	**TOT**	**PAST**	**PFV**	**FUT**	**TOT**	**% here & now**
I:									
adult	89	66	134	**289**	8	2	11	**21**	**93.2%**
child	115	53	98	**266**	1	3	3	**7**	**97.4%**
II:									
adult	50	54	84	**188**	20	/	/	**20**	**90.3 %**
child	85	93	190	**368**	5	/	/	**5**	**98.6 %**
III:									
adult	74	36	121	**231**	50	2	27	**79**	**74.5 %**
child	47	40	144	**278**	26	4	13	**43**	**86.6 %**

Table 6. Temporal displacement: Nina-I-II-III

	Non-displaced (here & now)				Displaced				
	PRES	**PROG**	**IMM-FUT**	**TOT**	**PAST**	**PFV**	**FUT**	**TOT**	**% here & now**
I:									
adult	131	124	161	**416**	17	2	/	**19**	**95.6%**
child	160	29	113	**302**	7	4	/	**11**	**96.4%**
II:									
adult	163	52	178	**393**	22	3	10	**35**	**91.8 %**
child	114	22	224	**360**	8	3	3	**14**	**96.2 %**
III:									
adult	193	63	157	**413**	50	4	15	**69**	**85.6 %**
child	111	48	146	**305**	35	/	17	**52**	**85.4 %**

In all three subject diads, at all three stages, the temporality is predominantly here-and-now. This is consonant with Diessel and Tomasello's observation that the child's modal grammatical devices are used, overwhelmingly, to mark *direct speech-acts.* But in two of the children there seems to be a drop in the percent of here-and-now temporality in the last stage (III). Most important, across diads and stages, the adult discourse is just as here-and-now oriented as the child's. This is consonant with the suggestion that grammaticalized modal expressions are used by the adult, at least in these transcripts, in very much the same way as they are by the child. Though the adults may be adjusting to the children (down-shifting).

7.5.3 Speech-act value

We have already noted the high prevalence of deontic interactions in our transcripts. Next, we focus more narrowly on the speech-act value of all utterances, dividing them between those that carry a deontic-manipulative intent and those that have an informative — either declarative or interrogative — intent. This determination is not always bound by grammatical marking. As noted earlier above, the child's utterances at these early stages are often elliptic and grammatically unmarked. So that their modal intent is determined — by the adult interlocutor as well by the researcher — from the immediate discourse context. Further, many of the adult's manipulative gestures are so-called *indirect speech-acts*, using either the declarative or interrogative grammatical form.

Tables 7–9 below summarize the numerical results.

Table 7. Speech-act distribution: Eve-I-II-III

		Speech act							
		Deontic		Epistemic					
		Manip.		Declar		Question		TOTAL	
		N	%	N	%	N	%	N	%
I:	ADU:	175	**47.5**	102	27.7	91	24.4	368	100.0
	CHI:	124	**50.0**	119	47.9	5	**2.1**	248	100.0
II:	ADU:	35	**14.3**	120	49.1	89	36.6	244	100.0
	CHI:	63	**24.9**	169	66.7	20	**8.4**	253	100.0
III:	ADU:	78	**21.1**	161	43.5	130	35.5	369	100.0
	CHI:	104	**35.3**	148	50.5	42	**14.5**	294	100.0

Table 8. Speech-ACT distribution: Naomi-I-II-III

		Speech act							
		Deontic		Epistemic					
		Manip.		Declar		Question		Total	
		N	%	N	%	N	%	N	%
I:	ADU:	128	**38.6**	127	38.9	71	22.5	326	100.0
	CHI:	97	**33.6**	166	57.6	25	**8.8**	288	100.0
II:	ADU:	68	**32.8**	97	46.8	42	20.4	207	100.0
	CHI:	116	**31.1**	176	44.9	80	**24.0**	372	100.0
III:	ADU:	68	**22.0**	129	41.8	109	36.2	308	100.0
	CHI:	106	**36.1**	137	46.7	50	**17.2**	293	100.0

Table 9. Speech-ACT distribution: Nina-I-II-III

		Speech act							
		Deontic		Epistemic					
		Manip.		Declar		Question		Total	
		N	%	N	%	N	%	N	%
I:	ADU:	155	**35.5**	107	24.5	174	40.0	436	100.0
	CHI:	110	**31.7**	231	66.7	5	**1.6**	346	100.0
II:	ADU:	181	**42.4**	113	26.5	132	30.1	426	100.0
	CHI:	215	**58.2**	137	37.1	17	**4.7**	369	100.0
III:	ADU:	131	**26.2**	145	29.0	223	44.8	499	100.0
	CHI:	110	**30.6**	184	51.2	65	**18.2**	359	100.0

With much cross-diad and cross-stage variation, two trends seem to emerge out of these distributional data. First, within bounds, the child and adult use manipulative speech-acts at a similar rate, in the 20–50% range. And second, the children lag behind the adults, rather conspicuously, in producing *interrogative speech-acts*, although their use rises slowly toward the last stage (III).

7.5.4 Subject of modal expressions

Another known characteristic of early childhood speech is that it is mostly about the speech-act participants — speaker and hearer. This is indeed strongly implicit in Diessel and Tomasello's observations about the child use of epistemic and deontic main verbs as direct speech-acts, i.e., transactions between *you* and *I*. To demonstrate this, the subjects of all deontic or epistemic 'higher verbs' within all MIUs were counted and divided into 1st/2nd person vs. 3rd person.

As we shall see later on, there is a strong correlation between reference to 3rd person subjects and the extension of main-verb usage from marking a direct speech-act to marking a *description* of an epistemic or deontic interaction. What is striking about our results, once again, is the virtual identity of the child and adult frequency-distribution patterns. Tables 10–12 below summarize the numerical distributions.

Table 10. 1st-2nd vs. 3rd pers. subject: Eve-I-II-III

	Deontic						Epistemic					
	1–2		3		TOT		1–2		3		TOT	
	N	%	N	%	N	%	N	%	N	%	N	%
I:												
adult	142	**87.6**	20	12.3	162	100.0	52	**71.2**	21	28.8	73	100.0
child	20	**83.3**	4	16.6	24	100.0	14	**87.5**	2	12.5	16	100.0
II:												
adult	62	**88.5**	8	11.5	70	100.0	42	**66.6**	21	33.4	63	100.0
child	32	**100.0**	/	/	32	100.0	7	**87.5**	1	12.5	8	100.0
III:												
adult	122	**87.5**	17	12.5	139	100.0	58	**93.5**	4	6.5	62	100.0
child	46	**73.0**	17	17.0	63	100.0	5	**50.0**	5	50.0	10	100.0

Table 11. 1st-2nd vs. 3rd pers. subject: Naomi-I-II-III

	Deontic						Epistemic					
	1–2		3		TOT		1–2		3		TOT	
	N	%	N	%	N	%	N	%	N	%	N	%
I:												
adult	123	**86.0**	17	14.0	143	100.0	110	**68.7**	50	31.3	160	100.0
child	53	**98.1**	1	1.9	54	100.0	14	**60.8**	9	39.2	23	100.0
II:												
adult	54	**94.7**	3	5.3	57	100.0	82	**82.0**	18	18.0	100	100.0
child	94	**92.1**	8	7.9	102	100.0	42	**66.6**	21	33.4	63	100.0
III:												
adult	96	**88.8**	12	11.2	108	100.0	111	**84.1**	21	15.9	132	100.0
child	104	**98.1**	2	1.8	106	100.0	66	**88.0**	9	12.0	75	100.0

Table 12. 1st-2nd vs. 3rd pers. subject: Nina-I-II-III

	Deontic						Epistemic					
	1–2		3		TOT		1–2		3		TOT	
	N	%	N	%	N	%	N	%	N	%	N	%
I:												
adult	177	**100.0**	/	/	177	100.0	81	**30.6**	183	69.4	264	100.0
child	118	**99.1**	1	0.9	119	100.0	19	**9.2**	186	90.8	205	100.0
II:												
adult	177	**91.7**	15	8.3	193	100.0	133	**63.0**	78	37.0	211	100.0
child	97	**90.6**	10	9.4	107	100.0	42	**64.6**	23	35.4	65	100.0
III:												
adult	122	**79.2**	32	20.8	154	100.0	158	**59.3**	107	40.7	256	100.0
child	69	**73.4**	25	26.6	94	100.0	40	**43.9**	51	56.1	91	100.0

While there is again a considerable amount of fluctuation in the numerical values, two trends seem to emerge. First, the percent of 1st/2nd person subjects of *epistemic* verbs is almost always lower than of *deontic* ones. And second, the modal behavior of the child and adult is once again broadly similar.

If one were to summarize the distribution of the adaptive-communicative features of complex modal expressions in our CHILDES transcripts, or at least in the modal interactions that form the immediate communicative context for produced complex modal expressions, one would have to agree with Diessel and Tomasello's observation about the child's modal behavior. But the adults behave, in this early-childhood communicative context, very much like the children. As we shall see further below, this observation extends to other facets of the use of complex-VPs.

7.6 Modality-marking grammatical devices

7.6.1 General considerations

We come now to the structural core of this study — the classification and quantification of the modality-marking grammatical devices used by the child and adult in their modal interactions. While the rough division into deontic and epistemic holds in the main, it needs some refinement. The general division of complement-taking verbs into three major syntactic classes seems valid (Givón 2001, ch. 12; Diessel 2005). That is, for English:

- *Modality verbs* ('want to do it') take an equi-subject non-finite complement.
- *Manipulation verbs* ('make someone do it') take a nominal object-manipulee and an equi-object non-finite complement.
- *Perception-cognition-utterance verbs* ('know that someone did it') take a finite complement.

Broadly, most deontic modal operators distribute in the first two groups, and most of the epistemic ones in the third. But many exceptions and refinements to this general classification must be noted.

To begin with, we need to distinguish between the *potential* deontic speech-act use of a modal expression, and the *actual* use of such an expression as a direct manipulative speech-act. Consider for example (19a,b) below, where both the child and adult use 'want' as a direct-manipulative speech act (Nina-III):

(19)	a.	MOT:	Here's another fence.	(offer)
		NIN:	**Want** another fence. [p. 25]	(request)
	b.	NIN:	Many other fence?	(request)
		MOT:	**Want** to build some more fences? [p. 25]	(offer)

In contrast, in both (20a,b) the child and the adult use 'want' as a *description* of 3rd person volition. It is no accident that such usage is embedded in *epistemic* MIU contexts. Thus (Nina-III):

(20)	a.	NIN:	Where, where **can't** [= 'can'] this go in the hole?	(FUT-HYPOTH)
			Oh there. If they get out of there [,] these things.	(FUT-HYPOTH)
			Oh, they **want** to get out of there.	(PRES-VOLIT)
		MOT:	What happened? [p. 45–46]	(PAST)
	b.	MOT:	What's on the wall of the station?	(Q-PRES)
		NIN:	A apple.	(PRES)
		MOT:	No, that's a clock.	(PRES)
		NIN:	Who are [???]?	(Q-PRES)
		MOT:	People **want** to know what time it is. [p. 52]	(PRES-VOLIT)

The correlation between person (1st/2nd vs. 3rd) and speech-act value (direct vs. descriptive, respectively) is strong but not absolute. Thus, for example, in (21) below Nina uses a 3rd person subject of 'want' in a direct speech-act of *request*, a natural over-generalization from the much-more-common deontic-manipulative use of the verb (Nina-III):

(21)	NIN:	I forgot [to put] some more sticks in this, in this …	(PAST)
		Two sticks **wanna** go in this truck.	(request)
	MOT:	Well, we'**ll have** to take some things out. [p. 47]	(manipulation)

The same two-way modal potential is found in the use of modal auxiliaries by both the adult and the child. Thus in (22a,b), both use 'can' to mark a direct manipulative speech-act (Nina-III):

(22)	a.	NIN:	A dog cookie.	(request)
			After he eats that one, **can** I, **can** I give him give him another one?	(request)
		MOT:	Do you **think** he' **d like** to eat another one? [p. 1]	(Q-FUT/HYPOTH)
	b.	NIN:	A banana.	(request)
		MOT:	Oh, **can** you make him eat a banana? [p. 3]	(manipulation)

In (23a,b), on the other hand, both the child and the adult use 'can' as a *description* of ability, not surprisingly involving a 3rd person subject in an *epistemic* MIU context. Thus (Nina-III):

(23)	a.	MOT:	What's that?	(Q-PRES)
		NIN:	A circle.	(PRES)
		MOT:	Is that the right place for it?	(Q-PRES)
		NIN:	Where **can** the other one go? [p. 30–31]	(Q-PRES-ABIL)
	b.	MOT:	What's he doing?	(Q-PRES)
		NIN:	Swing one one …	(PRES)
		MOT:	What about this man? Do you **think** he **can** hang by your magnet? [p. 22]	(Q-PRES) (Q-PRES/ABIL)

A whole sub-class of modality verbs, the aspectual markers such as the progressive 'be', the perfect 'have', or the perfective 'finish' and 'be (all) gone', are clearly used only in an epistemic sense.

The use of manipulation verbs in the CHILDES transcripts is a bit more consistent. Only two of those are used with any frequency, and they split down the modal line: 'let' (and at a much lower frequency 'want') is used by both the child and adult only in direct manipulative speech-acts, with 1st or 2nd person subject, as in (24a,b) below. In contrast, 'make' is used by both child and adult primarily as a *description* of manipulation/causation, as in (24c,d), even with 1st and 2nd person subject. Thus (Nina-III):

(24)	a.	NIN:	Yeah, **let me** give that to Poy now. I **want** …	(request)
		MOT:	What do you **want** to do?	(solicitation)
		NIN:	I **wanna** give that to Poy now. [p. 1–2]	(request)

b.	MOT:	**Let's** set up a big village here.	(manipulation)
	NIN:	Okay, **let's** do so. [p. 11–12]	(consent/request)
c.	MOT:	What did you do?	(Q-PAST)
	NIN:	I **make** the little bounce like a ball.	(PAST, CAUS)
		I did it, Mommy. [p. 28]	(PAST)
d.	NIN:	Where's the gas?	(Q-PAST)
	MOT:	Gas is what **makes** my car run.	(PAST, CAUS)
	NIN:	Oh. [p. 28–29]	

The same potential for double-usage exists in several perception-cognition-utterance verbs, most conspicuously 'know', 'think', 'guess', 'say, 'look' and 'see'. But since, as Diessel (2005) has noted, these verbs are acquired much later, most of the uses in the CHILDES transcripts at the developmental stages studied here, by both child and adult, involves the direct speech-act of *epistemic quantification* of the complement clause, with 1st-2nd person subject.

Most commonly, 'know' and 'think' are used in contexts of **epistemic uncertainty** or **epistemic conflict**. Thus consider (Nina-III):

(25)	a.	MOT:	What colors are rabbits usually?	(Q-PRES)
			Do you **know**?	(Q-PRES, EPIST)
		NIN:	Yup.	(PRES)
		MOT:	What color?	(Q-PRES)
		NIN:	Red. Blue.	(PRES)
		MOT:	No, they're white.	(PRES)
		NIN:	Or red and blue.	(PRES)
			You **know** that together,	
			Mommy. [p. 32–33]	(PRES)
	b.	MOT:	**Is** she **gonna** put what on her hair?	(Q-FUT)
		NIN:	Her ribbon on her hair.	(FUT)
		MOT:	I don't **know**. [p. 41]	(PRES, EPIST)
	c.	NIN:	Any more sticks?	(Q-PRES)
		MOT:	I don't **think** so. [p. 18]	(PRES, EPIST)
	d.	MOT:	Her ears are near her earrings, right?	(PRES)
		NIN:	Yup. Let me see.	(PRES); (request)
		MOT:	Oh, I **guess** she really doesn't	
			have ears. [p. 41–42]	(PRES, EPIST)

Many of these are also typical examples of cross-turn sharing of complex constructions.

The perception verbs 'look', 'see' and 'feel' are used, at high frequency, as markers for the direct speech-act of **directing attention**. Again, most typically such usages involve a 2nd person subject (imperative form). Thus (Nina-III):

(26)	a.	NIN:	He's, he's eating a banana.	(PROG)
		MOT:	He is? My goodness.	(PROG)
		NIN:	**Look** at poy. [p. 3]	(direct-attention) > (PRES)
	b.	MOT:	What soft material.	(PRES)
			Feel how soft it feels.	(direct-attention) > (PRES)
		NIN:	And her hair.	(PRES)
		MOT:	That's a …	(PRES)
		NIN:	And a ribbon in her hair. **See?** [p. 43]	(PRES) < (direct-attention)
	c.	NIN:	The wheels don't move.	(PRES)
		MOT:	No, I **guess** not.	(PRES, CONCESSION)
		NIN:	Oh **see** they move.	(direct-attention) > (PRES)
		MOT:	Oh, they do? [p. 15–16]	(Q-PRES)
	d.	NIN:	Who goes in this little house?	(Q-PRES)
		MOT:	All the animals go in there.	(PRES)
			See, this man is called Noah.	(direct-attention) > PRES
		NIN:	Oh. What is he doing with the animals? [p. 53]	(Q-PROG)
	e.	MOT:	**Look**. What is the clown doing?	(direct-attention) > (Q-PROG)
			Look, look at the clown, Nina.	(direct-attention) > (PRES)
		NIN:	Oh.	
		MOT:	**Look** at him.	(direct-attention) > (PRES)
			See what he's doing.	(direct-attention) > (PROG)
			Can you **see**?	(direct-attention)
		NIN:	Yup.	
		MOT:	**Look** at the funny clown.	(direct-attention) > PRES
			You don't **see** him.	(PRES; complaint of inattention)
			Look what I made him do?	(direct-attention) > (PERF)
			See, Nina?	(direct-attention)
			Look. What's he doing? [p. 18]	(direct attention) > (Q-PROG)

All such uses of perception verbs, in spite of being themselves direct-manipulative speech-acts, are embedded in highly epistemic MIUs. The later expansion of their use into descriptive epistemic modulation is driven, presumably, by their epistemic communicative context.

7.6.2 Quantitative analysis

7.6.2.1 Stage-I

In Appendix-I, at the end of this chapter, examples are given of all the types of modal expressions used by the children and adults in our stage-I CHILDES transcripts. They are divided according to the various complement-taking verb types. Whenever applicable and attested, examples are given of both the direct speech-act and the descriptive use of modal expressions. The total number in the transcript of every usage type is given in parentheses. To make the modal intent of the examples more transparent, they are cited with enough of the MIU context within which they are embedded.

The frequency distribution of direct speech-act vs. descriptive use of modal expressions by the children and adults in our stage-I transcripts are summarized in Table 13 below.

In the absence of inferential statistics, and with some allowance for variation and low counts (Eve-I, Nina-I), the results, in the main, hold Diessel's (2005) prediction about the child's early use of complex modal expressions as direct speech-acts. However, they also show that the adult interlocutors' use of these modal expressions falls very much in the same range as that of the child.

Table 13. Distribution of direct speech-act vs. descriptive use of modal expressions by child and adult in stage-I transcripts

	Child			Adult		
	Direct S-A	**Descrip.**	**Total**	**Direct S-A**	**Descrip.**	**Total**
EVE:	8 (72.7%)	3	11	146 (91.2%)	14	160
NAO:	53 (89.8%)	6	59	136 (76.4%)	42	178
NIN:	26 (83.8%)	5	31	191 (89.6%)	22	213

7.6.2.2 Stage II

In Appendix 2, at the end of this chapter, all the usage-types of complex modal expressions in our stage-II transcripts, by both children and adults, are listed in a more compressed form. The frequency distribution of direct speech-act vs. descriptive use of these modal expressions by the children and adults in our stage-II transcripts is summarized in Table 14 below.

Table 14. Distribution of direct speech-act vs. descriptive use of modal expressions by child and adult in stage-II transcripts

	Child			Adult		
	Direct S-A	**Descrip.**	**Total**	**Direct S-A**	**Descrip.**	**Total**
EVE:	42 (93.3%)	3 (6.7%)	45	94 (84.6%)	17 (15.4%)	111
NAO:	127 (95.4%)	6 (4.6%)	133	86 (87.7%)	12 (12.3%)	98
NIN:	128 (83.1%)	26 (16.9%)	154	215 (73.4%)	71 (26.6%)	286

Again, a certain amount of cross-subject fluctuation persists. But the overall trend remains as in stage-I, with the bulk of usage in both children and adults conforming to Diessel's (2005) characterization of the early child pattern — direct speech-act use of complex modal expressions.

7.6.2.3 Stage-III

In Appendix 3, at the end of this chapter, all the usage-types of complex modal expressions in our stage-III transcripts, by both children and adults, are listed in the same compressed form as for stage-II, above. The frequency distribution of direct speech-act vs. descriptive use of these modal expressions by the children and adults in our stage-III transcripts is summarized in Table 15 below.

Table 15. Distribution of direct speech-act vs. descriptive use of modal expressions by child and adult in stage-III transcripts

	Child			Adult		
	Direct S-A	**Descrip.**	**Total**	**Direct S-A**	**Descrip.**	**Total**
EVE:	84 (91.3%)	8 (8.7%)	92	195 (83.5%)	30 (16.5%)	225
NAO:	107 **(85.2%)**	15 (14.8%)	122	103 **(61.9%)**	62 (48.1%)	165
NIN:	95 **(66.4%)**	48 (43.6%)	143	209 **(67.8%)**	99 (32.2%)	308

While inferential statistics is not available, it appears that in two of the children, Naomi and Nina, a shift towards higher use of the modal expressions in the *descriptive* sense begin at this stage — in both child and adult.

Table 16, below, summarizes the frequency distribution of modal uses by the children and adults in all three stages, expressed in terms of the percent of direct speech-act use.

Table 16. Percent of direct speech-act use of modal expressions stage

	I		II		III	
Subject	**Child**	**Adult**	**Child**	**Adult**	**Child**	**Adult**
Eve	72.7	91.2	93.3	84.6	91.3	83.5
Naomi	89.8	76.4	95.4	87.7	**85.2**	**61.9**
Nina	83.8	89.6	83.1	73.4	**66.4**	**67.8**

7.7 Cross-turn distribution of syntactic complexity: Paratactic precursors of complex verb phrases

We come now to the crux of this investigation — the distribution of grammatically-marked complex clauses across adjacent adult-child or child-adult turns, and the possibility that such **distributed complexity** is the paratactic precursor of the child's complex VPs. What I present first below is a tentative typology of the various ways in which cross-turn collaboration between child and adult on the construction of complex modal expressions is transacted in our transcripts. I will begin by illustrating all the types with examples from the Nina-II transcripts. In the following section, I will present the quantitative distribution of the types for all three subject-diads at all three developmental stages.

7.7.1 Qualitative analysis: Types of cross-turn distribution of complex modal expressions

The following examples of the types of cross-turn distribution of complex modal expressions are taken from the Nina-II transcripts. I have divided them into two main categories: (i) types of the **child's responses** to adult-initiated marked modal structures; and (ii) the **adult's response** to two types of child modal expressions: (a) grammatically unmarked and (b) grammatically marked. For each category, I'll give at least one deontic and one epistemic example. The response types are ordered from the least elaborate to the most elaborate — and eventually grammatically-marked.

7.7.1.1 Child responses to grammatically-marked adult modal expression (Nina-II)

(27) a. **Appropriate yes/no elliptic responses**

EX:	MOT:	**Would** you **like** to play with the village?	(offer)
	NIN:	Yeah. [p. 5]	(accept)
EX:	MOT:	Do you **think** he'**ll** eat another one?	(Q-FUT)
	NIN:	Yup. [p. 1]	(FUT)

b. **Response with an object of the complement clause**

EX:	MOT:	You **want** to give Poy a cookie?	(offer)
	NIN:	That one. [p. 1]	(accept)
EX:	MOT:	What **is** he eating?	(Q-PROG)
	NIN:	A dog cookie. [p. 1]	(PROG)

c. **Response with an unmarked complement clause**

EX:	MOT:	What **are** you **gonna** do?	(solicit)
	NIN:	Pat him. [p. 4]	(intent)
EX:	MOT:	Do you **know** what these are?	(Q-PRES)
	NIN:	What this thing? [p. 11]	(Q-PRES)

d. **Response with a marked complex modal construction**

EX:	MOT:	**Can** you make him do that?	(manip.)
	NIN:	I **can't** do that. [p. 18]	(refuse)
EX:	MOT:	What **is** Poy doing?	(Q-PROG)
	NIN:	He**'s** eating a cookie. [p. 1]	(PROG)
EX:	MOT:	That **would** hurt, **wouldn't** it?	(Q-FUT/HYPOTH)
	NIN:	Yeah, on the road it **would**. [p. 48]	(FUT/HYPOTH)

e. **Child-initiated marked complex modal construction with no adult prompt**

EX:	MOT:	Many little houses.	(PRES)
	NIN:	**Let. Let's** put, **let's** build these. [p. 13]	(request)
EX:	NIN:	Oh, oh, there **will** be another picture.	(FUT)
		Just a minute.	(request)
		See what this is. [p. 14]	(direct-attention)
EX:	MOT:	What's on his pajamas? Oh.	(Q-PRES)
	NIN:	He**'s** hanging on two feet. [p. 21]	(PROG)

7.7.1.2 Adult response to child's previous modal turn (Nina-II)

(28) a. **Expansion: Marked complex-modal response to child unmarked expression**

EX:	NIN:	The cookie for Poy.	(request)
	MOT:	Do you **want** to give Poy a cookie? [p. 1]	(offer)
EX:	MOT:	What's he eating?	(Q-PRES)
	NIN:	A banana.	(PROG)
	MOT:	Oh, **can** you **make** him eat a banana? [p. 3]	(manip.)
EX:	NIN:	What's he doing?	(Q-PROG)
	MOT:	I don't **know**. [p. 14–15]	(EPIST-PROG)
EX:	NIN:	These wheels don't move, Momma.	(PRES)
	MOT:	Oh, I **think** they'll move. [p. 15]	(EPIST-FUT)
EX:	NIN:	Where does it belong?	(Q-PRES)
	MOT:	Where does it go?	(Q-PRES)
	NIN:	Yeah.	(Q-PRES)
	MOT:	I **think** it goes right here.	(EPIST-PRES)

	NIN:	Where?	(Q-PRES)
	MOT:	I don't **know** … Maybe …	(EPIST-PRES)
		I don't **know** where it goes.	(EPIST-PRES)

b. **Reinforcement: Marked complex-modal response to child's marked complex-modal expression**:

EX:	NIN:	I **want** …	(request)
	MOT:	What do you **want** to do? [p. 1–2]	(solicit)
EX:	NIN:	**Would** you make a whole building?	(request)
	MOT:	**Would** I make what? [p. 53]	(solicit)
EX:	NIN:	This is **gonna** be a nurse.	(FUT)
	MOT:	Is that **gonna** be a nurse?	(Q-FUT)
EX:	NIN:	Cami doesn't **understand**.	(PRES)
	MOT:	What doesn't Cami **understand**?	(Q-PRES)
	NIN:	Doesn't **understand** [how not to play] the rough.	(PRES)
	MOT:	You have to play gently, you **mean**.	(PRES)
	NIN:	Yup. [p. 3]	(PRES)
EX:	NIN:	He' **s** eating that.	(PROG)
	MOT:	What **is** he eating? [p. 1]	(Q-PROG)

Of the five types of adult-child adjacent turns in (27), the first three (27a,b,c) can be considered **joint constructions** of the complex modal structures, where the adult opens by contributing the marked modal structure and the child then contributes various chunks of the complement proposition — the gist of the communication — without an explicit modal marking. Only in types (27d,e) does the child contribute the full complex construction, in (27d) following adult prompting, in (27e) without prompting. It is significant, I believe, that the latter two types are either absent from or appear at low frequency in the Stage-I transcripts.

Of the two types of child-adult adjacent turns in (28), (28a) is of course the most interesting kind of **joint construction** of a complex structure. The child contributes an unmarked, elliptic expression, which is then interpreted by the adult via **modal expansion**. Again, this type is more prevalent in the early stages, while type (28b), **modal reinforcement**, appears later.

7.7.2 **Quantitative analysis: Distribution of the various response types** across diads and stages

7.7.2.1 **Child responses to marked modal expressions in the preceding adult turns**

The frequency distribution of the five types of child responses to modal expressions in the preceding adult turn is given in Table 17 below.

Table 17. Child responses to marked modal expressions in preceding adult turn response type (27a–e)

		(a)		(b)		(c)		(d)		(e)		Total	
Child-st.		**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
EVE	I	25	32.0	12	**15.3**	36	**46.1**	5	**6.6**	/	**0.0**	78	100.0
	II	20	19.2	10	9.5	19	18.2	19	18.2	36	34.9	104	100.0
	III	19	16.5	22	19.1	12	10.4	26	22.6	36	31.4	115	100.0
NAO	I	6	5.6	36	**33.9**	35	**33.0**	12	**11.3**	17	**16.2**	106	100.0
	II	6	4.7	7	5.5	6	4.7	25	19.6	83	60.5	127	100.0
	III	36	19.5	13	7.0	15	8.1	20	10.8	100	54.6	184	100.0
NIN	I	35	28.9	33	**27.2**	51	**42.1**	/	**0.0**	2	**1.8**	121	100.0
	II	41	24.2	30	17.7	28	16.5	21	12.4	49	29.2	169	100.0
	III	75	30.0	33	13.2	12	4.8	23	9.2	107	42.8	250	100.0

7.7.2.2 Adult response to unmarked modal expressions in the child's preceding turn

The frequency distribution of the two types of adult responses to unmarked modal expressions in the preceding child turn is given in Table 18 below.

Table 18. Adult response to unmarked modal expressions in preceding child turn response type (28a–b)

		(a)		(b)		Total	
Child	**Stage**	**N**	**%**	**N**	**%**	**N**	**%**
EVE	I	75	**79.7**	19	21.3	94	100.0
	II	76	75.2	25	24.8	101	100.0
	III	30	65.2	16	**34.8**	46	100.0
NAO	I	82	**85.4**	14	14.6	96	100.0
	II	36	59.0	25	**41.0**	61	100.0
	III	45	41.6	63	**58.4**	108	100.0
NIN	I	117	**100.0**	/	/	117	100.0
	II	51	57.9	37	**42.1**	88	100.0
	III	59	65.5	31	**34.5**	90	100.0

Because of the way the original modal interactions were selected (and within them the adjacent-pair types), and because of the low number of subjects and data points, it is not feasible to do inferential statistics on these numerical distributions. Still, several trends seem both present and plausible.

i. In the **adult-child** adjacent turns, type (27a) should have no correlation to the developmental stage, since it is a perfectly universal elliptic response strategy to both epistemic questions and deontic suggestions. Types (27b) and (27c) are the best candidates for early-stage syntax. Both show a drop in late stages.

Types (27d) and (27e) are the end-products of learning, so their rise in the later stages is not surprising.

ii. In the **child-adult** adjacent turns, type (28a) is the most striking early-stage cross-turn collaboration, where the child opens with an unmarked modal expression, and the adult then expands this by supplying the marked modal structure. It is thus not surprising that this type is most prevalent at the early stage, and decreases later on. Type (28b), adult reinforcement of a marked modal-expression produced by the child, is thus naturally a later development that depends on the child's acquisition of marked modal structures.

My aim in presenting the numerical distribution of all these types of interaction was to show the high prevalence in our early-stage transcripts of adjacent turns of type (27b,c) and (28a), where the complex modal structure is **distributed across adjacent turns**. In such modal interactions, the adult contributes most of the modal grammatical marking, and the child either responds with (27b,c), or contributes initially with (28a), various grammatically-unmarked chunks of the complement clause, including the most elliptic yes/no responses (27a).

7.8 Child-adult comparisons

To quite an extent, the results of this study uphold Diessel and Tomasello's general thesis that in early child language the use of complement-taking main verbs is heavily tilted toward **direct speech-act** use, and thus that the main clause is not the semantic focus of the communication; rather, the complement clause is. But the results reported above also suggest that, at least in our early-stage CHILDES transcripts (age range 1;8 to 2;9), the adult's use of complex modal expressions does not deviate significantly from that of the child.

This brings us to our earlier assessment of the type of adaptive-communicative context we deal with at this developmental stage. As seen above, this context is strongly tilted towards **non-displaced reference** — here-and-now, you-and-I, this-and-that visible. It is also heavily invested in **manipulative** speech-acts. And it is largely **speaker-hearer centered**. This communicative context is characteristic of both pre-human and early-childhood communication. So it may be plausibly asked whether it isn't this 'primitive' communicative context that motivates the adults' child-like modal behavior. Are these adults in the CHILDES transcripts *slumming* or *down-shifting*?

To assess this possibility, I selected as a comparison one chapter from recorded (and then transcribed) face-to-face oral narrative, the life-story of a retired rancher and oil-field worker. His story is, predominantly, about

displaced time, place and referents, about past times, unfamiliar places, and people not known to his listener.[6] The question we are concerned with is the narrator's use of deontic and epistemic main verbs — to what extent does he use them as grammaticalized **direct speech-act** markers, the way both children and adults have done in our study? His past-time narrative is tilted heavily towards the epistemic, since his listener (myself) was interested primarily in his life story. But epistemic and deontic complement-taking verbs are found in both the *narrative* and the direct-quoted *conversation* portions of the texts. This affords us a revealing comparison between the two communicative contexts — within the same speaker.

As an example of the use of epistemic and deontic modal operators in both the narrative and direct-quoted conversation portions of the text, consider:

(29) And I **knew** I **was gonna** get so far so that I ever drive over there to see the family. So about this time this [oil] boom started here, **see**. Boy, I **mean** it was, I **think** a hundred and seventy-five rigs in here through most of the Fifties, **y'know**, drillin' all this country up … So I came over here and started on this roughneckin' job. But when I got here there was an old preacher up there that had seven, a little seventeen-acre place, and he'd been **wantin'** to sell it and he ah, **you know**, he'd known him, I **guess** knew at least, kinda **wanted** family, he knew my dad. So he **told** me he **said**: "Harris you **need** a place", **said** "**let me** sell you that little ol' seventeen-acre farm …" It had a little three-room shack on it, **see** … It was up at Cedar, this side of Cedar Hill … That's where my dad lived is up in that Cedar Hill area. So ah … he **said**: "I'**ll** sell it to you for fifty dollars down …" I **said**: "Well, OK, I'**ll** buy it". And at that time, after we got all that movin' done, **y'know**, I wasn't making any money with the state … [p. 78]

To further illustrate the high concentration of direct manipulative speech-act use of deontic modal expressions inside direct-quoted conversation, consider:

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6. The narrative was tape-recorded over several long sessions in Bloomfield, NM in 1981–1982; when the speaker as ca. 62 years old. The text was then transcribed but not edited, with punctuation marks reflecting, as much as possible, the oral intonation units. For the narrative portion, the first 10 pages (70–79) were counted. For the inside-the-quotes portion, the whole 32 page chapter (70–101) was counted. For the text, the endless conversations, the winter trapping, year-round fiddlin' and above all for the friendship, I am eternally indebted to Harris A. Brown (1923–1992). R.I.P.

(30) … He said: "Well" he said, "I'**m gonna** draw you a picture right here on this piece of paper, what you'**re gonna** find". He said: "**We gotta**, **we gotta** come out of that hole 'cause" he said, "this bit is wore out". And he said: "I **can't** get these other two guys to go up and I'**m gonna have** to have a man up there" he said. "**Would** you go up and **try** it for me as a favor?" he said, "'cause I **got to** come out" … [p. 73]

Table 19 below offers a quantitative summary of the uses of modal operator in the *narrative* portion of text (10 pp. 70–79).

Table 19. Distribution of modal uses in the narrative text

	Function	
Modality verbs	**Direct (manipulative)**	**Descriptive**
'be-gonna'-VP		10
'go'-to-VP		2
'have-to'-VP		11
'will'-VP		14
'would'-VP		4
'want'-to-VP		11
'want'-NP		1
'can'-VP		7
'could'-VP		17
'most-'ve'-VP		1
'need'-NP		1
'might'-VP		1
'ought'-to-VP		1
'try'-to-VP		5
'come'-V (serial)		1
'be-supposed-to'-VP		1
'be-liable'-to-VP		1
'threaten'-to-VP		1
'be-liable'-to-VP		2
'('ve)gotta'-VP		4
'start'-VP		1
'gotta'-VP		2
total-MOD:	0 (**0%**)	99
manipulation verbs:		
'tell'-NP-how-to-VP		1
'tell'-NP-to-VP		1
'tell'-NP-WH-VP		2
'have'-NP-VP		5
'let'-NP-VP		1
'keep'-NP-VP		1

(*Continued*)

Table 19. (Continued)

	Function	
Modality verbs	**Direct (manipulative)**	**Descriptive**
'get'-NP-(to)-VP		2
'want'-NP-VP		1
total-MANIP	0 **(0%)**	14
Epistemic verbs:	**Epistemic quant.**	**Descriptive**
'think'-S	4	2
S, 'think'	1	
'find-out'-S		1
'know'-S	2	
S, 'know'	50	
S. 'know'	1	
'know', S	7	
'know'-if-S	1	
'know'-WH/S	7	6
'know' (ellipsis)	2	
'guess'-S	3	
S, 'guess'	1	
'figure'-S	1	
S, 'remember'	1	
'see'-that-S		1
'see'-if-S		1
S, 'see'	30	
'See', S	16	
'see'-WH/S		1
'see'-NP-VP	1	1
'tell'-NP-about-NP	2	1
'tell'-NP: "…"		10
'tell'-WH/S		2
'tell'-if-S		2
'say': … "/" … "-'say'		53
'say'(,) S	2	
'mean', S	6	
'figure-out'-(ellipsis)	1	
total EPIST	139 **(63.1%)**	81

Table 20 below offers the comparable distribution in the quoted conversational portions of the text.

Table 20. Distribution of modal uses in the quoted conversation function

	Function	
Modality verbs	**Manipulative**	**Descriptive**
'hate'-to-VP	2	
'go'-V (serial)	1	
'will'-VP	26	5
'would'-VP	3	
'can'-VP	8	2
'could'-VP	1	
'want'-to-VP	5	1
'would-like'-VP	2	
'why-don't-you'-VP	1	
'feel-like'-VP		1
'need'-NOM		1
'supposed-to'-VP		1
'have-to'-VP	5	
'gotta'-VP	4	
'you-better'-VP	1	
'try'-VP	2	
total-MOD:	67 **(80.7%)**	16
manipulation verbs:		
'let'-NP-VP	6	
'want'-NP-VP	2	
total-MANIP	8 **(100%)**	0
Epistemic verbs	**Epistemic quant.**	**Descriptive**
'know'-WH/S	1	
'know'-if-S	1	
'know'-S	1	
S, 'know'	1	
S. 'know'	2	
'say'-S	1	
'hear'-S	1	
'see'-NP-VP (raising)		1
'tell'-NP-WH/S	1	
total EPIST:	9 **(90.0%)**	1

While the data again does not allow inferential statistics, its main thrust is fairly dramatic. Narrative about the past, be it oral or written, is predominantly an *epistemic* ('descriptive') enterprise. This is because the main transactional goal in face-to-face narrative is descriptive-informative. It is thus not an accident that the bulk of epistemic verbs of belief, perception and utterance used in such narrative — **63.1%** in this text — are used as **direct epistemic speech-acts**, i.e., as

grammaticalized epistemic quantifiers on the complement clause. These epistemic speech-acts are directed at the face-to-face listener.

Likewise, it is not an accident that the modality and manipulation verbs that appear in narrative portion of the text are used — **100%** — in their **descriptive** sense. Manipulation as a direct speech-act is not relevant in this communicative transaction, whose goal-posts have been set firmly in advance in the epistemic domain, and whose displaced temporality makes direct manipulative speech-acts infelicitous. In contrast, the direct-quoted face-to-face conversations had, so it appears, primarily *deontic* goals — to get things done. And the deontic operators used in that context change their valuation dramatically: They are used at the level of **80%-to-100%** as **direct manipulative** speech-acts.

The modal intent of complement-taking main verbs, it seems, has nothing to do with the child vs. adult developmental stage *per se*. Rather, it has much more to do with the **communicative context**. Of course, it just so happens that the communicative context of early childhood is predominantly here-and-now, you-and-I, non-displaced reference; and heavily tilted toward deontics ('getting things done') rather than epistemics ('what is the state of the world').

7.9 Conclusion

7.9.1 Child development and the communicative context

In the early stages of modal development, children exhibit a strong tendency towards using modal operators — deontic and epistemic 'higher' verbs — as **direct speech-act** markers. But their adult interlocutors exhibit the very same trend in their face-to-face communication with the children. This usage pattern seems strongly associated with the intimate communicative context of early childhood: here-and-now, you-and-I, this-and-that visible. However, the same modal usage pattern is apparently found in oral face-to-face *adult* narrative, and in the quoted conversations embedded within it.

In the non-conversational portion of the adult oral text studied here, deontic modal operators are not used as manipulative speech-act markers because the transaction goals in that context are predominantly epistemic. Once inside the quotation marks, the communicative goals shift toward the deontic, and the very same modal operators shift their use back to the deontic-manipulative.

It is of course yet to be determined which discourse type — or rather, which communicative context — is the true *prototype* of human language use. My own private bias, on evolutionary, diachronic and developmental grounds leans strongly toward the developmentally-prior context of *face-to-face communication*. The modal usage that Diessel and Tomasello ascribed to early child language is thus

not specific to children, but is rather the benchmark of face-to-face communication. While literacy and academic discourse are important cultural phenomena, I think it is best to view them — on evolutionary, diachronic and developmental grounds — as secondary, derived outcrops.

7.9.2 Semantics vs. syntax

Diessel and Tomasello's description of the two stages of child modal-use development pertains, strictly speaking, to *semantic* interpretation. There is no independent syntactic evidence that the two usages — direct speech-act vs. descriptive — differ syntactically in any demonstrable way. The semantic developmental trend observed by Diessel and Tomasello, while important, thus in no way supports the thesis that children **expand** simplex syntactic structures into complex ones. At most, the process involves a *semantic shift* — change of modal intent. The directionality of this change, however, is mediated by the communicative context, and it is practiced by both children and adults. What is more, the same directionality is seen in diachronic change in adults.

7.9.3 Combination and condensation: From parataxis to syntaxis

The data of early child language suggest, strongly if not conclusively, that the earlier precursor of the child's complex VP constructions, of whatever modality, is to be found in the **joint construction** of complex clauses across adjacent child-adult or adult-child conversational turns. The later, 'standard' use of complex VPs by the child most likely emerges out of this paratactic precursor. This conforms closely to what has been observed in the diachronic rise of both complex VPs (ch. 4) and complex NPs (ch. 5). In both, earlier paratactic structures, with the two clauses packed under separate intonation contours, condense into later syntactic structures, with the two clauses falling under a single joint intonation contour. The main difference between the early-stage diachrony and early-stage ontogeny of complex syntax, in this respect, is that in diachrony the paratactic precursor for the condensation is found across two adjacent intonation units of the *same adult speaker*; while in early ontogeny, at least of complex VPs, the paratactic precursor for the condensed, complex syntactic structure is collaborative, spanning *adjacent turns of two different speakers*.

7.9.4 Early childhood modal structure and the acquisition of Theories of Mind

In both developmental and evolutionary terms, the shift in modal usage from direct speech-act to description of the modal states of others is part and parcel of several other major shifts in the communicative ecology:

- the shift from here-and-now, you-and-I, this-and-that reference to **displaced reference**.
- the shift from manipulative to **informative speech-acts**.
- the shift from deontic modality to **epistemic modality**.
- the shift from mental models of one's own mind to mental models of **other minds**.

The close association — and temporal coincidence — of these four developmental trends is well attested in child language acquisition. The Theory of Mind literature, beginning with Premack & Woodruff (1978), suggests the development of deontic before epistemic mental representation, and the representation of the self's mind before the mind of others. This suggestion has received recent empirical support in primate the work of Cheney & Seyfarth (2007). The diachronic development of modal expressions suggests the same directional trend (Givón 1979; Heine *et al.* 1991; Hopper & Traugott 1993).

The early stages of child development bear witness to the close association of the four developmental trends. Children acquire growing proficiency in the descriptive use of modal expressions roughly during the period — 2 to 4 years — when they acquire growing proficiency at Theory of Mind (Wellman 1990; Povinelli & DeBlois 1992; Meltzoff 1999, 2000; *inter alia*). The development noted by Diessel and Tomasello, of the child's ability to use modal expressions descriptively, is thus part and parcel of the child's growing ability to attribute epistemic and deontic mental states to others.

APPENDIX 1: Example and numerical distribution of direct speech-act vs. descriptive uses of complex modal expressions by the children and adults at stage-I

1A: EVE-I: Distribution of child use of complex modal expressions

(a) **Equi-subject modality verbs:**

'can'-VP: **Descriptive (epistemic)**: (1)

EX: MOT: And [when] Sarh's a big girl, so **can** she. (FUT/ABIL)

EVE: So **can** she. [p. 23–24] (FUT/ABIL)

'(be)-gonna'-VP: **Direct (manipulative)**: (1)

EX: EVE: 'Sue **gon** read Lassie' (request; Sue=You)

MOT: 'I'm not **gonna** read Lassie'. [p. 9] (refusal)

Descriptive (epistemic-future): (2)

EX: EVE: She **goin** burp. (FUT)

MOT: What? (Q)

EVE: She**'s goin** burp. (FUT)

MOT: She **gonna** burp. (FUT)

She **has** to have milk first. [p. 14] (OBLIG)

'have-(to)-VP: **Direct (manipulative)**: (1)

EX:	EVE:	Drink gain.	(request)
	MOT:	After Sarah has a turn.	(deferral)
	EVE:	Eve have it.	(request)
	MOT:	Yes, you **can** have it,	(permit)
		but you **have** to wait	(oblig.)
	EVE:	**Have** to wait. [p. 31]	(oblig)

'wanna'-VP: **Direct (manipulative)**: (4)

EX:	MOT:	You write on Eve's paper.	(manip.)
	EVE:	No.	(refuse)
	MOT:	Look here's a lot of paper … .	(offer)
	EVE:	**Wanna** write Fraser paper … [p. 36]	(demand)

(b) **Equi-object manipulative verbs**:

'let'-NP-VP: **Direct (manipulative)**: (1)

EX:	EVE:	Get a stool.	(request)
	MOT:	Get the cup, please	(manip.)
		and I'**ll** pour it.	(offer)
		Bring the cup, eve.	(manip.)
	EVE:	**Let me** have it. [p. 41]	(request)

'help'-NP-(VP): **Direct (manipulative):** (1)

EX:	EVE:	Sue **help** Eve.	(request)
	MOT:	**Help** Eve do what?	(solicit/offer)
	EVE:	Radiator.	(request)
	MOT:	Oh, you wanna sleep on the	
		radiator? [p. 44]	(offer)

(c) **Cognition-perception-utterance verbs**: (none attested)

1B: EVE-I: Distribution of adult use of complex modal expressions

(a) **Equi-subject modality verbs:**

'will'-VP: **Direct (manipulative)**: (41)

EX:	EVE:	Fraser wipe Eve nose 'gain.	(request)
	MOT:	Come here. Mommy' **ll** wipe	
		your nose. [p. 5]	(offer)

'can'-VP: **Direct (manipulative)**: (9)

EX:	EVE:	Eve have it.	(request)
	MOT:	Yes, you **can** have it … [p. 31]	(permit)
	Descriptive (ability): (4)		
EX:	MOT:	And [when] Sarh's a big girl,	(FUT)
		so **can** she. [p. 23–24]	(FUT/ABIL)

'may'-VP: **Direct (manipulative)**: (5)

EX: EVE: Look, oh, my pencil. (request)
MOT: There's one in the kitchen. (PRES)
You **may** have that one. [p. 1] (offer)

'want'-NP/WH: **Direct (manipulative)**: (11)

EX: EVE: Napkin. (request)
MOT: Oh, do you **want** a napkin too? [p. 2] (offer)

'want'-VP: **Direct (manipulative)**: (9)

EX: EVE: Cracker on table. (request)
MOT: Oh, you **want** to have a cracker on the table? [p. 25] (offer)

'would-like'-NP: **Direct (manipulative)**: (2)

EX: MOT: **Would** you **like** some fruit? (offer)
EVE: No. [p. 64] (refuse)

'would-like'-to-VP: **Direct (manipulative)**: (7)

EX: MOT: **Would** you **like** to have your lunch now? (offer)
EVE: No. [p. 14–15] (refuse)

'know-how'-to-VP: **Descriptive (ability)**: (1)

EX: EVE: Baby Sarah. (PRES)
MOT: She doesn't **know how** to drink out of a glass. [p. 17] (PRES)

'like'-NP: **Direct (manipulative)**: (2)

EX: MOT: **Would** you **like** to have some lunch? (offer)
EVE: No. (refuse)
MOT: Papa will fix you one if you **like**. [p. 24] (offer)

Descriptive (liking): (2)

EX: MOT: Is that good? (Q-PRES)
EVE: Yeah. (PRES)
MOT: D'you **like** it? [p. 22] (PRES)

'need'-NP: **Direct (manipulative):** (3)

EX: EVE: [For]got a spoon. (PAST)/(request?)
MOT: I forgot a spoon? (Q-PAST)
No, you don't **get** a spoon. (refuse)
You don't **need** one. [p. 4] (refuse)

'supposed'-to-VP: **Descriptive**(?): (1)

EX: EVE: That Fraser spoon. (PRES)
MOT: Thank you.
What am I **supposed** to do with it?' [p. 57] (FUT?)

'try'-NP/VP/elliptic: **Direct (manipulative)**: (2)

EX: MOT: Not very good. No. (PRES)
EVE: I **try** again. (offer/intent)
MOT: **Try** again. (manip)
Well, what **are** you **trying** to do? [p. 21] (Q-PROG)
Descriptive: (1) (see directly above)

'(be)gonna'-VP: **Direct (manipulative):** (8)

EX: EVE: Sue read Lassie. (request)
MOT: No, Mommy's not **gonna** read Lassie. [p. 12] (refuse)
Descriptive: (4)
EX: EVE: She **goin** burp. (FUT/imminent)
MOT: She **gonna** burp. [p. 14] (FUT/imminent)

'go-and-V' (serial): **Direct (manipulative)**: (3)

EX: FAT: You **go** eat your lunch. [p. 61] (manip)

'why don't you'-VP: **Direct (manipulative)**: (2)

EX: MOT: **Why don't we** have lunch? (manip)
EVE: Drinking. [p. 20] (request)

(b) **Cognate object constructions**:
'have'-NOM: **Direct (manipulative) contexts**: (12)

EX: EVE: Eve **have** drink of milk. (request)
MOT: After Sarah **has** a turn. [p. 29] (refuse)

(c) **Equi-object manipulation verbs:**
'let'-NP-VP: **Direct (manipulative**): (3)

EX: MOT: Is your grape juice all gone? (Q-PERFV)
EVE: Yeah. (PERFV)
MOT: Okay, **let's** wipe your face then. [p. 7] (manip)

'get'-NP-to-VP: **Descriptive(?)**: (1)

EX: EVE: [???] Eve ring. (request)
MOT: You don't have a ring. (PRES)/(refuse)
When you **get** to be a lady, (FUT)/(promise?)
then you **can** have a ring. [p. 46] (FUT)

'help'-NP-VP: **Direct (manipulative):** (1)

EX: EVE: Sue **help** Eve. (request)
MOT: **Help** Eve do what? (solicit/offer)
EVE: Radiator. (request)
MOT: Oh, you **wanna** sleep on the radiator? [p. 44] (offer)

'leave'-NP-VP: **Direct (manipulative)**: (4)

EX:	MOT:	You **want** me to smack you?	(warning)
	EVE:	No.	(rejection)
	MOT:	Then put it away.	(manip.)
		Don't touch it again	(manip)
		Leave it lay right there.	(manip)
		Leave it alone. [p. 50]	(manip)

'want'-NP-to-VP: **Direct (manipulative)**: (2)

EX:	EVE:	[???].	(request)
	MOT:	Do what?	(solicit)
	EVE:	[???]-ing Eve.	(request)
	MOT:	What do you **want** me to do? [p. 45–46]	(solicit)

(d) **Perception verbs:**

'see'-NP: **Direct (attention)**: (4)

EX:	MOT:	Where is the penny?	(Q-PRES)
	EVE:	[???] fall down floor.	(PAST)
	MOT:	There it is.	(direct-attention)
		I **see** it, by the table.	(direct-attention)
		On the floor. **See** it? [p. 31]	(direct attention)

'see'-if-S: **Direct (attention)**: (2)

EX:	MOT:	**Wanna** go **see** if the coffee is read?	(manip.; direct-attention)
	EVE:	Yep. [p. 46]	(consent)

'see'. S: **Direct (attention):** (2)

EX:	MOT:	**See**. She's heavy. **See**. She's heavy. [p. 43]	(direct-attention)

'look-at'-NP: **Direct (attention)**: (4)

EX:	EVE:	**Look**, rocking-chair.	(direct-attention)
	MOT:	It's moving again.	(PROG)
		Look at the rocking chair.	(direct-attention)
		It's doing it again.	(PROG)
		There is goes again.	(direct-attention)
		What is the rocking chair doing? [p. 4–5]	(Q-PROG)

(e) **Cognition verbs**:

'know'-if-S: **Direct (epistemic quantifier)**: (1)

EX:	EVE:	[???] fall.	(PAST)
	MOT:	It fell?	(Q-PAST)
		I don't **know** whether it did. [p. 47]	(EPIST-PAST)

'know'-S: **Direct (epistemic quantifier)**: (2)

EX:	EVE:	Fall down.	(PAST)
	MOT:	I **know** you fell down. [p. 17]	(EPIST-PAST)

S, 'think': **Direct (epistemic quantifier)**: (1)

	EVE:	Eating bread too.	(PROG)
	MOT:	She's eating bread too, I **think**. [p. 57]	(EPIST-PROG)

'think'-S: **Direct (epistemic quantifier)**: (2)

EX:	MOT:	There's a dog barking outside. Yeah.	(PROG)
	COL:	I'm not **sure**. Yeah, I **think** it is.	
		I'm **sure** it is. [p. 56)	(QUANT-PROG)

'be-sure'-(S): **Direct (epistemic quantifier)**: (2) (see directly above)

1C: NAOMI-I: Distribution of child use of complex modal expressions

(a) **Equi-subject (modality) verbs**

'will'-VP: **Descriptive (future):** (1)

EX:	NAO:	Daddy.	(PRES)
	MOT:	Daddy's in Florida. In Florida.	(PRES)
		He'**ll** be home tonight.	(FUT)
	NAO:	Daddy **will** be home tonight. [p. 19]	(FUT)

'can'-VP: **Direct (manipulative)(?):** (1)

EX:	NAO:	Closed door.	(request)
		More.	(request)
		What's this? What's this? What's this?	(Q-PRES)
		Can't get [it] off.	(request?)
		Close door.	(request)
	FAT:	Close the door. [p. 59]	(MANIP.)

'want'-NP: **Direct (manipulative)**: (20)

EX:	MOT:	**Want** some vitamins, Naomi?	(offer)
	NAO:	All gone. All gone.	(PERFV)
		More vitamin.	(request)
	MOT:	Wait.	(manip)
	NAO:	Sit. Juice. Mommy.	
		I **want** it. [p. 27]	(request)

'wanna'-VP: **Direct (manipulative):** (3)

EX:	NAO:	Sit. Get up. Hug.	(requests)
		Want hug.	(request)
		Want it hug.	(request)
	FAT:	Do you **want** me to hug	
		Georgie or Naomi? [p. 51]	(solicit)

'go'-to-V: **Descriptive (volition):** (1)

EX:	NAO:	Mouse tired.	(PRES)
	MOT:	Oh, does he **want** to **go** to sleep?	(Q-PRES/VOLIT)
	NAO:	**Go** to sleep.	(PRES/VOLIT)
	MOT:	Oh, I don't **think** so. [p. 2]	(PRES/EPIST)

'like'-NP: **Descriptive (valuative):** (2)

EX:	MOT:	Naomi eat it.	(manip.)
	NAO:	I **like** it. I **like** it.	(PRES/EVAL)
	MOT:	It's good.	(PRES/EVAL)
	NAO:	No. [p. 32]	(PRES/EVAL)

'need'-NP: **Direct (manipulative)**: (7)

EX:	FAT:	How are you doing Nomi?	(Q-PRES)/(solicit)
	NAO:	Sugar. **Need** sugar. **Need** sugar on.	(request)
	FAT:	You need sugar?	(offer)
	NAO:	Need sugar on. [p. 42]	(request)

'need'-VP: **Direct (manipulative):** (1)

EX:	NAO:	Leave it.	(request)
		I **need** cook.	(request)
		I **need** it. I **need** it. [p. 45]	(request)

(b) **Equi-OBJ manipulation verbs**

'get'-NP: **Direct (manipulative):** (7)

EX:	NAO:	**Get** it. **Get** it. **Get**.	(request)
	MOT:	What are you **getting**, honey?	(Q-PROG)/(solicit)
	NAO:	**Getting** oof-oof. **Getting** woof.	(PROG)/(request)
	MOT:	Getting off?	(Q-PROG; misinterpret)
	NAO:	Oof-oof.	(clarification of request)
	MOT:	What are you **getting**?	(Q-PROG)
		Are you **going** to get a doggie?	(Q-intent)/(solicit)
	NAO:	**Get** doggie. [p. 17]	(request/intent)

'get'-NP-LOC: **Descriptive(causative)(?):** (1)

EX:	NAO:	Closed door.	(request)
		More.	(request)
		What's this? What's this?	
		What's this?	(Q-PRES)
		Can't **get** [it] off.	(request?)
		Close door.	(request)
	FAT:	Close the door. [p. 59]	(manip.)

'leave'-NP-(ADJ): **Direct (manipulative):** (11)

EX:	NAO:	Plate.	(PRES)
	FAT:	An empty plate.	(PRES)
	NAO:	Empty plate.	
		Leave it. **Leave** it.	
		Leave it. **Leave** it.	(manip.)
		Leave it alone. **Leave** it.	
		Leave it alone.	(manip.)
		Leave it alone.	
		Be careful. [p. 45–46]	(manip)

(c) **Perception verbs**

'see'-NP: **Direct (attention):** (2)

EX:	NAO:	Sun. Sun coming. Sun coming.	(PROG)
		Sun coming. Sun coming.	(PROG)
	MOT:	Yeah. It is getting bright.	(PROG)
		Sun. **See** sun. Where sun? [p. 24]	(direct-attention)

S. 'see': **Direct (attention)**: (1)

EX:	NAO:	Eating aspirin. Mommy **see**.	(direct-attention)–(PROG)
		More Juice. More Juice. More Juice.	(request)
		Eating. Eating. [p. 34]	(PROG)

'listen' (ellipsis): **Descriptive** (perception): (1)

EX:	FAT:	What are you doing with the sea-shell?	(Q-PROG)
		Are you holding it over your ear?	(Q-PROG)
	NAO:	Holding hear.	(PROG)
	FAT:	Are you **listening?**	(Q-PROG)
	NAO:	**Listen**. [p. 50]	(PROG)

(d) **Cognition verbs:**

'think' (ellipsis): **Descriptive (cognition)**: (1)

EX:	MOT:	We're not doing it.	(PROG)
		I'm just **thinking** [of putting N. to bed].	(PROG)
	NAO:	**Thinking**.	(PROG)
	MOT:	**Thinking**, yeah. With my head.	(PROG)
		You **think** up there. [p. 20]	(manip.)

(e) **Evaluative verbs:**

'feel'-ADJ: **Descriptive (internal state)**: (1)

EX:	NAO:	I **feel** better.	(PRES)–(self-eval)
	MOT:	**Good**. That's **good**.	(PRES)–(eval)
		I'm **glad** you **feel** better. [p. 35]	(PRES)–(self-eval)–(eval)

1D: NAOMI-I: Distribution of adult use of complex modal expressions

(a) **Equi-subject modality verbs**

'will'-VP: **Direct (manipulative)**: (7)

EX:	MOT:	Do you **want** to comb your hair, Naomi?	(offer)
	NAO:	Comb hair.	(request)
	MOT:	Mommy **will** get something for you to comb your hair. [p. 18–19]	(offer)

Descriptive (future): (7)

EX:	MOT:	Sailboats. [looking at picture]	(PRES)
	NAO:	Sailboats.	(PRES)
	MOT:	We'**ll** see a sailboat this summer. [p. 9]	(FUT)

'would'-VP: **Direct (manipulative)**: (1)

EX:	NAO:	That's moon.	(PRES)
	MOT:	That's not the moon, honey.	(PRES)
		Would you please don't push your hands on the tray, honey? [p. 25]	(request)

'can'-VP: **Direct (manipulative):** (16)

EX:	NAO:	Toy doggie.	PRES/(request?)
	MOT:	Show me were it is.	(manip)
		Can you point? [p. 7]	(manip)

Descriptive (ability): (4)

EX:	NAO:	Home.	(PAST)
	MOT:	The piggie didn't want to stay home.	(PAST)
		See, sometime other people cry too	(HAB)
		because they have to stay home.	(HAB)
		Just like Nomi when she **can't** go outside. [p. 12–13]	(HAB/ABIL)

'could'-VP: **Direct (manipulative)**: (2)

EX:	NAO:	Shadow.	(request)
	MOT:	Shadow pictures. We **could** do shadow. [p. 15]	(offer)

'should'-VP: **Direct (manipulative)**: (2)

EX:	NAO:	Brush hair.	(request)
	MOT:	You **should** wash your hair today. [p. 19–20]	(manip.)

'might'-VP: **Direct (epistemic)**: (1)

EX:	NAO:	What's this?	(Q-PRES)
	MOT:	I don't **know**.	(PRES)–(EPIST)
		I **think** it **might** be a matzo crumb too. [p. 32]	(PRES)–(EPIST)

'must'-VP: **Direct (epistemic)**: (1)

EX: MOT: Naomi, did you **see** (PAST)
how the trees are blowing in the wind? (PROG)
Must be windy. (PRES)–(EPIST)
NAO: Windy. [p. 23] (PRES)

'want'-NP: **Direct (manipulative):** (13)

EX: MOT: **Want** some vitamins, Naomi? (offer)
NAO: All gone. All gone. (PERFV)
More vitamin. [p. 27] (request)

'want'-to-VP: **Direct (manipulative)**: (6)

EX: NAO: Fix. (request)
MOT: Get it in the right place. (manip.)
You don't **want** to break it. (manip.)
NAO: Fix. [p. 22] (request)

Descriptive (volition): (3)

EX: NAO: Mouse tired. (PRES)
MOT: Oh, does it **want** to go to sleep? [p. 2] (Q-PRES/VOLIT)

'would-like'-to-VP: **Direct (manipulative)**: (2)

EX: FAT: Nomi, **would** you **like** to have
some Famiglia this morning? (offer)
NAO: Mmm mmm Mommy. [p. 41] (accept)

'like-NP: **Descriptive (liking)**: (3)

EX: MOT: Did you **like** the matzo Nomi. (PAST)
NAO: I drop it. [p. 28] (PAST)

'like'-to-VP: **Descriptive (future)**: (1)

EX: MOT: The after that we **could** go over to (promise)
school and go outside for a while. (promise)
NAO: Yeah. (consent)
MOT: Yeah, outside is where you **like** to (PRES)
be, isn't it? [p. 20–21]

'know-how'-to-VP: **Descriptive (ability)**: (1)

EX: NAO: Toy doggie. PRES/(request?)
MOT: Show me were it is. (manip)
Can you point? (manip)
Do you **know how** to
point? [p. 7] (HAB/ABIL)

'need'-NP: **Direct (manipulative):** (1)

EX: NAO: Juice. (request)
MOT: [to F.] I think she **needs** some aspirin. (manip.)
NAO: [???]. What 's this? (Q-PRES)
MOT: Aspirin. [p. 33] (PRES)

'try'-to-VP: **Descriptive (attempt)**: (1)

EX: MOT: Would you please don't push your hands back on your tray, honey. (manip.)
I'm **trying** to clean you off. [p. 25] (PROG)

'(be)-gonna'-VP: **Direct (manipulative)**: (1)

EX: NAO: Woof-woof. (request)
MOT: What are you getting? (solicit)
Are you **going** to get a dogie? (solicit)
NAO: Get doggie. [p. 16–17] (request)

Descriptive (future ?): (2)

EX: MOT: Watch. (direct-attention)
It's **going** to pop. (FUT)
NAO: [???] hot. Toast coming. [p. 29] (FUT)

'have-to'-VP: **Direct (manipulative):** (5)

EX: NAO: **Want** it. **Want** it. (request)
MOT: It's coming, Naomi. (promise)
You **have to** wait till it pops out. [p. 29] (manip.)

Descriptive (obligation): (1)

EX: NAO: Piggy crying. (PROG)
MOT: See the tears? Look at the tears. (attract-attention)
That's because the piggy **had** to stay home. [p. 12–13] (PAST/OBLIG)

'finish-up'-NP: **Direct (manipulative context)**: (1)

EX: NAO: More Famiglia. (request)
FAT: You've got a little bit more in there. (PRES)
You **finish** that **up** first. (manip.)
NAO: No more. [p. 44] (reject)

'go'-to-V: **Descriptive (motion)**: (1)

EX: NAO: Mouse tired. (PRES)
MOT: Oh, does it want to **go** to sleep? [p. 2] (PRES/VOLIT)

'go'-(and)-V: **Serial-verb (manipulative context)**: (1)

NAO: Point. (agree)
MOT: Point with your finger. (manip.)
See, like this. (direct-attention)
Go point. [p. 7] (manip.

(b) **Equi-object manipulation verbs**

'let'-NP-VP: **Direct (manipulative)**: (8)

EX: NAO: Oof-oof. [bringing a dog puppet] (PRES)
MOT: **Let's** make a shadow of that puppet, honey. [p. 17] (manip.)

'have'-NP-VP: **Descriptive (causative)**: (1)

EX: MOT: How **should** we plan our day? (FUT?)
Maybe we'**ll have** Naomi take a
nap this morning. [p. 20] (FUT/CAUS)

'leave'-NP-ADJ: **Direct (manipulative context):** (1)

EX: NAO: Leave it. Leave it. (manip.)
FAT: Yeah, **leave** it alone, Nomi. [p. 45] (manip.)

'want'-NP-VP: **Direct (manipulative)**: (1)

EX: NAO: I want it hug. (request)
FAT: Do you **want** me to hug Georgie
or Nomi? [p. 51] (offer)

'make'-NP-VP: **Direct (manipulative)**: (3)

EX: NAO: Comb hair. (request)
MOT: Here's a brush, Naomi. (offer)
Make your hair feel good. [p. 18–19] (offer)

Descriptive (causative): (1)

EX: NAO: Where sun? (PRES)
MOT: The sun is **making** it warm … [p. 24] (PROG/CAUS)

'get'-NP-VP: **Direct (manipulative context)**: (1)

EX: MOT: Lie down on the floor (manip.)
so Mommy **can get** you dressed. (manip.)
NAO: No. [p. 39] (refuse)

(c) **Perception verbs**

'see'-NP: **Direct (attention)**: (6)

EX: MOT: Look, **see** the shadow. (attract-attention)
NAO: Shadow. [p. 20] (PRES)

Descriptive (perception): (5)

EX: NAO: Where daddy? (Q-PRES)
MOT: Daddy is working tonight, hone. (PROG)
Daddy will be home tonight. (FUT)
You'll **see** him tomorrow morning. [p. 24] (FUT/PERCEP)

'see'-if-S: **Direct (attention):** (1)

EX: MOT: Let's **see** if you remember all of them. (manip)
Who's this? (Q-PRES)
NAO: Mr. Gum. [p. 9] (PRES)

'see'-WH/S: **Descriptive (perception):** (2)

EX: NAO: What's this? (Q-PRES)
FAT: I can't **see** what you're
pointing at. [p. 58] (PRES/PERCEP)

S. 'see': **Direct (attention)**: (1)
EX: NAO: [???]. (???)
MOT: There it is. **See.** [p. 16] (direct-attention)–(PRES)

'see', S: **Direct (attention)**: (4)
EX: NAO: What's this? Man. [doing] (Q-PROG)
MOT: **See**, this man is making
shoes. [p. 62] (direct-attention)–(PROG)

'watch'-NP: **Direct (attention)**: (1)
EX: MOT: Hold it up nice. (manip)
Sit down and **watch**
the shadow. [p. 18] (direct-attention)

'watch'. S: **Direct (attention)**: (1)
EX: MOT: **Watch**. It's going to pop. (direct-attention)–
(IMM. FUT)
NIN: [???] hot. Toast coming. [p. 29] (PRES/PROG)

'look-at'-NP: **Direct (attention)**: (3)
EX: NAO: Piggy crying. (PROG)
MOT: **See** the tears? (attract-attention)>
(PROG)
Look at the tears. [p. 12–13] (attract-attention)

'look', S: **Direct (attention):** (1)
EX: MOT: **Look**, see the shadow. (direct-attention)>(PRES)
NAO: Shadow. [p. 20] (PRES)

'show'-DAT-NP: **Direct (attention):** (5)
EX: MOT: **Show** me the mommy. (direct-attention)
NAO: Mommy.
[pointing]. [p. 5] (PRES)

'show'-DAT-WH/S: **Direct (attention)**: (1)
EX: NAO: Toy doggie. (PRES)
MOT: **Show** me
where is. [p. 7] (direct-attention)

'hear'-NP-VP: **Direct (attention):** (2)
EX: FAT: Do you **hear** the birds (direct attention)>
singing? (PROG)
NAO: [???]. (PRES)
FAT: Yes, the sun is out. [p. 42] (PRES)

'listen' (ellipsis): **Direct (attention)**: (1)
EX: FAT: Are you listening? (Q-PROG)
NAO: Listen. (PROG)
FAT: Yeah, **listen**. [p. 50] (direct-attention)

Descriptive (perception): (1)

EX:	FAT:	Are you holding it over your ear?	(Q-PROG)
	NAO:	Holding ear.	(PROG)
	FAT:	Are you **listening?**	(Q-PROG)
	NAO:	Listen. [p. 50]	(PROG)

(d) **Cognition verbs**

WH/S. 'know': **Direct (epistemic quantifier)**: (1)

EX:	NAO:	What's this?	(Q-PRES)
	MOT:	I don't **know**. [p. 32]	(PRES/EPIST)

'know'-WH/S: **Direct (epistemic quantifier):** (3)

EX:	NAO:	Elbow.	(PRES)
	MOT:	Do you **know** where the elbow is?	(Q-PRES/EPIST)
	NAO:	Elbow. [pointing to picture] [p. 5]	(PRES)

'think'-S: **Direct (epistemic quantifier)**: (7)

EX:	NAO:	What's this.	(Q-PRES)
	MOT:	I don't know.	(PRES/EPIST)
		I **think** it might be a matzo crumb. [p. 32]	(PRES/EPIS)

S, 'think': **Direct (epistemic quantifier):** (2)

EX:	NAO:	Go to sleep.	(request)
	FAT:	I don't **think** so. [p. 2]	(PRES/EPIST)/ (refusal?)
EX:	NAO:	What's this?	(Q-PRES)
	FAT:	It's a piece of foam I **think**. [p. 47]	(PRES/EPIST)

'think' (about): **Descriptive (cognition):** (4)

EX:	MOT:	Don't cry. I'm **thinking** about it, honey.	(PROG)
		We're not doing it.	
		I'm just **thinking**.	(PROG)
	EVE:	Thinking.	(PROG)
	MOT:	**Thinking,** yeah. With my head.	(PROG)
		You **think** up there. [p. 20]	(HAB)

'remember'-NP: **Direct (attention):** (2)

EX:	NAO:	What's this? Man. [doing?]	(Q-PROG)
	FAT:	**See**, this man is making shoes.	(dir.-attention)/ (PROG)
		Do you **remember** the other shoemaker? [p. 62]	(dir.-attention)

'remember'-WH/A: **Direct (attention):** (2)

EX: MOT: Just like Nomi when she can't go outside she cries (HAB)
Remember how (direct-attention)/
you cry when you
can't go outside? [p. 12–13] (HAB)

S. 'understand' (ellipsis): **Descriptive (cognition):** (1)

EX: NAO: Hi. (greeting)
MOT: Hi what? I don't
understand. [p. 8] (PRES)

'be-hard'-to-'understand': **Descriptive (cognition):** (1)

EX: MOT: We're making toast
out of bread. (PROG)
NAO: [???].
MOT: It's kinda hard to
understand. [p. 29] (PRES)

'figure out'-WH/S: **Direct (directive context)**: (1)

EX: NAO: Daddy. Hi (greeting)
FAT: Let's **figure out** (dir. attention)
what Nomi **is going** to wear
today. [p. 53] (FUT)

(e) **Utterance verbs**

'say'-dir.quote: **Directive contexts**: (15)

EX: NAO: Piggy sleeping. (PROG)
MOT: Piggy is sleeping. (PROG)
Can you **say**: "Piggy *is*
sleeping"? [p. 12] (mark dir. quote)

Descriptive (utterance): (2)

EX: MOT: You don't **want** that delicious honey. (manip.)
NAO: Yes. (assent)
MOT: You **said**: "Yes". (PAST/DIR.
QUOTE)
You don't **mean** a word of it. [p. 32] (PRES/EPIST)

'tell'-DAT-WH/S: **Directive context**: (4)

EX: NAO: Hat. (PRES)
MOT: **Tell** me who this is. Peter. (EPIST.
QUANTIFIER)
NAO: Peter. [p. 9] (PRES)

1E: NINA-I: Distribution of child use of complex modal expressions

(a) **Equi-subject modality verbs:**

'go': **Descriptive (motion):** (1)

EX:	MOT:	Is the rabbit going fast? Uh?	(Q-PROG)
	NIN:	**Go**.	(PROG)
	MOT:	It's going. [p. 3]	(PROG)

'like'-NP: **Descriptive (liking):** (2)

EX:	NIN:	Kitty cat. Big kitty cat.	(PRES)
	MOT:	Do you like kitty cat?	(Q-PRES)
	NIN:	**Like** kitty cat. **Like** kitty cat. [p. 24]	(PRES)

(b) **Equi-object manipulation verbs**

'have'-NP-LOC: **Direct (manipulative context):** (2)

EX:	NIN:	Duck room, **have** it o[n] wee.	(request)
		On the black. On the black.	(request)
	MOT:	**Are** you **going** to put the duck in the black space?	(solicit)
		This is a puzzle. [p. 27]	

'make'-NP: **Direct (manipulative context)**: (2)

EX:	MOT:	Did you **make** the blocks fall down?	(Q-PAST)
	NIN:	Here.	(request)
	MOT:	Uh?	
	NIN:	**Make** it, Mommy.	(request)
	MOT:	You **want** me to make it? [p. 44]	(solicit)

'get'-NP: **Direct (manipulative context)**: (9)

EX:	NIN:	**Get** the ball.	(request)
	MOT:	**Get** the ball?	(offer)
		You **want** me to get the ball?	(offer)
	NIN:	**Get** the ball. [p. 54]	(request)

'take'-NP-LOC: **Descriptive (removal)**: (2)

EX:	MOT:	What am I doing? What is Mommy doing?	(Q-PROG)
	NIN:	**Take** it off. [???] off.	(PROG)
	MOT:	Taking the pants off.	(PROG)
	NIN:	**Take** off clothes. [p. 39]	(PROG)

(c) **Perception verbs**:

'look'-(at)–(NP): **Direct (attention)**: (11)

EX:	NIN:	Open that. [book]	(request)
	MOT:	That doesn't open.	(PRES)
		That's the end of the book.	(PRES)
		Want to **look** at it some more?	(offer)
	NIN:	**Look** rabbit. [p. 18]	(direct-attention/ request)

'look' [.]-S: **Direct (attention)**: (2)

EX:	MOT:	What are you giving dolly to drink?	(Q-PROG)
	NIN:	**Look**. Drink a dolly. [p. 42]	(direct-attention)–(PROG)

'fee'-ADV: **Descriptive (internal):** (2)

EX:	MOT:	Oh, you're hugging the lady.	(PROG)
		Does she **feel** better?	(Q-PRES)
	NIN:	**Feel** better. [p. 60]	(PRES)

1F: NINA-I: Distribution of adult use of complex modal expressions

(a) **Equi-subject modality verbs**:

'will'-VP: **Direct (manipulative):** (5)

EX:	NIN:	Read.	(request)
	MOT:	**Won't** you read the bunny?	(manip.)
	NIN:	Read the bunny. [p. 2]	(request)
EX:	NIN:	The book.	(request)
	MOT:	No, you **can't** open that.	(prohibit)
		It'**ll** tear. [p. 22]	(warn)

'can'-VP: **Direct (manipulative):** (32)

EX:	NIN:	**Look**, Mommy.	(direct-attention/request)
	MOT:	Do you **want** me to take off your shoes too?	(offer)
		Can you take off your shoe?	(manip.)
	NIN:	Hard. [p. 40]	(complain)

'shall'-VP: **Direct (manipulative)**: (16)

EX:	NIN:	Other kitty cat.	(request)
	MOT:	**Shall** we find some other kitty cat? [p. 25]	(offer)

'have-to'-VP: **Direct (manipulative**): (3)

EX:	NIN:	The book.	(request)
	MOT:	No, you can't open that. It'll tear.	(prohibit)
		You have to just turn the pages. [p. 22]	(manip.)

'want-to'-VP: **Direct (manipulative)**: (16)

EX:	NIN:	More rabbit books.	(request)
	MOT:	Do you **want** to find another book with a rabbit in it?	(offer)
	NIN:	Here. [p. 19]	(request)

'would-like-NP: **Direct (manipulative)**: (2)

EX: NIN: Yummy. [eating a cookie] (PRES)
EX: MOT: **Would** you **like** some more cookies? [p. 38] (offer)

'would-like'-to-VP: **Direct (manipulative)**: (2)

EX: MOT: **Want** me to drink dolly's milk? (offer)
NIN: Yeah. (request)
MOT: Oh, it's so good. Umm. (PRES)
Would you **like** to play with dolly's milk? [p. 49] (offer)

'like'-to-NP: **Descriptive (liking)**: (7)

EX: NIN: Panda. (PRES)
MOT: Do you **like** the panda? (Q-PRES)
NIN: Yeah. [p. 8] (PRES)

'like'-to-VP: **Descriptive (volition):** (7)

EX: MOT: The guitar makes music, doesn't it? (PRES)
NIN: Yeah. (PRES)
MOT: Do you **like** to sing? [p. 13–14] (Q-PRES)

'try'-NP: **Direct (manipulative):** (3)

EX: NIN: Hard. (PRES/complain)
MOT: Is it hard to put it on? (Q-PRES)
NIN: Here. (request)
MOT: You **try** it. **Try** again. [p. 27–28]

'try'-to-VP: **Direct (manipulative)**: (5)

EX: NIN: Hard. (PRES/complain)
MOT: It is hard? (Q-PRES)
NIN: Yes. (PRES)
MOT: You **try** to take off your shoe. [p. 40] (manip.)

'(be)-gonna'-VP: **Direct (manipulative)**: (11)

EX: NIN: Read. (request)
MO: Won't you read to bunny? (manip.)
NIN: Read to bunny. Read to bunny. (request)
MOT: Are you going to read to bunny? [p. 16] (manip.)

'go'-(LOC): **Direct (manipulative context)**: (5)

EX: MOT: **Would** you **like** to **go** out to supper with Mommy? (offer)
NIN: Supper. [p. 56] (agree)

Descriptive (motion): (2)

EX:	MOT:	Is the rabbit **going** fast?	(Q-PROG)
	NIN:	Go.	(PROG)
	MOT:	It's **going**. [p. 3]	(PROG)

'go'-(and)-V (serial): **Direct (manipulative context)**: (3)

EX:	MOT:	**Go** find the ball. **Go** find the ball.	(manip.)
		Can you find the ball? [p. 52]	(manip.)

'why-don't-you'-VP: **Direct (manipulative)**: (1)

EX:	MOT:	Oh dear, we **have** to start over again.	(manip.)
		Oh, **let's** start over again.	(manip.)
		Why don't you bring me the yellow block?	(manip.)
		Where is the yellow block?	(Q-PRES/manip.)
	NIN:	Here. [p. 44]	(PRES/comply)

(b) **Equi-object manipulation verbs**

'let'-NP-VP: **Direct (manipulative)**: (22)

EX:	MOT:	Look at the puzzle.	(direct-attention)
		Let's take att the pieces out.	(manip.)
	NIN:	Yeah. [p. 26–27]	(agree)

'make'-NP: **Direct (manipulative context)**: (3)

EX:	NIN:	**Make** it, Mommy.	(request)
	MOT:	You **want** me to **make** it?	(offer)
		Okay, **let's make** it. [p. 44]	(manip.)

Descriptive (construction): (2)

EX:	NIN:	Here.	(PRES)
	MOT:	You are **making** a building?	(Q-PROG)
	NIN:	Building. [p. 45]	(PROG)

'make'-NP-VP: **Direct (manipulative context):** (4)

EX:	MOT:	**Shall** we **make** dolly dance?	(manip.)
		Let's see, dance, dance.	(manip.)
		Make dolly dance.	(manip.)
		You **make** dolly dance. [p. 38]	(manip.)

'want'-NP-VP: **Direct (manipulative)**: (11)

EX:	NIN:	Untie.	(request)
	MOT:	**Want** me to tie it?	(offer)
	NIN:	Off. Shoe off. [p. 41]	(request)

'get'-NP: **Direct (manipulative context):** (16)

EX:	NIN:	**Get** big ball. Big ball.	(request)
	MOT:	**Shall** we **get** the big ball? [p. 51]	(offer)

'take'-NP-LOC: **Direct (manipulative context)**: (4)

EX:	NIN:	Books	(PRES/request?)
	MOT:	Look at the puzzle.	(direct-attention)
		Let's take all the pieces out.	(manip.)
	NIN:	Yeah. [p. 26–27]	(agree)

(c) **Perception verbs**:

'see'-NP: **Direct (attention)**: (3)

EX:	MOT:	What's the rabbit doing?	(Q-PROG)
	NIN:	Hopping.	(PROG)
	MOT:	Uh-huh. And he's painting too.	(PROG)
		See the rabbit? [p. 17–18]	(attract attention)

'see' (ellipsis): **Direct (attention; manipulative context)**: (3)

EX:	NIN:	Other kitty cat.	(request)
	MOT:	**Shall** we find some other kitty cat?	(manip.)
		Let's see. [p. 25]	(manip.)

'see'-if-S: **Direct (attention; manipulative context)**: (3)

EX:	MOT:	It's hard?	(Q-PRES)
	NIN:	Yes.	(PRES)
	MOT:	You **try** to take off your shoe.	(manip.)
		See if you **can** take it off. [p. 40]	(manip)

'see'-NP-VP: **Direct (attention; manipulative context):** (1)

EX:	MOT:	Oh, did it fall down?	(PAST)
	NIN:	Yeah.	(PAST)
	MOT:	Oh, **can** you build it some more?	(manip)
		Let's see you build it. [p. 43]	(manip.)

'look'(at-NP): **Direct (attention)**: (1)

EX:	NIN:	Books.	(request)
	MOT:	**Look** at the puzzle.	(direct-attention)
		Let's take all the pieces out. [p. 26–27]	(manip.)

'look' (,) S: **Direct (attention)**: (1)

EX:	MOT:	**Shall** we build something?	(manip.)
	NIN:	Oh, something.	(request)
	MOT:	Oh, **look let's** put all the blocks on top of each other. [p. 43]	(direct-attention/ manip.)

'look-like-NP: **Descriptive (perception)**: (1)

EX:	NIN:	Big mouse, big mouse.	(PRES)
	MOT:	He **looks like** a mouse,	(PRES/EPIST)
		but he is a seal. [p. 16]	(PRES)

(d) **Cognition verbs**

S, 'think': **Direct (epistemic quantifier):** (1)

EX: NIN: A bird. (PRES)
MOT: That's a bug, I **think**. (PRES/EPIST)
Yes, that's a bug. [p. 10] (PRES)

'think'-S: **Direct (epistemic quantifier):** (3)

EX: MOT: Do you **think** dolly is getting hungry again? (Q-PROG/EPIST)
NIN: Yeah. [p. 47–48] (PROG)

'think' (ellipsis): **Direct (epistemic quantifier)**: (1)

EX: MOT: He's falling down. (PROG)
NIN: Yeah. (PROG)
MOT: Do you **think so?** [p. 3] (PROG/EPIST)

WH/S, 'remember': **Direct (epistemic quantifier)**: (1)

EX: MOT: He's playing the guitar. (PROG)
NIN: [???].
MOT: Who plays the guitar, Nina? **Remember?** (Q-PRES/EPIST)

'understand' (ellipsis): **Descriptive (cognition)**: (1)

EX: MOT: What can you sing? (PRES/ABIL)
NIN: Up down. (PRES)
MOT: I don't **understand**. [p. 13–14] (PRES)

(e) **Utterance verbs**

'say'-dir.quote: **Direct (manipulative context)**: (9)

EX: MOT: **Can** you **say**: "Giraffe"? (manip.)
NIN: Giraffe. [p. 8] (comply)

'say'-WH/S: **Descriptive (utterance)**: (2)

EX: NIN: Meow, meow.
MOT: Meow? Is that what the cat **says**? (Q-PRES)
NIN: Meow. [p. 9]

APPENDIX 2: Distribution of direct speech-act vs. descriptive use of complex modal expressions by children and adults in stage-II transcripts

2A: Distribution of child uses of modal patterns in Eve-II

Modality verbs	**Direct(manip.)**	**Descriptive**
'have'-to-VP	13	/
'gotta'-VP	2	/
'can'-VP	1	/
(you/I) better-VP	2	/
'gonna'-VP	6	1
'need'-NP	4	/
'want'-NP	4	/
'try'-to-VP	1	/
'forget'-to-VP	/	1
manipulation verbs		
'let'-NP-VP	4	/
Perception-epistemic	**Direct (attention)**	**Descriptive**
'look'	4	/
'feel'	/	1
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**
'think'-S	1	/
total:	42 **(93.3%)**	3

2B: Distribution of adult uses of modal patterns in Eve-II

Modality verbs	**Direct (manip.)**	**Descriptive**
'will'-VP	20	7
'can'-VP	7	2
'would'-VP	1	1
'might'-VP	/	1
'gonna'-VP	6	2
'have'-to-VP	3	/
'want'-NP	1	1
'want'-to-VP	1	/
'would-like'-NP	5	/
'need'-NP	5	/
'(had)-better'-VP	5	/
Manipulation verbs	**Direct (manip.)**	**Descriptive**
'let'-NP-VP	3	/
'want'-NP-VP	3	/

Perception-epistemic	**Direct (attention)**	**Descriptive**
'look'-WH/S	1	/
'look'-like-NP	/	1
'watch'-NP-VP	1	/
'show'-NP-VP	6	/
'hear'-NP	3	/
'listen' (ellipsis)	1	/
'feel'-ADJ	/	1
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**
'know'-if-S	1	/
'know'-S	3	/
'know' (ellipsis)	3	/
'remember'-WH/S	1	1
'think'-S	11	/
S, 'think'	1	/
Utterance-epistemic	**Direct**	**Descriptive**
'ask'-DAT (ellipsis)	1	/
'say'-dir.quote	1	/
total:	94 **(84.6%)**	17

2C: Distribution of child uses of modal patterns, Naomi-II

Modality verbs	**Direct (manip.)**	**Descriptive**
'will'-VP	5	/
'can'-VP	9	/
'gonna'-VP	31	4
'go-and-V' (serial)	6	/
'go'-LOC	17	/
'want'-NP	4	/
'wanna'-VP	2	/
'stop'-(VP)	4	/
'like'-NP	5	/
Manipulation verbs	**Direct (manip.)**	**Descriptive**
'let'-NP-VP	2	/
'have'-NP-VP	1	/
'make'-NP	3	/
'get'-(NP)	8	/
Perception-epistemic	**Attract-attention**	**Descriptive**
'see'-(NP)	2	/
'see'-NP-VP/S	6	/
S, 'see'	2	/
'look'-(at)-NP	18	/
'look'. S	2	/

utterance-epistemic	manipulative	descriptive
'say'-WH/S	/	1
'say'-dir. quote	/	1
total:	127 **(95.4%)**	6

2D: Distribution of adult uses of modal patterns , Naomi-II

Modality verbs	Direct (manip.)	Descriptive	
'will'-VP	7	/	
'can'-VP	5	/	
'could'-VP	2	1	
'should'-VP	2	/	
'may'-VP	1	/	
'gonna'-VP	5	1	
'have'-to-VP	3	1	
'gotta'-VP	1	/	
'want'-NP	2	/	
'want'-to-VP	7	/	
'like'-NP	/	1	
'need'-NP	1	/	
'try'-to-VP	/	1	
'come-(and)-V (serial)	1	/	
Manipulation verbs	**Direct (manip.)**	**Descriptive**	
'let'-NP-VP	9	/	
'have'-NP	/	2	
'have'-NP-VP	2	/	
'want'-NP-VP	2	/	
'make'-NP	1	1	
'make'-NP-VP	4	/	
'get'-NP-VP	/	1	
Perception-epistemic	**Direct (attention)**	**Descriptive**	**Direct (evidential)**
'see'-NP	/	1	/
'see'-NP-VP (raising)	1	/	1
'see'-WH/S	1	/	1
S. 'see'	/	/	1
'look'-at-NP	/	1	/
'show'-NP (ellipsis)	1	/	/
'hear'-(ellipsis)	/	/	1
'listen' (ellipsis)	2	/	/
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	
'know'-(ellipsis)	5	/	
S, 'know'	1	/	

'know'-WH/S	3	/	
'know'-S	1	/	
'remember-(S/WH/S)	5	/	
'think'-S	3	/	
S, 'guess'	1	/	
Utterance-epistemic	**Direct (manip.)**	**Descriptive**	
'say'-dir.quote	1	/	
'say'-NP	2	1	
'say'-WH/S	/	/	
total:	82 (+4) **(87.7%)**	12	4

2E: Distribution of child uses of modal patterns, Nina-II

Modality verbs	**Direct (manip.)**	**Descriptive**	
'will'-VP	11	1	
'can'-VP	1	/	
'gonna'-VP	6	1	
'go-and-V' (serial)	2	/	
'go'-LOC	3	2	
'go'-to-V	3	/	
'come-(and)-V (serial)	1	/	
'want'-NP	27	1	
'wanna'-VP	25	2	
'like'-NP	/	1	
Manipulation verbs			
'let'-NP-VP	17	/	
'have'-NP	/	14	
'make'-NP	2	/	
'get'-(NP)	13	/	
'get'-LOC (incho.)	5	2	
Perception-epistemic	**Direct (manip.)**	**Descriptive**	
'see'-(NP)	2	2	
'see'-S	1	/	
S. 'see'	1	/	
'look'-(at)-NP	1	/	
'show-DAT-NP	1	/	
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	**Direct (manip.)**
'know'-WH/S	2	/	/
'pretend'-S	/	/	1
'wonder'-WH/S	3	/	/
total:	127 (+1) **(83.1%)**	26	1

2F: Distribution of adult uses of modal patterns in Nina-II

Modality verbs	Direct (manip.)	Descriptive
'will'-VP	14	6
'would'-VP	1	/
'can'-VP	16	8
'may'-VP	2	/
'shall-VP	13	/
'must'-VP	/	3
'might'-VP	/	/
'have-to'-VP	7	1
'gonna'-VP	21	6
'go'-LOC/WH	/	7
'go'-(and)-V (serial)	1	/
'come'-(and)-V (serial)	1	/
'want'-NP/WH	14	1
'want'-to-VP	27	2
'would-like'-NP	2	/
'would-like'-to-VP	6	/
'like'-NP	/	4
'like'-to-VP	/	2
'need'-NP	1	/
'be-ready'-(to-VP)	2	/
'finish'-NP	1	/
'why-don't-you'-VP	1	/
Manipulation verbs	**Direct (manip.)**	**Descriptive**
'let'-NP-VP	12	/
'have'-NP	/	21
'want'-NP-VP	5	/
'would-like'-NP-VP	1	/
'make'-NP	8	/
'make'-NP-(into)-NP	2	/
'get'-NP-(NP)	6	/
'get'-LOC (incho.)	2	1
'get'-to-VP (incho.)	1	/

Perception-epistemic	Direct (attention)	Descriptive	Direct (evidential)
'see'-(NP)	14	5	3
'see'-WH/S	3	/	/
'see'-if-S	2	/	/
'see'-S	1	/	/
'look'-at-NP	1	/	/
'look'-LOC	1	/	/
'look'-WH/S	2	/	/

'look-like'-NP	/	1	/
'watch'-NP	/	1	/
'show'-DAT-(NP)	3	/	/
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	**Direct (attention)**
'know'-WH/S	2	/	/
'remember'-NP	/	/	2
'think'-S	8	/	/
S, 'think'	1	/	/
'think'-if-S	1	/	/
'understand'-(ellipsis)	/	1	/
S, 'guess'	1	/	/
'bet'-S	1	/	/
'pretend'-S	1	/	/
Utterance-epistemic	**Direct (manip.)**	**Descriptive**	
'tell'-WH/S	1	/	
'ask'-for-NP	/	1	
total:	210 (+5) **(73.4%)**	71	5

APPENDIX 3: Distribution of direct speech-act vs. descriptive use of complex modal expressions by children and adults in stage-III transcripts

3A: Distribution of child uses of modal patterns, Eve-III

Modality verbs	**Direct (manip.)**	**Descriptive**
'will'	2	2
'can'-VP	7	2
'gonna'-VP	12	2
'go'-V (serial)	4	/
'want'-NP	6	/
'want'-to-VP	1	/
'need'-NP	1	/
'have-to-VP	12	/
'like'-(ellipsis)	1	/
Manipulation verbs	**Direct (manip.)**	**Descriptive**
'let'-NP-VP	6	/
'get'-NP	4 (context)	/
'have'-NP	4 (context)	/
'make'-NP	9 (context)	/

Perception-epistemic	Direct (attention)	Descriptive	
'see'-NP	2	2	
'see'-S	2	/	
'see'-NP-VP	(raising)	5	/
'look'-NP.S	1	/	
Cognition-epistemic	**Direct (epist.quant.)**	**Descriptive**	**Direct (attention)**
'think', S	1	/	/
'guess'-S	1	/	/
'find-out'-WH/S	1	/	/
'remember'-S	/	/	1
total:	83 (+1) **(91.3%)**	8	1

3B: Distribution of adult uses of modal patterns, Eve-III

Modality verbs	Direct (manip.)	Descriptive
'will'-VP	30	9
'would'-VP	5	1
'can'-VP	15	5
'could'-VP	1	/
'may'-VP	5	/
'might'-VP	/	1
'shall'-VP	6	/
'should'-VP	7	/
'must'-VP	2	/
'have-to'-VP	7	1
''ve-got-to'-VP	1	/
'supposed-to'-VP	/	1
'go'-LOC	3 (context)	1
'gonna'-VP	9	2
'want'-NP	4	/
'want'-to-VP	3	/
'would-like'-NP	2	/
'like'-NP	/	1
'need'-NP	5	/
'try'-to-VP	1 (context)	/
'go'-(and)-V (serial)	5 (context)	/
'come'-(and)-V (serial)	1 (context)	/
'wait'-and-V (serial)	1 (context)	/
'(had)-better'-VP	2	/
'why-don't-you'-VP	5	/

Manipulation	Verbs	Direct (manip.)	Descriptive
'let'-NP-VP	3	/	
'want'-NP-VP	1	/	
'would-like-NP-to-VP	1	/	
'make'-NP	10(context)	2	
'make'-NP-VP/PRED	6 (context)	/	
'have'-NP	8 (context)	/	
'take'-NP	2 (context)	/	
'get'-NP	2 (context)	/	
Perception-epistemic	**Direct (attention)**	**Descriptive**	
'see'-NP	6	3	
'see'-if-S	1	/	
'see'-NP-VP (raising)	/	1	
'look'-(at-NP)	3	/	
'watch'-NP-VP	1	/	
'hear'	1	/	
'listen'	1	/	
'feel'-ADV	/	/	
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	**Direct (attention)**
'know'-if-S	1	/	/
'know'-S	2	/	/
S, 'know'	1	/	/
'find-out'-WH/S	/	/	1
'remember'-(WH/S)	/	/	6
'forget'-about-NP	/	1	/
'think'-S	11	/	/
'think'-(ellipsis)	1	/	/
'guess'-S	2	/	/
'be-sure'-(ellipsis)	1	/	/
Utterance-epistemic	**Manipulative**	**Descriptive**	
'say'-dir.quote	2	/	
'tell'-WH/S	/	1	
'ask'-DAT	1	/	
total:	188 (+7) **(83.5%)**	30	7

3C: Distribution of child uses of modal patterns, Naomi-III

Modality verbs	Direct (manip.)	Descriptive
'can'-VP	10	/
'could'-VP	1	/
'gonna'-VP	7	3

'go'-LOC	4	/	
'want'-NP	36	/	
'wanna'-(ellipsis)	4	/	
'wanna'-VP	21	/	
'need'-NP	3	/	
'have'-to-VP	1	/	
'like'-NP	/	6	
'finish'-(ellipsis)	/	2	
Manipulation verbs	**Direct (manip.)**	**Descriptive)**	
'let'-NP-VP	1	/	
'get'-NP			
'have'-(NP)	/	1	
'get'-NP	3	2	
'get'-LOC	(icho.)	3	
Perception-epistemic	**Direct (attention)**	**Descriptive**	**Direct (manip.)**
'see'-NP	2	/	1
'see'-(ellipsis)	1	/	2
'see'-NP-VP (raising)	1	/	/
'look'-(at)-NP	2	/	/
'look'-at-NP-VP (raising)	2	/	/
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	**Direct (attention)**
'think'-WH	2	/	/
utterance-epistemic	**direct**	**descriptive**	
'say'-WH	/	1	
total:	104 (+3) **(85.2%)**	15	3

3D: Distribution of adult uses of modal patterns, Naomi-III

Modality verbs	**Direct (anip.)**	**Descriptive**
'will'-VP	9	3
'would'-VP	/	4
'can'-VP	9	4
'could'-VP	/	2
'be-able'-to-VP	/	1
'should'-VP	1	/
'have-to'-VP	1	/
'seem-to-be'-VP	/	1
'go'-LOC	3 (context)	1
'gonna'-VP	6	19
'go'-(and)-V (serial)	1 (context)	/
'come'-(and)-V (serial)	1 (context)	/
'want'-NP	9	/

'want'-to-VP	9	1	
'need'-NP	3	/	
'need'-to-VP	1	/	
'would-like'-to-VP	1	/	
'have'-to-VP	3	/	
'like'-NP	/	7	
'finish'-(VP/NP)	/	2	
'why-don't-you'-VP	2	/	
Manipulation verbs	**Direct (manip.)**	**Descriptive**	
'let'-NP-VP	3	3	
'want'-NP-VP	7	/	
'wish'-S	1	/	
'ask'-NP(VP)	/	1	
'help'-DAT-(VP)	2	2	
'get'(DAT)-NP	5 (context)	/	
've-got'-NP	/	2	
'be-time-for'-NP-to-VP	1	/	
Perception-epistemic	**Direct (attention)**	**Descriptive**	**Epist. quantifier**
'see'-NP	/	3	1
'see'-(ellipsis)	1	1	/
'look'-(at-NP)	2	/	/
'listen', S	1	/	/
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	**Direct (attention)**
'know'-(ellipsis)	3	/	/
'know'-WH/S	4	/	/
'remember'-(WH/S)	/	/	2
'think'-S	3	/	/
'think'-(ellipsis)	1	/	/
'wonder'-WH/S	1	/	/
'mean'-dir.quote	1	/	/
Utterance-epistemic	**Direct (manip.)**	**Descriptive**	
'say'	4	4	
'tell'	1	1	
total:	98 (+3) **(61.9%)**	62	3

3E: Distribution of child uses of modal patterns, Nina-III

Modality verbs	**Direct (manip.)**	**Descriptive**
'will'-VP	5	6
'would'-VP	2	1
'can'-VP	7	3
'could'-VP	1	/

'should'-VP	2	1
'gonna'-VP	7	9
'go'-LOC	7 (context)	8
'want'-NP	5	/
'wanna'-(ellipsis)	1	/
'wanna'-VP	5	1
'like'-NP	/	/
'try'-VP	5 (context)	/
'it's time'-(for you-to-VP)	2	/
Manipulation verbs	**Direct (manip.)**	**Descriptive**
'let'-NP-VP	20	/
'have'-NP	/	5
'make'-NP	11 (context)	/
'make'-NP-VP (caus.)	1	1
'get'-NP	1 (context)	/
'get'-LOC (incho.)	/	3
Perception-epistemic	**Direct (attention)**	**Descriptive**
'see'-(ellipsis)	3	/
'see'-WH/S	1	/
'see'-S	2	/
S. 'see'	1	/
'look'-at-NP	5	/
'look'-at-NP-VP (raising)		
Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**
'know'-NP	1	/
'forget'-(ellipses)	/	1
'forget'-to-VP	/	1
'understand'-(NP)–(ellipsis)	/	2
Utterance-epistemic	**Direct (manip.)**	**Descriptive**
'say'-dir. quote	/	5
'say'-S	/	1
total:	95(**66.4%**)	48

3F: Distribution of adult uses of modal patterns, Nina-III

Modality verbs	**Direct (manip.)**	**Descriptive**
'will'-VP	4	6
'can'-VP	18	6
'could'-VP	/	1
'shall'-VP	16	/
'should'-VP	2	3
'must'-VP	/	1

'have-to'-VP	5	3
'go'-LOC	3	14
'gonna'-VP	1	22
'go-(and)-V (serial)	2	/
'go'-to-V	1	1
'come'-(ellipsis)	/	1
'want'-NP/WH	2	/
'want'-to-VP	23	2
'love'-to-VP	/	1
Modality (cont.)	**Direct (manip.)**	**Descriptive**
'would-like'-to-VP	5	/
'like'-NP	/	2
'like'-to-VP	/	4
'need'-NP/WH	/	3
'be-ready'-to-VP	/	2
'try'-NP	2	/
'try'-to-VP	1	1
'be-time'-(for-NP)-to-VP	1	/
'be-better'-VP	3	/
Manipulation verbs	**Direct (manip.)**	**Descriptive**
'let'-NP-VP	8	/
'have'-NP	/	4
'make'-NP/WH	3 (context)	2
'make-NP-VP	7	4
'get'-NP-ADJ	/	2
'take'-NP-ADJ	/	1
Perception-epistemic	**Direct (attention)**	**Descriptive**
'see'-NP	4	4
'see'-(ellipsis)	11	/
'see'-WH/S	2	/
'see'-S	2	/
'see', S	1	/
S, 'see'	1	/
'see'-if-S	1	/
'look'-(at-NP)	15	/
'look'-at-NP-VP (raising)	1	/
'look'-WH/S	4	/
WH/S, 'look'	1	/
'look'-for-NP	/	2
'look'-ADJ	/	1
'watch'-NP	/	1
'feel'-WH/S	1	/
'feel'-ADJ	/	1

Cognition-epistemic	**Direct (epist. quant.)**	**Descriptive**	**Direct (attention)**
'know'-(ellipsis)	10	/	/
'know'-WH/S	4	1	/
WH/S, 'know'	3	/	/
'remember'-NP	/	/	1
'wonder'-WH/S	3	/	/
'think'-S	22	/	/
'think'-(ellipsis)	2	/	/
WH/S-'think'	2	/	/
'guess'(-S)	2	/	/
'understand'-WH	/	1	/
'mean'-S	3	/	/
S, 'mean'	2	/	/
'pretend'-to-VP	1	/	/
'forget'-to-VP	/	1	/
Utterance-epistemic	**Direct (manip.)**	**Descriptive**	**Direct (evidential)**
'say'-dir.quote	1	/	/
'say'-WH	/	1	/
S, 'say'	/	/	1
'tell'-S	/	/	1
total:	206 (+3) **(67.8%)**	99	3

CHAPTER 8

The ontogeny of relative clauses:
How children learn to negotiate complex reference

8.1 Introduction*

8.1.1 The adaptive ecology of REL-clauses

In the preceding chapter we traced the acquisition of complex verb phrases in native English-speaking children through the age range of 1;9–2;8. The findings suggested that complex VPs are acquired relatively early, in the distinct communicative ecology that characterizes early child communication (see ch. 6). That is:

(1) **Early childhood communicative ecology**:
   a. **Speech act**: The child's, and indeed adult's, speech-acts are heavily manipulative (Carter 1974; Bates *et al*. 1975).
   b. **Domain of reference**: The child's, and indeed the adult's, referents are mostly non-displaced, both spatially and temporally.
   c. **Discourse coherence span**: The child's conversational turns, most characteristically one- or two-word long , are most commonly also one-clause long, so that the child and the adult typically alternate single-clause turns, building up multi-propositional coherence primarily *across turns* rather than within turns (Ervin-Tripp 1970; Scollon 1976; Ochs *et al.* 1979).

Within bounds, these features also characterize the adaptive ecology of pre-human communication (see ch. 12).

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*I am indebted to Holger Diessel for his stimulating study on the acquisition of complex clauses (2005); to Brian MacWhinney for making the CHILDES data-base available electronically, as well as for many helpful comments; to Cecilia Rojas for helpful discussion of her study of the acquisition of REL-clauses in Spanish; and to Bernd Heine and Tania Kuteva for the stimulating chapters 5 ands 6 of their book (2007).

The acquisition of complex VPs during this early period of child development is characterized by the following five features, the first three of which (2a,b,c) recapitulate Diessel's (2005) observations:

(2) **Manner of acquisition of complex VPs**: (Diessel 2005; see ch. 7, above)

a. Deontic modal structures are acquired before epistemic ones.

b. Direct speech-act usage, with the speaker and hearer centrally involved, is acquired before descriptive usage with 3rd person participants.

c. The main verbs are semantically grammaticalized at the early stages of acquisition, serving as deontic or epistemic modal envelope on the complement proposition.

d. The two-clause construction in the early stages is distributed across adjacent adult-child or child-adult turn, and only later gets condensed into complex syntactic constructions in the child's usage; that is, from parataxis to syntaxis.

e. The child and adult usage during the acquisition period is finely synchronized , both in terms of the type of constructions, their use frequency, and the adaptive-communicative goals that motivate the use of complex modal expressions.

Syntactically-complex VPs are thus functionally simplex during the early stages of acquisition (Tomasello & Diessel 2001; Diessel 2005). That is, the complement proposition is the semantic focus of the complex modal expression, and the main-clause verbs, such as the deontic 'want', 'can' or 'let' or the epistemic 'know', 'think', 'see', 'guess' or 'say', are used to mark the modal value of the complement proposition.

The communicative ecology of child language acquisition has shifted markedly by the time REL-clauses are acquired. To begin with, they are acquired much later. By stage III of the acquisition of complex VPs (ca. 2;8), when children use V-complement structures at a frequency approximating that of the adults, REL-clauses are virtually absent from their speech, and are also relatively infrequent in the speech of their adult interlocutors. To drive this point home, compare the text frequency of complex VPs and restrictive REL-clauses (including all large *restrictive post-nominal modifiers*) in three contiguous acquisition stages of this and the earlier study (ch. 7).[1]

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1. The child-adult communication studied here was based on the CHILDES database, courtesy of Brian MacWhinney (MacWhinney & Snow, 1985). The subjects of the previous study, stages I, II, III (ch.), were Eve, Naomi and Nina, with ca. 60 pp. of printed transcript each. The transcripts of Adam were added to Stage III. Stage IV involved Naomi, Nina and Adam, with ca. 90 pp. of printed transcripts each, and stage V Naomi and Adam with ca. 90 pp. of printed transcript each. The age range for stage III was 2;4–2;8, for stage IV ca. 3;6 and for stage V ca. 4;6.

Table 1. Text frequencies of complex VPs (CVP) vs. complex NPs (REL) (pp. 1–10 of CHILDES transcript)

	Stage											
	III (ca. 2;8)				IV (ca. 3;6)				V (ca. 4;6)			
	CHILD		ADULT		CHILD		ADULT		CHILD		ADULT	
Subject	CVP	REL	CVP	REL	CVP	REL	CVP	REL	CVP	REL	CVP	REL
EVE	10	/	32		----------				----------			
NAOMI	39	1	35	1	43	2	43	1	47	5	46	6
NINA	18	2	43	1	92	3	45	2	----------			
ADAM	9	/	24	1	39	4	19	3	48	4	30	2
total:	76	3	134	3	174	9	107	6	95	9	76	8
mean;	19	0.75	33.5	0.75	58	3	35.6	2	47.5	4.5	38	4
cvp/rel ratio:	**25:1**		**44:1**		**19:1**		**17:1**		**10:1**		**9:1**	

These distributions are instructive. First, the text frequency of complex VPs fluctuates but doesn't seem to rise any more during the period under study (2;8–4;6), neither for the child nor for the adult; it seems to have reached a plateau. In contrast, the text frequency of REL-clauses doubles or triples for both the child and the adult during this period. Consequently, the frequency ratio of the two constructions, expressed as complex VPs over complex NPs, is coming down in a remarkably similar way for the child and adult. It is highest — **25:1** for the children and **44:1** for the adults — at stage III , the last stage of our study of complex VPs and first in the study of complex NPs; ca. **20:1** at stage IV; and ca. **10:1** at stage V, a ratio that converges with the adult norm. To underscore these results, consider the frequency distribution of the two types of complex clauses in a sample of adult oral narrative.[2]

Table 2. Adult text frequencies of complex VPs (CVP) and complex NPs (REL) (first 10 pp. of transcript)

CVP	474
REL	41
CVP/REL ratio:	**11.5**

2. The comparison adult text used here was tape-recorded in 1981 when the speaker, a retired rancher, trapper, oil-field roustabout, Ol' Time fiddler and natural *renconteur*, was in his early 60s. The text counted here was taken from the transcribed chapter 3 of his yet-to-be-published life-story (see ch. 7).

Second, at the time when REL-clauses appear in child discourse, from the age of ca. 2;6 and onward to the age of 4;6 (stage-V of the present study), the three main features of the communicative ecology (1a,b,c) have already shifted markedly towards the more mature adult norm: (a) More declarative and interrogative speech-acts; (b) more displaced spatio-temporal reference; and (c) longer multi-propositional turns of coherent discourse.

Third, the adaptive context of child-adult communication has also shifted markedly between the acquisition of complex VPs (ca. 1;9-to-2;8) and the acquisition of REL-clauses (ca. 2;6-to-4;6). Deontic and epistemic complex-VP structures are acquired in the interactive context of short-turn **modal negotiations** between child and adult, where the complex structures emerge first as collaborations, shared across adjacent child-adult or adult-child turns. The proximate goals of these modal negotiations, shared by both child and adult, are:

(3) **Proximate goals of modal negotiations**:

a. **Deontic**:
"This is what I want you to do for me" (manipulation/request).
or
"What would you like me to do for you?" (solicitation/offer)

b. **Epistemic**:
"This is my certainty/verity level regarding this proposition." (assertion)
or
"What is your certainty/verity level regarding this proposition?" (inquiry)

Child-adult discourse at the developmental stages when REL-clauses are acquired is still profoundly interactive, but the child's conversational turns have become increasingly multi-propositional (1c). And the interactive context within which adult and child REL-clauses are produced may be characterized as **referential negotiations**, with the aim of establishing common reference. The proximate goals of such negotiations are strictly epistemic, and are reminiscent of the much-earlier developmental stage of establishing **joint attention**. In the earlier stage of referential negotiations (4a), the most relevant communicative context is the **shared speech situation**. In the later stage (4b), it becomes, increasingly, the **shared current discourse**.

(4) **Proximate goals of referential negotiations**:

a. **Joint attention (earlier):**
"How can I make sure that you and I are *attending to* the same referent?"

b. **Common referent (later):**
"How can I make sure that you and I are *talking about* the same referent?"

In other words, the proximate communicative goals motivating the acquisition of REL-clauses have to do with the grammar of referent tracking (or referential coherence).

The acquisition of the two types of complex-embedded clauses thus seems to differ along multiple dimensions:

- age of acquisition
- communicative ecology during acquisition
- manner of acquisition
- proximate communicative goals that drive the acquisition process.
- usage frequency

They also differ in the ultimate syntactic product they yield. Complex VPs, due to grammaticalization of main verbs into modal operators, often display full **clause-union**, yielding morphologically-complex **verbs.** Complex NPs most typically do not result in clause-union. And when ending in lexicalization, they yield complex **nouns**.

The syntactic difference between the two complex constructions may be illustrated by their differential sensitivity to zero co-reference and 'extraction' tests. Thus, compare the behavior of switch-subject V-complements in (5b–e) below with that of the switch-subject REL-clause in (5f), all in the same double embedding syntactic context:

(5) a. **Single embedding**: the letter that [she sent [**0**]] …
b. **Manipulation COM**: the letter that [I forced her [to send [**0**]]] …
c. **Cognition COMP**: the letter that [I thought [she sent [**0**]]] …
d. **Utterance COMP**: the letter that [they told me [she sent [**0**]]] …
e. **Perception COMP**: the letter that [I heard [she sent [**0**]]]..
f. **REL-clause**: *the letter that [I saw the woman [who sent [**0**]]] …

Complex VPs thus behave syntactically like single clauses, while complex NPs behave like two clauses (Ross 1967).

All these differences, taken together, raise a fundamental question: Is **recursivity** as defined formally by Simon (1962), Chomsky (1957) or Hauser *et al.* (2002) a meaningful concept, or does it fall out of two distinct processes of grammatical evolution? We will return to this question later on.

8.1.2 The grammar referent tracking

About half of the grammatical machinery of any language is dedicated to referent tracking: Determiners, syntactic case markers, pronouns and anaphoric zeros, REL-clauses, pragmatic voice constructions, topic and focus constructions, presentative devices, WH-questions and switch-reference devices (Givón 2001). The adaptive-communicative niche of REL-clauses must be thus viewed within the

wider context of the grammar of **referential coherence** (Givón ed. 1983b; Givón 1992, 1995; ch. 8; 2005, ch. 5). Example (6) below, repeated from ch. 2, is but a brief illustration of the more general dimensions of this complex grammar-coded domain, and of the specific niche REL-clauses occupy within it. Consider the mid-discourse narrative in:

(6) a. There was **this** man [standing near the bar],
b. but we ignored **him** and went on across the room,
c. where **another man** was playing the pinball machine.
d. **I** sat down and ordered a beer.
e. **The bar tender** took his time,
f. Guess **he** was busy.
g. So **we** just sat there waiting,
h. when all of a sudden **the man** [**standing next to the bar**] got up and started screaming.

In coding 'man', introduced for the first time in (6a), with the referring-topical indefinite marker 'this', the speaker cues the hearer first that s/he doesn't expect him/her to have an **episodic-memory** trace of the referent. Since the marker is 'this' rather than 'a', the speaker is also alerting the hearer that the newly-introduced referent is topical, likely to recur in the subsequent discourse, and thus must be marked as such in the **new episodic memory** structure that the hearer is in the midst of constructing. In coding the same referent with the anaphoric pronoun 'him' in (6b), the speaker assumes that the referent is not only accessible, but is still **currently activated**, i.e., still under **focal attention**.

Another referent is introduced for the first time in (6c), this time with the indefinite marker 'another'. In using of the first-person pronoun 'we' in (6d), next, the speaker assumes that his/her own referential identity is accessible to the hearer from the **immediate speech situation,** i.e., available in **working memory**. 'The bar tender' is introduced for the first time in (6e) — but marked as definite. This is possible because the prior discourse had activated 'bar', which then remains activated by the persistence of the narrated situation. And 'bar tender' is an automatically-activated connected node of the **lexical-cultural frame** 'bar', already encoded in **semantic memory**. In continuing with the anaphoric pronoun 'he' in (6f), the speaker again assumes that the referent is both accessible to the hearer and currently activated, i.e., still under **focal attention**. And in using the first-person pronoun 'I' in (6g), the speaker assumes that his own identity is still accessible to the hearer from the **immediate speech situation**, held in **working memory**.

Finally, the man introduced earlier in (6a,b) and then absent for five intervening clauses, is re-introduced in (6h). The use of a definite article suggests that the speaker assumes that this referent is still accessible in the hearer's **episodic memory.**

However, the hearer's memory search is not going to be simple. Another man had been mentioned in the interim in (6c), described as 'was playing the pinball machine'. Both referents are assumed to still be accessible in the hearer's **episodic memory**, and would thus compete for the simple definite description 'the man'. To differentiate between the two, a *restrictive relative clause* is used, matching 'standing next to the bar' in (6h) with the restrictive REL-clause 'standing near the bar' in (6a). In using this grammatical cue, the speaker reveals his/her assumption that the hearer still has an episodic trace of both the referent and the proposition in (6a).

The two restrictive REL-clauses used in (6) above reveals three important communicative uses of this construction:

- **Presentative**: To give salient information about topical referents upon their first introduction into the discourse (6a).
- **Long-range retrieval**: To help the hearer search in their episodic memory and retrieve a previously-introduced important referent when it is re-introduced into the discourse after a considerable gap of absence (6h).
- **Referential competition**: When the preceding discourse, and thus presumably its episodic trace, contains other lexically-similar referents that may compete with the intended referent (6h).

As we shall see below, the range of communicative functions coded by REL-clauses in both child and adult discourse is somewhat broader.

8.2 Texts and subjects

The previous study of the acquisition of complex VPs (ch. 7) used three English speaking children — Eve, Naomi and Nina — from the CHILDES data-base (MacWhinney & Snow, 1985). The age range there was ca. 1;9–2;8. For each child, the period was divided into three stages (I, II, III), by intuitively surveying the type and frequency of complex VPs produced.

In the present study, we began with stage III (ca. 2;6–2;8) of the previous study, and then added two more stages, one ca. 3;6 (IV) and one ca. 4;6 (V). In stage IV, we lost Eve, so we added Adam in stages III, IV, V to maintain continuity. In stage V we lost Nina. We thus had 4 children for stage III, 3 for stage IV and 2 for stage V.[3] For each child at stage III, we studied ca. 60 pp. of printed CHILDES transcript. For each child at stages IV and V we studied ca. 90 pp. of printed CHILDES transcripts. Whenever the absolute text-density was important, we express the results in terms of a uniform baseline, e.g., per number of pages.

3. Nina's transcripts did not continue beyond our stage IV, so her stage IV was counted as stage V.

8.3 REL-clause types in the CHILDES texts

8.3.1 What counts as a REL-clause?

It is relatively easy to define in structural terms what counts as a restrictive REL-clause in adult English (e.g., Givón 1993b, ch. 9), and such criteria were applied in Diessel's (2005) study. But do children acquire adult-type REL-clauses right away, or are there precursors that don't look like full-fledged adult relative clauses but perform the same communicative function? For the purpose of this study, I decided to be more inclusive and consider all large restrictive post-nominal modifiers (RPN modifiers) that can be paraphrased, without stretching the meaning too much, by a REL-clause. This pulls in an array of structures that either have no verb or have no REL-pronoun but, within bounds, are functional equivalents of restrictive REL-clauses in both children and adults.

The following are the categories of restrictive post-nominal modifiers that were considered. Adult-produced examples were used only when no child-produced examples were found in the transcripts.

(7) **Structural classification of restrictive post-nominal modifiers**

a. **HEADED REL-clauses:**
   i. **Subject:** 'The pretty thing **that's on the floor**'. (Naomi-V, p. 22)
   ii. **Dir. Object:** 'That's all **I wanna say**'. (Naomi-V, p. 22)
   iii. **Ind. object:** 'And everything **they go on** tick-tock[s]'. (Adam-IV, p. 16)
   iv. **PART (subj.):** 'Once there was a [???] **sitting on the back of …**' (Naomi-V, p. 20)
   v. **PASS (subj.):** 'Something **made out of clay**'. (Nina-IV, adult, p. 13)

b. **HEADLESS REL-clauses:**
   i. **Subject (of passive):** 'So you can tape **what's left**'. (Naomi-V, adult, p. 22)
   ii. **Dir. object:** 'I hope I'll get **what I said**'. (Nina-V, p. 19)
   iii. **Indir./Locative:** 'Here's **where the cat goes**'. (Nina-V, p. 23)
   iv. **Predicate:** 'Gas is **what makes my car run**'. (Nina-III, adult, p. 5)
   v. **Reason:** 'That's **why they had to squeeze out**'. (Nina-V, p. 19)

vi. **Extent:** 'Hey, is that **how far it goes?**' (Nina-V, p. 21)
vii. **Manner:** 'That's **how you unbutton them**'. (Nina-IV, adult, p. 13–14).

c. **INFINITIVE REL-clauses:**
   i. **Subject:** 'Where's the bottom to **go in these panties?**' (Naomi-IV, adult, p. 10)
   ii. **Dir. object:** 'Oh, so many things **to remember** …' (Naomi-V, adult, p. 29)
   iii. **Indir. object:** 'I want something **to play with**'. (Adam-IV, p. 15)

d. **VERBLESS restrictive modifiers:**
   i. **Possessive:** 'I scratched it on the metal **of your bedroom study**'. (Nina-V, p. 20)
   ii. **Prepositional:** 'A bear **just like mine**'. (Adam-IV, p. 17)
   'I got all the books **from my the other school** …' (Naomi-IV, p. 8)

e. **CLEFT:** 'It's Rusty **who has fingers**'. (Adam-III, adult, p. 31)

The numerical distribution of the five main types of REL-clauses in the child and adult usage, in the three developmental stages studied here are summarized in tables 3–5 below.

Table 3. Distribution of post-nominal restrictive modifier types: Stage III (ca. age 2;6–2;8)

	SUBJECT									
	EVE		NAOMI		NINA		ADAM			
TYPE:	CHI	ADU	CHI	ADU	CHI	ADU	CHI	ADU	TOT/C	TOT/A
REL	/	1	/	8	/	3	1	2	1	14
INF	/	/	/	/	2	1	/	/	2	1
H-LESS	/	/	/	4	/	2	/	3	/	9
V-LESS	1	/	/	/	5	4	2	/	9	4
CLEFT	/	/	/	/	/	/	/	1	/	1
TOTAL	1	1	/	12	7	10	3	6	12	28

One may express the overall text frequency of the various REL-clause, including the various RPN modifiers, in the child and adult at this early stage on a per-page basis, yielding:

- Child: 12/4 subj = 3 per subject per 60 pp. = **0.05** page of transcript
- Adult: 28/4 subj = 7.0 per subject per 60 pp. = **0.11**/page of transcript

Table 4. Distribution of modifier types: Stage IV (ca. age 3; 6)

	SUBJECT							
	NAOMI		NINA		ADAM			
TYPE:	CHI	ADU	CHI	ADU	CHI	ADU	TOT/C	TOT/A
REL	4	11	10	10	9	7	23	28
INF	1	5	1	2	3	/	5	7
H-LESS	2	2	1	1	/	4	3	7
V-LESS	2	3	2	12	4	6	8	21
TOTAL:	9	21	14	25	16	17	39	63

The overall text frequencies at this stage, expressed again on a per-page basis, are:

- **Child**: 39/3 subj = 13 per subj. per 90 pp. = **0.144** per page of transcript
- **Adult**: 63/3 subj. = 21 per subj per/90 pp. = **0.233** per page of transcript

Table 5. Distribution of modifier types: Stage V (ca. age 4;6)

	SUBJECT					
	NAOMI		ADAM			
TYPE:	CHI	ADU	CHI	ADU	TOT/C	TOT/A
REL	8	13	4	4	12	17
INF	/	/	2	1	0	3
H-LESS	11	8	7	1	18	9
V-LESS	1	2	5	2	6	4
TOTAL:	20	23	18	8	36	33

The overall text frequencies at this stage, again expressed on a per-page basis, is:

- **Child**: 36/2 subj. = 17.5 per subject per 90 pp. = **0.194** per page of transcript
- **Adult**: 33/2 subj = 16.5 per subject per 90 pp. = **0.183** per page of transcript

When these text frequencies are plotted together for the three stages and then expressed as a child-over-adult ratio, as in Table 6, below, they yield a vivid demonstration of how the child catches up with the adult in the use-frequency of REL-clauses.

Table 6. Text frequency of all post-nominal restrictive modifiers (per page of transcript)

	STAGE		
	III	IV	V
CHILD:	0.05	0.14	0.194
ADULT:	0.11	0.233	0.183
CH/AD RATIO:	**0.45**	**0.6**	**1.06**

What is also striking about these distributions is that the adult text frequencies are relatively low. That is, however important the adaptive-communicative function(s) of REL-clauses may be in referent tracking, they don't seem to be urgently needed in the type of child-adult communication seen in our transcripts. Alternatively, such function(s) may be performed by alternative, perhaps paratactic, means.

Some assessment of these two alternatives may be furnished by noting that in the adult oral narrative cited earlier (Table 2, above), the text frequency of REL-clauses was 41 per10 pages or **4.1**/page — roughly 20 times the frequency in stage V transcripts. However, the printed CHILDES transcript page has much fewer words (ca. 52/page) than the typed adult narrative we used for comparison (ca. 640/page), yielding a word-density ratio of 640/52 = **12.3**. This figure can now be used to multiply the per-page frequency of ca. 0.2/page for both adults and children in the CHILDES transcripts, yielding a comparable figure of **2.4** REL-clauses per comparable page of text vs. the adult oral narrative of **4.1** REL-clauses per page. This is obviously a very rough approximation, especially that the word-per-page count in the CHILDES text is a combined child-adult figure. Nonetheless, in a rough way this suggests that the text frequency of adults and children at stage V of our transcripts does not deviate all that much from some general adult oral norm.

The difference in REL-clause usage frequencies — 2.4 vs. 4.1 — may be ascribed to the fact that the CHILDES texts are of rapid-exchange, highly collaborative *conversations*, while the adult oral text is a single-perspective *narrative*. In the latter, no referential negotiations apply, and perhaps fewer alternative referent-tracking devices are used.

Given that the three main communicative functions of REL-clauses — resentative, long absence, and referential competition — are all cognitively more complex than simple referential continuity, it would perhaps make sense that the frequency of REL-clauses in narrative should be higher than in highly collaborative conversation.

8.4 The communicative use of restrictive post-nominal modifiers: Qualitative analysis

8.4.1 Early stage (III; ca. 2;6–2;8)

Diessel (2005) suggested that the existential-presentative use of REL-clauses was the earliest one to appear in English-speaking children in the CHILDES data-base. And further, that such constructions are simple clauses syntactically, due to the grammaticalization of the verb 'be'. The data analyzed in this study does not bear out Diessel's analysis, even though there is a considerable overlap in the actual children studied (Naomi, Nina, Adam). Part of this is of course due to our definition of what is a REL-clause, admittedly more inclusive.

At stage III (ca. 2;6–2;8; Table 3 above), where our study started, there was only one post-nominal restrictive REL-clause produced by a child (Adam), and it is not an existential-presentative but rather a pronoun-less, 'be'-less *participial* REL-clause. True, it does introduce a new participant (indefinite), after a fashion. Though not with the verb 'be', but with 'look':

(8) URS: What do you have, Adam?
ADA: Looking for bear **sleeping**. (Adam III, p. 15)

The most frequent type of RPN modifier produced by the four children at this stage (III) is the *verbless* one, with 9 out of the total of 13 (2 by Eve, 2 by Adam, 5 by Nina). Eve's use is perhaps marginal:

(9) EVE: My glass.
MOT: Your glass?
EVE: Yep.
MOT: Which glass? Your [???] glass?
EVE: Yes. **With the ice cubes in it.** (Eve III, p. 3–4)

One of Eve's two uses of PP verbless modifiers in (9) is embedded inside the other. The first ('With the ice cubes') is *headless* and qualifies 'glass' in the directly preceding discourse. The second ('in it') modifies 'ice cubes'. The referential negotiation, and the communicative use of restrictive modifiers here, involve the sub-function of *referential competition*.

Consider next Nina's stage-III use of restrictive verbless PP modifiers:

(10) a. MOT: That's a pretty pretty dolly.
NIN: Yes, she has a blouse **like that dolly**.
She has a skirt **like that dolly**. (Nina III, p. 42)

b. NIN: What are these things?
MOT: That's a tree.
NIN: What, what are those things **on the tree**? (Nina III, p. 36)

The two uses of the PP modifier in (10a) may be termed *presentative*. But in (10b) the PP modifies a demonstrative-marked noun accessible in the speech situation, not exactly a classical presentative.

Likewise, Nina's use of a post-nominal restrictive adjective in (11) below again modifies a demonstrative-marked noun visible on the scene:

(11) MOT: I like rabbits, don't you?
NIN: Yup. I like them. Like this one **the red**.
MOT: You like red rabbits?
NIN: Yup. (Nina III, p. 32)

Nina's last two uses of restrictive post-nominal modifiers in (12) below, both of infinitival REL-clauses, indeed modify indefinite referents — but *non-referring* ones, again hardly a classical presentative:

(12) [context: Pretend phone conversation with uncle Frank.]
NIN: Hi, Frankie is there something for me **to play with**?
MOT: What did he say?
NIN: He said he had something **to play with** for me. (Nin III, p. 4)

At this early stage, it appears, children use various RPN modifiers, most of them not classical adult-like REL-clauses, in communicative functions that are fully parallel to the use of restrictive REL-clauses. One of those is the presentative, but it is hardly predominant. And neither is the re-introduction of a referent with a previously-established episodic trace following a considerable absence.

If one could single out any communicative function as more prevalent in the child usage at this early stage, it is probably the context of **referential competition**, often involving referents in the immediate speech situations. This is of course hardly an accident, since the referential universe of child-adult communication at this early stage is still predominated by referents that are accessible in the immediate speech situation (see ch. 7 above, as well section 5.1. and Table 9, below).

Probably the most striking fact about the use of restrictive modifiers in our transcripts, at all three stages, is how they appear in the highly interactive context of **referential negotiations**. This is just as striking in the adult usage, which is syntactically more sophisticated but still embedded in the same referential negotiations. Thus consider the two negotiations in (13) below, where the child's incomprehension of the complex clauses forces the adult to simplify:

(13) a. EVE: Hi, Fraser, what's that?
MOT: What? That's Sara's new toy **that she got in the mail this morning**?
EVE: Eh? [incomprehension]
MOT: Sarah's new toy. [giving up on complexity] (Eve III, p. 28)

b. EVE: What's that?
MOT: That's a card **I was going to send to those people who had a baby**.
NAO: Had a baby?
MOT: Yeah.
NAO: [???].
MOT: That's okay.
NAO: A little baby. Baby.

MOT: Yeah, I was going to send that to the people **who had the baby**.
NAO: It's for Nomi?
MOT: No, it's for another baby, honey. (Naomi III, p. 2)

8.4.2 Intermediate stage (IV; ca. age 3;6)

At our intermediate stage (IV; see Table 4 above), bona-fide REL-clauses begin to predominate the child usage — **23 out of 40**, with verbless RPN modifiers a distant second at **8 out of 40.** Headless REL-clauses make their first appearance in the child's usage, at **4 out of 40.**

Consider first the use of bona fide REL-clauses. In (14) below, Naomi is looking for a cover to change diapers on her doll. Her use of the definite 'the cover' is not licensed by any previous mention, prompting her mother to ask for clarification, which is then supplied by a REL-clause that is paratactically detached from its main clause, two turns earlier.

(14) NAO: Baby sit there and I'm gonna change you. Up there.
I can't find the cover.
MOT: What cover?
NAO: The cover **that I'm looking for**. (Naomi IV, p. 8)

In (15) below, Naomi first produces the verbless restrictive PP to narrow the domain of 'book', discussed earlier; that is, there already is an established *episodic trace*. Then she uses two object REL-clauses in succession, both modifying definite objects visible at the scene — indeed identified first by a demonstrative. The second use is paratactic (unembedded), an NP detached from its main clause ('These are …'):

(15) MOT: You have to do the work in the book?
Okay, well I will tell you, let's see …
NAO: I got all the books **from my other school**,
so I have to sit down and …
MOT: Okay.
NAO: Read these. All these. These are all the books **I have**.
And all the puzzles **I have**.
MOT: All the puzzles **you have**? (Naomi IV, p. 14)

In (16) below, Naomi uses a 'be-less' participial REL-clause to describe a referent visible on the scene, in a book the two interlocutors are reading together. While 'girl' is referring-indefinite, Naomi's usage is not a classical presentative, since the indefinite referent is equally accessible to both interlocutors, in the book they are reading. At best, one may term this use *descriptive*, and the modified NP is again paratactically detached from its main clause:

(16) MOT: Here's a mommy. A big mommy.
NAO: Yup. With gir g g girl **standing by her**.
MOT: And the mommy has a bib … What does she have on?
NAO: Apron. (Naomi IV, p. 26)

In example (17) below, a 'be-less' passive-subject REL-clause is used in a contrastive context, perhaps involving *referential competition*, and again the modified NP is paratactically detached from its main clause:

(17) MOT: You're gonna hold *me*?
NIN: No, this lady **named Florence**. (Nina IV, p. 6)

In (18) below, the REL-clause again modifies a noun visible to both interlocutors (in a book they are reading), and the usage seems to be again *descriptive:*

(18) MOT: What's that?
NIN: That's the kind of food **that they eat**.
MOT: You mean pancakes?
NIN: Yeah [???] pancakes. (Nina IV, p. 20)

The two examples in (19) below seem to involve, at least in part, reference to a previously shared experience, thus presumably with an *episodic trace*. In both cases, the modified NP is paratactically detached from its main clause:

(19) a. MOT: Why don't you find a home for all of them?
Put them in their homes and take care of them.
NIN: All the animals **that belong** …
All the animals **that we were playing with**, Mommy.
(Nina IV, p. 65)

b. NIN: Yup, so the people could go in.
MOT: Have you seen them around?
NIN: Mommy. I want the same people **that were at the doll, that were at the doll**.
MOT: You saw some … Did you play with the doll house yesterday? (Nina IV, p. 70–71)

The last example, (20) below, is a complex referential negotiation where both child and adult resort to restrictive post-nominal modifiers. The first, a subject REL-clause produced by the child, is paratactically detached from its main clause:

(20) MOT: What **park** should we go to?
NIN: To the merry … To the park **that has the animals**.
MOT: Which one is that?
NIN: [???].

MOT: Which one?
NIN: The [???].
MOT: The big one. How about the little park **that's near the school**? Would you like that? What's there?
NIN: Uh, a, a lions.
MOT: No. Oh, you mean at the park **near here with those animals on the springs**?
NIN: Yeah. (Nina IV, p. 80–81)

What we see in the stage-IV data so far is an expansion of the functional range of REL-clauses used by the child. Once again, the presentative use is not particularly prominent. In fact, in the entire 3-children transcripts of stage IV, only one example of a classical presentative form could be identified, again in a context where the referents are visible on the scene:

(21) [context: a long stretch of playing with toys]
ADA: A jeep. I goin' put some in the jeep.
There['s] a man **driving** and need somebody …
And this [is] somebody **sitting in the back**.
I putting things in the jeep.
MOT: Oh. I see. (Adam IV, p. 79)

The other REL-clause form that makes its appearance for the first time in stage IV is the *headless REL-clause* headed by a WH word. There are 3 child uses and 7 adult uses of this construction in out stage-IV transcripts. Let us consider first the adult uses:

(22) a. MOT: Which one's the hokey-pokey book?
NAO: I'll show you. This one.
MOT: Oh, I didn't know that was **what that was called**.
Oh, The Pokey Little Puppy. (Naomi IV, p. 19)

b. NAO: More snacks please.
FAT: Are you all finished with all those?
MOT: She's had her next to the last one.
FAT: Nomi, **what you need** is a napkin, don't you?
NAO: Where are the rest of them? (Naomi IV, p. 56)

c. NIN: How do you take these buttons off?
MOT: You unbutton them.
NIN: I can't.
MOT: There we go. That's **how you unbutton them**.
(Nina IV, p. 13–14)

d. MOT: What did he find on his head?
ADA: Is that bead?
MOT: No, that's **where the acorn hit him**, and he went to tell the king.
ADA: Tell you falling from a tree. (Adam IV, p. 12)

e. ADA: What are these?
MOT: That's **what you call chalk**.
ADA: Chalk for putting in the mouth?
MOT: No, not for putting in the mouth. (Adam IV, p. 20)

f. ADA: I bringing it**.**
MOT: No, you don't have **what I ordered.**
ADA: What I 'posed to have?
MOT: I said four quarts of milk. Where's the milk? (Adam IV, p. 34)

g. ADA: What's that?
MOT: That's **where you keep your milk**.
I'd like two quarts of milk, please. (Adam IV, p. 43)

All 7 examples are contrastive, involving **referential conflict**, arguments or misunderstandings about the referent. Of those, 6 are predicate constructions — one a pseudo-cleft, the remaining five with a contrastive-stressed 'that' as the subject. The sole non-predicate form (22f) is still contrastive. The three child-produced examples are given in (23) below.

(23) a. NAO: Just whisper.
MOT: Whisper. Because he's crabby?
NAO: Yep. That's **why he should take a long long … long nap**.
MOT: Okay. (Naomi IV, p. 18)

b. MOT: So he didn't understand you.
NAO: Go insi[de]. He wanted to walk around the house.
And. Go right there and. Stand up there and go to sleep.
MOT: Oh.
NAO: That's **why he didn't want** [**to**] **talk.** (Naomi IV, p. 62)

c. NIN: **Go to sleep**.
MOT: **Where** am I going to sleep?
NIN: Right here next to the dolly.
That [is] **where you gonna go to sleep**. (Nina IV, p. 6)

They are all contrastive, all with a stressed 'that' as their subject.

In sum, the children at this stage show an expansion of the syntactic form of the RPN modifiers, with two more-standard REL-clause forms taking over, one with multiple functions, the other restricted to contrast or *referential conflict*. The children of course continue to use infinitival and verbless forms, but their functional load diminishes and is gradually transferred to the more standard REL-clause forms.

8.4.3 Late stage (V; ca. age 4;6)

Out of the 35 RPN modifiers produced by the two children studied for stage V (Table 5, above), 12 are standard adult-type REL-clause forms and 18 are headless REL-clauses. Only 6 are verbless forms; and no infinitival REL-clauses were found in the sample. Of the 33 adult-produced RPN modifiers, 17 are standard forms, 9 headless, 4 verbless and 3 infinitival. The child and adult distributions are broadly similar.

Of the 18 child-produced headless REL-clauses, fully 15 have the stressed 'that' as their subject, in what appears to have become the standard contrastive form. The other 3 are used in analogous context of *referential conflict* or *uncertainty*. Thus:

(24) a. FAT: An opossum. He's got holes in his ears, doesn't he?
NAO: [???] squeak anymore.
FAT: [???].
NAO: I hope I'll get **what I said**.
FAT: Oh yeah, **what you said** will be on there.
NAO: It really is. (Naomi V, p. 2)

b. NAO: I don't want to go to summer camp.
FAT: Why now?
NAO: Because I have to do **what the teacher says I have to do** and I don't like to do that.
FAT: What sort of things don't you like to do? (Naomi V, p. 6)

c. MOT: It looks like you're there?
ADA: Yeah.
MOT: What does that mean?
ADA: That mean **what I see on television**.
MOT: Oh, **what you see on television**. (Adam V, p. 11–12)

8.5 The communicative ecology of REL-clause acquisition: Quantitative analysis

In this section I will try to characterize the changes in communicative ecology that form, leastwise in my judgement, the adaptive foundation for the use of restrictive post-nominal modifiers. This assessment is not always easy, given the nature of the transcripts and the extreme context-dependency required in making some of the determinations. The marking frequency of many grammatical sub-systems at this stage is still rather low, and the conversational style of both the child and adult is highly elliptic.

8.5.1 Displaced referents

In the preceding chapter we assessed the distribution of 1st and 2nd person (SAP) vs. 3rd person subjects of modal expressions during the acquisition of modal expressions (stages I, II, III; ca. 1;9–2;8). The data illustrated vividly the extreme **egocentricity** of communication during these early stages, albeit only with respect to the selection of subjects of complex VPs (i.e., the controllers of modal attitudes). A compressed summary of those results, for both child and adult interlocutors, is given in Table 7, below.

Table 7. Percent of 1st/2nd vs. 3rd person subjects of complex VPs in stages I, II, III (summary)

	DEONTIC				EPISTEMIC			
	CHILD		ADULT		CHILD		ADULT	
STAGE	1–2	3	1–2	3	1–2	3	1–2	3
I	**97%**	3%	**92%**	6%	63%	**37%**	40%	**60%**
II	**92%**	8%	**92%**	8%	67%	**33%**	69%	**31%**
III	**83%**	17%	**85%**	15%	63%	**37%**	71%	**29%**

With one exceptional adult (the mother in Nina-I, epistemic), both the adults and children showed a predominant use of 1st/2nd subjects (83%–97%) in deontic-modal constructions, and a much higher percentage of 3rd person subjects in epistemic-modal constructions (29%–37%). A slight shift toward 3rd person subjects of deontic-modal expressions in stage III is perhaps visible (83%–85%).

What may be more relevant for the acquisition of REL-clauses is that RPN modifiers and restrictive modifiers in general are not commonly used with three types of referents:

- speaker-hearer pronouns (or proper names), accessible in the *speech situation*.
- 3rd person referents visible in the *speech situation*.
- anaphoric-pronouns or zero-marked 3rd person referents still under the scope of focal attention or working memory (immediate repetition).

What I tried to measure next, therefore, is the frequency distribution of 3rd person referents that are *not* accessible in either the speech situation or current attention/working-memory. For this purpose, I divided accessible vs. inaccessible referents, counting the first 10 pp. of the CHILDES transcripts of stages I (ca. 2;0), III (ca. 2;8) and V (ca. 4;6). The rough numerical results are given first in Table 8, below.

Table 8. Accessible vs. inaccessible referents (raw figures in pp. 1–10 of transcripts)

	ACCESSIBLE				INACCESSIBLE							
	SUBJ.		OBJ		SUBJ		OBJ-n/ref		OBJ-ref		TOTAL	
SUBJECT	N	%	N	%	N	%	N	%	N	%	N	%
EVE-I	109		55		/		6		/		170	100.0
NAOMI-I	106		14		/		2		/		122	100.0
NINA-I	132		29		/		3		/		164	100.0
TOTAL-I:	347		98		/		11		/		456	100.0
EVE-III	64		17		10		18		10		119	100.0
NAOMI-III	129		42		7		26		18		222	100.0
NINA-III	121		72		15		14		8		230	100.0
ADAM-III	135		54		19		7		6		221	100.0
TOTAL-III:	449		185		51		65		42		792	100.0
NAOMI-V	87		24		65		13		40		207	100.0
NINA-IV	177		80		11		20		44		332	100.0
ADAM-V	139		65		/		13		19		236	100.0
TOTAL-V:	403		169		76		46		103		797	100.0

From Table 8, we can compute the percent of inaccessible referents for each child at each developmental stage, collapsing together the grammatical sub-categories (subject/object, referring/non-referring). The results of this computation are given in Table 9 below

Table 9. Percent of inaccessible referents

STAGE					
I		III		V	
EVE-I	3.5	EVE-III	31.9	----------	
NAOMI-I	1.6	NAOMI-III	18.4	NAOMI-V	57.0
NINA-I	1.8	NINA-III	16.0	NINA-IV	21.3
----------		ADAM-III	14.4	ADAM-V	13.1

The results reveal considerable variation, due first to the small text sample (10 pp.), given the considerable within-text variation of discourse topics. Considerable cross-subject variation is also due to the imprecise assessment of the developmental stage.[4] While these results cannot be subjected to inferential statistics, a clear jump in the percentage of inaccessible referents seems to occur in all children between stage I and III, where RPN modifiers make their first appearance. For two of the three children there is also a large jump from stage III to stage V. When the results for all the children are collapsed together, the following overall pattern emerges:

Table 10. Overall percent of inaccessible referents

STAGE	Distribution	Percent
I :	11/456	**2.4 %**
III:	158/792	**19.9 %**
V:	225/797	**28.2 %**

8.5.2 Displaced temporality

One major use of restrictive REL-clauses in adults is to bring back into the discourse — i.e, into *attention focus* — referents that have been mentioned earlier, or ones that may have been discussed or known sometime in the past, and that the speaker assumes are still accessible in the hearer's *episodic memory* (Givón 1992). In early childhood, when communication is centered on the here-and-now, there is scant need for such grammatical devices. It is thus of interest to see how the temporal reference used by the children shifts from the almost absolute anchoring in the *speech situation* (present, progressive) characteristic of early childhood, to a more *displaced temporality* of past, future or habitual.

4. The methodology depends heavily on the analysis of the immediate context, i.e., preceding and following turns of both child and adult, to indicate the intended temporality of the oft-unmarked and immensely elliptic child utterances.

Tables 11, 12 and 13 below summarize the frequency distribution of temporal reference in the children's discourse at stages I, III and V, respectively. The 'here-and-now' category collapses the *progressive*, *present* and *immediate future*, with the latter taking in all direct manipulative speech-acts. For the methodology of making such determinations at a stage where the grammar of tense-aspect-modality is often unmarked, as well as the notion of 'clause' in early child discourse, see ch. 7.

Table 11. Temporal displacement — stage I (pp. 1–30 of transcript)

	HERE & NOW		DISPLACED								
	PR/PR/IMM		HAB		PAST		FUT		TOT		TOT
	N	%	N	%	N	%	N	%	N	%	N
EVE	228	**97.0**	/	/	7		/	/	7	**3.0**	235
NAOMI	257	**98.8**	/	/	2		1		3	**1.2**	260
NINA	340	**100.0**	/	/	/		/	/	/	/	340
TOTAL:	825	**98.8**	/	/	9		1		10	**1.2**	835

Table 12. Temporal displacement — stage III (pp. 1–30 of transcript)

	NOW & IMM		DISPLACED								
	PR/PR/IMM		HAB		PAST		FUT		TOT		TOT
	N	%	N	%	N	%	N	%	N	%	N
EVE	163	**83.5**	4		20		8		32	**16.5**	195
NAOMI	211	**67.8**	8		73		19		100	**32.2**	311
NINA	281	**76.5**	26		41		19		86	**23.5**	367
ADAM	372	**87.3**	11		43		/		54	**12.7**	426
TOTAL:	1,027	**79.0**	49		177		46		272	**21.0**	1,299

Table 13. Temporal displacement — stage IV (pp. 1–30 of transcript)

	NOW & IMM		DISPLACED								
	PR/PR/IMM		HAB		PAST		FUT		TOT		TOT
	N	%	N	%	N	%	N	%	N	%	N
NAOMI	213	**55.0**	18		148		8		174	**45.0**	387
NINA(IV)	308	**64.0**	13		60		100		173	**36.0**	481
ADAM	248	**74.4**	50		22		13		85	**25.6**	333
TOTAL:	769	**64.0**	81		230		121		432	**36.0**	1,201

The results, while not amenable to inferential statistics, are striking. At stage-I of our study (ca. 1;9–1;11), the children anchor virtually all their clauses in the here-and-now of the current speech situation. Only an average of **1.2%** of their temporal reference is displaced. At stage III (ca. 2;6–2;8), where the children are just beginning to produce restrictive RPN modifiers, the average has risen to **21.0%.** And at stage V (ca. 4;6), the final one in our study, the average was **36.0%**. While one cannot claim a direct causal link, it is fairly clear that REL-clauses are acquired by children during the time when they begin to communicate about events and states that are not anchored in the here-and-now of the current speech situation.

8.5.3 Length of coherent clause-chains inside single turns

Another characteristic of early child communication is the rather **local coherence** of the discourse, where commonly the topic shifts every turn. What is striking in early childhood discourse — ca. 2;0 and below — is that the child's turns are often just **one-clause** long. This gives rise to an extremely collaborative discourse style, where both topics and constructions are shared and elaborated across adjacent turns (Ervin Tripp 1970; Scollon 1976; Ochs *et al.* 1979). At this early stage, topic negotiations are often protracted and repetitious (Keenan-Ochs 1974, 1975) and the discourse style highly **paratactic**, shunning complex NPs, in particular large RPN modifiers. Multi-propositional discourse within single turns, the hallmark of more sophisticated adult discourse with single-person control of perspective, emerges only gradually.[5]

Table 14, 15, 16 below summarize the distribution of turn-length in stages III, IV and V, respectively, of our study. The counts were performed on the first 15 pp. of each child/stage text.

Table 14. Number of clauses per turn (child) — Stage III

	Length of chain											
	1		2		3		4		5+		TOTAL	
SUBJECT	N	%	N	%	N	%	N	%	N	%	N	%
EVE	81	**86.1**	12	12.7	1	1.2	/	/	/	/	94	100.0
NAOMI	74	**69.2**	22	20.6	6	5.6	2	1.8	3	**2.8**	107	100.0
NINA	86	**66.6**	28	21.7	6	4.6	5	3.8	4	**3.3**	129	100.0
ADAM	84	**64.7**	22	16.9	10	7.6	7	5.4	7	**5.4**	130	100.0
TOTAL:	325	**70.7**	84	18.3	23	5.0	14	3.0	14	**3.0**	460	100.0

5. The most extreme type of multi-propositional discourse is, of course, edited written text, whose coherence and grammatical structure are controlled by a single mind (Keenan-Ochs & Bennett 1977; Givón 1979, ch. 5).

Table 15. Number of clauses per turn (child) — Stage IV

	Length of chain											
	1		2		3		4		5+		TOTAL	
SUBJECT	N	%	N	%	N	%	N	%	N	%	N	%
NAOMI	34	**48.5**	11	15.7	7	10.0	5	7.1	13	**18.7**	70	100.0
NINA	77	**62.2**	22	17.7	10	8.0	8	6.4	7	**5.7**	124	100.0
ADAM	50	**57.4**	15	17.2	12	13.9	6	6.9	4	**4.8**	87	100.0
TOTAL:	161	**57.2**	48	17.0	29	10.3	19	6.7	24	**8.8**	281	100.0

Table 16. Number of clauses per turn (child) — Stage V

	Length of chain											
	1		2		3		4		5+		TOTAL	
SUBJECT	N	%	N	%	N	%	N	%	N	%	N	%
NAOMI	30	**44.2**	15	22.1	8	11.7	1	1.4	14	**20.1**	68	100.0
ADAM	26	**46.5**	11	19.6	5	8.9	4	7.1	10	**17.9**	56	100.0
TOTAL:	56	**45.2**	26	20.9	13	10.5	5	4.0	24	**19.4**	124	100.0

With considerable cross-subject variation, the general trend is nonetheless fairly clear. One-clause turns drop gradually, from ca. **70%** of all children turns at stage III, to ca. **57%** at stage IV, to ca. **45%** at stage V. Correspondingly, turns of 5 or more clauses stand at ca. **3%** at stage III, **8%** at stage IV and **19%** at stage V, the stage where some of the children can produce long bursts of multi-clause narrative chains.

I will illustrate the two extremes on this developmental scale with one example from stage I (ca. 2;0) and one from stage V (ca. 4;6). In the first (25), the collaborative nature of early-stage topic negotiations is striking, as are the rapid *topic shifts* initiated by the child. This contrasts sharply with the adult's turns in (25), which pull repeatedly toward *topic continuity* in the first portion of the interaction, until in frustration the adult takes charge.

(25) **One-clause child turns, stage I** (Naomi-I, p. 45):
[Context: discussing objects in the immediate environment]
NAO: Baby **ball**.
MOT: Baby has a ball.
NAO: Got [???].Got [???].
MOT: What?
NAO: Got **shoe**.
MOT: Got show, yeah. Yes. The baby has a dress on.
NAO: **Jacket** on.

MOT: And a jacket on, right.
CHI: **Shoes** on.
MOT: Yes, Daddy has shoes on.
NAO: **Knee**.
MOT: Yeah. Daddy has knees. Where is the baby's **elbow**?
NAO: Elbow.
MOT: Do you know where the elbow is?
NAO: Elbow [pointing to Daddy's **head**].
MOT: No, that's Daddy's head.

Contrast this short-burst child discourse style with (26) below, where the same child at stage V produces a 13-clause turn, taking charge of topic continuity to the point of discouraging the adult's 'clarifying' intervention:

(26) **Multi-clause child turns, stage V** (Naomi-V, p. 2–3)
[Context: playing in the bathtub]
FAT: That's so you can slide down and get your hair rinsed.
NAO: Oh. Whoopsie. I slided down for real fun. And isn't that nice? All the friends except **Froggy** and Pogo. **Froggy** and Pogo live next doors.
They live next door and little. **Froggy** says "here I go [???]".
'at['s] all. So **he** just swam under everything. Until one day. [???].
All the people ran in **his** house. And **he** most of all [???].
FAT: Most of all what, Nomi?
NAO: I wasn't talking to you.

At our stage V, children are of course still capable of engaging in short-turn back-and-forth discourse, superficially similar to that in (25). But such rapid-switch interactions tend to exhibit much higher cross-turn collaborative coherence, characteristic of adult conversation (Chafe 1997; Ervin-Tripp & A. Küntay 1997). Thus consider (27) below, another interaction with the same child at stage-V:

(27) **One-clause child turns** (Naomi V, p. 94–95)
[Context: Imaginary play with a doll]
NAO: Um also, she um also she had **chicken pox**.
MOT: **Chicken pox**!
NAO: [???].
MOT: She **itching**?
NAO: **Uh-huh**.
MOT: Oh, you still have the **chicken pox**.
NAO: **Oh yeah**.

MOT: And such a **young baby** too.
NAO: She's only **two**.
MOT: Yeah. She must feel a lot better now.
NAO: She still has **chicken pox**.
MOT: Uh-huh.
NAO: Are you cold?

8.5.4 Speech-act distribution

The last important feature of the communicative ecology that changes rapidly during early language acquisition is the frequency of speech-act types. In our earlier study of the acquisition of verbal modalities (complex VPs) between the ages of ca. 1;9 and 2;8 (ch. 7), it was shown that the text frequency of **manipulative speech-acts**, which predominate the early stages of child communication (Carter 1974; Bates *et al.* 1975), had already stabilized at ca. **30%** by age 2;0. Thus, by the time children in our CHILDES transcripts begin to acquire post-nominal restrictive modifiers, the major shift in speech-act distribution has already taken place.

The counts of speech-act distribution in the transcripts of stages III, IV and V show wide swings across subjects and across different portions of the transcript for the same child/stage. Long stretches of child narrative, as in (26) above, tend to tilt towards a high frequency of *declaratives*; while more rapid-shift short-turn exchanges show a higher frequency of m*anipulatives*. The frequency distribution in Tables 17, 18, 19 below testifies to such variation, rather than to any continuing developmental trend from stage III to IV to V.

Table 17. Speech-act distribution — stage III (pp. 1–15 of transcript)

	Speech act							
	Manip.		Declar.		Question		TOTAL	
SUBJECT:	N	%	N	%	N	%	N	%
EVE	30	**36.1**	39	46.9	14	17.0	83	100.0
ADU	37	**23.8**	73	47.0	45	29.2	155	100.0
NAO	66	**45.5**	63	43.4	16	11.1	145	100.0
ADU	38	**28.1**	47	34.8	50	37.1	135	100.0
NIN	32	**21.3**	86	57.3	32	21.4	150	100.0
ADU	34	**19.1**	42	23.5	102	57.4	178	100.0
ADA	61	**32.6**	74	39.5	52	17.9	187	100.0
ADU	23	**18.6**	64	52.0	36	29.4	123	100.0
CHI	189	= **44.4%**					425	
ADU	132	= **22.3%**					591	

Table 18. Speech-act distribution — stage IV (pp. 1–15 of transcript)

	Speech act							
	Manip.		Declar.		Question		TOTAL	
SUBJECT:	N	%	N	%	N	%	N	%
NAO	51	**40.4**	61	48.4	14	11.2	126	100.0
ADU	36	**40.9**	36	40.9	16	18.2	88	100.0
NIN	63	**31.9**	121	61.4	13	6.7	197	100.0
ADU	26	**17.7**	39	25.6	87	56.7	152	100.0
ADA	17	**12.5**	90	66.6	28	20.9	135	100.0
ADU	16	**17.5**	37	40.6	38	41.9	91	100.0
CHI	131	= **28.6%**					458	
ADU	78	= **23.5%**					331	

Table 19. Speech-act distribution — stage V (pp. 1–15 of transcript)

	Speech act							
	Manip.		Declar.		Question		TOTAL	
SUBJECT:	N	%	N	%	N	%	N	%
NAO	15	**9.5**	128	81.5	14	9.0	157	100.0
ADU	33	**32.3**	40	39.2	29	18.6	102	100.0
ADA	37	**27.4**	80	59.2	18	13.4	135	100.0
ADU	28	**42.4**	21	31.8	17	25.8	66	100.0
CHI	52	= **17.8%**					292	
ADU	61	= **36.3%**					168	

8.6 Paratactic precursors of children's REL-clauses

In his study, Diessel (2005) suggested that the acquisition of both complex VPs and complex NPs proceeds through **expansion**, starting from an earlier **holistic** single-clause construction and eventually expanding to two clauses packed together as a complex construction. In our study of the acquisition of complex VPs (ch. 7), I suggested that the expansion model did not accurately characterize the acquisition process. Rather, what was involved here was a process of **condensation**, whereby the precursor **paratactic** combination of two-clause, spread across adjacent conversational turns, was merged into a complex-VP construction.

Earlier above, I have shown that before children acquire adult-like 'canonical' REL-clauses, they already produce several types of restrictive post-nominal modifiers that are the functional equivalents of REL-clauses. Such constructions may be considered early precursors of 'canonical' REL-clause forms. I also showed that presentative clauses, the presumed early holistic one-clause stage identified by Diessel (2005), are not found in any high frequency in the early stages of REL-clause acquisition. What I would like to suggest now is that a *combination/condensation* — rather than expansion — model also characterizes the early stages of the acquisition of restrictive REL-clauses.

It is not easy to prove that some paratactic construction is *the* precursor' of syntactic REL-clauses. To begin with, the notion of 'semantic equivalence' is rife with difficulties, and the difference between run-of-the-mill conjoined clauses and paratactic clausal modifiers may hinge on subtle pragmatic differences between *asserted* and *presupposed* information. Demonstrating the semantic equivalence of paratactic and syntactic configurations is thus, at best, suggestive.

What follows below is the entire inventory of paratactic N-modifying constructions used by the children at stages III, IV and V of our study. The plausibility of these constructions being the developmental precursors of the RPN modifiers discussed earlier above is certainly not proven, but only suggested. In each of the examples, either the RPN modifier itself or the entire modified noun phrase is packed under a **separate intonation contour** from its proper main clause.

Consider first the entire sample of paratactic RPN modifiers found in the **stage-III** transcripts:

(28) **EVE-III** (ca. 60 pp. of transcript)

a. EVE: My glass.
MOT: Your glass?
EVE: Yep.
MOT: Which glass? Your [???] one?
EVE: Yes. **With ice-cubes in it?**
MOT: With an ice-cube in it?
EVE: Yeah. [p. 3–4]

b. RIC: Let's put it …
EVE: There. You make it right there.
You make it there, **by your other flower**. [p. 43]

c. FAT: A bill from Dr. Finn for Eve's chin.
EVE: A bill, **from Dr. Finn, to fix Eve chin**. [p. 60]

(29) **NAOMI-III** (ca. 60 pp. of transcript)

MOT: That's a card I was going to send to these people who had a baby.
NAO: **Had a baby**?
MOT: Yeah.
NAO: [???].
MOT: That's okay.
NAO: **A little baby. Baby**.
MOT: Yeah, I was going to send that to the people who had the baby. [p. 2]

(30) **NINA-III** (ca. 60 pp. of transcript)

a. MOT: What's this?
NIN: A little ducky. **Swimming in the water**. [p. 13]

b. NIN: Oh there's a new picture of one.
MOT: Of what?
NIN: **Of building houses**. [p. 13]

c. NIN: Oh, this is a picture … **of hippopotamus and seals and a man**.
MOT: Oh, that the little box that the rhinoceroses came in. [p. 33]

d. MOT: And what else is this dolly wearing?
NIN: A blouse like that one. **Louise gave me that one.**
MOT: That a pretty, pretty dolly.
NIN: Yes, she has a blouse like that dolly. She has a skirt like that dolly. [p. 42]

(31) **ADAM-III** (ca. 60 pp. of transcript)

a. ADA: [???] paper. Have some. Have some table. **Ursula brought this Adam**.
NOT: What? Have something on the table that Ursula brought Adam?
ADA: Sit a right there. [p. 5]

b. ADA: Like a house. Cowboy like a house.
MOT: Cowboy likes a house? It's a restaurant, **where you go to eat**. [p. 23]

Out of the combined sample of 14 post-nominal restrictive modifiers produced by our four children at stage III, **10/14** appeared as paratactic constructions.

The comparable list for the three children at **stage IV** is as follows:

(32) **NAOMI-IV** (ca. 90 pp. of transcript)

a. NAO: Because I want the black dolly. The black dolly.
The dolly **with the brown sleeper**.
MOT: You want this one?
NAO: Yes.
MOT: This is the one with the brown [sleeper?]. [p. 8–9]

b. NAO: Up there. I can't find the cover.
MOT: What cover?
NAO: The cover **that I'm looking for**. [p. 8]

c. MOT: You have to do the work in the book? Okay, well I will tell you, let's see.
NAO: I got all the books from my the other school, so I have to sit down and …
MOT: Okay.
NAO: Read these. All these. These are all the books I have and all the puzzles **I have**.
MOT: All the puzzles ***you have***? [p. 16–17]

d. MOT: Here's a mommy. A big mommy.
NAO: Yup. **W**[**ith**] **ger gir g g girl standing by her**.
MOT: And the mommy has a bid … What does she have on?
NAO: Apron. [p. 26]

e. MOT: I don't know what we can get to fasten this and we'll have to think about it.
So we can get …
NAO: [???] something **to play with**. [p. 80–81]

(33) **NINA-IV** (ca. 90 pp. of transcript; total RPN modifiers =14; paratactic = 9)

a. MOT: Okay, tell me the story about Pinocchio.
NIN: Okay … Once upon a time here was a three many Pinocchios **and they had a great time**. And we had two stories. [p. 6]

b. MOT: You're gonna hold me?
NIN: No, this lady **named Florence**. [p. 6]

c. NIN: Now slap her legs down.
And go to sleep in your sleeping bag. **like your friend Elizabeth is.**
This is Elizabeth and this is Nina. [p. 7]

d. MOT: Why don't you find a home for all of them?
Put them in their homes and take care of them.
NIN: All the animals **that belong** …
All the animals **that we were playing with**, Mommy. [p. 65]

e. NIN: Yup, so the people could go in.
MOT: Have you seen them around?
NIN: Mommy. I want the same people that were at the doll.
that were at the doll. [p. 70–71]

f. MOT: Is it going to be in the city or in the country?
NIN: In the country.
MOT: And what are we going to see in the country?
NIN: People **that are not gonna be burned up.** [p. 76]

g. MOT: You went to see a movie with daddy?
NIN: Yup.
MOT: And what was the story of the movie?
NIN: Uh, the people **that are in love**. [p. 76]

h. NIN: In the morning Yup. They are going to a movie that, **that's Hikey and Fixey and the Fox**. [p. 77]

i. MOT: What **park** should we go to?
NIN: To the merry … To the park **that has the animals**.
MOT: **Which one** is that? [p. 80–81]

(34) **ADAM-IV** (ca. 90 pp. of transcript)

a. ADA: See the engine?
URS: Yes
ADA: A box, that is a boxcar and that a log car. **Carrying logs**. [p. 3]

b. MOT: What kind of whale is that?
ADA: **Have big sharp mouth. Have big sharp teeth**.
It's a baby whale. [p. 10]

c. ADA: What are these?
MOT: That's what you call chalk.
ADA: Chalk **for putting in the mouth**?
MOT: No, not for putting in the mouth. [p. 20]
MOT: This isn't a doggie.
ADA: What is it? A bear **just like mine**.
MOT: Mmhm. [p. 28]

Out of the combined total of **39** RPN modifiers produced by our 3 children at stage-IV, **18/39** appeared as paratactic constructions.

Finally, consider the paratactic post-nominal restrictive modifiers produced by the two children at **stage V**:

(35) **NAOMI-V:** (ca. 90 pp. of transcript)

a. FAT: Okay, one more story and then you come out of the tub.
NAO: There was two frogs and one Pokey. **And they all lived together**.
Frogs, two frogs and one Pokey **and they always pooped in their face**. [p. 14]

b. NAO: Know what?
MOT: What?
NAO: I have … I picked up that thing. That pretty thing **that's on the floor**.
MOT: The wall paper, piece of wallpaper?
NAO: Yeah. [p. 34]

c. NAO: Okay. Once there was …
Once there was. Humpty Dumpty **sitting on a wall**.
He fell down and hurt hisself. Tumbling from it, [???]
cried. [p. 37–38]

(36) **ADAM-V:** (ca. 90 pp. of transcript)

a. MOT: Alvin.
ADA: Rocky.
MOT: Oh, Rocky, I'm sorry.
ADA: Rocky **with nothing on his … with his friends**. [p. 13]

b. ADA: What's in here?
URS: Oh, that's something for your mother.
ADA: That's a book, right? A book **about knights**? A book **about knights**. [p. 46–47]

Out of the total of **37** RPN modifiers produced by the two children at stage-V, **9/37** appeared in paratactic constructions.

The overall frequency distribution of paratactic RPN modifiers in our transcripts at stages III, IV and V, combined for all children, is summarized in table 20 below.

Table 20. Percent of paratactic RPN modifiers

STAGE	# of subjects	Total RPN modifiers	Total paratactic	% Paratactic
III	4	14 (3.5/child)	10	**71.4%**
IV	3	39 (13/child)	18	**46.1%**
V	2	37 (18.5/child)	9	**24.3%**

While these distributions are in no way definitive, they nonetheless suggest a developmental trend, whereby the presumed paratactic precursors appear at the highest frequency — **71.4%** — at the early stage, and then taper off gradually — to **46.1%** and then **24.3 %** — as the children produce more, and more standard forms of, restrictive REL-clauses.

8.7 Conclusion

8.7.1 The adaptive ecology of child communication

It has become fashionable, ever since Slobin's (2002) course reversal,[6] to assert that the three developmental processes that define human language — language ontogeny, language diachrony and language evolution — have little to do with each other. Heine & Kuteva (2007) have already argued, I think convincingly, that parallels between language diachrony and language evolution feed into a fruitful line of inquiry (see ch. 3,6, above). My own reading of the acquisition data, including those surveyed here and in ch. 7, is that the course of child development is a powerful analogue of language evolution — provided one remembers the difference between analogy (or similarity) and identity.

In particular, the developmental course of the three main features of the human communicative ecology is fundamentally the same process in language ontogeny and language evolution. That is:

- the rise of displaced reference
- the liberation of declarative/epistemic speech-acts from their prior subservience to the deontic/manipulative;
- the rise of multi-propositional discourse

6. See e.g., his earlier pronouncements on the similarity between ontogeny and diachrony (Slobin 1977).

In language ontogeny and language evolution, these three developmental trends form the context within which the rise of restrictive modifiers begins to make sense. It is only when the third trend has come on line, and the child is capable of producing multi-propositional *paratactic* discourse (coherent clause chains), that both the syntactic and functional pre-conditions for the genesis of the complex NP have been reached.

8.7.2 Adaptive-communicative context and syntactic development

Relative clauses are acquired in the intensive, interactive conversational context of **referential negotiations**. In the ecology of earlier child communication, such negotiations were handled by rapid-shift, short-burst turns, with much repetition and back-and-forth thrusts and parries (Keenan-Ochs 1974, 1975). This negotiation style, and the fact that referents at the early stage are largely accessible in the speech situation, make restrictive modifiers communicatively superfluous at that early stage of language acquisition. But the back-and-forth, short-busts paratactic negotiation style of early childhood is a highly inefficient **pre-grammatical** strategy. The new strategy, of adding restrictive REL-clauses to the earlier referent-marking arsenal of full nouns, demonstratives and articles, emphatic stress, pragmatic word-order, pronouns and zero anaphora, is obviously more efficient, in the relatively rare discourse contexts where it is required.

The relatively late acquisition of REL-clauses and their relative rarity in informal face-to-face communication, of both children and adults, go hand in hand. Only within the more complex referential demands of maturing communication does the acquisition of REL-clauses begin to make adaptive sense, with an increased frequency of recourse to the communicative functions coded by REL-clauses:

- presentative constructions (making new referents salient)
- referential competition (complex referential environment)
- reference to prior discourse (searches in episodic memory)

8.7.3 Expansion vs condensation: From parataxis to syntaxis

The expansion-from-holistic (analytic) model in child language development has its origins in the work of Tomasello (1991, 2000, 2003; Tomasello & Diessel 2001). This model may indeed account for some aspects of the acquisition of morphology and complex-word forms (MacWhinney 1982), but not for syntactic constructions. Tallerman (2007) criticized this model as inadequate for language evolution, a criticism that may or may not apply quite as forcefully to

language ontogeny.[7] But as our survey in ch. 4,5 above suggests, the alternative model — combination (condensation), from parataxis to syntaxis — is more consonant with the facts of diachrony. And as the present and previous chapters suggest, the same appears to be true for the ontogeny of complex clauses. While the adaptive context — negotiating the modality of propositions vs. negotiating common reference — may differ between the types of complex constructions, the general developmental combinatorial trend, **from parataxis to syntaxis**, seems to apply to the development of both types of complex clauses.

8.7.4 Whither 'recursivity'?

We come back once again to a question broached earlier. Our cumulative data for both language diachrony and language ontogeny suggest that the two main types of complex clauses, complex VPs (V-complements) and complex NPs (REL-clauses), differ in multiple ways, respectively:

- **time of acquisition**: early vs. late
- **prevailing communicative ecology**:
  - **domain of reference**: here-and-now (early) vs. displaced (late)
  - **speech acts**: deontic (early) vs. epistemic (late)
  - **coherence span**: limited (early) vs. expanded (late)
- **proximate goal for acquisition**: negotiating the epistemics and deontics of events vs. negotiating common reference
- **terminal usage frequency**: higher vs. lower
- **ultimate syntactic product**: clause union vs. no clause union
- **ultimate lexical product (if any)**: complex verbs vs. complex nouns.

In both VPs and NPs, the developmental trends seem to yield 'recursivity'. But the processes through which such 'recursivity' arises in the two types of embedded clauses are starkly different. In the genesis of complex VPs, the *main-clause verb* is recruited to mark the deontic or epistemic modal status of the embedded clause;

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7. In sum, Tallerman points out that if a multi-word sequence ('you give me apple') is learned first as a holistic unit ('you give me apple'), there is no learning procedure that will guarantee the eventual assignment of any of the four specific meanings to any particular parts of the unsegmented whole. The use of single words to stand for whole propositions ('apple!') in early childhood, much like the use of lexical-specific predator calls in primate communication, is *not* an example of holistic meaning. Rather, it involves well-defined lexical meaning, with the rest of the proposition ('you', 'me', 'give', manipulative speech-act) inferred from the context. Syntactic development, leastwise in language evolution, is overwhelmingly compositional, rather than analytic. But the facts of early language ontogeny, in particular the proverbial one-word stage (Bloom 1973; Scollon 1976), also suggest the same context-dependent reading of single-word 'holistic' utterances (see ch. 7, above). We will return to this subject in ch. 10, below.

and it is the embedded clause that retains the communicative center stage. In the genesis of complex NPs, the *embedded clause* is recruited to mark the referential status of a main-clause referent; and it is the main-clause referent that retains the communicative center stage. In both cases, a clause is recruited to operate on another clause. But it is the *main* clause that becomes the operator in genesis of complex VPs, and the *subordinate* clause in the genesis of complex NPs.

Chomsky (1957); Simon (1962), and Hauser *et al.* (2002) all define complexity formally, abstractly and configurationally, with *recursivity*, coming out of Chomsky's early machine-theory work, being but a sub-case of Simon's more general notion of *hierarchy*. But is recursivity a central feature of human language? Or is it a by-product of development, perhaps an *epiphenomenon* that 'falls out' of two (or more) separate and distinct processes of grammatical evolution?

Perhaps all 'recursivity' really means is the following: In the genesis of morphology (complex words), *lexical words* are recruited to become grammatical operators on clauses, phrases and words. In the genesis of complex syntax, *whole clauses* are recruited to become grammatical operators on other clauses (complex VPs), or on words (complex NPs). But in the genesis of complex VPs, the recruited clause soon shrinks to its lexical core — the *verb*, which then goes on to become a *morpheme* — bye-bye synchronic 'recursivity'. In the genesis of complex NPs, on the other hand, the recruited clause remains a clause — welcome synchronic 'recursivity'. The common denominator is valid, at best, during the initial recruitment process, the early stage of the genesis of complex syntax.

CHAPTER 9

Second-language pidgin

9.1 Introduction

One of the fossils of language cited by those of us who believe that it is possible to reconstruct the course of language evolution in spite of no direct evidence of intermediate stages (Givón 1979; Bickerton 1981; Heine & Kuteva 2007; *inter alia*) is second-language pidgin. Over the years, a great number of communication systems have been called 'pidgin', often including both Creoles and substrate/calque pidgins (e.g., Tok Pisin, Keesing 1988). In this chapter, I will use the term **pidgin** to mean only a second language acquired under the following conditions:

- in adulthood (post puberty)
- orally (without literacy)
- informally (without organized instruction)
- in natural communicative contexts (work, home, street, etc.)
- in the absence a uniform grammatical substrate

Speakers using pidgin communication of this type employ lexical words, and seem to produce coherent multi-propositional discourse. What they seem to lack are grammatical morphology and well-marked syntactic constructions. In this, pidgin communication broadly resembles the pre-grammatical **two-word stage** of child language acquisition (Bowerman 1973):

> "… Early child speech is 'telegraphic' — that is consists of strings of contents words like nouns, verbs and adjectives, and lacks inflections, articles, conjunctions, copulas, prepositions and post-positions, and, in general, all functors or 'little words' with grammatical … significance …" (1973: pp. 3–4)

Second-language Pidgin speakers thus seem to deploy the more universal **cognitive representation** sub-systems of human language, presumably the ones initially organized and coded during their first language acquisition:

- lexical semantic
- propositional semantics
- multi-propositional coherence.

They also seem to have acquired some use, however rudimentary, of the phylogenetically-older communicative code, **lexical phonology**, in their

non-native language. Where they seem to be deficient in their non-native language is the second — more abstract, more complex and phylogenetically younger — communicative code of human language, **grammar**. That is, they lack grammatical morphology and well-marked syntactic constructions, including complex clauses.[1] What one finds in abundance in pidgin communication, however, is clause-chaining; that is, concatenated, conjoined clauses, or **parataxis**.

As an illustration of coherent, multi-propositional second-language pidgin discourse, consider the following narrative from a Japanese-English Hawaii Pidgin speaker (Bickerton & Odo 1976):[2]

(1) **Japanese-English Pidgin**:
[F 59 yrs. old; 40-year resident of Hawaii;
telling her life story; husband present]
a. … me born three three month, then Japan go home, see?
b. and then, ey, Japan go school see?
c. me all together Japan go school ten year … ten years-*no*, *uchi* ['we'] …
d. me two year old Japanese school go, you know?
e. and then Hawaii come … nowadays me … ah, not across, so see?
f. yeah, and then my fa- … my husband ho, ah, marry,
g. ah nineteen thirty-six, August thirty, little more whole forty year …
h. Papa, what's come talk to me, now, now, you by me, by …
i. how many place no more light place go?
j. Kauai Lia go, but Honolulu man Lilia, she don't know, no? …
k. yeah, anyway Kanturi go, see? Kanturi go, Hilo go …
l. before over here plantation sugar-mill get,
m. old-town, now only *make*-['dead'] man place, yeah,
n. only one man, Hawaiian man *hapai* ['carry'] he stay over there,
o. now *make*-['dead'] man place …
p. but new Shiburo company … over there make improve ah?
q. see like he make, over there, condominium now,
r. build-em up, Hieria … nice place coming new …
s. me Hieria stay, marry, Hieria stay nine year stay,

---

1. As noted earlier above (ch. 2), both phonology and grammar are highly automated, implicit skill systems; that is, systems of procedural knowledge or habituated skills. The sound system of pidgin speakers is much less firmly automated than that of native first language speakers.

2. From the Hawaii pidgin transcripts collection, courtesy of D. Bickerton. As can be noted, at this early (stage-II) pidgin, native language word-order, in this case Japanese OV, is often carried over into the pidgin, as are a few native lexical words and even grammatical morphemes. Two lexical predicates, *make* 'dead' and *hapai* 'carry', came into the Pidgin from Hawaiian rather than English.

t. and then children two born … ba[by] …
u. ah, telephone no-more, number one humbug,
v. lite ['write'] no-more, number-one humbug me …
w. children sick time, hard time, that time, ha …

With much attention to the context, both linguistic and extra-linguistics, pidgin discourse can be decoded and interpreted coherently. As noted in ch. 2, the absence of morpho-syntactic clues in pre-grammatical communication makes both production and comprehension much slower and more error prone, with various attention-demanding inferences recruited to compensate for the absence of the automatic connections of the grammatical code.

9.2 Pre-grammar: Syntactic regularities in pidgin communication

Some earlier discussion tended to suggest that pidgin communication was a rather haphazard combinatorial system with few if any syntactic regularities (Bickerton 1977, 1981; Bickerton & Odo 1976; Selinker 1972; Schumann 1976, 1978, 1985; Andersen 1979). Closer examination of pidgin communication, including early-childhood pidgin, reveals that it is not totally chaotic but rather systematic, displaying a number of syntactic regularities, those that may be labeled **pre-grammar** or **proto-grammar** (Givón 1979, 1984, 1995). Unlike mature first-language syntax, which contains many more-arbitrary, cognitively less-transparent rules, the regularities of pre-grammar are cognitively transparent and non-arbitrary ('more iconic'). Some of the main 'rules' are summarized below (Givón 1979, ch. 5, 1984, 1985a, 1989, ch. 3, 1995):[3]

(2) **Intonation rules**:

a. **Stress and predictability**:
"Less-predictable information chunks are stressed"

b. **Melodic contour and relevance**:
"Information chunks that belong together conceptually are packed together under a unified melodic contour".

c. **Pause and rhythm**:
"The size of the temporal break between information chunks corresponds to the size of the cognitive or thematic distance between them".

3. The 'rules' of pre-grammar are presumably much less rigid and much more variable in application than those of mature first language. This may have to do with the lower level of automaticity and, conversely, higher attentional demands (Neville 1995; Neville *et al.* 1992; see section 3, below). However, some of pre-grammar rules are amazingly well-governed (see ch. 10).

(3) **Spacing rules**:

a. **Proximity and relevance**:
"Information chunks that belong together conceptually are kept in closer spatio-temporal proximity".

b. **Proximity and scope**:
"Functional operators are kept closest to the operand to which they are relevant".

(4) **Sequence rules**:

a. **Order and importance**:
"A more important information chunk is fronted".

b. **Occurrence order and reported order**:
"The temporal order in which events occurred will be mirrored in the language-coded report of the events".

(5) **Quantity rules**:

a. **Zero expression and predictability**:
"Predictable — or already activated — information will be left unexpressed".

b. **Zero expression and relevance**:
"Unimportant or irrelevant information will be left unexpressed".

The most interesting fact about the 'rules' of proto-grammar is that, without exception, they are found intact in mature grammaticalized language. Nothing is lost in grammaticalization, but rather a considerable amount of morpho-syntactic machinery is added to the regularities of pre-grammatical pidgin. In mature, grammaticalized first language, some of the rules of proto-syntax are found by themselves. For example:

- zero anaphora (5a)
- zero-expressed passive agent or antipassive patient (5b)
- topicalizing pre-posed word-order (4a) [cleft, L-dislocation, WH-fronting, Y-move]
- contrastive marked-focus stress (2a) [cleft, WH-question, Y-movement]

As an illustration of the contrast between zero anaphora, which marks referential continuity, and full NP, often followed by a pause (L-dislocation), which marks referential discontinuity, compare (1a,b) with (1m–p) above, re-produced as (6) and (7) below; respectively:

(6) **Zero-anaphora and referential continuity**:

a. … me born three three month, then [Ø] Japan go home, see?
(… I was just three months old, then I went home to Japan, see?)

b. and then, ey, [Ø] Japan go school see?
(then I went to school in Japan, see? …)

(7) **Full-NP/L-dislocation and referential discontinuity**:

l. … before over here plantation **sugar-mill** get,
(… earlier there was a plantation and sugar-mill here,)

m. **old-town**, [Ø] now only *make*-['dead'] man place, yeah,
(the old town, it is now a dead-man place, yeah,)

n. **only one man**, Hawaiian man *hapai* ['carry'] he stay over there,
(only one man, a Hawaiian man, still lives there,)

o. now [Ø] *make*-['dead'] man place …
(now it is a dead-man place …)

p. but new **Shiburo company** … over there [Ø] make improve ah? …
(but the new Shiburo company, they made improvements
there, ha? …)

L-dislocation as used in (1m,n,p)/(7m,n,p) is attested in all spoken languages. But in the pidgin no resumptive pronoun is used, only zero-anaphora (7m,p).

The use of another widespread pre-grammar construction, verbal zero-anaphora, is discussed in considerable detail in ch. 10, where its distribution in adult language, early child language, second language pidgin and Broca's aphasic communication is compared.

Most commonly, the more-iconic rules of pre-grammar are integrated with the more arbitrary (symbolic) devices — morphology, hierarchic-syntactic constructions, grammatical word-order, GR-governed constructions, etc. (Givón 1984, 1985a, 1989, ch. 3).

9.3 Broca's aphasia and pidgin communication

Pre-grammatical pidgin communication, whether by children or by adult second language learners, is fundamentally not all that different from the discourse of **Broca's aphasia** patients. As an illustration of the latter, consider (Menn 1990: p. 165):

(8) … I had stroke … blood pressure … low pressure …
period … Ah … pass out … Uh … Rosa and I, and …
friends … of mine … uh … uh … shore … uh drink,
talk, pass out …

… Hahnemann Hospital … uh, uh I … uh uh wife, Rosa …
uh … take … uh … love … ladies … uh Ocean uh Hospital
and transfer Hahnemann Hospital ambulance … uh …
half'n hour … uh … uh it's … uh … motion, motion …
uh … bad … patient … I uh … flat on the back …
um … it's … uh … shaved, shaved … nurse, shaved me …
uh … shaved me, nurse … [sigh] … wheel chair … uh..

The main apparent difference between early childhood pidgin and second-language pidgin, on the one hand, and Broca's aphasia communication on the other, seems to be the degree of **disfluency** — much greater in Broca's aphasia, which impacts not only grammar-related brain loci but also neighboring phonological and motor areas (apraxia) and working-memory.

In a number of neuro-imaging studies relating second-language acquisition, brain maturation and the brain loci implicated in grammatical communication, Neville *et al.* (1992) and Neville (1995) compared performance of three adult groups, all fluent speakers of English:

i. fluent native speakers
ii. fluent non-native speakers who learned English before puberty
iii. fluent non-native speakers who learned English after puberty

Groups (i) and (ii) were neurologically indistinguishable (using ERP scans), both showing high levels of activation in the left-prefrontal Broca's region (IFG), as well as some right-parietal attention-related activation. Group (iii), of equally-fluent speakers, showed a much-reduced level of left-frontal (IFG) activation, coupled with a much higher activation in the right-parietal region.

A tentative interpretation of Neville's experimental results is that Broca's area is involved in the processing of the more structured, automated, complex-hierarchic parts of language processing. That area of the pre-frontal cortex matures beginning ca. 2-years of age and rigidifies around puberty, making it hard to acquire grammar either before 18 months or after puberty — without extraordinary investment of time, effort and instruction. Late second language learners who overcame this neurological handicap and achieved near-native fluency, gain their fluency by investing much higher **attentional resources** in language processing. As we shall see further below (ch. 11), more recent neurological work on the processing of grammar is consonant with such an interpretation.

9.4 Conclusion

Second-language pidgin shares many of its structural, adaptive-functional and neurological features with the pre-grammatical communication of children

around the age of ca. 1;6 (Bowerman 1973). In particular, second-language pidgin and pre-grammatical child communication:

- have a well-coded (if restricted) lexicon;
- have a cognitive event-level representation;
- have a cognitive representation of multi-propositional coherence;
- have a phonological representation of lexical words;
- lack grammatical morphology and distinct syntactic constructions;
- tend to restrict lexical vocabulary to more concrete meanings;
- tend to restrict communicative reference to here-and-now.

While an instrument wielded by the mature *homo sapiens* mind/brain, second language pidgin communication nonetheless shares many features of the presumed earlier evolutionary stage of language, so-called **pre-language** or **proto-language** (Givón 1979; Bickerton 1981, 1990). One may view pidgin communication as an instance of **creative regression** in three contexts where the normal neurology that supports morpho-syntax is not available:

- in the context of developmental unreadiness (children);
- in the context of post-puberty rigidification (adults second language);
- in the context of traumatic brain damage (Broca's aphasia).

PART IV

Biology, neuro-cognition and evolution

CHAPTER 10

From single words to verbal clauses:
Where do simple clauses come from?

10.1 Introduction*

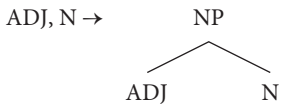
In discussing the ontogeny of complex clauses in chapters 7 and 8, I have deliberately deferred the discussion of one topic that is crucial for our understanding both the ontogeny and phylogeny of syntactic complexity. I noted that complex-subordinate clauses arise from chained (conjoined) clauses. Simple clauses are thus, obviously, a developmental prerequisite for the genesis of both chained and complex-subordinate clauses. But how do simple clauses come into being? That is:

(1) How do children, and how did earlier hominids, bridge the gap between single-word utterances, mostly nouns, that stand for whole verbal clauses, and multi-word clauses that include a verb?

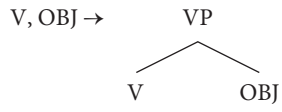
Derek Bickerton (2008) has proposed answering this question by suggesting that early hominid speakers must have used the minimalist formal procedure called "merge". The very same procedure, he suggests, was also used in the evolution of complex clauses from chained simple clauses. In formal terms, "merge" may be described as the creation of a **hierarchic configuration**, whereby adjacent but previously unattached constituents are joined under a higher, more abstract node. This can be presumably done at the phrase level, as in (2a,b) below, at the simple clause level, as in (3), or at the complex-clause level, as in (4a,b):

(2) **"Merge" at the phrase level**:

a. **Noun phrase**:

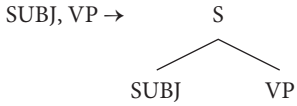


b. **Verb phrase**:

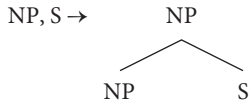


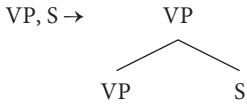
*I am indebted to Derek Bickerton for comments on an earlier version of the ms. Likewise, discussions with Luigi Rizzi and access to two of his papers (Rizzi 2005, 2008) have proven most helpful. This is not to suggest either of them would endorse my conclusions.

(3) **"Merge" at the simple clause level**:



(4) **"Merge" at the complex clause level**:

a. 

b. 

However attractive such a procedure may appear to formal minimalists, it does not begin to answer question (1), leastwise not in the sense I have intended it. To begin with, constituents are not merged by virtue of mere adjacency, but only when they are **functionally relevant** to each other within a specific functional domain. Thus, the adjacent pair N,V within the string ADJ, N, V, OBJ will not be automatically "merged" into either a hierarchic NP (2a) or VP (2b). Two adjacent constituents will only be "merged" when they are relevant to each other as "pertaining to the same referent" (a modifier–noun pair = NP) or "pertaining to the same predication about the same subject" (a verb-object pair = VP), respectively. Likewise, the adjacent pairs NP, S or VP, S will not be automatically "merged" into a complex NP (4a) or complex VP (4b), respectively. They will only be "merged" when the S is either a relevant event/state specifier of a referent (4a), or a state/event modally quantified by a main-clause verb (4b).

Further, Bickerton does not specify a **behavioral mechanism** by which the gap between the one-word clause and the simple multi-word verbal clause can be bridged, in either ontogeny or phylogeny. For the "merge" operation to be more than a formal label for the developmental process, it must be fleshed out into a feasible behavioral-developmental mechanism. A genetic mutation and/or neurological recruitment, however important a role they may play at some level of development, will not by themselves do the trick. That is, not if behavior is indeed, to paraphrase Ernst Mayr, the *pacemaker of evolution* (Fernald & White 2000).

What I propose to do in this chapter is describe a developmental behavioral mechanism that could, plausibly, bridge the gap between the one-word stage and the simple-clause stage in both ontogeny and phylogeny.[1] I will go about this task by describing first a synchronic communicative behavior — a grammatical construction — that is so ubiquitous in spoken language that it is most commonly ignored. I will call this construction either **verbless clauses** or **scattered**

1. In diachrony this of course is not an issue, since mature adult speakers, the agents of diachronic change, have already passed the one-word stage.

non-verbal constituent falling under its own intonation contour. I will first illustrate the use of this construction in two typologically-dissimilar languages, Ute (oral narrative) and English (conversation), and will show that it is an amazingly well governed construction in both languages, thus in both oral genres.

The verbless-clause construction is a full analog of **nominal zero-anaphora**. First, both constructions reflect ('obey') the same universal principle of **pre-grammar** (ch. 9, principle (5a)):

(5) "Leave predictable information unexpressed".

Though the predictability of the zero constituent can only be seen in connected discourse. And second, in natural communication ('performance') this construction is just as amazingly well-governed as nominal zero-anaphora — at a level approaching 100% fidelity — and by the very same licensing principle:

(6) "The licensing governor of the zero element is found in a directly-adjacent clause, most commonly the preceding clause".

The description of verbless clauses and their communicative use given in this chapter also offers a vivid example of how pre-grammar — so prevalent in early child language, second language pidgin and Broca's aphasia — is also still available and indeed rather ubiquitous in grammaticalized adult language.

After describing the use of the verbless-clause construction in oral adult usage, I will describe its use in **early child language**, using English data from a relatively early period of grammar acquisition (ca. age 1;8–1;11; stage-I; see ch. 7). During this period, a major transition occurs, from one-word clauses that are predominantly nouns (Bloom 1973) to two-word or longer clauses with the verb and nominal arguments falling under a single intonation contour (Bowerman 1973). I will suggest that the very same behavioral mechanism attested in adult usage for joining together nominal arguments of the clause with their relevant verb under a single intonation contour, is also available to children at this transitional stage of language acquisition. What is more, the use of the verbless-clause construction is just as well-governed in children as it is in adults.

I will next show the use of the same construction, with the same communicative behavior, in **second language pidgin** narrative text, using stage-I Korean-English oral narrative transcripts (Bickerton & Odo 1976; see ch. 9). I will show that this construction is widespread in the pidgin narrative, and that its use is just as well-governed in the pidgin as it is in adult Ute, adult English, and early childhood usage.

Lastly, I will describe the use of the same construction in oral narrative of a **Broca's aphasia** patient (Menn 1990), showing both its high text frequency and its amazing well-governedness. The inference I will draw at the end is that the same behavioral mechanism identified in the usage of adult English and Ute speakers, young children, pidgin speakers and Broca's Aphasia patients must have also been

available in the corresponding early stage of language evolution. Indeed, I will suggest that just like nominal zero-anaphora, **verbal zero-anaphora** is part of pre-grammar or proto-grammar. And that just like its nominal counterpart, this construction remains part of the mature adult grammatical inventory.

10.2 Zero anaphora and verbless clauses

Zero anaphora is usually thought of as applicable to nominal arguments of clauses (NPs; subjects, objects), and as such has been studied by both formal and functional linguists. In formal studies, it has been assumed to be characteristic of a certain type, so-called 'non-configurational' or 'pro-drop' languages (Hale 1980, 1982, 1983, 1992; Huang 1984; Jelinek 1984; Payne 1993; Austin & Bresnan 1996; *inter alia;* see also Chomsky 1981, 1982; as well as Givón 2002, ch. 3).

In function-oriented studies, most conspicuously of the discourse distribution of referent-coding devices (Givón ed. 1983a, 1983b, 1983c; DuBois 1987; *inter alia)*, nominal zero anaphora was shown to be amazingly well governed, in the sense that nearly 100% of its distribution in text can be predicted from its very short anaphoric distance from its antecedent — **one clause** back. Put another way, the referent of zero anaphors is cognitively highly accessible (Givón 1992).

A phenomenon that in many ways closely parallels nominal zero anaphora is that of verbless clauses falling under their own separate intonation contours. To the naked eye, such verbless chunks may seem but classical *performance* phenomena of spoken language, the kind of careless slop that is associated with memory lapses and other extra-grammatical cognitive constraints. However, Chafe (1987, 1988a, 1988b, 1994) has described such constructions more revealingly as part of the grammar of spoken language, where information is typically packaged in short **breath groups** (intonation units, intonation contours; Givón 1991c).

What I would like to show first is that verbless clauses are prevalent in languages regardless of the putative typological feature of 'configurationality'. And that their behavior in spoken language is just as well-governed as that of nominal zero anaphora. I will use Ute and English as my typological comparison set, one that can easily be extended (e.g., Croft 1997, 2007).

10.3 Verbless clauses in spoken Ute narrative

10.3.1 Flexible word-order in Ute

Ute has considerable word-order flexibility, very much in the same vein as described for the 'non-configurational' Papago or Walpiri (Hale 1992). A quantitative

documentation of the word-order distribution in a wide range of clausal constituents in Spoken Ute may be found in Givón (1983c). The following examples, all clauses falling under a single intonation contour, are taken from a recorded traditional narrative by an accomplished story teller, the late Mollie Buck Cloud (Givón ed. 1985b; Story #5):

(7) a. ’iya-na mʉn *i*-’ura ’agha-paa poro-xwa-gha ’ani-kh?
here-LOC you/PL/SUBJ-be WH-DIR walk/PL-go-GER do-IMM
LOC S LOC GERUND-ADV V
‘… “Where are y’all going flocking through here?” …’

b. mʉn *i*-’ura nʉ́nay kac ’u-vwaa-tʉ nóo’wa-y-’ura
you/NOM-be me/OBJ NEG there-DIR carry-IMM-be
S O LOC V
‘… “Won’t you please carry me there?” …’

c. ’umʉaatʉ ya-yagha-pʉga ’a-vaa-amʉ
one/PART/NOM RED-cry-REM there-LOC-3P
S V LOC
‘… one of them kept crying there …’

d. ’uru máy-pʉga ’umʉs
that/OBJ say-REM they/NOM
O V S
‘they said it’

e. ’uwas-’ura payu-kwa-pʉga ’u mamach-’u
she-be return-go-REM that/SUBJ woman-DEF
S V S
‘… so she returned home, that woman …’

f. mavaa-tugwa-sʉ-ni mawisi-vaani mama-’ayh-pʉ-chi
there-TO-CONJ-ADJ appear-FUT woman-child-DIM/SUBJ
LOC V S
‘… a young woman will appear right there’

g. ’umʉs-nukw-’ura-’uru suwa-kwáa-xw-puay-aghay-’u ’uwayas
they-EMPH-be-that almost-win-ASP-REM-CONCL-him him/OBJ
S V O

sinawavi
Sinawav/OBJ
‘… they almost beat Sinawav (in the race) …’

h. ’uni-kya-pʉga ’umʉs ’uru
do-PL-REM they/SUBJ that/OBJ
V S O
‘… so they did that …’

Such word-order flexibility, coupled with extensive nominal zero anaphora, presumably makes Ute a *bona fide* ‘non-configurational’ language.

10.3.2 Verbless constituents under separate intonation contours

The following examples of verbless clauses in spoken Ute are all taken from traditional oral narratives (Givón ed. 1985b). As one can see, such ‘clauses’ may be the subject, object, indirect object or various adverbs. And, Ute being a recently-changed ex-SOV language, such verbless constituents may appear either post-verbally or pre-verbally.

(8) a. **Post-verbal subject & locative**:
’umʉ Sinawavi-u yúaa-va-tʉ tavi-navich *i*-pʉga,
3P/OBJ Sinawav-PL land-LOC-DIR step-MASS-REM
‘… [and they] landed on Sinawav’s people’s land,

’umʉ chakuura-u, ’uwa-vaa-chʉ
3P/NOM cranep-PL 3S/OBJ-LOC-DIR
those cranes, in front of him …’ (story #3, Mollie C.)

b. **Pre-verbal locative & post-verbal object**:
yagha-vaa-tʉ-av, tʉpʉychi kʉʉ-pʉga,
side-LOC-DIR-REFL rock/OBJ take-REM
‘… at his side, (he) picked a rock,

’i-vee-tʉ pa’a-toghwa-tʉ tʉpʉychi, maghachi
here-LOC-DIR long-NOM/OBJ rock/OBJ pestle

niaa-gha-tʉ
name-have-NOM/SUBJ

right there a long rock, they call it ‘pestle’ …’ (Story # 6, Harry R.)

c. **Post-verbal object**:
táa-mana-xwa-’uru ’ʊa-xw-pʉga, tʉkuavi
knee-leave-go-it/OBJ pour-go-REM meat/OBJ
‘… from his knee he poured it, meat …’ (Story #6, Harry R.)

d. **Post-verbal locatives and object**:
súu, kani-vaghay-kwa-nʉ, máa-pa nʉ́-vwaa-chux,
hey house-walk-go-IMP there-LOC 1S-LOC-DIR
'… Say, come visit, there at my place,

'áa-vaya-vaa-chugwa-av, kani-vaghay-kwa-nʉ
new-side-LOC-DIR/OBJ-REFL house-walk-go-IMP
(me) your new neighbor, come visit (me) …' (Story #6, Harry R.)

e. **Pre-verbal subject, post-verbal object**:
kh-'ura 'uwas-'u, kuch*u*-'u, kʉʉ-pʉga,
then he-DEF//SUBJ buffalo-DEF/SUBJ take-REM stick/OBJ
'… then he, buffalo, picked up …

'ivichi kuvua-ri-kya-tʉ
stick/OBJ sharp-NOM-HAVE-NOM/OBJ
a sharpened stick …' (Story #7, Mollie C.)

f. **Post-verbal adverb**:
"Whwhwh …" may-pʉga, 'uwas, kuchu-gwa-y
"onomato …." say-REM he buffalo-be-IMM
'… "Whwhwh …" (he) said, he, like buffalo …' (Story #7, Mollie C.)

g. **Post-verbal adverb**:
khakha-ti-pʉga, púupa 'uni-kya-na 'uwayas, kuchu
crouch-CAUS-REM manner do-ANT-SUB he/OBJ buffalo/OBJ
'… (and he) lowered his head, the way that one did, buffalo …'
(Story #7, Mollie C.)

h. **Pre-verbal locatives, post verbal subject & locative**:
'i-vee-ni kh-'ura, qovaa-va-na-'u-'ura …
here-LOC-LOC then front-LOC-LOC-his-be
'… right there and then, in front of him …

qovaa-va-y-'u pʉ'i-av-kway tʉ-tʉrapi-kya-pʉga,
front-LOC-OBJ-3S eye-REFL-lo RED-throw-PL-REM
in front of him (they) kept throwing their eyes up,

píischi-u, wa'apʉ wʉni-rʉ-ma-tux …
child-PL piñon/OBJ stand-NOM-LOC-DIR
children, into the standing piñons …' (Story #8, Mollie C.)

The only major constituent type that is rarely found at the pre-verbal position under its own separate intonation contour is the *direct object*. It is seldom scattered

away from the verb, and when it is scattered, it appears only post-verbally (R-dislocation). This probably reflects the persistence of the old OV order (Givón 1983c).

10.3.3 Text distribution of verbal vs. verbless clauses in Ute

Tables 1 through 5 below summarize the distribution of major non-verbal constituents under separate intonation contours, i.e., our verbless-clause construction, in five Ute oral narratives (stories 1 through 5 of Givón ed. 1985b).

The four story-tellers that contributed these narratives ca. 1976–1978 were all tribal elders, with the oldest showing early signs of memory loss and the youngest a very vigorous speaker. Plotting the total percent of scattered verbless constituents against the speakers' approximate age at the time of contributing the narrative may thus be of some interest.

Table 1. Verbless (scattered) vs. verbal (unscattered) clauses in Ute narrative; story #1 (Ralph C., age 75)

	Scattered		Unscattered		Total	
Role	**N**	**%**	**N**	**%**	**N**	**%**
SUBJ:	13	35.1	24	64.9	35	100.0
DOBJ:	8	36.4	14	63.6	22	100.0
LOC:	5	20.0	20	80.0	25	100.0
DAT:	/	/	/	/		
INST:	/	/	/	/		
ASSOC:	/	/	1	100.0	1	100.0
PRED:	3	30.0	7	70.0	10	100.0
ADV:	8	25.8	23	74.2	31	100.0
total:	37	**29.4**	89	70.6	126	100.0

Table 2. Verbless (scattered) vs. verbal (unscattered) clauses in Ute narrative; story #2 (Julius C., age 86)

	Scattered		Unscattered		Total	
Role	**N**	**%**	**N**	**%**	**N**	**%**
SUBJ:	23	40.3	34	59.7	57	100.0
DOBJ:	13	56.5	10	43.5	23	100.0
LOC:	13	59.1	9	40.9	22	100.0
DAT:	/	/	/	/		
INST:	/	/	1	100.0	1	100.0
ASSOC:	/	/	/	/		
PRED:	5	35.7	9	64.3	14	100.0
ADV:	16	42.1	22	57.9	22	100.0
total:	70	**45.1**	85	54.9	155	100.0

Table 3. Verbless (scattered) vs. verbal (unscattered) clauses in Ute narrative; story #3 (Julius C., age 86)

	Scattered		Unscattered		Total	
Role	**N**	**%**	**N**	**%**	**N**	**%**
SUBJ:	10	43.5	13	56.5	23	100.0
DOBJ:	5	55.5	4	44.5	9	100.0
LOC:	13	59.1	9	40.9	22	100.0
DAT:	/	/	/	/		
INST:	/	/	/	/		
ASSOC:	/	/	/	/		
PRED:	/	/	2	100.0	2	100.0
ADV:	13	50.0	13	50.0	26	100.0
total:	41	**50.0**	41	50.0	82	100.0

Table 4. Verbless (scattered) vs. verbal (unscattered) clauses in Ute narrative; story #4 (Mollie C., age 76)

	Scattered		Unscattered		Total	
Role	**N**	**%**	**N**	**%**	**N**	**%**
SUBJ:	27	24.3	84	75.7	111	100.0
DOBJ:	19	34.5	36	65.5	55	100.0
LOC:	7	17.9	32	82.1	39	100.0
DAT:	/	/	4	100.0	4	100.0
INST:	/	/	/	/		
ASSOC:	/	/	/	/		
PRED:	3	21.4	11	78.6	24	100.0
ADV:	35	37.2	59	62.8	94	100.0
total:	91	**28.7**	226	71.3	317	100.0

Table 5. Verbless (scattered) vs. verbal (unscattered) clauses in Ute narrative; story #5 (Bertha G., age 60)

	Scattered		Unscattered		Total	
Role	**N**	**%**	**N**	**%**	**N**	**%**
SUBJ:	2	5.9	32	94.1	34	100.0
DOBJ:	4	20.0	16	80.0	20	100.0
LOC:	1	6.6	14	93.4	15	100.0
DAT:	/	/	/	/		
INST:	/	/	1	100.0	1	100.0
ASSOC:	/	/	/	/		
PRED:	/	/	7	100.0	7	100.0
ADV:	4	15.4	22	84.6	26	100.0
total:	11	**10.7**	92	89.3	103	100.0

Table 6. Age of speaker and percent of verbless clauses

Age	Percent 'scattered' constituents
60	10.7 (Bertha G.)
75	25.8 (Ralph C.)
76	28.7 (Mollie C.)
86	45.1 (Julius C.)
86	50.0 (Julius C.)

While this seeming correlation lays no statistical claim, it is nonetheless of some interest. What it suggests is not all that different from Chomsky's (1965) original idea about processor ('performance') effects and their interaction with 'competence' (grammatical fluency and consistency; 'generativity') in spoken language. In this, oral language contrasts with at least some types of well-edited written genres, where the frequency of scattered verbless constituents may indeed be minuscule (Chafe 1994). Such well-edited written genres seem to approximate Chomsky's ideal 'competence'.

10.4 Verbless ('scattered') constituents in spoken English

Our data of spoken English is taken from a rather different population: Undergraduate college students, in five recorded diadic conversations elicited by a movie they had just seen (Givón 1991c; Dickinson & Givón 1997). We exclude the subject constituents in this study because of low text frequency (most subjects were pronominal). As in Ute, we consider a non-verbal constituent to be 'scattered' if it comes under a separate intonation contour without a verb. Such scattering may occur either within the same conversational turn (9a) or across adjacent turns (9b):

(9) a. the man was … hoeing, **with a hoe**, **in a … garden**, **very dry**

b. M: walked with …
D: mmm [overlap]
M: **a hoe and a shovel**
D: and **a rake**
M: yeah and **a rake**

With post-verbal constituents, an NP separated by a pause from its article is still counted as an instance of scattering, as in:

(10) a. she went back to the … **the hatch or something**
b. and got **a** … **something, uh a cloth with something inside it** …

The separated constituent may be the direct object, as in:

(11) a. she brought the, uh, **the wrapped up thing**
b. she said … **some sort of a** …
c. so she did collect, like, **dry branches and leaves**
d. and got **a** … **something, uh a cloth with something inside it** …

This contrasts with unscattered DOs, as in:

(12) a. she started **a little fire**
b. she broke up **branches and dry things**

The scattered constituent may be a locative — most often prepositional — object, as in:

(13) a. it was very dry and sunny around, **on the outside**
b. she went back to the … **the hatch or something**
c. so she put her skirt … **under** … **between her legs**
d. it was, **in a bag of plastic**

This contrasts with unscattered locatives, as in:

(14) a. she went **to a shady place**
b. he was hoeing **in the garden**

The scattered constituent may be, at least in principle, a dative prepositional object, but no such examples were found in our transcripts, where unscattered datives direct-objects predominate, as in:

(15) a. yelling **at him**
b. yelling at him **about something**
c. she said something **to him**

The scattered constituent may be an instrument, as in:

(16) a. M: walked with …
D: mmm [overlap]
M: **a hoe and a shovel**
D: and **a rake**
M: yeah and **a rake**

b. M: the man was … hoeing, **with a hoe**

This contrasts with unscattered instrumentals, as in:

(17) chased her around the tree 'bout three times **with the hoe**

The scattered constituent may be, at least in principle, an associative object, but only one example of such an object was found in our transcripts — unscattered:

(18) mine started **with the guy**

The scattered constituent may be a predicate — nominal or other — as in:

(19) a. Yeah they were about … boy, maybe, **two inches in diameter**
b. my guess is there were **four or five**
c. there was, uh, probably **two sitting benches**

This contrasts with unscattered predicates, as in:

(20) a. it was **very dry and sunny around**
b. it was **rather ineffective**
c. there was **a dress**
d. it was **a mountain of brush**
e. it looked **kinda comical**

Finally, the scattered constituent may be an adverb, as in:

(21) a. she put the pot … on the stove uh … **at that point** …
b. so she did collect, like, dry branches and leaves in yours **right after she walked off with the firewood?**
c. she went around my lean-to […] **the very beginning**
d. so she put her skirt … **under** … between her legs **like this** …
e. and he chased around in a circle … **twice**

This contrasts with unscattered adverbs, as in:

(22) a. we didn't show the guy again **until later**
b. it's focused on her **for quite some time**
c. we didn't show the guy **again**
d. she put it **right explicitly** on the stove
e. I read the label on the video **real quick**
f. she let it go **on purpose**
g. she rearranged it **a coupla times**
h. you have three pieces of wood around the fire **like blocks**

The overall mean frequency of scattering of VP constituents, i.e., of post-verbal objects and adverbs appearing under a separate intonation contour, in 5 conversational diads is summarized in Table 7 below.

Table 7. Overall mean frequency of verbless (scattered) vs. verbal (unscattered) clauses in English conversations

	Scattered		Unscattered		Total	
Pair:	**N**	**%**	**N**	**%**	**N**	**%**
#1	34	**29.0**	83	71.0	117	100.0
#2	63	**33.0**	128	67.0	191	100.0
#3	33	**27.0**	89	73.0	122	100.0
#4	32	**32.6**	66	67.4	98	100.0
#5	24	**24.5**	74	75.5	98	100.0
total:	186	**29.7**	440	70.3	626	100.0

Though our English speakers were young (ca., 20 years old), the incidence of verbless clauses — i.e., scattered major VP constituents coming under separate intonation contours — in our conversational transcripts falls within the range seen above for our non-senile 75 yr. old Ute speakers. The 'performance' effect of old age is thus not a sufficient explanation. Rather, as Chafe (1994) has suggested, verbless clauses are an integral part of the grammar of spoken language. But are they regular enough to be counted as *grammar*?

10.5 Are verbless clauses well-governed?

The conventional wisdom has always been that there was something terribly ungoverned about **constituent scattering** in oral language, Chafe's (1994) verbless 'bursts'. In the preceding section I have shown that the frequency of this construction in oral language is quite high, that it has relatively little to do with the presumed typological dimension of 'configurationality',[2] that it is hard to predict on purely grammatical grounds,[3] and that does not seem to correlate with age. In this section I will show that verbless clauses — this **zero-predicate construction** — are extremely well-governed in terms of their indexing to particular governing — licensing — predicates. Such indexing operates very much like the indexing of **nominal zero anaphora**. That is, in the overwhelming majority of cases the

2. In this, verbless clauses — verbal zero- anaphora — are just as universal as nominal zero-anaphora, and just as irrelevant to this presumed typological dimension (Givón 2002, ch. 3).

3. Though as Goldman-Eisler (1968) points out, it is highly predictable on psycholinguistic grounds, a fact that is underscored by the increase of this feature with aging, no doubt due to memory loss.

antecedent 'licensing' predicate to which the verb-less clause is indexed, or by which it is governed, is found in the *directly-preceding* clause.

10.5.1 Government of verbless clauses in English conversation

The vast majority of verbless clauses in our English conversational transcripts are **anaphorically** governed. In the few cataphoric cases, the licensing predicate *directly follows*. By way of demonstration, I have taken the transcripts of the first two conversational pairs studied in section 4. above. To contrast verbless (scattered) clauses with their verbal (unscattered) counterparts, consider first some of the relatively few examples in our English conversation transcripts in which a great number of post-verbal arguments fall under the *same* intonation contour with their licensing verb:

(23) **Unscattered verbal clauses**:
- a. … chases her around the tree about three times with the hoe …
- b. … I read the label on the video real quick …
- c. … put the wood over there on the fire before she …
- d. … she didn't go into the lean-to or around it to get there …

In such examples, the non-verbal constituents are all indexed to the verb that falls under the same intonation contour with them.

Consider now the use of verbless clauses. In the majority of such cases, they are indexed to an **adjacent preceding predicate** within the same conversational turn, as in (with the licensing verbal clause bold-faced):

(24)
- a. **and, it was**, in a plastic bag, a bag of some sort …
- b. **She did something little** … block of wood or something …
- c. **It was very dry outside** and sunny around, on the outside and green in the back
- d. **She went back to the** … the hatch or something
- e. **she collects**, like, dry branches and leaves in yours
- f. **so she put her skirt** … under … between her legs like this
- g. **a man was … hoeing** … with a hoe, in a … garden, very dry
- h. **He was wearing**, uh, red shorts and white T-shirt. No shoes …

In several cases, the same anaphoric adjacency manifests itself **across turns**, as in:

(25) a. L: **He was wearing**, uh, red shorts and white T-shirt. No shoes …
V: No shoes?
L: No shoes.

b. M: **walked in with** …
D: mmm … [overlap]
M: a hoe and a shovel and a …
D: and a rake …
M: yea and a rake …

c. M: … **Yeah … she tried to slit its throat** …
D: yeah …
M: yeah, a fairly big knife
D: yeah, a whole bunch of knives …

d. M: I didn't see **her put the pot** …
D: Uh … [overlap]
M: on the stove

In the few instances where the indexing was **cataphoric**, i.e. to a following verbal clause, adjacency to the licensing verb is observed just as rigidly. In one case, (26d) below, the cataphoric indexing is due to an intervening turn:

(26) a. … the next time … that I remember **she uh …… moved, the man was hoeing** …
b. Yeah, in mine she, yeah, **she sat down** …
c. and then, like you said, **she put it** …
d. V: … the chicken she …
L: Yeah … [overlap]
V: **she kinda rearranged it**

In a few cases — all excluded from the frequency count below — the scattered constituent does include a verb. But in some fundamental way, a fairly similar indexing strategy is involved in such cases, with just as rigid a constraint on adjacency. However, the licensing predicate is repeated, so technically we don't have a verbless clause, and thus didn't count it. Such a strategy, which one may term *expansion*, is occasionally found within the same turn, as in:

(27) a. My lady went over **and kinda yelled at him for** … sounded like she **yelled** at him for doing whatever …

b. … **and she put** … […] … I thought she **put** a little bit of kindling in to get it going …

In other cases, this strategy is found across several turns, as in:

(28) L: **He was wearing**, uh, red shorts and white T-shirt. No shoes …
V: No shoes?
L: No shoes.
V: My guy was **wearing** foot … or something …

In only one instance was the direction of the indexing ambiguous, and could be counted as going in either direction — anaphoric or cataphoric. However, a change of turn is involved here:

(29) V: **She never sat down** … in mine …
L: Mine too … **she just never sat down** …

Finally, in only one case does an intervening clause break the adjacency between the scattered verbless constituent and its licensing predicate. This case was again due to an intervening turn (30a). In another case, this time within the same turn (30b), the licensing predicate 'bring' is recapped later, somewhat sloppily, with 'do' — directly preceding the scattered object:

(30) a. L: **and, it was**, in a plastic bag, a bag of some sort … uh …
and she unwrapped the bag, and then she, she, *she cut the* …
V: It was a bag, not a cloth …

b. … **basically she is bringing lunch,** but I assume **she is doing** … or a snack or something

The frequency distribution of the indexing of verbless clauses to adjacent predicates in our English conversations (pairs #1 and #2) is summarized in Table 8 below. As can be seen, in 99.2% of the cases, the verbless constituent was governed by an *adjacent* predicate, predominantly a preceding (anaphoric) one.

Table 8. Adjacency of verbless clauses to their governing predicate in English conversation

	Non-adjacent		Adjacent		Total	
Pair:	**N**	**%**	**N**	**%**	**N**	**%**
#1						
ANAPH	/	/	41	**100.0**	41	100.0
CATAPH	/	/	6	**100.0**	6	100.0
#2						
ANAPH	1	1.4	71	**98.6**	72	100.0
CATAPH	/	/	8	**100.0**	8	100.0
total:	1	0.8	125	**99.2**	126	100.0

10.5.2 Government of verbless clauses in spoken Ute narratives

The same quantitative analysis of the adjacency of the governing predicate was applied to story #4 of our Ute narrative collection (Givón ed. 1985b), the longest of the five stories. The results are given in Table 9 below.

Table 9. Adjacency of verbless clauses to their governing predicate in Ute oral narrative (#4, Mollie C., age 76)

	Non-adjacent		Adjacent		Total	
	N	%	N	%	N	%
ANAPH	1	1.9	52	**98.1**	53	100.0
CATAPH	1	3.2	31	**96.8**	32	100.0
TOTAL:	2	2.3	83	**97.7**	85	100.0

Only two examples in the Ute texts violated the strict adjacency constraint, one anaphoric (31a), the other cataphoric (31b). In both cases, the crossing of a direct-quote boundary is involved, i.e., the intervention of the quotative 'say':

(31) a. …: "ma-vaa-tugwa-sʉ-ni **mawisi**-vaani mama-'aypuch*i*"
there-LOC-go-CONJ-ADJ **appear**-FUT woman-child/SUBJ
'…: "A young woman will appear over there"

may-pʉga-s, "'ú kwáatʉ-mʉ-s 'ú" …
say-REM-CONJ that/SUBJ fast-AN-CONJ that/SUBJ
he said, "A fast one that one" …'

b. … x-'ura 'ú 'aapach *i* 'u pini-vʉni-paghay-gya:
then that/SUBJ boy/SUBJ DEF back-look-walk-GER
'… then the boy, looking backward (said):

"ya'ay-kwa-xa-n" **may**-pga …
die-ASP-ANT-I **say**-REM
"I have died" (he) said …'

10.6 Verbless clauses in early child language

What we have seen so far is that verbless clauses, i.e., scattered nominal constituents falling under their own separate intonation contours, are widespread in spoken adult language and are amazingly well-governed, in the sense that the predicate that licenses ('governs') the scattered verbless constituent can be found, with rare exceptions, in an *adjacent* verbal clause. What I will show in this section is that the same is true in the early-stage of child communication, ca. age 1;8–2;0, when the child still produces a plethora of one-word verbless clauses. With one important difference: The licensing predicate is to be found, most commonly, in an adjacent preceding or following turn produced by the *adult* interlocutor.

Let me first illustrate the phenomenon from our stage-I transcripts of conversations between Naomi (N; age 1;10) and her mother (M; see ch. 7).

(32) M: **What's this**, honey?
N: Lap.
M: Hmm?
N: Lap.
M: Lap. **That's Mommy's lap**. [p. 1]

The mother's verbal clauses at both the beginning (anaphoric) and the end (cataphoric) of the interaction in (32) license Naomi's 'scattered' nominal constituent ('lap') as the predicate of a clause.

Consider next:

(33) N: Kitty. Kitty.
M: No, **it's not a kitty, honey**. **It's a mouse**.
N: Mouse. [p. 2]

The mother licenses the verbless constituent ('kitty') twice as the predicate of the following two verbal clauses. The second of those the licenses Naomi's corrected verbless constituent ('mouse').

Consider next:

(34) N: Mouse
M: **You see a mouse here, too? Where is the mouse?**
N: Mouse too. [p. 3]

The mother licenses the child's verbless constituent ('mouse') first as the object of the first adjacent clause, then as the subject of the next adjacent clause. The child then responds to the first — licensing clause with the recapitulated verbless constituent ('mouse', plus 'too').

Consider next:

(35) N: Lolly. Lolly.
M: **Do you see a lolly?**
N: Lolly. [p. 3]

Again, following the child's verbless constituent ('lolly'), the mother contributes an adjacent verbal clause, licensing 'lolly' as its object. After which Naomi re-confirms with the same verbless constituent ('lolly').

What the next example illustrates is the emergence in the child's usage, after considerable negotiation, of an explicitly-uttered verb, as a single word under its own intonation contour:

(36) N: Lolly
M: **What's that lolly doing?**
N: Lolly ear.
M: What? **Smiling, honey**.
N: Smiling. [p. 3]

The mother first licenses the child's verbless constituent ('lolly') as the subject of the following clause. The child then responds with another verbless clause, two nouns. The mother counters with a zero-subject verbal clause, clearly indexed to the child's directly-preceding 'lolly' as the subject. To which the child responds with the appropriate zero-anaphora expression, a one-word verbal clause ('smiling'). The child's zero-anaphora subject was in turn licensed by the adult's directly-preceding clause with the same zero-anaphora subject ('lolly').

A more elaborate example of the gradual, collaborative emergence of the child's two-word verbal clauses may be seen in:

(37) N: **Got** [???]. **Got** [???].
M: What?
N: **Got shoe**.
M: Got shoe, yeah. [p. 4]

And similarly:

(38) M: **Point to the doggie**.
N: [???]
M: There it is.
N: **Point. Doggie**. [pointing] [p. 7]

And again:

(39) M: What's this piggy doing?
N: Piggy.
M: **That piggy is crying.**
N: **Piggy Crying**. [p. 12]

Finally, in only few cases, the adjacent verbal clause that licenses a verbless constituent is produced by the child, then reinforced by the adult, as in:

(40) N: Hi.
M: Hi what? I don't understand.
N: Birdie.
M: Yes, birdie.
N: **Birdie singing**.
M: **Singing, yeah**. [p. 9]

What our last three examples illustrated, rather vividly, is how the collaboration between adult and child not only provides the context within which the child's verbless one-word clauses are interpreted ('licensed'), but also provides the child with the context for — eventually — beginning to produce verbal clauses on her own.

In a few instances, the child's verbless clauses are two-noun or noun-modifier clauses. The licensing by the adult's adjacent verbal clause is just as recognizable. Thus:

(41) a. M: **There's a blanket on the baby's bed**.
N: Blanket bed.

b. M: **Do you see some toys in the room?**
N: Toys in room.

c. M: **Are there some nice toys?**
N: Nice toys. [p. 6]

Table 10 below summarizes the frequency distribution of instances in which single non-verbal constituents, coming under their separate intonation contours, are licenced by an *adjacent* clause, either preceding (anaphoric) or following (cataphoric), as against the frequency of instances where the licensing predicate is *non-adjacent*. All instances of the child's use of non-verbal single-word 'clauses' in the first 12 pages of the Naomi-I transcript were counted.

Table 10. Adjacency vs. non-adjacency of verbal clause that licenses the child's verbless clause (Naomi-I, age 1;10: pp. 1–12)

Adjacent				Non-adjacent					
Anaphoric		Cataphoric		Anaphoric		Cataphoric		Total	
N	%	N	%	N	%	N	%	N	%
31	**63.2**	18	**36.8**	/	/	/	/	49	100.0

The frequency distribution in table 10 demonstrates, rather vividly, the role of the immediate communicative context in licensing the successful use of verbless clauses by the child. The developmental stage studied here is a transitional one, during which the child is shifting from one-word verbless clauses to two-word or longer clauses that include a verb under a unified intonation contour. As in the adult usage, 100% of the verbless (scattered) clauses used by the child are governed ('licensed') by a predicate in an adjacent clause.

A frequency count of the totals of verbless vs. verbal clauses in the child transcript used above would have been somewhat meaningless, given the

deliberate selection of a transitional stage. A more meaningful count on Bloom's (1973) "one-word stage" transcripts was presented in Givón (1979, ch. 7: p. 294).[4] At this developmental stage, ca. **80%** of the child's utterances were indeed single-word turns. The frequency distribution of the various types of one-word turns in Bloom's transcript are reproduced in Table 11 below.

Table 11. Verbless vs. verbal child utterances at the one-word stage (Bloom 1973 transcripts; appendix pp. 150–160)

Non-verbal	**N**	**%**
nouns & names	63	
prepositions	22	
there	15	
'pivot' (*wid*)	36	
interjections (*oh*, *uh*)	13	
total non-verbal:	149	**81.9**
predicative		
no	6	
dirty	4	
gone	5	
more	18	
total predicative:	33	18.1
total utterances:	182	100.00

What our data suggest, I think, are two interlinked core features of child language development:

- It is the immediate communicative context — in this case supplied primarily by the adult — that makes possible the mutually-negotiated interpretation of the child's one-word verbless clauses.
- It is also the same immediate communicative context, with the missing verb supplied mostly by the adult, that makes it possible for the child to shift, gradually, from using verbless one-word clauses to using two-word and longer verbal clauses under a unified intonation contour.

10.7 Verbless clauses in second language pidgin

To investigate the use of verbless clauses in second language pidgin communication, I looked at a 7-page narrative produced by a 79 year old Korean-born woman

4. Bloom (1973), appendix, pp. 150–160.

who had spent most of her life in Hawaii. The text is taken from Derek Bickerton's Hawaii Pidgin collection, Stage-I (Bickerton & Odo 1976). An example of the pidgin narrative and my proposed English translation is given in (36), below. Verbless clauses under their own separate intonation contours are marked [VL] on the right. All verbs, including those that license verbless clauses, are bold-faced.

(42) a. Picture **marry**.
(I was married through a picture.)

b. Husband picture me **see** girl-time Korea.
(My husband saw a picture of me when I was a girl in Korea.)

c. My picture my husband **see**.
(My husband saw my picture.)

d. He **like** OK marry. **Come** Hawaii.
(He liked it well enough for marrying. So I came to Hawaii.)

e. Husband **pay**, **help** husband better.
(My husband paid for it, so I can come and help him.)

f. That's why Hawaii **come.**
(That's why I came to Hawaii.)

g. I **like** Hawaii come.
(I liked coming to Hawaii.)

h. My father, my mama, all **say**: "Go. You like, go".
(My father and mother said "Go. If you like it/him, go".)

i. That's why **come** Hawaii.
(That's why I came to Hawaii.)

k. Yes, one brother, six sister … VL [2]
(Yes, I had one brother and six sisters …)

l. No, one brother, three sister, all together. VL [3]
(No, I had one brother and three sister altogether.)

m. No, only me **come**.
(No, [of all of us] only I came.)

n. Japan, first-time, ship Japan **come**. VL [2]
(First the ship came to Japan.)

o. Second **come** Hawaii.
(Next it came to Hawaii.)

p. This steamer … **name** Chang-Yang-Huang …. VL [1]
(The steamer was named C.-Y.-H. …)

q. He **said** … ah …
([??] said … hah …)

r. Some people they … ah … American boat **come**. VL [1]
(Some people came on an American boat.)

s. **Too big**.
(It was too big.)

t. America boat **come,** first time in *Made* [?] … VL [1]
(The American boat stopped first in Made [?] …)

u. Satori **come**,
(Then it came to Satori,)

v. Satori they Japan, VL [1]
(Satori is in Japan.)

w. Japan **come** one … one month time, VL [1]
(It came to Japan in one … [?] it took one month,)

x. boat Hawaii **come**.
(for the boat to come to Hawaii.)

y. Yes, Ulsan … me **stop** Ulsan. **Go**. Me go. VL [1]
(Yes, I was in Ulsan (once). I went there.)

z. Girl-time another place no **go**, never.
('During my childhood I never went anywhere else'.) [pp. 1–2]

Wherever a number higher than [1] is given on the right side, it indicates that more than one verbless clause is governed by the same predicate, i.e., in an equi-predicate chain. Another example of multiple indexing to the same verb can be seen in (43e–f) below:

(43) a. Two twin girl. VL [1]
('I have twin girls'.)

b. One … one girl husband **wika** office. VL [1]
(One of the girls' husband works in an office.)

c. Four year **stop** girl in town over-here …
(She lived in town over here for four years …)

d. Honolulu office. VL [1]
(She worked in an office in Honolulu.)

e. He **name** two girl, twin girl **name**.
(He [husband?] named the two girls.)

f. One girl Carol, one girl Natalie. Twins. VL [3]
(One girl is named Carol, the other Natalie. They are twins.)

g. Before school, yeah, highschool. Yes, twins. VL [2]
(They went to highschool. Yes, they're twins.)

h. Highschool, highschool diploma. Diploma highschool. VL [3]
(They have a highschool diploma.) [p. 4]

In the seven pages of the life-story narrative analyzed, **89** instances of verbless clauses were found. All — **100%** — were licensed by a predicate in an adjacent verbal clause. Even when a new topic is introduced, rather infrequently, it is licensed by a following (cataphoric) adjacent predicate, as in (44b) below with the shifting to *Korean food*:

(44) a. Diploma my son highschool **get**. Yes, yes, Farrington highschool. VL [1]
(My son also got a highschool diploma, from Farrington Highschool.)

b. Yes, **Korea food**, everything, everything for **eat**, **eating**, **eating**. VL [2]
Yes, we eat only Korean food [?].

c. Yeah, everything. Everything food **can eat**. VL [1]
All we can eat is Korean food. [p. 4]

The frequency distribution of the verbless vs. verbal intonational clauses in the 7-pp. text is summarized in Table 12, below.

Table 12. Verbless (scattered) vs. verbal (unscattered) intonational clauses in the Korean-English pidgin text (7 pp. of transcript)

Verbless/scattered		Verbal/unscattered	Total
Adjacent	**Non-adjacent**		
89 (**42.7%**)	/	119	208

The percent of verbless clauses in the text was 89/208 = **42.7%.** This compares with the **10-35-50%** range for the Ute-speaking elders and ca. **30%** for the English-speaking young adults, above.

10.8 Verbless clauses in Broca's aphasia speech

For assessing the distribution of verbless constituents falling under their own separate intonation contour in the speech of a Broca's aphasia patient, I counted the entire text produced by case #1 (Mr. Franklin) in Menn (1990: pp. 154–156). As an example of this type of communication, consider (pp. 154–155):

(45) a. … Little Red Riding Hood … **go** … to … **see**...grand. ma … house.. VL [4]
b. The wolf. **was**. **watching**. Uh … the wolf. **says** … "Where're you. **going**". VL [2]
c. Little Red Riding Hood **says** … "I'm **going**. to **see** … grandma house." VL [1]
d. An[d]. the wolf. **said**: "Oh" (chuckles). So … he, ah, the wolf … **hurrying** … VL [4]
e. **running** … (pause) … the uh, the wolf. **is running** to. Little Red … VL [3]
f. Riding Hood. grandma. So. he. **comes in**, An(d) … he … **tied up** … VL [4]
g. uh. grandma … And then. he. uh. **took** … gran, grandma. han, hanet, VL [6]
h. han, hanet, that, bonnet. And **dropped in.** to bed … VL [5]

The sole example in (45) above of an argument falling under the same intonation contour with its licensing verb is (45c) 'Little Red Riding Hood Says …'.

The frequency distribution of verbless (scattered) vs. verbal (unscattered) intonational clauses in the Broca's aphasia text is summarized in Table 13, below.

Table 13. Verbless (scattered) vs. verbal (unscattered) intonational clauses in the Broca's aphasia text (2 pp. of transcript; Menn 1990: pp. 154–155)

Verbless/scattered		**Verbal/unscattered**	**Total**
Adjacent	**Non-adjacent**		
131 (**89.2%**)	/	16	147

The total number of intonational clauses in the text was 147. Out of those, 131 — **89.2%** — were verbless (scattered) constituents falling under their own separate intonation contours. All of them — **100%** — were *adjacent* to their licensing predicates. Only 16 of the intonational clauses — **10.8%** — were unscattered verbal clauses; that is, with the non-verbal argument falling under a joint ("merged") intonation contour with their licensing verb.

10.9 Summary

In spoken adult language, as exemplified by the Ute narratives and English conversation, two language processing modes seem to co-exist. First, the one usually

discussed by linguists, with nominal arguments placed under the same intonation contour with their licensing verb; that is, in Bickerton's (2008) terms, with "merge" operation having applied. This processing mode may be called **grammatical**. And second, with the nominal arguments placed under their own separate intonation contours, but nevertheless indexed rather stringently — at the level of **ca. 99%** — to the proper semantic predicate in an *adjacent* clause. This is the processing mode that may be called **pre-grammatical**.

As we have known all along (see ch. 9), adult humans do not lose the 'rules' of pre-grammar when they acquire grammar. Rather, they remain capable of reverting to pidgin communication in the appropriate context (2nd language acquisition, Broca's aphasia). In our English conversation transcripts, produced by young adults, the use of "unmerged" verbless clauses — pidgin, pre-grammar — appeared at a frequency level of ca. **30%**. In the Ute narrative the figure ranged from **10-35%-50%,** with the higher figure produced by the oldest, memory-impaired speaker.

We also know that at a certain early stage of language acquisition, the so-called "one-word stage" (Bloom 1973; Scollon 1976), children use the same "un-merged" verbless construction at a much higher frequency — in our count (Table 11) **ca. 80%**. What we also saw is that the child's use of verbless "unmerged" clauses is just as well-governed as the adults', at the level of **ca. 100%** *adjacency* to the licensing predicate (Table 10). But with two important differences:

- First, at an early stage (ca. 1;0–1;6) children use this "un-merged" processing mode almost exclusively, not just as an option (Bloom 1973; Scollon 1976). That is, their usage level (80%) approximates that of Broca's aphasia patients (90%).
- Second, when children use this "unmerged", pre-grammatical language processing mode, the predicate that governs ('licenses') the verbless one-word constituents is supplied *not* by the child's own adjacent intonational units, but primarily by the **adult's** adjacent turns (Ochs *et al.'s* 1979).

We saw, next, that the same verbless "unmerged-clause" construction appeared in second language pidgin usage at the level of **42%**; and that it is just as well-governed — 100% adjacent to the licensing predicate — as in the adult and child usage. And we saw, lastly, that the same construction, again 100% well-governed by an adjacent predicate, appears at the level of **90%** in Broca's aphasia usage.

For both language processing modes, verbless vs. verbal clauses, and in all four data-bases we have inspected, the strict adjacency governing condition was observed. The only difference between the two modes of processing appears to be their **intonational packaging** — "merged" intonation contours in the more evolved grammatical mode, "unmerged" intonation contours in the more primitive pre-grammatical mode.

10.10 Discussion

10.10.1 Indexing verbless constituents to adjacent verbal clauses

Our quantitative results raise a number of issues. The first one is formal: One could now describe two well-governedness conditions for indexing clausal arguments to their proper ('licensing') predicates, one for the grammatical processing mode, with arguments falling under the *same* intonation contour with their governing predicate,[5] the other for the pre-grammatical processing mode, with scattered non-verbal arguments falling under separate intonation contours:

(46) **Conditions for indexing arguments to their proper predicates**:

a. **Under the same intonation contour (grammatical)**:
Index the argument to a predicate falling under the same intonation contour.

b. **Under separate intonation contours (pre-grammatical)**:
Index the argument to a predicate falling under an adjacent intonation contour.

The conditions that govern the choice of anaphoric vs. cataphoric indexing in adult oral communication are yet to be specified. The paucity of cataphoric indexing in both nominal and verbal zero-marking, at least in a VO language like English, strongly suggests that cataphoric indexing in adult English usage may be described as a special case, and anaphoric indexing the default ('elsewhere') case. The much higher frequency of cataphoric indexing in Ute, on the other hand, may perhaps be ascribed to its having relatively recently changed from OV to flexible-order.

The frequency distribution data from the English-learning child (Table 10) suggest a slightly different story about the direction of the governing predicate. Cataphoric indexing of verbless clauses accounts for ca. **36%** of the total sample. And the controlling factor seems to be — who takes the initiative in starting a new unit of verbal interaction. If the child takes the initiative with a verbless clause, the indexing is most likely to be **cataphoric** — the following verbal clause supplied by the adult. If the adult takes the initiative with a full verbal clause, and the child then responds with a verbless constituent, the indexing will be by

5. Well-known special conditions govern the indexing of arguments of subordinate clauses embedded under the same intonation contour with their main clause, and many syntactic mechanisms can be used to distinguish embedded from main clauses.

definition **anaphoric**. Given the dynamics of child-adult communication at this age, one should not expect a strong bias either way.[6]

In both second language Pidgin and Broca's aphasia communication, licensing of a scattered verbless constituent by an adjacent predicate/clause could be either anaphoric or cataphoric regardless of typological considerations. Thus, the fact that Korean is an OV language shows prominently in the clauses where the nominal arguments fall under the same ("merged") intonation contour with its licensing verb (Bickerton & Givón 1976). But our stage-I Korean-English speaker scatters well-governed non-verbal constituents either before or after their licensing predicate. And the same is true in the Broca's aphasia transcripts.

One may as well note that well-edited or consciously-constructed written texts that display the idealized properties of Chomsky's 'competence' will tend to abide more consistently by condition (46a). On the other hand, oral communication, where the natural cognitive constraints on the amount of information packaged into a single **intonational clause** are more decisive (Goldman-Eisler 1968; Givón 1975b; Chafe 1994), may display a higher frequency of government by condition (46b). However, such a division is not absolute (see 10.10.3 below).

10.10.2 Cognitive status of verbless clauses

The second issue arising out of the study of verbless clauses is cognitive. One might as well note that the strict adjacency condition that governs our verbless clauses closely parallels the one that governs nominal zero-anaphora. Thus, in Givón (1983b) it was found that **98%** of anaphoric zeros in English found their antecedent in the directly-preceding clause (anaphoric distance 1), and the remaining **2%** within the next clause (anaphoric distance 2). The comparable numbers for oral Ute narrative (Givón 1983c) were **86%** and **8%**, respectively.

As I have suggested elsewhere (Givón 1992), the almost absolute requirement of adjacency in zero anaphora can be interpreted to mean **continued mental activation** of the persisting **topical referent** in focal attention or working-memory. One could likewise suggest that the equally near-absolute adjacency requirement on verbal zero-anaphora means the very same thing: continuing mental activation of the persisting **governing predicate** in focal attention or working-memory.

Cognitively, thus, zero predicates can be indexed to their proper overtly-expressed 'licensing' predicate because it is the only one that is mentally activated at that point. Presumably then, the same limiting-capacity provision invoked in the grammar of referential coherence must also hold in the case of predicates:

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6. In ch. 7, it was shown that children and their adult interlocutors at stages I-II-III of our study initiated modal interaction units at about the same frequency in the CHILDES transcripts.

Only **one at a time** can be mentally activated. The grounding of this parsimony provision in the attentional literature is only too transparent (Givón 1992).

10.10.3 Are verbless clauses a product of 'performance' or 'competence'?

Derek Bickerton (in personal communication) has suggested that verbless clauses in native-speaking unimpaired adults, as in our Ute and English data, are nothing but the effect of 'performance factors' on an underlying competence. This suggestion would, presumably, ascribe the scattering of verbless constituents under their own separate intonation contours to working-memory limitation and other vagaries of the overloaded processor beyond the speakers' choice. It is thus of interest to note that the same construction, with the same well-governed adjacency condition, is also used by English prose writers, not only in quoted conversation but also in their own narrative voice. Let me illustrate this by an example from one of my all-time favorite short stories, written by a premier stylist, D. Barthelme's "The Emperor" (1981: p. 31):

(47) a. Every morning the Emperor **weighs** the documents brought to him,
b. every evening he **weighs** them again;
c. he **will not rest** until a certain weight has passed through his hands;
d. he has **declared** six to **be** the paramount number of his reign,
black the paramount color; VL [1]
e. he **hurries** from palace to palace, along underground corridors, VL [1]
f. **ignoring** gorgeous wall hangings, bells, drums, beautiful ladies; VL [3]
g. how many more responsible officials **must** he **strangle**
h. before his will **prevails**, absolutely. VL [1]

In Barthelme's one-page story, there are **55** scattered verbless constituents under their own separate intonation contours, as marked by punctuation. Without exception, they are all strictly governed by (or indexed to) adjacent predicates. There are a total of **125** marked verbs in the text. Out of the total **180** (55 + 125) clauses under a separate intonation contour, thus, 55/180—**30.5%**—are verbless constituents indexed to an adjacent verbal clause. This is well within the range of spoken Ute narrative (10%-35%-50%) and spoken English conversation (ca. 30%).

Since Barthelme is one of the most careful self-editing stylists writing in English, the likelihood of his verbless clauses being due to the vagaries of 'performance' during the time-pressured flow of oral conversation is *nihil*. One could of course argue that he is anticipating his readers' performance problems. But they too are not pressured by the rhythm of spoken language. A 'performance' account of verbless clauses thus seems unhelpful.

10.10.4 Developmental trends

In early child language, a switch in language processing mode occurs — from pre-grammar to grammar. Among other things, this switch involves a change from one-word verbless utterances with clausal meaning, to multi-word verbal clauses. This switch is accomplished, manifestly, not by **expansion** (analysis) but by **combination** (synthesis; Tallerman 2007). In early childhood, one-word utterances are not analyzed into component parts. Rather, other words, especially the verb, are gradually transferred from the communicative context — be it cross-turns or within-turn — into the emerging clause. A holistic-to-analysis model is simply not consonant with the facts.

The child language data surveyed above also suggest that the early child language transition from the one-word verbless clause to the two- or three-word verbal clause may be also characterized as a transition from our governing constraint (46b) to our governing constraint (46a). Developmentally, the first constraint (46b) applies to the kind of interactive communication used at the one-word stage, when multi-propositional coherence stretches **across adjacent turns** and is often supplied by the adult. The second constraint (46a) is phased in when the child begins to acquires longer multi-clausal turns, in which multi-propositional coherence applies **within the child's own turn** (see ch. 8).

10.10.5 The role of multi-propositional coherence

In language ontogeny and most likely also in language phylogeny, the move from one-word non-verbal clauses to multiple-word verbal clauses coincides with the rise of multi-propositional discourse coherence. Indeed, one may argue that it is the appearance of such cross-clausal coherence, i.e., a sequence of one-word clauses that cohere together as members of the **same event**, that prompt the eventual packaging of all event components under a single intonational contour. That is, schematically, in a pre-grammatical pidgin:

(48) man, catch, goat, barn, yesterday > man catch goat barn yesterday

Put another way, there is no plausible motivation for joining the words together into a unified intonational clause and thus hierarchic constituent structure — Bickerton's "merge" — unless they are already seen as pertaining to, or cohering in, the **same event**. The developmental trend, in ontogeny, and most likely in phylogeny, is therefore *not* from words to clauses, but from words representing **coherent single events** in a succession of one-word intonational clauses, to words representing the same coherent event *more efficiently* under a single intonation contour. Bickerton's "merge" may thus be interpreted as a cognitive operation, perhaps akin to Simon's **chunking**. But it could only apply, in both ontogeny and phylogeny, after coherent multi-propositional discourse has emerged.

10.10.6 Shared mechanisms between adaptive behavior, ontogeny and phylogeny

As Fernald & White (2000) note, the synchronic (on-line) adaptive behavior of biological organisms is the shared, linking mechanism between individual adaptive behavior, ontogeny and phylogeny. The comparative study of the use of verbless clauses by adults, young children, pidgin speakers and Broca's aphasia patients suggests a similar story about the relation between synchronic communicative behavior, child language acquisition and language evolution. The mechanism of transferring information from the **adjacent context** to an **explicitly-coded** verbal clause is a fundamental synchronic mechanism in mature adult communication. The entire field of **discourse pragmatics** rests on this very mechanism. This is also the main developmental mechanism in child language acquisition, responsible for the rise of multi-word verbal clauses out of one-word non-verbal ones. I see no reason to assume that the same mechanism was not also implicated in the evolution of multi-word verbal clauses out of one-word non-verbal clauses.

Abbreviations of Ute grammatical terms

ADJ	adjective	LOC	locative (case)
ADV	adverb	MASS	mass (crowd)
AN	animate (suffix)	NEG	negation marker
ANT	anterior (pluperfect)	NOM	nominal(izer)
ASP	aspect	OBJ	object (case)
CAUS	causative (verb suffix)	OBL	oblique case
CONCL	conclusion (of episode)	PART	partitive
CONJ	conjunction	PL	plural
DIM	diminutive	RED	reduplication (verb)
DIR	directional (case)	REFL	reflexive (possessive)
EMPH	emphasis	S(UBJ)	subject (case)
FUT	future	TO	'to' (directional)
GER(UND)	gerund (adverbial)	V	verb
I	1st person singular	WH	WH question/pronoun
IMM	immediate (progressive, perfect)	3P	3rd person plural (pronoun)
		3S	3rd person singular (pronoun)
IMP	imperative	DEF	definite (article)

CHAPTER 11

The neuro-cognition of syntactic complexity

11.1 Language, cognition and neurology*

In this chapter I will survey what may be prudently said about the neuro-cognitive correlates of syntactic complexity. As noted earlier, it would be comforting to assume that there existed a simple two-step isomorphism between language, cognition and neurology: first between syntactic and cognitive complexity; then between cognitive and neurological complexity. The latter assumption seems, on the face of it, easier to make, given the virtual merger in recent years of cognitive psychology and neuro-psychology into the unified fields of **cognitive neuroscience** (e.g., Gazzaniga ed. 2000). But even within this combined field, the one-to-one correlation between mental operations and the neural structures that support them cannot always be taken for granted.

An isomorphism between syntactic complexity as described by the linguists and cognitive complexity as described by the psychologist is not easy to articulate in full detail. This is in part due to the chasm in methodologies, terminologies and theoretical perspectives between linguistics and cognitive psychology, two fields of inquiry with largely separate histories. Intuitively, one would like to assume at least two language-to-cognition mappings, which taken together may yield a third:

(1) **Possible mapping relations between linguistic and cognitive complexity**:
- **Coding**: More complex mentally-represented events are coded by more complex linguistic/syntactic structures.
- **Processing-I**: More complex mentally-represented events require more complex mental processing operations. Therefore,
- **Processing-II**: More complex syntactic structures require more complex mental processing operations.

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Much of the vast experimental work in the sentence-processing tradition has purported to show the details of such mappings (see review in Fernandez-Duque 2008), but the situation remains rather murky. The main concern of this chapter is to assess the extension of the language-to-mind mapping to a language-to-mind-to-brain mapping in the domain of syntactic complexity.

11.2 Cognitive representation as a combinatorial system

As noted earlier (ch. 2), the cognitive representation system underlying language is combinatorial-hierarchic, whereby individual **concepts** (words) combine into **events/states** (clauses), and events/states combine into coherent **multi-propositional discourse** (clause-chains). To recapitulate:

(2) **Cognitive representation system**:

	Cognition		Language/grammar	
	System	**Units**	**System**	**Units**
a.	semantic memory	concepts	lexical semantics	words
b.	episodic memory-I	events/states	propositional semantics	clauses
c.	episodic memory-II	event chains	discourse pragmatics	clause chains

At this rudimentary level, the isomorphism between levels of cognitive representation (Atkinson & Shiffrin 1968) and levels of linguistic representation is transparent. The problem starts with complex-embedded clauses, thus with the use of grammar to code the cognitive level above the event/state proposition — the **communicative intent** of the speaker producing clauses in natural discourse context. Traditional psycholinguistics and neuro-linguistics, in an experimental paradigm known as **sentence processing**, have largely ignored the central role of syntax in coding communicative intent, concentrating almost exclusively on its relatively minor role in coding clause/event-level propositional semantics. A typical statement of this underlying bias may be seen in the following programmatic summary (Kaan & Swaab 2002):

> "… Reading or hearing a sentence such as '*The little old man knocked out the giant wrestler*' demonstrates the crucial role of syntax in normal language understanding. Identifying **who did what to whom** enable humans to understand the unlikely scenario that is described here. Thus, syntactic information helps us combine words we hear or read in a particular way such that we can extract the **meaning of sentences** …" (2002: p. 350; boldface added).

The traditional perspective is of course understandable, given that episodic memory represents both simple events/states and event/state concatenations (chains, paragraphs, episodes). It is also understandable in light of the almost exclusive use of isolated-sentence stimuli in psycholinguistic and neuro-linguistic experiments. And it is in line with the Generative descriptive bias, which made the communicative function of grammar — the vast part of syntax called earlier **transformed clauses** (Chomsky 1965, ch. 3) — a functionally-opaque mystery. So that of the two functions coded by grammar:

- event/argument structure = simple-clause grammar; and
- communicative intent in discourse context = complex-clause grammar,

only the first was conceded a coherent function.

A simple example will illustrate the conundrum that linguists have imposed upon themselves, and in their wake upon neuro-psychologists, in trying to understand the adaptive function of the grammar of complex clauses.

(3) a. She loaned the book to some man.
b. The man [she loaned the book **to**] …
c. She had a book she really liked**,** and **she loaned a book to some man**, and then forgot all about it. Well, she kept trying to remember, she racked her brain, but it wouldn't come back to her. It took months, till one night it came back to her, in a dream: The man [**she loaned the book to**] was Joe.
d. She had a book that she really liked, and she kept looking for it and couldn't find it. Well, she kept trying to remember, she racked her brain, but it wouldn't come back to her. It took months, till one night it came to her, in a dream: **She had loaned the book to Joe**.

Simple clauses as (3a), with their canonic structure, are the benchmark of both syntactic description and language processing, being by far the most common clause-type in natural communication (Givón 1995, ch. 2). They code most transparently level (2b) of cognitive representation, propositional semantics ('who did what to whom'). And the role of syntax here is relatively modest — word order and/or case-marking, including the preposition 'to' in (3a). Most of the propositional information is already furnished, rather transparently, by the lexical words themselves. And the bulk of the morph-syntactic machinery of human languages is invested in the grammar of complex ('transformed') clauses.

In transforming itself into the REL-clause (3b), the relatively transparent structure of (3a) becomes partially mutilated, now missing its indirect object argument

and sporting a stranded preposition. To recover the lost information, the rigid grammar REL-clauses give the hearer of (3b) two clues:

- The referential identity of the missing argument is recoverable from the adjacent head noun, which by convention must be co-referent.
- The case-role of the missing argument (recipient) is recoverable from the stranded preposition ('to').

But this leaves one question unraised and thus unanswered: Given the deleterious effects of the structural mutilation of transformed clauses, why use a REL-clause at all in (3c)? The answer is, of course, that in a complex referent-tracking task in real communicative context, a REL-clause is designed to identify a less-accessible referent, in this case over a gap of several intervening clauses, by matching with a proposition **presupposed** by the speaker to still be accessible in the hearer's episodic memory of the text. The REL-clause is used as an **other-mind-prodding device**.

In the contrasting communicative context (3d), on the other hand, no complex referent-tracking task is involved. The very same prepositional information is brand-new now, and is thus **asserted** in the syntactic form of a simple clause.

Another dubious feature of the neuro-psychology experimental paradigm concerns the ubiquity of **grammatical violation** experimental stimuli. Implicit in this practice is the assumption that grammar is about well-formedness rules and their violation; that is, *grammar is about grammar*. But since the adaptive impetus for the rise of grammar is not well-formedness rules, but rather the coding of distinct **communicative functions**, it is not all that clear that the traditional neuro-psychology paradigm investigates anything but a carefully-constructed artifact.

Given this rather unsettling situation, our task here is to identify, to the extent possible, the neuro-cognitive correlates of the various components/levels of syntactic complexity: words, simple clauses, conjoined clauses and complex-embedded clauses.

11.3 Cognition and syntactic complexity

A number of neuro-cognitive experimental studies suggest that relative clauses are harder to process than conjoined ones (Just *et al.* 1996; Booth *et al.* 1999, 2000; Caplan *et al.* 2006a, 2006b; *inter alia)*. But the same studies also suggest that object REL-clauses are harder to process than subject REL-clauses. What is more, the increased brain activation, thus processing difficulty, between subject REL-clauses and object REL-clauses occurs in the same brain region — *inferior frontal gyrus* (IFG, Broca's area) — as the increased activation between conjoined clauses and

subject REL-clauses. In other words, neither the brain locus nor the increased activation are specific to embedding ('recursivity'). Indeed, an extensive review of the earlier experimental neuro-cognitive literature on syntactic complexity (Fernández-Duque 2008) reveals that increased activation in the IFG may not be specific to syntactic complexity, perhaps not even to grammar or language. Rather, the IFG partakes in a large and diverse array of cognitive tasks, supporting diverse types of difficult computations. Among those tasks, Hagoort (2008) singles out **unification** as a function of Broca's area that is applied to diverse cognitive domains, including the combinatorial aspects of syntax. 'Unification' may thus apply to syntactic complexity at multiple levels, such as combining words into simple clauses (ch. 10), simple clauses into conjoined clauses, or conjoined clauses into complex-embedded ones. In this way, Hagoort's (2008) 'unification' resembles Bickerton's (2008) "merge".

A second cognitive research tradition suggests a different take on complexity. The processing of sequential information in perception, memory, and motor behavior involves **chunking**, whereby sequentially-presented information that is longer than 3–4 items is re-coded into chunked **hierarchic structure**. Such chunking and hierarchization depend strongly on repeated exposure (frequency), so that skilled **expert** performers — typists, musicians, dancers, readers, chess players — organize their knowledge more hierarchically than novices (Chase & Simon 1973; Chase & Ericsson 1982; Gobet 2005; *inter alia*).

A parallel line of investigation has noted that chunked, hierarchic structures, or **schemata**, are implicated in increased **automaticity** of processing, thus decreased mental effort and lower **attentional demands** (Posner & Snyder 1974; Schneider & Shiffrin 1977; Schneider 1985; Schneider & Chein 2003; *inter alia*). The interaction between rhythmic-hierarchic structure, increased expertise and a more strategic deployment of limited attentional resources is also found in complex motor routines ('schemata') employed in walking, grasping, typing, dancing or piano-playing (Shapiro 1978; Shapiro & Schmidt 1980; Thelen 1984).

Typically, the higher, global, less-frequently-accessed nodes in a hierarchy are processed with more conscious attention, slower processing rate and more careful **context monitoring.** While the lower, local, more-frequently-accessed nodes are processed more **automatically**, with less mental effort and less conscious monitoring of the context. The gradient of attentional demands thus matches the gradient of **informational predictability** ('transitional probability') or frequency of exposure.

If grammar is taken to be an automated processor, then, as Kintsch (1992) has noted, there is a division of labor between syntactic processing and lexically-triggered *inferences* in language comprehension. Syntax is a bulk-search strategy, proceeding at high speed via higher levels of hierarchic organization (say, freeways, US highways). It brings the language user to the neighborhood, *roughly* but not all the way. To get to the exact location (say, street address), one must decouple

the automated system and use the finer, slower, context-dependent strategy of lexically-guided inferences. And the two processes may proceed in parallel.

But now we seem to face a contradiction between the experimental results that suggest a greater processing difficulty for complex-embedded syntactic structure, and those that suggest faster, more effortless and automatic processing of chunked, hierarchically-organized information. Can this conflict be resolved?

A possible resolution may run as follows: The experimental *stimuli*, and thus *communicative contexts*, used in the two sets of experimental studies are rather different. The neuro-cognitive experiments that contrasted conjoined and embedded clauses were couched in the **sentence processing** tradition, invariably using two-clause stimuli detached from their natural communicative context. Thus, the very context that would motivate the use of either conjoined or embedded structures is missing from the experimental stimuli. Since conjoined simple clauses are the *unmarked* ('canonical'), most frequent clause-type in discourse, it is not surprising that they are easier to process — out of context. The chunking-and-automaticity experimental tradition, on the other hand, investigated larger-scope stimuli embedded in wider motivating context (repetition, habituation). Above all, the stimuli used in both experimental traditions did not involve coherent multi-propositional discourse frames.

The proper comparison, I suspect, must contrast the processing efficiency of conjoined vs. embedded clauses in their proper communicative contexts — the one that motivates the use of chained clauses vs. the one that motivates the use of either REL-clauses or V-complements. Using more valid stimuli may yet reveal that in their proper adaptive contexts, REL-clauses and V-complements are processed more efficiently than the equivalent conjoined clauses; and that the latter, in turn, are processed more efficiently in *their* proper adaptive context.[1]

11.4 The neurology of syntactic complexity

Grammar is not a single-module device, but rather a widely distributed multi-modular network of cognitive-communicative functions. Given what we know about the adaptive functions of grammar (see ch. 2), it must involve a complex interaction between, potentially, *at least* the following components:

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1. An experiment of just this type was reported in Givón *et al.* (1985), comparing the processing efficiency of pronouns vs. definite nouns in retrieving anaphoric antecedents. When the anaphoric antecedent was 1-clause back, pronouns retrieved it faster and with less attentional demands. When the antecedent was 20-clauses back, definite nouns retrieved it faster and with lower attentional demands. The processing efficiency of syntactic constructions thus seems to be indexed to their habitual communicative context.

(4) **Distributive network for grammar:**

	Functional/cognitive	Language/grammar
a.	semantic memory	event types (verbs)
b.	combinatorial semantics	event representation (propositions)
c.	episodic memory	propositional & discourse representation
d.	working memory	syntactic buffer; on-line representation of other-minds
e.	executive attention	relevance, topicality, perspective shifting
f.	complex-hierarchic structure	complex-embedded clauses
g.	serial-order module	word-order variation
h.	morphological module	grammatical morphology
i.	timing module	temporal coordination

11.4.1 Language and brain: Overview

The old Geschwind (1970) model divided the load for language processing in the cortical left hemisphere between **Broca's area** in the *inferior frontal gyrus* (IFG), responsible for grammar, and **Wernicke's area** in the *posterior superior temporal gyrus* (p-STG), responsible for meaning. The two areas were presumed to interact through a dense cross-cortical connector, the **arcuate fasciculus**. Figure 1 below gives the general organization of the left-cortex.

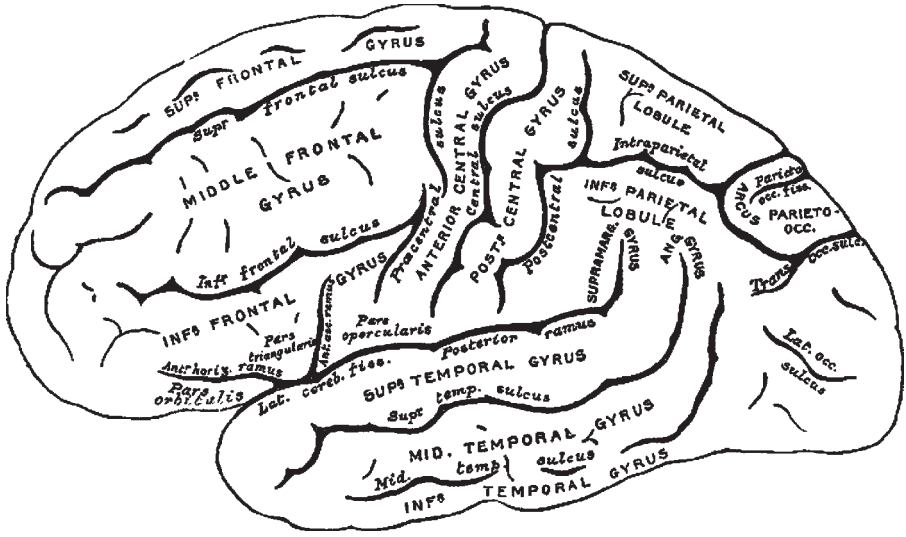

Figure 1. General Organization of the left cortex [from Gray's Anatomy].

Figure 2 below gives a schematic view of the more detailed Brodmann Areas (BA) organization of the left cortex. BA 44, 45 and 47 in the IFG are traditionally grouped as the broader Broca's region. BA 42 is at the center of the traditional Wernicke's area.

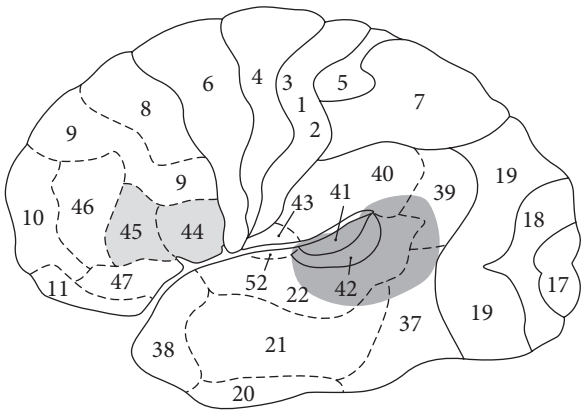

Figure 2. Brodmann Areas organization of the left cortex. The traditional Broca's and Wernicke's areas are shaded [Kaan & Swaab 2002].

The two-module view of language processing in the brain has been largely superceded and refined by an immense amount of work done since the pioneering lesion-based insights of Broca and Wernicke. The accumulation of new work has taken advantage of an array of brain-imaging techniques that allow much finer spatial (PET, fMRI) and temporal (ERP) resolution of brain loci and their specific processing activity. In this connection, Bookheimer (2002) observes:

> "… It is apparent that large-module theories are clearly incorrect; rather, the language system [in the brain] is organized into a large number of relatively small but tightly clustered and interconnected modules [, each] with a unique contribution to language processing. There is increasing evidence that language regions in the brain — even classic Broca's area — are not specific to language, but rather involve more reductionist processes that give to language as well as non-linguistic functions …" (Bookheimer 2002: p. 153)

Similar conclusions, more specifically addressing the representation and processing of syntax, have been voiced by Kaan (2008):

> "… Similarly, the brain areas found activated in syntactic processing tasks are not dedicated to this particular cognitive domain. Broca's region is involved in various non-syntactic and even non-linguistic functions, such as working memory, inhibition,, or resolving conflicts among representations … The (anterior) temporal

> lobe found active for syntactic processing, is also involved in semantic priming and discourse processing … The parietal areas are typically involved in imagery, reading and working memory, whereas subcortical areas are involved in a great variety of tasks. None of the brain areas activated and ERP components elicited in syntactic tasks are therefore unique to syntactic processing …" (Kaan 2008: p. 12)

Both the frontal and temporal sites, as well as the connecting channels, turn out to have many anatomically- and functionally-distinct sub-components. And those sites, in both the pre-frontal (old Broca's) and temporal (old Wernicke's) areas, appear to be joined into a number of **distributive networks** or circuits, each with its own pattern of spatial connectivity and temporal activation. In the space below I will survey some of the relevant literature pertaining to the distribution of these functionally-specific networks and, whenever available, to the patterns of interaction of the cognitive-linguistic functions listed in (4) above.

11.4.2 Integrative framework: The two information-processing trends

Before proceeding to identify the brain loci that correspond to the cognitive-linguistic modules, I would like to outline a broader neurological framework that is pre-linguistic and shared by all primates, and within which the brain mechanisms responsible for language and grammar are embedded. Earlier work by Mishkin (1982), Mishkin *et al.* (1983), Ungerleider & Mishkin (1982), and Kaas (1989), *inter alia*, described two pathways in the posterior left cortex, responsible for **visual information processing** in both monkeys and humans. Both pathways begin in the primary visual cortex (occipital lobe; BA 17, 18, 19). Moving forward, the re-processing of incoming visual information splits into two "trends", dorsal and ventral. Figure 3, below is a schematic rendition of the two pathways (Ungerleider & Miskin 1982; Kaas 1989).

The ventral trend leads through the *inferior-temporal gyrus* to the front of the temporal lobe (TE). It is responsible for **object recognition**; that is identifying objects *qua types*. This is the primate — and human — **visual lexicon** processor.

The dorsal trend proceeds up to a parietal lobe locus (PG), and is responsible for processing objects in their spatial context. In other words, it processes the **episodic occurrence** of objects as *tokens* as they partake in episodes of spatial **location** (states) or **motion** (events). The two visual processing pathways have also been called the "what" channel (ventral) and the "where" channel (dorsal).

While the initial description of the two visual processing trends emphasized their cortical components, both are in fact parts of the two major **limbic-cortical circuits** (Tucker 1991, 2002, 2008; Mesulam 2000). A recent review by Eichenbaum *et al.* (2007) suggests that both systems are rooted in the subcortical *medial-temporal* memory system. The ventral (lexical) channel connects first to the

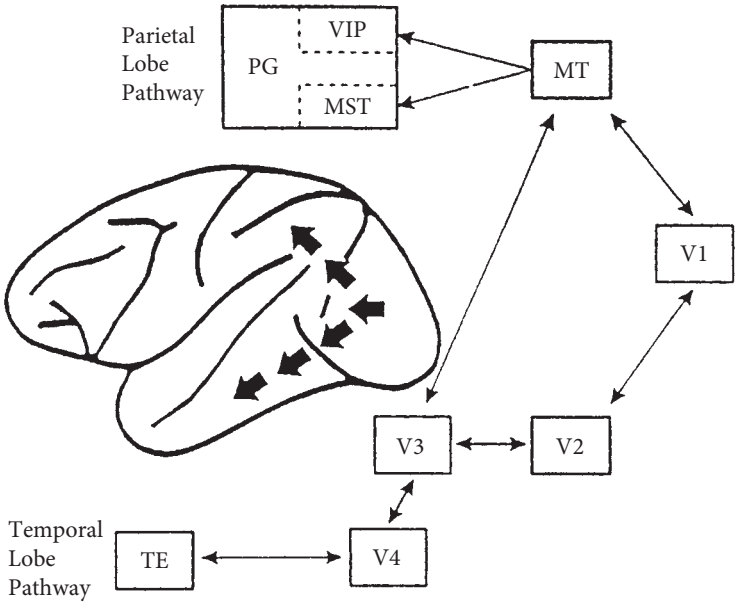

Figure 3. The two visual information-processing trends.
[From: Kaas (1989); Ungerleider & Mishkin (1982)]

perirhinal cortex. The dorsal (episodic) channel connects first to the *parahippocapus* and *medial-entorhinal* area. From those intermediate sites, both pathways connect to the *hippocampus*, where item (object) information and spatio-temporal (context) information are integrated into a unified coherent episodic representation of states and events. A schematic model of the two channels is given in Figure 4, below.

From the their sub-cortical roots ('core'), both visual processing trends link back to frontal-lobe cortical sites, one lexical, the other episodic. The "what" (lexical) trend projects back the lexical-semantic site in the L-*inferior-prefrontal* cortex (BA 47/12; see further below). The "where" (spatio-temporal context, episodic) trend projects back to a *R-prefrontal* long-term episodic memory site (Squire 1987; Squire & Zola-Morgan 1998). The sub-cortical limbic-thalamic 'core', most specifically the *hippocampus*, integrates the information coming from the two pathways — the dorsal episodic-contextual ("where") and the ventral generic-lexical ("what"), and is responsible for some of the cross-cortical — frontal-temporal and frontal-parietal — connectivity (Tucker 2008).

In earlier works (Givón 1995, ch. 9; 2002, ch. 4), I identified the ventral-temporal ("what") trend of visual-information processing as the pre-linguistic precursor of the human semantic lexicon. I think this identification still holds, although other

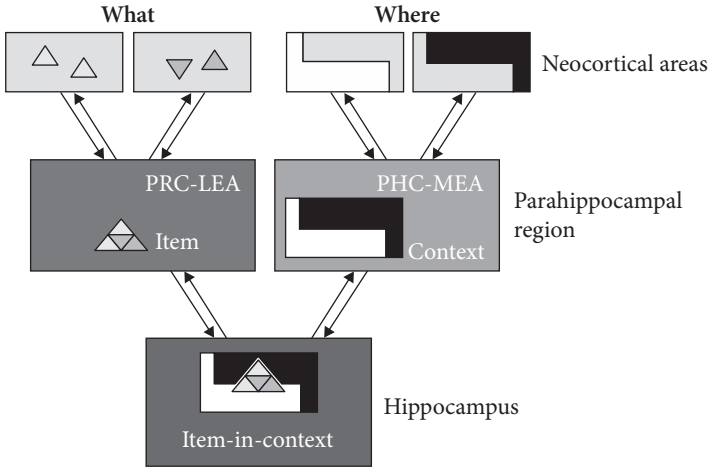

Figure 4. Functional Organization of the Medial-Temporal Memory System [Eichenbaum *et al.* 2007: p. 128].

temporal regions (*medial temporal gyrus*) are probably also involved, at least in representation of the verbal lexicon (see below). I further identified the dorsal trend as the pre-linguistic precursor of episodic event/state representation, thus of propositional/combinatorial representation. Further review of the evidence, both recent (Friederici 2008; Eichenbaum *et al.* 2007) and less recent (Perret *et al.* 1989), suggests that the latter identification begs some refinement. Event representation has two distinct components — episodic and lexical. The episodic component ((4b) above), processing *tokens* of states/events and situating their participants in their spatio-temporal context, indeed corresponds to the dorsal-parietal ("where") processing trend. The lexical component ((4a) above), which processes events as *types* — that is, for language-coded information, *verb types* — is probably processed by a temporal site, the *anterior superior temporal gyrus* (Friederici 2008), perhaps also the *medial temporal gyrus* (Perret *et al.* 1989). This latter component, being lexical-generic and thus not indexed to any particular spatio-temporal context, is probably part of the *ventral* processing trend.[2]

2. The hippocampus-related episodic memory system is traditionally referred to as the *medial-temporal* memory system (Squire 1987, 1994; Squire & Zola-Morgan 1998; Eichenbaum *et al.* 2007). But the term 'temporal' here refers primarily to the sub-cortical *limbic* components of the system, located under the temporal cortex. The sub-cortical system should not be identified exclusively with the ventral-temporal processing trend, since both the "what" and the "where" pathways connect to it, and are ultimately rooted in the hippocampus (Eichenbaum *et al.* 2007).

11.4.3 Complexity: Brain localization

a. **Lexical semantics**

Earlier work by Petersen, Posner, Raichle and associates (Petersen *et al.* 1988; Raichle *et al.* 1993), using PET scans, probed the localization of word-meaning representation, implicating one *inferior-pre-frontal* site and one *medial-temporal* site. Subsequent ERP imaging studies (Snyder *et al.* 1995; Posner & Pavese 1997; Abdulaev & Posner 1997) suggested both a functional and a temporal distinctness between the two sites. The pre-frontal site was activated by purely-lexical tasks, and its activation peaked at ca. 200 msecs, the well-known time range for the resolution of both **word** meaning (Swinney 1979) and **visual object** meaning (Treisman 1995; Treisman & DeSchepper 1996; Treisman & Kanwisher 1998; Barker & Givón 2002). The medial-temporal site was activated by noun-verb combinatorial tasks, and peaked at ca. 800 msecs, within the time range of the resolution of both **clausal-propositional** meaning (Swinney 1979) and **visual event** meaning (Barker & Givón 2002).

A finer yet spatial resolution of the core lexical network was reported by Badre & Wagner (2007), identifying the *ventri-lateral pre-frontal cortex* (*pars orbitalis*; BA 47/12) as the pre-frontal lexical representation locus. But additional brain areas were implicated in more specific processing tasks related to lexical-semantic representation. Figure 5, below, gives a schematic view of the organization of the inferior frontal gyrus (IFG), including Broca's area.

The work of Badre & Wagner (2007) suggests that lexical-semantic representation-cum-processing implicates a network of brain sub-modules. In her

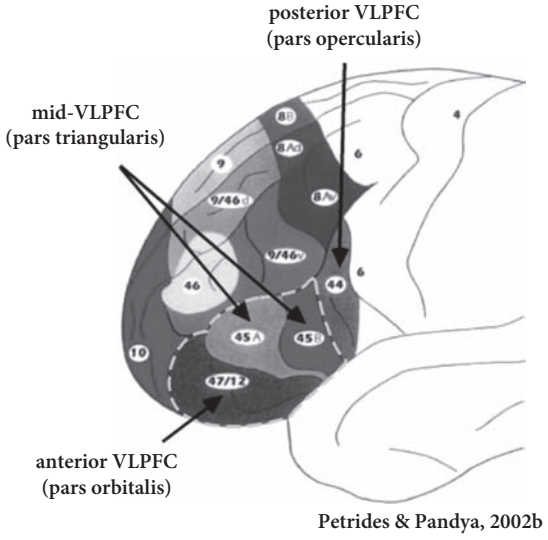

Figure 5. Organization of the pre-frontal cortex [Badre & Wagner 2007; Fig. A, p. 2884].

general review of the localization of lexical semantics in the brain, Bookheimer (2002) suggests just that, implicating (a) the L-*ventri-lateral pre-frontal* site (*pars orbitalis*; BA 47/12); but in addition also (b) a L-*temporal* site responsible for object and concept categorization, perhaps the posterior STG or MTG; and (c) R-hemisphere sites responsible for the comprehension of contextual and figurative meaning (pragmatics). The frontal-temporal connection for lexical-semantic processing is now said to go via the *extreme capsule* (Schmahmann *et al.* 2007). In addition, various lexically-related phonological functions, including visual, auditory and articulatory coding, also seem to implicate some L-inferior pre-frontal (IFG) sites (Fietz 1997; Price *et al.* 1997). Support for this distributive view of lexical semantics also comes from work by Pulvermüller (1999), Caramazza (2000); Hauk *et al.* (2004), and González *et al.* (2006). The combined thrust of this research is that concrete, sensory-motor or affective-visceral words prompt the activation of relevant peripheral **sensory-motor** or **visceral-affective** regions, endowing meaning with its 'wet' experiential contents.

Given such a wide distribution of sites, Bookheimer (2002) poses the crucial question about the overall brain organization of lexical semantics: Is there a controlling core component? Both her question and her answer are worth quoting:

> "… Assuming that different aspects of sensory, conceptual and associative semantic information have separate and diffuse organization in the brain, how do we then **integrate** such knowledge in the service of language? Martin & Chao (2001) argue that a good candidate model for this integration could be observed by the **left anterior IFG** [BA 47/12] as discussed in detail above. This region is likely involved in the **executive control** of semantic information processing, including retrieving, integrating, comparing, and possibly selecting the diverse pieces of semantic information in the brain …" (Bookheimer 2002; brackets and boldface added)

The representation of lexical-semantic meaning thus seems to be a network of nodes and connections, within which lexical items are specific clusters of co-activated nodes (Spitzer 1999; Givón 2005, ch. 3). For each word, co-activated peripheral nodes endow it with category-specific senses (Martin *et al.* 1996). But a more abstract, central **core-network**, possibly in the left anterior IFG (BA 47/12; Martin & Chao 2001) is responsible for integrating concepts and relating them to other concepts in the global network.

b. **Combinatorial propositional semantics**

The *L-temporal* site identified by Abdulaev & Posner (1997) and Posner & Pavese (1997) was activated by noun-verb **combinatorial** tasks. One may thus identify it with clause-level event representation. The peak activation time (ca. 800 msecs from stimulus presentation) is consonant with the clause processing time-frame

of Swinney (1979) and the visual-event processing time-frame (Barker & Givón 2002). This activation contrasts with that of the *left-inferior-pre-frontal* semantic site (at ca. 200 msecs).

More recent work by Badre & Wagner (2007) and Friederici and colleagues (Friederici & Frisch 2000; Friederici *et al.* 2006a, 2006b; Grodzinsky & Friederici 2006; Bahlmann *et al.* 2008; Friederici 2008) has clarified the locations of these centers more precisely. With combination of ERP and fMRI imaging, Friederici and her colleagues identified two combinatorial-syntactic prefrontal-to-temporal circuits. The first, relevant to combinatorial/propositional semantics, connects the *frontal operculus* (fOP; posterior VLPFC; *pars opercularis*; BA 44) with an *anterior superior-temporal-gyrus* (STG) site. The connecting venue here is the *fasciculus uncinatus*. This 'simple' ('local', 'phrase structure') circuit is responsible for processing clause-level combinatorial clusters; that is, our **level-I** of syntactic complexity (see (5), below). It is distinguished, both spatially and temporally, from another prefrontal-temporal circuit, the 'complex' ('global') one. This second circuit is responsible for processing **complex clauses** and/or longer-distance dependencies; that is, our **level-III** of syntactic complexity (see (5), below).

Friederici and her colleagues' simple/local circuit may correspond to Posner and colleagues' combinatorial temporal-lobe site, although the peak activation times don't quite match.[3] It also corresponds, at least conceptually, to Bickerton's (2008) clause-level "merge" operation.[4] It probably also corresponds to Pulvermüller and associates' serial-order module (Pulvermüller 2002, 2003; Pulvermüller & Assadollahi 2007); as well as to Hagoort's (2008) 'unification' function.

One may suggest, lastly, that the simple/local frontal-temporal circuit (Friederici 2008) may have a pre-human precursor, given the rhesus macaque work of Perret *et al.* (1989). Perret and his colleagues found, using single-cell recordings, that a site in the *anterior superior temporal sulcus*, the lower part of the *superior temporal*

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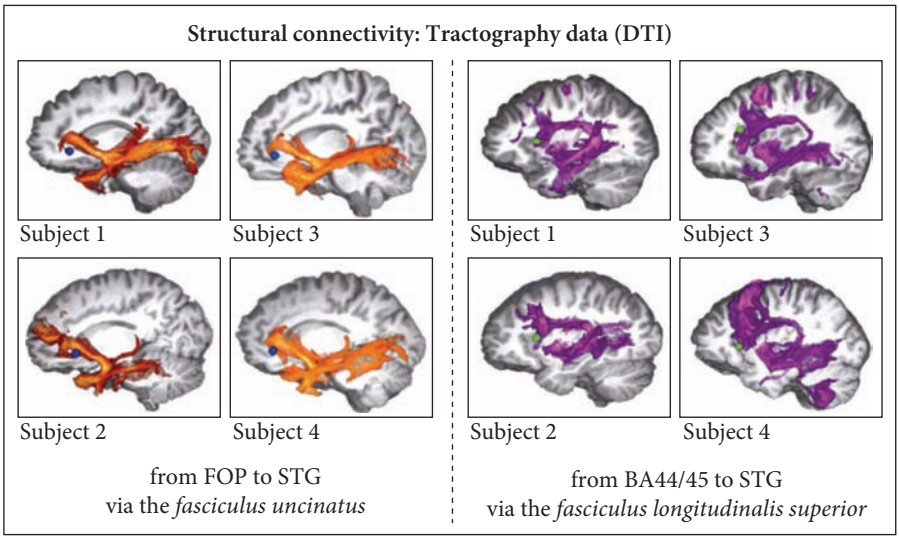
3. Posner and associates suggested peak activation for the combinatorial temporal site at ca. 800 msecs, in the clause-processing time-range identified by Swinney (1979). Friederici and her colleagues suggest a much earlier activation for their "local/simple" circuit (early left anterior negativity, ELAN, at ca. 150 msecs), as against a later activation for the "complex" one (late centro-parietal positivity, ca. 600 msecs; P600). The latter timing for "complex" syntax corresponds to Posner & Pavese's (1997) timing range for the combinatorial task, presumably the clause-level "simple" circuit. (BA44 to anterior-STG). Posner and associates' timing data is consonant with Swinney's (1979) clause-activation timing.

4. Bickerton (2008) furnishes no neurological identification of his "merge" operation, but contends that the same operation accounts for both "local" (clause-level phrase structure) and "global" (complex-clause) processing. The work of Friederici and her colleagues, if I am not misjudging, pretty much scuttles this parsimony-driven minimalist suggestion.

gyrus, is activated by pictures of *a hand-held object being moved to the monkey's mouth*, in essence a complex three-argument event/verb. Friederici (2008) notes that the simple/local combinatorial circuit matures earlier in children, has a clear homolog in pre-human primates, and is thus older phylogenetically, as compared to the complex/global circuit (see below).

c. **Hierarchic-embedded structures: Complex clauses**

As noted above, earlier work implicated Broca's area (BA 44/45) in **grammar** as a general mega-module (Geschwind 1970; Neville *et al.* 1992; Neville 1995), as well as in processing sequential-hierarchic structures (Greenfield 1991). More recently, Friederici and her colleagues (Friederici & Frisch 2000; Friederici *et al.* 2006a, 2006b; Grodzinsky & Friederici 2006; Bahlmann *et al.* 2008; Friederici 2008) have identified a second syntax-related prefrontal-to-temporal circuit, implicated in processing **complex clauses** or longer-distance dependencies. This circuit connects Broca's area proper (BA 45a/45b; mid-VLPFC; *pars triangularis*) with a site in the *posterior superior temporal gyrus* (posterior STG). The connecting venue here is the *fasciculus longitudinalis superior* (FLS).



Source: Friederici, Bahlmann et al., PNAS, 2006

Figure 6. The two syntactic combinatorial circuits [Friederici 2008: p. 10].

Other works purport to further differentiate sites responsible for specific aspects of syntactic processing. Thus, for example, Ben-Schachar *et al.* (2003)

report that a site in Broca's region (BA 45) responds selectively to "transformed" — as against simple — clauses. In another study, Ben-Schachar *et al.* (2004) identified a prefrontal-to-parietal circuit responsible for processing "movement" transformations; that is, constructions such as WH-questions, cleft, dative-shift and OBJ-rel clauses where the surface order differs from the canonical order of simple clauses. The implicated brain sites here are the *L-inferior frontal gyrus* (IFG), and a *bilateral* activation in the *posterior superior temporal sulcus* (p-STS) This circuit is not clearly distinguishable from Friederici's (2008) "complex/global" circuit. Finally, Bornkessel *et al.* (2005) have also reported different circuits for word-order, morphology, and verb-frame semantics.

Bookheimer (2002), Kaan (2008) and Hagoort (2008) all caution us about ascribing dedicated linguistic functions to brain modules that may have general cognitive functions, and that still perform older pre-linguistic tasks. Such modules partake in — i.e., are **coopted** by — various language-processing circuits. The task-sharing view of such modules is consonant with the idea that complex syntax is probably the last evolutionary addition to language processing (see ch. 12; also Friederici 2008). As such, the brain modules that process complex syntax have the highest probability of not yet being dedicated exclusive to grammar or language.

With the complex and sometime contradictory experimental evidence taken together, we can now map three of the four levels of the **combinatorial complexity** of language structure — and language processing — onto three distinct frontal-temporal brain circuits:

(5) **Brain localization of three levels of complexity**

System	Unit	Brain circuits	Complexity level
• lexical semantics	word	BA 47/12 to posterior STG and/or MTG, sensory-motor and R-parietal sites (via the *extreme capsule*)	
• propositional semantics	simple clause	fOP (BA 44) to anterior-STG (via the *fasciculus uncinatus*)	I
• discourse pragmatics	complex clause	BA 45 to posterior-STG (via the *fasciculus longitudinalis superior*)	III

One level (II), that of **conjoined clauses** (as contrasted with both single simple clauses and complex-embedded clauses), has yet to be systematically addressed by the neurologists.[5]

11.4.4 Other grammar-relevant brain loci

Several other neuro-cognitive systems are relevant for grammatically-coded language processing, if grammar is to perform what I think it must perform during natural communication.

i. **Attention and working memory**
Several sub-divisions of **working-memory buffers**, whatever their brain location may be, are implicated in at least two phases of grammatical language processing. First, during clause processing, whether simple or complex or chained, earlier chunks of information must be held in modality-specific working memory, typically for 1–2 seconds, until grammatical structure is decoded and the propositional-semantic structure ('local phrase structure') is resolved (Gernsbacher 1990; Gathercole & Baddeley 1993; Ericsson & Kintsch 1995; Fernández-Duque 2008).

Second, some cross-modal working memory component is probably implicated in representing the interlocutor's constantly-shifting mental states during communication (Givón 2005, ch. 4; ch. 2, above). And perspective shifting during communication (MacWhinney 2002, 2008) implicates some component of the executive attention network, perhaps the **attention control** module in the *posterior parietal cortex* (PPC; Schneider & Chein 2003).

Third, the **executive attention** network is probably also implicated in the activation of referents during discourse processing (Givón 2005, ch. 5), and probably in other more-global discourse processing tasks. Figure 7. below gives a general view of the brain distribution of several attention networks (Posner & Rothbart 2007). Figure 8. below gives another perspective on the brain distribution of the executive attention network (Schneider & Chein 2003).

ii. **The cerebellum**
An intriguing recent article by Argyropoulos (2007) implicates the cerebellum in **grammaticalization**; that is in the everyday behavioral experimentation by adults during ongoing communication that gives rise, over time, to both grammatical morphology and syntactic constructions. The argument rests on the cerebellum's

5. The research tradition of 'sentence processing' has not yet taken account of the processing difference between the artifact isolated clause and the ecologically valid clause in its natural communicative context.

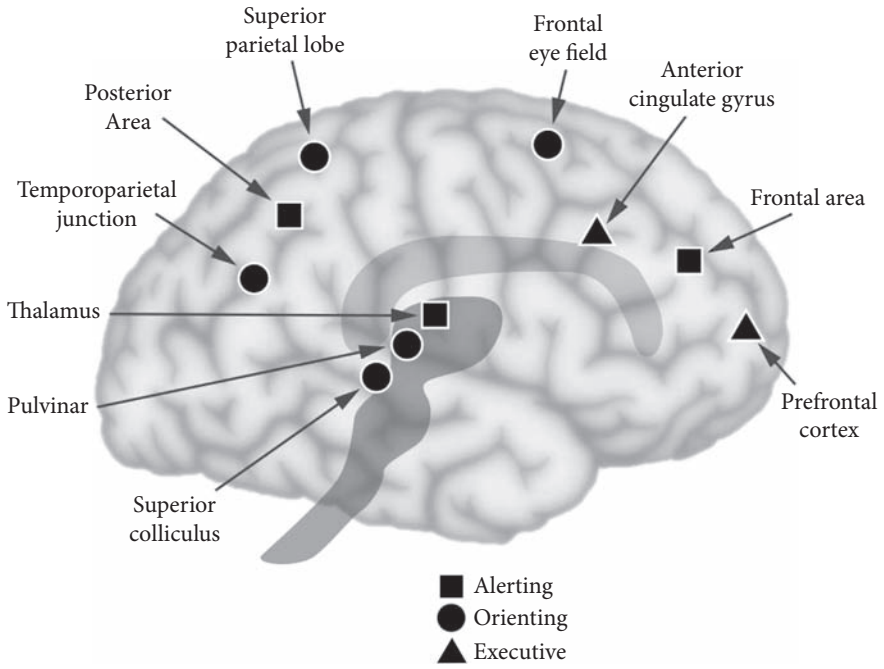


Figure 7. Major attention networks [Posner & Rothbart 2007].

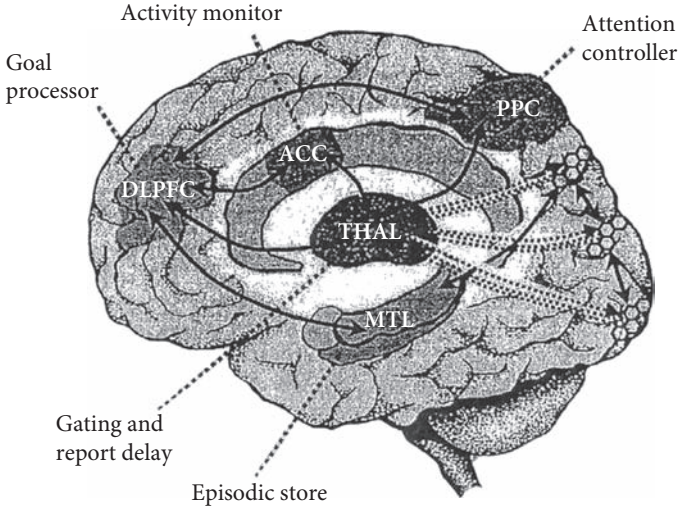


Figure 8. The executive attention network [Schneider and Chein 2003].

involvement in **automaticity**, i.e., in the creation of rhythmic-hierarchic routines**;** as well as the cerebellum's involvement in the **timing** of sequential processing.

11.5 Some unresolved issues

11.5.1 Grammatical morphology

Classical Broca's-aphasia communication shows impaired use of *both* grammatical morphology and syntactic constructions. The same coupling of these two components of grammar is seen in early childhood pidgin (ch. 6,7,8) and in adult second-language pidgin (ch. 9). What is more, the diachronic rise of morphology and syntactic constructions are two aspects of the very same process (Givón 1971, 1979; Dahl 2008). All these considerations suggest a single locus — or distributive network — for processing morphology and syntactic constructions.

On the other hand, grammatical morphology invariably arises from the reanalysis — both functional and structural — of lexical words, and this **morphogenesis** takes place during ongoing communicative behavior. The neurological site that codes and/or processes grammatical morphology may thus be, at least in principle, distinct from the site(s) that process of hierarchic syntax, both simple and complex. This is especially intriguing given the adjacency of the lexical-semantic site (BA 47/12) and the complex-syntactic sites (BA 45) in Broca's area. Is there a submodule for grammatical morphology at the upper fringe of BA 47/12? Or at the lower fringe of BA 45? Or spanning the borderline of both in a connected circuit?[6]

The possibility that grammatical morphology may have its own neuro-cognitive niche is suggested by the facts of **grammaticalization**. During morphogenesis**,** the lexical precursors of grammatical morphemes are *de-semanticized***,** gaining more abstract meanings. That is, they cease to partake in the lexical-semantic network of nodes and connections, and lose the typical lexical capacity for *semantic priming* and *spreading activation*. This militates against an unmodified representation of grammatical morphology within the lexical network (BA 47/12).

An added complication, partly methodological, arises from the fact that grammatical morphology — both nominal (articles, demonstratives, pronouns, adpositions/case-makers, plural markers) and verbal (tense-aspect-modal markers,

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6. There is a neurological precedent for interactive cross-modal sites located between two modality-specific sites. In the optic tectum (*superior culliculus*) of the barn owl, a cross-modal representation area is located between two modality-specific areas, the visual and auditory sites. In the first 90 days of the neonate owl's life, the visual system trains the auditory system in 3D spatial representation (Takahashi 1989).

pronouns, transitivity markers, speech-act markers) — appears copiously in **simple clauses**. The stimuli used in most of the investigation of the neurology of syntactic constructions seldom compare the presence vs. absence of grammatical morphology. A study by Bornkessel *et al.* (2005) has attempted to address this issue, reporting differential brain activation for word-order (object fronting) and morphology (case-marking) in German: an IFG site (BA 44) for word-order, and a *posterior-STG* site for case-marking. However, both sites partake in the two syntactic circuit reported in Friederici (2008). It is thus not clear that the temporal site is specific to morphology. What is more, the experiment did not deal with the much richer, more complex and cross-linguistically much more widely used component of morphology — verbal morphology.[7]

11.5.2 Conjoined vs. embedded clauses

The experimental studies by Just *et al.* (1996), Booth *et al.* (1999, 2000) and Caplan *et al.* (2006a) compared stimuli of two conjoined clauses vs. a complex two-clause construction — all outside their natural communicative context. The more specific studies by Friederici and her colleagues compared simple clauses with complex/embedded clauses, again outside their natural communicative context. But as noted earlier above, in both diachrony and ontogeny, complex-embedded **syntactic** constructions arise from **paratactic** — chained/conjoined — precursors. Such paratactic precursors to either Rel-clauses or V-complements perform the very same communicative functions as their embedded counterparts. That is, in Friederici's terms, they exhibit the same long-distance ('global') dependencies or control relations.

In both diachrony and ontogeny, the rise of complexity progresses from chained clauses (parataxis) to complex-embedded clauses (syntaxis). It would thus be of great interest to investigate a bit more carefully the neuro-cognitive status of the intermediate step in the rise of syntactic complexity — clausal conjunction or chaining. However, this can only be done using language stimuli that take into account the natural communicative context.

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7. In most language families, but most conspicuously in Iroquois, Algonquian, Athabaskan, Southern Arawak, Uralic, Bodic (Tibetan), Turkic, Nilotic, Semitic or Bantu, verbal morphology is rich and complex, signaling multiple communicative functions. In such languages, the processing load is tipped heavily from constructional syntax to morphology, and most syntactic constructions find their morphological coding primarily on the verb. What is more, in connected natural discourse in all languages, subject and object NPs tend to be anaphoric, thus either zero-marked or coded as pronominal affixes on the verb. In order to assess more realistically the processing role and brain localization of morphology, cognitive neurologists must design stimuli that take account of these facts.

11.5.3 Module sharing, circuit sharing and control of function-switching

In a recent thought provoking article, Dehaene & Cohen (2007) discuss brain circuits, or cortical maps in their terminology, that are shared between recently-acquired cultural-symbolic functions, such as reading and math, and older precursor functions in the primate brain. The recency of these cultural-symbolic pursuits virtually guaranties that they have not yet acquired any specifically-evolved dedicated brain modules. Rather, the brain circuits that process them are assembled during development and learning from available, functionally amenable precursors. Dehaene & Cohen (2007) suggest that **module sharing** of this type may involve all levels of brain hierarchic organizations — micro-maps (millimeter-size columns), meso-maps (centimeter-size circuits) and macro-maps (larger-size networks). There are two questions one would like to raise about this proposal, which may turn out to be applicable to the evolution of language-related neurology.

First, reading and math are recent cultural innovations with no evolved, dedicated brain-processing mechanism. The opportunistic recruitments, during development and learning, and subsequent sharing of modules that evolved for other functions, is thus plausible at all hierarchic levels of brain organization, micro to macro. Syntax, on the other hand, is a much older function, within the time range of, perhaps, 50,000-to-500,000 years or longer. Some evolutionary changes specific to syntax, however subtle, may have already had time to occur, at least at the higher levels of **distributive networks** organization. One could thus raise the possibility that while lower-level syntax-related 'micro' modules, such as the pre-frontal BA 47, BA 45, BA 44, or the temporal and parietal sites, may still perform both their pre-linguistic and linguistic/syntactic functions, the more global circuits and networks, those that group together multiple low-level modules in specific spatio-temporal interaction patterns, may have already become dedicated to syntax, and thus in some sense have an evolved neural basis.

Second, if modules are shared between distributive networks (circuits; macro-maps) that perform different functions, what are the **control mechanisms** that instruct a module — or a whole circuit — to perform one function rather than another? Is there a **default** mechanism that instructs the module to partake in its old pre-linguistic circuit rather than its new linguistic/syntactic circuit absent counter-default switching instructions? Is **attention** involved in the control of switching a module from one functional circuit to another?[8] Or could the

8. As suggested by Mike Posner (in personal communication).

context by itself — say, motor activity vs. visual memory vs. communication — trigger the automatic switching of a module from one circuit to another? I have no concrete answer to these questions, which apply to many other brain networks that support the processing of complex functions. But they must be addressed eventually, if we are to develop an more comprehensive evolutionary model of the neurology of grammar.

CHAPTER 12

Syntactic complexity and language evolution

12.1 Prospectus

In attempting to pull it all together, one must perform three complementary tasks, though not necessarily in strict order. First, one needs to show that taken together, diachrony, ontogeny, pidginization, animal communication and neurocognition reveal a coherent developmental trend. Second, one needs to argue that drawing parallels between language diachrony, language ontogeny and pidginization, on the one hand, and language evolution on the other, is both theoretically relevant and empirically viable. And third, one needs to present a coherent step-by-step scenario for the evolution of human language, and within it of syntactic complexity. In the process, one must also place the evolution of human language in its proper ecological context, both cultural and communicative.

12.2 The launching pad: Pre-human communication

12.2.1 Saltation vs. graduality

The thesis of gapped evolution, proposed by S.J. Gould (Eldredge & Gould 1972) and embraced by R. Lewontin (Fracchia & Lewontin 1999), N. Chomsky (Chomsky 1968; Hauser *et al.* 2002) and others, has never been compatible with Darwinian evolution. Its roots are philosophical and ideological rather than

empirical, and have relatively little to do with biology, evolutionary or otherwise.[1] Indeed, it constitutes an assault on two major tenets of Darwinian evolution — **adaptive selection** and **graduality.** Once these two foundational notions are discarded, it becomes possible to interpret, in a circular fashion, the apparent lack of fossil intermediates between the communication modes of our nearest primate relatives and extant human language as evidence for *both* gapped and non-adaptive evolution (Hauser *et al.* 2002). Rather than being a regrettable gap in the fossil record, thus a mere methodological conundrum, the lack of soft-tissue and behavioral fossils is transformed into a weighty theoretical issue. This is in spite of the fact that no such gap exists in the skeletal fossil record, nor in the paleo-archaeological record of sites and artefacts. Only diehard adherence to Descartes' mind-body dualism could have engendered such an interpretation of the lack of behavioral-linguistic fossils, whereby the body is said to have evolved gradually and adaptively, but not the mind.

12.2.2 Mental representation

The work of Mishkin (1982) and Ungerleider & Mishkin (1982) on the two visual information-processing trends in primates, the ventral trend for object recognition and the dorsal trend for spatio-temporally anchored states and events, makes it reasonably clear that both **semantic memory** (generic concepts) and **episodic memory** (specific states and events) are ancient pre-human representational capacities. The work of Perret *et al.* (1989) has further established that the pre-human primate mental lexicon contains not only concepts of concrete objects (nouns), but also of concrete actions (verbs). And the fact that one can teach symbols for both concrete nouns and concrete verbs to chimpanzees and bonobos (Tomasello & Call 1997; Rumbaugh & Washburn 2003) as well as to parrots (Pepperberg 1999) reinforces the

1. These philosophical roots fuse Marxism with Cartesian dualism in a curious blend. Marxism was, at least in one sense, a relatively straight-forward *empiricist* ('materialist') stance, purporting to describe how objective economic reality (facts) determined ideology (mind). Cartesian dualism, on the other hand, was part and parcel of the *rationalist* tradition. The way these two disparate rivulets of traditional epistemology were melded together into an anti-Darwinian agenda is probably this: Marxists in the late 19th Century were hostile to Darwinian evolution because they saw, rightly or not, that if it were extended beyond biology to socio-culture, it might engender the dread monster of *Social Darwinism*, thus a crass endorsement of anti-communal *survival-of-the-fittest* social ethos. What is more, once genetics entered the evolutionary equation, *inheritance* in biology now insinuated, to the Marxists, a social analog — preservation of the *entrenched power structure*. This was indeed Stalin's impetus for pushing Trofim Lysenko's Lamarckian program. In the context of the *post-modern* Marxist agenda, the cleavage between the body, subject to adaptive-selected evolution, and mind-culture-language, said to be free of such crass deterministic constraints, has emerged as the latest reincarnation of the old Wallace-Darwin fault line.

idea that both the conceptual lexicon and episodic event representation are pre-human capacities. Hauser *et al.*'s (2002) concession of adaptive Darwinian evolutionary status to these representational capacities (LFB) is thus not all that surprising.

The existence of complex-hierarchic hunting routines in wild dogs, wolf packs, lions and chimpanzees (Boesch 1994, 2002a, 2002b, 2005; Boesch & Boesch-Achermann 2000) are well documented. Thus, consider the encapsulated description of such a hunting routine in wild chimpanzees (Boesch 2005):

> "… The *driver* initiates the hunt by slowly pushing the arboreal prey in a constant direction; *blockers* climb trees to prevent the prey from dispersing in different directions; the *chaser* may climb under the prey and by rapidly running after them try a capture; and the *ambushers* may silently climb in front of the escaping prey to block their flight and close the trap around the prey …" (2005: p. 692).

In the same vein, complex-hierarchic tool-making routines have been shown in captive chimpanzees and bonobos (Rumbaugh & Washburn 2003). Taken together, such behaviors suggest a pre-human mental capacity for organizing sequences of events into complex-hierarchic mental representations.

Pre-human organisms demonstrate possession of the third level of human mental representation, that of coherent **multi-event** episodic representation. What is more, lower-level motor routines and their neuro-cognitive control are also a complex-hierarchic system, though they may not necessarily involve recursive embedding.[2] Taken together, the hierarchic organization of behavior and its attendant mental representation, including coherent states-and-events sequences, appears to be a pre-human capacity.

There is of course no doubt that the rise of lexical-phonology gave an enormous boost to the mental organization of *homo sapiens*' semantic memory. Likewise, there is no doubt that the rise of grammar gave an enormous boost to the episodic representation of states and events, and especially their coherent concatenations, in the human brain. But the basic neuro-cognitive capacities were already in place before our ancestors climbed down from the trees.

Lastly, human communication, and in particular the use of grammar, is heavily dependent on our ability to construct mental models of the interlocutor's shifting epistemic and deontic mental states during communication; that is, on so-called **Theory of Mind**. Whether other primates have the ability to construct such mental representations to support social interaction, including communication, has been a raging argument ever since the topic was broached by Premack & Woodruff (1978).

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2. Whether a complex-hierarchic system also involves recursion depends, at least to some extent, on the definition of abstract (non-terminal) syntactic nodes. Thus, Chomsky (1965) considered clause conjunction recursive by assigning to the chain node the same symbol (S) as to the clause node. And as late as 1986, generative grammarians treated clause-chaining as a subordinate structure.

The initial responses to Premack and Woodruff's question were largely negative (see review in Givón 2005, ch. 4), drawing a sharp dividing line between human and pre-human cognition. But that line has been slowly blurring. More recently, Cheyney & Seyfarth (2007) demonstrated in field experiments that baboons have an understanding of conspecifics' intentional-deontic states, but not of their epistemic-belief states, thus confirming a prediction made by Premack & Woodruff (1978). And Tomasello *et al.* (2005) concede that while chimpanzees may be less disposed to *focus* on the state of mind of others, they have the rudimentary capacity to represent both the deontic and epistemic states of conspecifics. A gradualist approach to the evolution of mind-reading appears more and more tenable.

12.2.3 Cultural ecology

The cultural ecology of social primates is eerily reminiscent of that of hunting-and-gathering hominids prior to the advent of agriculture. This social adaptation may be called **the society of intimates**. Its most salient characteristics are (Givón 2002, ch. 9):

- **Small social group size**: The size of foraging hominid social groups ranged between 50 and 150 (Dunbar 1992). Baboon societies tend toward the upper limit of the hominid range, with the group comprised of several female-headed matrilinial families (Cheyney & Seyfarth 2007). Bonobos and chimpanzees have a more flexible split-and-merge social organization, ranging from 25 individuals in the extended matrilinial family (plus associated males), all the way to to 120 members of multi-family 'tribes' (de Waal & Lanting 1997).
- **Kin-based social organization and cooperation**: Primate social organization is kin-based, and within it cooperation is organized most prominently along kin-based lines, particularly in female-headed matrilinial families.
- **Restricted territorial range**: The widest range recorded for chimpanzees in the wild is ca. 20 miles foraging radius.
- **Genetic homogeneity**: The social unit is kin-based, though provisions for exogamy are made, through either male or female migration.
- **Cultural homogeneity**: Social differentiation within the group follows primarily *gender* and *age* lines, augmented by personal charisma and foraging and social skills. Cultural and foraging skills are distributed relatively evenly across the group, with relatively low occupational specialization.
- **Consensual leadership**: Leadership of family units is determined by seniority and consensus. Linear pecking orders are strictly observed, but may change over time. The larger-group leadership (alpha male) is non-hereditary and in constant flux (Power 1991; Cheyney & Seyfarth 2007).

- **Flat, non-hierarchic social organization**: While leadership of the female-headed families is rigid and determined by seniority, the larger-group leadership is neither hereditary nor permanent, but depends on character, dominance and physical and social skills.

These features of higher-primate cultural ecology, taken together, predict the last feature, the one most directly relevant to the evolution of communication:

- **Informational stability and homogeneity**: The territorial stability, genetic homogeneity, cultural homogeneity and great cultural stability of pre-human primate societies, taken together, point to the most important parameter of pre-human and early-hominid communicative ecology — informational stability and homogeneity. When all members of the social group know each other intimately, when the terrain is stable and well-known to everybody, and when the culture is time-stable and cultural diversity is minimal, then the bulk of relevant **generic knowledge** — the conceptual-semantic map of the physical, social and mental universe — is equally shared by all group members and requires no elaboration. In the intimate social unit, day-to-day specific **episodic information** is also largely shared, by virtue of the ever-shared immediate situation. The communication system that springs out of such social ecology is neigh predictable.

12.2.4 Communicative ecology

The communicative ecology of pre-human communication is characterized by five major parameters, from which all else follows.

a. **Non-displaced spatio-temporal reference**: Communication is about the here-and-now, you-and-I, this-and-that referents that are accessible to all interlocutors who share the immediate situation.
b. **Manipulative speech-acts**: Speech-acts are overwhelmingly manipulative. No informative speech-acts (declaratives, interrogatives) are produced or comprehended.
c. **Mono-propositional message coherence**: The coherence span of communicative acts ('turns') is one state/event at a time. No multi-propositional messages are observed.
d. **Restricted topics of communication**: Communication is mostly about a few adaptively urgent, familiar cultural concerns: food, mating, dominance, hostility, territorial defense, predators.
e. **Extreme context-dependence of communication:** With widely shared generic and situational knowledge, pre-human communication depends only minimally on well-coded signals. Contextual inferences are the main

mechanism for understanding con-specifics' intentions. These inferences pertain to two main types of shared context:

- generic-cultural context (semantic memory).
- current speech situation (attention/working memory).

The third contextual category used systematically in human communication, the episodic memory of the **current discourse**, is not systematically exploited in pre-human communication. And most adaptively-relevant new information is extracted, in the immediate situational context, from behaviors that are not designed specifically for communication ('secular' behavior).

12.2.5 Communicative codes

Pre-human organisms certainly used communicative signals ('symbols'). But the use of such symbols differs profoundly from the use of human communicative codes. The following features characterize pre-human communication, all the way up to our nearest great-ape relatives:

- **Holistic rather than compositional:** Animal signals may be syntactically complex and hierarchic, as in e.g., bird songs or chimpanzee drumming-and-howling combinations (Hurford 2008). In the latter, distinct elements of the complex signal — barks, howls, drumming — may even contribute different elements of the message (Crockford & Boesch 2002, 2005). A similar combinatorial use of complex communicative signals is also reported in monkeys (Zuberbühler 2000, 2001, 2002). And of course, complex compositional communicative signals have been reported long ago in honey bees (von Frisch 1967). But the sequentially-arrayed code sub-units of animal communication still do not map one-to-one, isomorphically, with sequential units of the message. At best, they express parts of the message simultaneously. What is more, the message is invariably manipulative/deontic: 'I want to mate with you', 'come hither', 'stay away from this/my territory', 'come join me in this new food patch' 'let's go home', or 'take action to avoid predator'.[3] As a corollary,

3. Honey bees' communication may be an interesting exception to this, in the sense that one can factor out in the dance the element corresponding to direction of food target (axis of wiggle-dance), the desirability of the reported food (dance intensity) and food type (pollen samples). However, these are not arrayed in a combinatorial structure, either sequential or hierarchic. They are co-temporal features of the dance (von Frisch 1967; Gould & Towne 1987; Gould 1991). In this sense, the combinatorial system of honey-bee communication resembles that of chimpanzees (Crockford & Boesch 2005).

- **Absence of lexical or grammatical code**: The conspicuous apparent exception, the predator calls of vervet and other monkeys (Cheyney & Seyfarth 1990, 2007) are not used as referring signals (declarative), but only as direct warnings (manipulative). Their referential content is thus *subordinated* to the manipulative speech-act.

When members of non-human species are taught lexical vocabulary, whether by sound-code, gestural code or arbitrary visual symbols, communication with such vocabulary tends to have the predictable characteristics (see sec. 2.4., above):

a. **Domain of reference**: Spontaneous utterances tend to have non-displaced spatio-temporal reference. Entities not present on the scene can be talked about with present or immediate-future temporal reference, but only in *manipulative* speech-acts.
b. **Speech-acts**: Spontaneous utterances still tend to be strictly manipulative. But the comprehension and production of informative speech-acts (declarative, interrogative) can be taught, and used when a proper interactive setting is created (Savage-Rumbaugh 1986; Savage-Rumbaugh & Lewin 1994; Pepperberg 1999; Rumbaugh & Washburn 2003).
c. **Coherence scope**: Spontaneous utterances tend to be strictly monopropositional.
d. **Message length**: Spontaneous utterances tend to involve a single word or two- word combinations, thus reminiscent of the child's one-word stage (Bloom 1973).[4]
e. **Vocabulary**: The vocabulary is predominantly concrete, and nouns are much more numerous than verbs, thus reminiscent of the child's one-word stage (Bloom 1973).
f. **Grammar**: There is no good evidence for production or even comprehension of grammar (Premack 1971; Terrace 1979, 1985; Tomasello & Call 1997; Rumbaugh & Washburn 2003; Givón & Savage-Rumbaugh 2008). Trained chimpanzees and bonobos can certainly combine words into meaningful short-clauses utterances. But the usage has the characteristics of one- or two-word **pre-grammatical pidgin,** with neither grammatical morphology nor syntactic constructions.

4. There are considerable problems with making this kind of determination. In the case of the bonobos' use of the lexigram symbol-board, several seconds may elapse between pointing to one symbol and pointing to the next. In human oral language, including child language, such long pauses are usually taken to mean boundaries between clauses — be they one word in length — produced within the same turn. The criterion for *clausehood* — falling under a single intonation contour — is relatively stable for auditory-oral human communication (Givón 1991a; Chafe 1994; Mithun 2006, 2007a, 2007b, 2008). Such a criterion was much easier to apply in the case of Alex the African Gray Parrot (Pepperberg 1991), whose production rhythm approximated that of human speech.

g. **Comprehension vs. production**: In animal communication with humans, as any dog owner will testify, comprehension is much more extensive than production (Savage-Rumbaugh *et al.* 1993; Savage-Rumbaugh & Lewin 1994). But there is no compelling evidence that animal comprehension of human language is not strictly vocabulary-driven as in pre-grammatical pidgin, in the sense suggested by Kintsch (1992) or Kaan (2008).

12.2.6 Cognition vs. communication

A review of the cognitive capacity of pre-human animals — especially our nearest primate relatives — and of their communicative capabilities under instruction and training makes it fairly clear that their cognition far outstrips their communication. Their mental lexicon is rich and varied, comprising objects, animates, flora and fauna and features of the terrain ('nouns'), as well as states ('adjectives') and actions ('verbs'). They have a clear understanding of the difference between animate/agent and inanimate/non-agent. And the neurological circuits that support their semantic memory, the ventral limbic-cortical trend, is substantially the same as our own (Ungerleider & Mishkin 1982; Schmahmann, Pandya *et al.* 2007). However, the conceptual lexicon of pre-human animates is left communicatively un-coded. It lacks lexical phonology.

In the same vein, our primate next-of-kin clearly have episodic representation of events. Their behavior strongly suggests that they also have episodic representations of coherent, sequential-hierarchic multi-events. And the dorsal limbic-cortical network that supports their episodic memory is very much like our own (Ungerleider & Mishkin 1982; Schmahmann, Pandya *et al.* 20007). However, they lack the second human communicative code, the one that codes both single events (clauses) and coherent multi-events(discourse) — grammar.

The evolutionary accretion that demands most explanation, in comparing pre-human to human communication, is thus the genesis of the two communicative codes — phonology and grammar.

12.3 Ontogeny and phylogeny of language: The parallels

12.3.1 The cultural ecology of early childhood

The social ecology of early childhood, be it within the nuclear or extended family, is strikingly reminiscent of the cultural milieu of the *society of intimates* described above for pre-human primates and early hominids — up to a point. Six of the main salient features that characterize pre-human and early-human society are the same in early childhood:

- small-size social unit
- kin-based social unit
- kin-based cooperation
- restricted territorial range
- genetic homogeneity
- flat, non-hierarchic social organization

One feature is somewhat ambiguous:

- cultural homogeneity

This is so because in one sense, children are certainly members of their parents' culture, and indeed of a small intimate sub-cultural unit, the family. However, their command of that culture expands gradually from the initial near-zero during development. So that in the early stages of language acquisition, the parent-child dyad is far from culturally homogeneous.

Only two features of early childhood cultural ecology seem, *prima facie*, to diverge rather conspicuously from the classical society of intimates:

- **consensual leadership**: There is, obviously, an extreme *power imbalance* between the adult and the child. However, this imbalance is offset, to some extent, by the great empathy, indeed great indulgence, parents feel and display towards the child, at least in some cultures.
- **informational stability and homogeneity**: There is obviously an extreme *informational imbalance* between the child and the adult. However, this imbalance is offset, to quite an extent, by the way adult interlocutors pitch the level of their communication, finely and gradually, to the child's communicative competence and informational level ('down-shifting'; see ch. 7,8).

12.3.2 Communicative ecology of early childhood

The communicative ecology of early childhood, at the onset of the acquisition of well-coded communication (ca. 9—12 months), is remarkably like that of pre-human and early-hominid communication, characterized by the same five main parameters (see sec. 12.2.4. above):

- predominantly **manipulative** speech-acts
- predominantly **non-displaced** patio-temporal reference
- predominantly **mono-propositional** message coherence
- **restricted topics** of communication, limited to urgent adaptive concerns: food, comfort, warmth, protection (Carter 1974).
- **extreme context-dependence** — communication is heavily dependent on the shared *generic* and *situational* context (rather than on the shared episodic memory of the current text).

From this launching pad, the child's communicative development, much like the evolution of communication, shoots out along all five parameters towards the mature human standard. But as in the comparison between ontogeny and phylogeny in general, the time scale of language ontogeny is vastly compressed as compared to its putative phylogeny (Fernald & White 2000).

12.3.3 Acquisition of the communicative codes

Child language acquisition, at ca. 9 months, starts essentially from a launching pad that is strikingly similar to pre-human primate cognition. That is, with a rich and rapidly expanding pre-linguistic cognitive representation, both semantic and episodic. At the level of lexical-semantic memory, the child's representation spans the physical-external, the visceral and mental-internal, and the social-relational universe. In all major characteristics, this is the same launching pad from which human language has evolved. What is more, what the child will now acquire are the same two communicative codes that evolved, gradually over 6 million years, in the hominid primate line — phonology and grammar. But the time scale of child language development is that of ontogeny, not phylogeny (Fernald & White 2000).

The general trends in the ontogeny of language can now be recapitulated (see ch. 6, above):

(1) **Major developmental trends in the ontogeny of language**:

Growth of structural complexity:

a. lexicon > grammar
b. one-word clauses > multi-word clauses
c. shared cross-turn syntactic structures > clause-internal syntactic structure
d. mono-propositional utterances > multi-propositional discourse
e. shared cross-turn discourse coherence > child's within-turn discourse coherence
f. paratactic (chained) clauses > syntactic (embedded) clauses

Changes in communicative ecology:

g. non-displaced reference > displaced reference
h. manipulative speech-acts > informative speech acts
i. deontic modality > epistemic modality
j. dependence on generic (semantic memory) and situational (working memory) context > dependence on the discourse context (episodic memory)

Cognitive processing:

k. pragmatic (context-dependent) processing > syntactic (automated) processing

Trends (1b,c) are two aspects of the same process, whereby structural complexity is transferred from being spread across adjacent adult-child turns to the child's own clause-size turns. Likewise, trends (1d,e) are two aspects of the same process, whereby multi-propositional coherence is transferred from being spread across adjacent child-adult turns to the child's own multi-propositional turns. Trend (1e) is one part of the cluster of changes subsumed under (1j), where the child's early dependence on the **interlocutor as context** is part of the child's early dependence on the immediate-speech-situation and the shared generic context. The emergence of multi-propositional coherence, first shared cross-turns with the adult and then within the child's own turns (1e), allows the emergence of verbal episodic memory as a major cognitive support of language processing (1j). The child's early dependence on the two older types of context (1j), the culturally-shared conceptual map (semantic memory) and the shared immediate situation (working memory), recapitulates faithfully the pragmatics of pre-human communication.

12.4 Diachrony and evolution: The parallels

12.4.1 Preliminaries

Diachrony is of course the odd man out in a number of ways when one attempts to compare the linguistic developmental trends with biological evolution. Both language phylogeny and language ontogeny have clear analogs in biology. But language diachrony, and indeed cultural history — the cumulative historical accretion of non-inherited behavioral traits — are presumably Lamarckian, and thus devoid of both genetic consequences and evolutionary relevance. Yet language diachrony exerts the most direct bearing on the way any particular language is actually shaped, and thus on the diversity of known human languages. In this context, it is instructive to see how the same body of principles that control biological evolution also control diachronic change.

12.4.2 Controlling principles

In ch. 3, we noted the broad similarities between biological evolution and language diachrony. They are recapitulated briefly below:

- Today's micro-variation within the species/language presages, at least potentially, tomorrow's macro-variation across species/languages.
- Conversely, today's stark macro-diversity of species/dialects, genera/languages, phyla/families can be traced back to earlier micro-variation at lower taxonomic levels (sub-species, sub-dialects, idiolects).

- Consequently, gradual step-by-step *micro-variation* can yield over time stark and seemingly unbridgeable gaps of *macro-variation* among both species and languages.
- The process of change itself, the invisible hand that guides the ever-shifting but still roughly-isomorphic mapping of structures to functions, is driven by adaptive selection, i.e., functional pressures.
- The overlaying of adaptively-driven changes in temporal order can lead, over time, to considerable restructuring and arbitrary-seeming structure-function pairing, thus to seemingly non-adaptive *relic features* ('excess structure', 'spandrels').

The controlling developmental principles that language diachrony shares with biological evolution are likewise recapitulated below (ch. 3):

- Graduality of change
- Adaptive-selectional motivation
- Functional change (and functional ambiguity) precede structural change and the re-establishing of form-function isomorphism.
- Terminal addition of new structures to older ones
- Local adaptive causation may lead to global adaptive consequences
- Uni-directionality of change

That such similarities between the two developmental processes are accidental is unlikely.

12.4.3 Applicability of diachrony to phylogeny

Fernald & White (2000) have noted that evolution, synchronic behavior, ontogenetic growth and evolution share one core feature:

> "… Behavior can and does influence specific aspects of brain structure and function over *three different time frames*. A causal link is easy to establish on an *evolutionary time scale* because selective forces of the ecological niche of the animal typically are reflected in the body shape, sensory and motor systems, and behavior. Similarly, on a *developmental time scale*, behavior acts in concert with the environment to establish structural changes in the brain that influence an organism throughout its lifetime. Surprisingly, there currently is evidence that in real time, social behavior also causes changes in the brain in adult animals …" (Fernald & White 2000: p. 1193; italics added)

In other words, a common biological mechanism may be implicated in all three developmental trends — individual every day **adaptive behavior**. This is the so-called **Baldwin effect** in biology (Baldwin 1896), later attributed to **niche creation** and **genetic assimilation** (Waddington 1942, 1950; Deacon 2008). Such every-day adaptive behavior is certainly the driving mechanism in diachronic change.

There are obviously several features of the diachrony of language that are not relevant to the discussion of language evolution. To begin with, language diachrony has no clear genetic consequences. In the diachrony of grammar, morpho-syntactic structures rise and fall and then rise again, re-coding, often by new morpho-syntactic means, the same communicative functions. Further, language diachrony — unlike language ontogeny and phylogeny — does not start from the same ground-zero launching pad, from where all lexical and grammatical sub-systems are built from scratch. Rather, as attrition of old grammatical structures proceeds by its own motivation,[5] the re-coding of now-under-coded functional domains proceeds as needed. New words, new word senses, new morpho-syntactic constructions and new usages of existing morpho-syntactic constructions join, piecemeal, an already established well-coded communication system. Nonetheless, several specific trends in grammaticalization have direct bearing on language evolution.

12.4.4 Uni-directional diachronic trends

Several trends observed in the diachrony of grammar are relevant to our attempt to reconstruct the evolution of human language and, within it, the genesis of syntactic complexity (for an extensive discussion, see Heine & Kuteva 2007):

(2) **Major diachronic trends relevant to language evolution**:
- concrete words > abstract words
- abstract lexical words > grammatical morphemes
- deontic modality > epistemic senses
- chained/conjoined clauses > complex/embedded clauses
- pre-grammar (discourse-pragmatic) rules > syntactic (grammaticalized) rules

We will see further below how these general trends combine with more specific insights from the diachrony of grammar in fleshing out concrete proposals about the evolution of grammar.

12.5 Pre-grammatical pidgin and language evolution: The parallels

As suggested earlier above (ch. 9), pidgin communication has, potentially, strong bearing on our understanding of language evolution, and within it on

5. The main factors that lead to the attrition of grammatical morphology is phonological erosion, primarily through sound assimilation. The attrition of syntactic constructions is due primarily to the attrition and subsequent irregularization of their attendant morphology (Givón 1979; Dahl 2004).

the evolution of syntactic complexity. First, the regularities ('rules') of pre-grammatical communication as seen in both early child language and second language pidgins probably characterized **pre-grammar** as an evolutionary stage. Second, pidgin communication is much more context-dependent than fully-grammaticalized communication. And third, pidgin communication reveals several structural features that suggest an earlier evolutionary stage. These are:

(3) **Major pidgin structural features relevant to language evolution**:
- mostly-concrete vocabulary
- lack of grammatical morphology and well-marked constructions
- mostly short (1—3-word) clauses
- clause chaining rather than embedding
- pragmatic rather than syntactic pre-grammar rules
- highly context-dependent communication

Given the striking similarity between second language pidgin communication and early child language, there is no reason to refrain from considering pre-grammatical pidgins — whether in children or adults — as a legitimate analog to a distinct stage in language evolution.

12.6 The evolution of syntactic complexity

We come now to the core of this chapter, where one must put together coherently the multi-step, gradual evolutionary scenario for the rise of human language, grammar, and syntactic complexity.

12.6.1 Communicative ecology

a. **The rise of displaced spatio-temporal reference**

Both early childhood and pre-human communication are heavily invested in the here-and-now, you-and-I, this-or-that referents that are accessible to all participants in the shared **immediate speech situation**. When all referents are equally accessible to all participants on the scene, coding the lexical *type* of referents is superfluous. Mere pointing — deixis, directing the interlocutor's **attention** to the referent — will suffice.

Mature human communication is, in contrast, heavily tilted towards spatio-temporally displaced referents, be they agents, objects, states or events. This is reflected first in the lopsided *use-frequencies* of displaced reference. But it is also reflected in the fact that so much of our grammatical machinery is dedicated to communicating about displaced referents, states and events (Givón 1995, ch. 2; 2001).

Referents in the shared immediate speech-situation are mentally represented in *working memory* or *focal attention*. Such representation shifts — with motion and attention — from one moment to the next, and is thus temporally unstable. In contrast, displaced referents are more likely to be represented in *episodic memory*, either as recollections of past experience or projections of future plans, wishes, imaginations. Compared to working memory, episodic memory is a much more time-stable, longer-term mental representation.[6]

The rise of the human lexical code — phonology — may now be understood as an adaptation designed to accommodate the shift from non-displaced to displaced reference. When the adaptively-relevant topics of human communication became temporally and spatially displaced — away from the scene, remembered *past* or projected *future* — mere pointing ceased to be a viable tool of shared reference. Coding the mental lexicon by more specific means now became an adaptive necessity. It is hardly an accident that the most conspicuous lexical-like signals of pre-human primates are predator calls, produced in the most adaptively-urgent, context — life-and-death.

In the same vein, the shift to displaced referents, and the expansion of the range and complexity of the universe of reference, now require an extended structural machinery for **referent tracking**. Establishing **shared reference**, above and beyond the old shared-situation conventions of pointing and **joint attention**, became a pressing issue. The rise of the requisite grammatical machinery — articles, pronouns, grammatical case-markers, restrictive modifiers — is testimony to the new adaptive pressures exerted by the **expanded universe of reference**. Within this context, the no-doubt-late genesis of relative clauses to handle the most complex problems of shared reference can now be understood. It is adaptive pressures in the domain of reference that motivated, as they do in language ontogeny, the rise of this major component of syntactic complexity.

b. **The rise of declarative speech-acts**

As noted earlier above, spontaneous pre-human communication is confined almost exclusively to *manipulative* speech-acts, a tendency also observed in early childhood communication. In contrast, mature human communication is tilted heavily, at the use-frequency level, toward *declarative* speech-acts (Givón 1995, ch. 2). And the bulk of the grammatical machinery of human language is invested in coding *informative* speech-acts (Givón 2001).

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6. This temporal stability may have contributed toward the *objectivization* of verbally-coded referents, including mental predicates such as 'think', 'know', 'see', 'understand', 'want', 'be able', etc. Such predicates are central to the representation of other minds; and, incidentally, they are strongly implicated in the genesis of one type of syntactic complexity, verb complements.

The emergence of declarative communication also points toward the increasing adaptive relevance of *displaced referents*. Manipulative speech-acts are confined to the here-and-now, you-and-I, this-and-that; that is, to the immediate speech situation. They thus pertain to, primarily, information represented in *working memory* and *focal attention*. Declarative and interrogative speech-acts, on the other hand, are utterly superfluous when all referents are equally accessible to all interlocutors here-and-now. Why bother to tell another person about states of affairs s/he surely knows? Why bother to ask them if you already know what they know?

It is the emergence of displaced referents as the more prevalent topic of communication that endowed declarative and interrogative speech-acts with their adaptive urgency: They are designed to carry the load of reporting and querying about spatially inaccessible referents and past or future events, information that is not available to all interlocutors in the immediate speech situation. The rise of displaced reference created an **informational imbalance** in the intimate social unit, and declarative and interrogative speech-acts were the adaptive response designed to remedy the imbalance.

The emergence of declarative speech-acts is, further, part and parcel of the liberation of **epistemic predicates** from their erstwhile subordination to **deontic predicates**. This liberation led to separate and more explicit representation of epistemic mental states — 'think', 'know', 'see', 'hear, 'understand" etc. And this, in turn, may have contributed to heightened awareness of **mental framing** operations, first of those pertaining to one's own mind and then, by extension, of those pertaining to the minds of others. As the **Theory of Mind** literature has noted, representing of the self's mind is a pre-condition for representing other minds.[7]

It is worth noting in this connection that manipulative (deontic) speech-acts already contain within them the germ of declarative (epistemic) speech-acts — as Gricean *presuppositions* (Austin 1962; Grice 1968/1975). That is, some background *knowledge* must be there in order for the deontic speech-act to be felicitous. As a simple illustration of this, consider:

(4) a. **Deontic speech-act**:
I want you to give me the apple.

b. **Epistemic presuppositions about the world**:
You have the apple now, I don't.
In my intended future, I will have the apple, you won't.

c. **Social-deontic presuppositions about the speaker & hearer**:
I have a certain right to request the apple from you.
You have a certain predisposition to comply with my request.

7. See discussion in Givón (2005, ch. 4).

The change from deontic to epistemic is thus a case of **semantic bleaching**, or **liberation** of the epistemic from its erstwhile subservience to the deontic. This kind of liberation is, of course, greatly facilitated by displaced temporal reference. Direct speech-acts are only felicitous in the here-and-now (Austin 1962). The minute you recast them in the past or future, they lose their *illocutionary force*. Thus, neither (5a) nor (5b) below can be counted as manipulative speech-acts, but only as declarative descriptions of past or future manipulative speech-acts (see ch. 7):

(5) a. I wanted you to give me the apple yesterday.
b. I will want you to give me the apple tomorrow.

c. **The rise of multi-propositional discourse**

Both early childhood and primate communication are overwhelmingly mono-propositional. That is, their discourse **coherence scope** does not extend beyond the single proposition, so that the topic of communication shifts from one utterance to the next. In contrast, mature human communication is, at the use-frequency level, overwhelmingly multi-propositional, with long equi-topic clause chains, thematic paragraphs and coherent episodes. This is also reflected in the fact that the bulk of the machinery of grammar is invested in coding multi-propositional, cross-clausal coherence (Givón 2001). And discourse coherence translates, in cognitive terms, into representing the shifting epistemic and deontic states of the interlocutor during ongoing communication (ch. 2, above; Givón 2005).

One may view the rise of multi-propositional discourse as but the next logical-adaptive step in the rise of declarative communication. As the volume of adaptively-relevant information about displaced referents piled up higher, faster and more streamlined processing of such information became useful. This is especially true in terms of the constant **perspective-shifting** involved in the processing of longer stretches of coherent discourse. The rise of grammar may be viewed as an adaptive response to the need to process this rising tide of declarative multi-propositional information, as well as to the attendant need to construct more efficient mental models of other minds.

d. **Grammar and other minds**

As noted earlier (ch. 2), grammar codes, primarily, the speaker's mental models of the hearer's shifting epistemic and deontic states during ongoing communication. The high automaticity of grammar may mean, among other things, that the evolution of grammatical communication was motivated, at least in part, by the strong adaptive pressure of having to process a high frequency of perspective shifts during communication (MacWhinney 2002, 2008). The frequency of such shifting in human communication may be orders-of-magnitudes higher than in pre-human communication.

The increased dependence on the representation of other minds may also be linked to the greatly increased reliance, in human communication, on a type of context that is utterly unique to human communication — **episodic memory** of the **current text**. This memory capacity is specifically adapted to represent spatio-temporally *displaced reference*. The reliance on the interlocutor's representation of specific episodic — rather than generic or situational — knowledge may constitute added adaptive pressure for developing a streamlined, automated system of representing other minds — grammar.

Within grammar, lastly, embedded **verb complements** arose because mental verbs in main clauses — 'want', 'know', 'see', 'say' etc. — are used to express the deontic and epistemic modality the speaker assigns to propositions (as well as to mark the proposition's tense-aspect-modal perspective; Givón 2005, ch. 6). And **relative clauses**, as noted earlier above, arose to guide the hearer through the cognitive-epistemic labyrinth of complex reference. Complex syntax is thus not about some abstract structural complexity ('recursivity'). Rather, it is the predictable structural consequence of the adaptive need for complex **Theory of Mind** operations.

12.6.2 Cultural ecology

What we have seen in the preceding section boils down to a fairly straightforward chain of causation: Somehow, be the reason what it may, it became adaptively advantageous for early hominids to start communicating not only about the here-and-now, you-and-I, this-and-that visible, the way pre-human primates still do, but also about spatially- and temporally-displaced referents; and about states and events that were either memory traces of the past or projected traces of an imagined or planned future. Most germane, adaptively useful information was not anymore shared equally across the hominid social group. Somehow, the prior balance of **informational homogeneity and stability** characteristic of pre-human primate society became disrupted. And in conjunction, knowing the states of belief and intention of one's conspecifics became more adaptively urgent.

There are three obvious contextual factors that could engender such change in the erstwhile informational stability and homogeneity of early hominid society:

- a greatly expanded foraging range, particularly for small hunting, scouting or exploring groups, bringing back information about adaptive relevance displaced referents.
- a great increase in the size of the relevant social-communicative group, diluting the erstwhile cross-group homogeneity of information.
- an accelerated rate of cultural change, and with it a higher level of cultural-informational specialization within the group.

The first factor increases the number of adaptively-relevant displaced referents, especially when the increased foraging range is confined to relatively small groups fanning out in different directions. And all three factors contribute to the rise of an **informational imbalance** within the group, thus creating an adaptive pressure for the rise of informative speech-acts, multi-propositional discourse and a streamlined system of well-coded communication.

One need not be reductive about the exact causation of the **information explosion** in hominid evolution. Many factors have been mentioned as *the* initial adaptive impetus: sexual selection (Darwin 1871; Miller 2001), descent from the trees, moving to the savanna, bipedism, expanding foraging range, omnivorous feeding, tool-making (Greenfield 1991), social grooming (Dunbar 1992), group identity (Knight 1998), increased group size (Dunbar 1992), big-game hunting (Washburn & Lancaster 1968), big-game scavenging (Bickerton 2005), pre-hunt consultation (Számadó 2008), laryngeal retraction (Lieberman 1984) or theory of mind (Dunbar 1998; Tomasello *et al.* 2005).

A more realistic scenario would, I believe, be complex, multi-variant and **co-evolutionary**, along the less reductive lines of de Waal (2001); Geary (2005); Számadó & Szathmáry (2006) or Cheney & Seyfarth (2007). It may well be that many, perhaps most, of these factors are correlated. But whatever was the earliest cause, it must account for the profound disruption of the informational stability and homogeneity in the early-hominid society of intimates. And it must explain why specific knowledge by conspecifics became both inaccessible and adaptively vital to group members, to the point where a better-coded communication system became an adaptive must.

12.6.3 The rise of well-coded communication

In this section I will summarize the major evolutionary steps that must have taken place in the rise of the two major communicative codes of human language, lexical phonology and grammar. The sequence of steps given below constitutes a hypothesis, but one that is relatively easy to come by, given our previous survey of the facts of animal communication, language ontogeny, language diachrony and pidginization.

12.6.3.1 The rise of the well-coded lexicon

As noted above, as long as the referents of communication were equally accessible to all interlocutors in the immediate communicative situation, and thus as long as the topics of communication were concrete, symbolic-phonological coding of nominal referents (objects) was unnecessary. Pointing to attract the interlocutor's attention would have done the job of well-coded lexical nouns.

Further, as long as cultural stability, homogeneity and simplicity prevailed, the association of objects or animate beings with the stereotypical actions/states/events normally pertaining to them was predictable on cultural-generic grounds. What else does one do with foodstuff but *eat*? What else does one do with a newborn child except *feed* and *care*? What else does one do with an unrelated same-age member of the opposite sex except (potentially) *mate*? What else does one do with a shelter except *hide*? What else does one do with a round rock except *throw* at an adversary, or at a game animal, or *crack* a nut? What else does one use a sharp object for except to *cut*? What else does one do with a game animal except *hunt*? What else does one do with grains and grubs and roots and berries except *gather* and *eat*? What else does one do with strangers except *fight* or *run*? Given the cultural milieu of the pre-human society of intimates, neither symbolically-coded nouns nor verbs were a high communicative priority.

The rise of the well-coded lexicon, thus of phonology, is the direct result of both displaced reference and the disruption of cultural/informational stability and homogeneity. To judge by current non-human primate communication, both gestural-visual and auditory-oral coding could have arisen gradually and in tandem. The availability of the ventral visual object-recognition channel in the primate brain suggests that perhaps it may have been adaptively advantageous to place a heavier coding-load, at least initially, on the visual-gestural channel, thus taking advantage of the inherent **iconicity** of visual representation (Kaas 1989; Givón 1995, ch. 9). The extreme ease, naturalness and spontaneity with which non-hearing human children develop a gestural-visual code (Goldin-Meadow 2002; Morford 2002) suggests that the requisite neurology is still there; and there is no reason to assume it wasn't just as available to early hominids. The essentially-similar object or word, and event or clause, processing times for visually- and verbally-presented information suggests the same (Barker & Givón 2002). And gestural-visual coding remains a parallel, available channel alongside the oral-auditory in current human communication.

There are also equally good adaptive reasons why an eventual switch, at least in terms of relative coding load, to auditory-oral coding became an adaptive advantage later on (Givón 1995, ch. 9):

- communication about abstract referents
- increased vocabulary size
- communication over visual barriers or in the dark
- carrying distance of the signal

One may as well note, lastly, that recent neurological work suggests the presence in pre-human primates of a brain module dedicated to **vocal communication among conspecifics**. Thus Poremba *et al.* (2004) report that in the left *superior*

temporal gyrus of rhesus monkeys, where the primary auditory center is located, the *temporal pole* is specifically activated only by conspecifics' vocalization, but not by any other sounds. This suggests that pre-human primates already have a specialized sub-module in the primary auditory left-cortex dedicated to auditory-oral communication. An earlier report by Poremba *et al.* (2003) also suggests that the primary auditory cortex is a vast network, comparable to the visual system, spanning over the *left superior temporal gyrus* as well as parietal, pre-frontal and limbic sites. It thus appears more and more likely that the early hominid lexical-semantic code may have started as *both* gestural-visual and auditory-oral.

12.6.3.2 Early pre-grammatical pidgin: The one-word clause

The rise of early pre-grammatical pidgin, the one-word clause, was no doubt strongly associated with the shift to **declarative speech-acts**. One-word clauses, mostly nouns to begin with as in the corresponding stage of early child language (Bloom 1973; Scollon 1976), could now function as referring declarative expressions, not only as manipulative speech-acts. As in early childhood, the exact specification of the state/event/action in this type of early-pidgin communication was most likely negotiated across adjacent participant turns. Coding the verbs remained a lower priority — as long as the speech-situation and cultural stability and homogeneity allowed the verb to be inferred. And as noted in chapter 10, the immediate context could easily supplement the requisite missing verb — as long as communication remained highly dependent on culturally-shared knowledge and the immediate speech situation.

12.6.3.3 Late pre-grammatical pidgin: Two-word clauses and multi-propositional discourse

As noted earlier above, for as long as communication was about concrete entities that partook in concrete states/events, and for as long as the culture remained stable, predictable, homogeneous and compact, coding verbs was not a high adaptive priority. But with multi-propositional discourse, displaced reference, a disruption of early cultural homogeneity and an increased number and diversity of the topics of communication, the lexicalization of verbs became adaptively relevant.

As in child language, two-word clauses in language evolution must have been comprised of two nouns earlier on, and only gradually switched to noun-verb combinations. Indeed, as noted in ch. 10, verbless clauses are still used extensively in human communication, and are an extremely well-governed grammatical construction. The greater communicative efficacy of **noun-noun** combinations, be they agent-patient, patient-recipient, patient-instrument, recipient-location,

patient-location or agent-location, is due to the fact that it greatly constrains the choice of the appropriate lexical verb, as compared to the one-noun clause. Noun-noun clauses may have thus served, as in child language acquisition, as early precursors of **noun-verb** or **verb-noun** clauses.

Once the message became multi-propositional, thus chained two-word-clause discourse, and once the assumptions that the speaker must make about the hearer's mental states during ongoing communication aggregated, the adaptive pressure for the evolution of grammar was on. It is unlikely that the response was instantaneous. Rather, as in language ontogeny and diachrony, the evolution of morpho-syntax must have proceeded gradually, in multiple steps. And it may have spanned scores of thousands or hundreds of thousands of years. In the following sections I will outline some of the more likely major steps.

With the advent of multi-word clauses, early hominids have arrived at **level-I** of syntactic complexity, where an abstract clause-node governs a cluster of word-nodes (ch. 10). When noun modifiers appear together with their head nouns (noun phrase), or when objects appear together with their verbs (verb phrase), the simple clause is already **a hierarchic** structure.

12.6.3.4 The rise of pre-grammar

As noted earlier above (ch. 2,9,10), the conventions of early-childhood and second-language pre-grammatical pidgin, and thus by implication of the corresponding language-evolution stage, are highly iconic and cognitively transparent. Most likely, this early-stage grammar applied to clauses that were one-word, two-word or at most three-word long. This assumption is warranted by the observation that to this day, in natural spoken discourse, clause length seldom exceeds 2–3 words (Givón 1975; DuBois 1987; Chafe 1994). At the pre-grammar stage, further, both early childhood and adult second-language pidgin communication are devoid of grammatical morphology and well-marked syntactic constructions. The rules of pre-grammar must have thus applied to clauses that grouped together nouns, adjectives and verbs.

The rules of pre-grammar (ch. 9) are reproduced below with slight modifications. Consider first intonation and rhythm rules, the subliminal music of language:

(6) **Intonation and rhythm rules**:

a. **Stress and predictability**:
"Less-predictable information chunks are stressed".

b. **Stress and importance**:
"More important information chunks are stressed".

c. **Melodic contour and relevance**:
"Information chunks that belong together conceptually are packed together under a unified melodic contour".

d. **Pause and rhythm**:
"The size of the temporal break between information chunks corresponds to the size of the cognitive or thematic distance between them".

Rules (6a,6b) are still extant in the use of emphatic stress by itself, as in English. They are also incorporated into more grammaticalized constructions, such as stressed independent pronouns, stressed demonstratives, cleft, Y-movement or WH-questions. Rules (6c,d) pertain to the bracketing together of clause-size chunks of communication, i.e. intonational packaging (Goldman-Eisler 1968; Chafe 1994; Mithun 2006, 2007a, 2007b, 2008; Givón 1991a).

Consider next the rules that govern the spacing of constituents, in the sense of proximity (vs. distance) of the sub-units off the phrase or clause to each other:

(7) **Spacing rules**:

a. **Proximity and relevance**:
"Information chunks that belong together conceptually are kept in closer spatio-temporal proximity".

b. **Proximity and scope**:
"Functional operators are kept closest to the operand to which they are relevant".

Rules (8a,b) go the heart of packaging words together into multi-level hierarchic units, such as phrases or clauses. They predict a preference for non-scattered constituents, for putting operators next to operands and modifiers next to modified, and in general for placing the words belonging to the same phrase next to each other, and the phrases belonging to the same clause next to each other.

Consider next the rules of pre-grammar that govern pragmatic — as distinct from syntactic — word order:

(8) **Sequential precedence rules**:

a. **Order and importance**:
"A more important information chunk is fronted".

b. **Occurrence order and reported order**:
"The temporal order in which events occurred will be mirrored in the language-coded report of the events".

In languages with flexible, pragmatically-governed word-order, rule (8a) governs the placement of important topics in the clause-initial position, including referring-indefinite NPs. In grammaticalized syntactic constructions, this rule predicts the fronting of WH-question words, the fronting of the focused topical

element in cleft and Y-movement constructions, and the fronting of the topicalized constituent in L-dislocation (Givón 1988a, 2001).

Consider, lastly, the rules of pre-grammar that govern the phonological size of words and morphemes:

(9) **Quantity rules**:

a. **Zero expression and predictability**:
"Predictable—or already activated—information will be left unexpressed".

b. **Zero expression and relevance**:
"Unimportant or irrelevant information will be left unexpressed".

Rule (9a) predicts the use of zero-anaphora for continuing referents (Givón ed. 1983a, 1992) and continuing predicates (ch. 10). It also predicts the size difference between independent pronouns (stressed, contrastive) and anaphoric pronouns (unstressed, clitic). Rule (9b) predicts zero expression of the agent of passives and the patient of the antipassive.

In grammaticalized communication, the rules of pre-grammar are integrated with the more arbitrary ('symbolic') devices of grammar — morphology, complex-hierarchic constructions, grammatical word-order, scope and government conventions, etc. (Givón 1989, ch. 3)

12.6.3.5 The rise of grammatical morphology

There is a vast literature on the rise of grammatical morphemes out of lexical words.[8] What we need to note here is that grammatical morphemes do not arise just from words, but from words in specific **syntactic constructions**, be they noun phrases, verb phrases or concatenated clauses. What grammaticalization gives rise to, then, are morphologically-marked syntactic constructions. And the construction within which a morpheme arises, together with the semantics of the precursor word, determine the kind of morpheme it will be, and whether it will be a noun (-phrase) clitic, verb (-phrase) clitic, or clause-level clitic. This is the framework within which the genesis of complex clauses, such as V-complements and REL-clauses, should be understood.

Syntactic constructions most commonly include specific grammatical morphemes that *mark* them, in conjunction with word-order and intonation. In languages such as English or Chinese, with relatively scant morphology, this is not always apparent. But in most languages, the functional load carried by the morphology, particularly **verbal morphology**, is much higher.

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8. For relatively recent summaries, see Givón (2001, vol. 1) and Heine & Kuteva (2007).

In this section I will discuss briefly the rise of the two most common, and most elaborate, morphological systems: (a) referent-tracking morphology in the noun-phrase; and (b) verbal morphology that pertains to tense-aspect-modality, voice and transitivity. The important thing to remember is that once words have been grouped into phrases and clauses in pre-grammatical pidgin, the stage is set for **grammaticalization**. That is, for the rise of *both* grammatical morphemes and well-marked syntactic constructions — in tandem.

a. **Referent-marking nominal morphology**
As noted earlier, the most common referential signal in pre-human communication is a gestural or vocal deictic signal — **pointing**, most commonly with the head and eyes, aiming to attract the interlocutor's attention to a referent, i.e., to establish **joint attention**. This deictic gesture most likely gave rise first to a lexicalized **demonstrative pronoun** signal — 'this'/'that'. From demonstrative pronouns, grammaticalization studies suggest the development of two other, well known reference-tracking devices — pronouns and articles:

(10) a. **From demonstrative to pronoun**:
DEM > stressed PRO > unstressed (anaphoric, clitic) PRO:
thát (one) > s/hé > s/he-s-gone

b. **From demonstrative to definite article**:
DEM > DEM, N > DEM N > article + N:
thát > thát, woman > thát woman > the-woman

c. **From 'one' or 'this' to indefinite article:**
Stressed NUM/DEM > important new ref. > new ref.:
óne man > one-N > a-man
thís guy > this-guy

What (10b) suggests is that nouns were added to the initial deictic pointer as an *afterthought* in a paratactic NP construction that only later became a syntactic NP construction.

Subject (nominative) and direct-object (accusative) case-markers are central in the grammar of referential coherence, indicating the relative topicality (importance) of event participants. However, most commonly these 'pragmatic' case-markers are not grammaticalized directly from lexical words. Rather, they are derived indirectly from previously-grammaticalized semantic case-markers.[9]

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9. The semantic patient or dative marker may be re-grammaticalized into the pragmatic direct-object marker. Agent-of-passive, ergative-agent, genitive or dative-subject markers may be re-grammaticalized as subject case-markers.

Semantic case-markers are grammaticalized directly from lexical words through two main channels, de-verbal and de-nominal. The de-verbal channel can give rise to a large set of case-roles, via a process that presupposes two chained clauses as the precursor (see ch. 4):

(11) **The serial-verb channel of semantic case-markers**:
  a. 'take' > patient: 'she **took** apple, ate' > 'she ate the apple'
  b. 'take' > instrument: 'she **took** knife, cut meat' > 'she **with**-knife cut meat'
  c. 'go' > allative: 'she took child, **go** house' > 'she took child **to**-house'
  d. 'leave' > ablative: 'she took child, **leave** house' > 'she took child **from**-house'
  e. 'give' > benefactive: 'she built house, **give** man' > 'she built house **for**-man'

The de-nominal channel gives rise to, predominantly, various positional locative case-markers, a process that presupposes a noun phrase as precursor, with one noun modifying the other (Givón 2001, vol. I). And it is the erstwhile *head noun* that becomes the grammaticalized case-marker:

(12) **The relational-noun channel of locative case-markers**:
  a. 'face' > 'in front': '**face** (of the) house' > '(in) **front** (of) the house'
  b. 'back' > 'behind': '**back** (of the) house' > '**behind** the house'
  c. 'head' > 'on/above/up': '**head** (of the) house' > '**on top** (of) the house'
  d. 'foot' > 'under/down': '**foot** (of the) tree' > '**under** the tree'
  e. 'hand' > 'side/near': '**hand** (of the) man' > '**near** the man'

Noun-noun compounds in the noun phrase also give rise to nominal classifiers, and again it is the erstwhile head noun that becomes the grammaticalized classifier, as in 'swords-*man*' (*'man of sword'), 'helms-*man*' (*'man of helm'), 'crafts-*man*' (*'man of craft'), etc.[10] Modifying nouns may also serve, together with restrictive modifying adjectives, as an analogical template for the subsequent development of clause-size restrictive modifiers (REL-clauses; see ch. 8).

b. **Verbal morphology**

As noted earlier (ch. 4,7), verbal morphology, with the obvious exception of clitic anaphoric pronouns (10a), most commonly arises out of two-clause configurations, where the main-clause verb is grammaticalized into a marker of either **tense-aspect**, epistemic or deontic **modality**, or **voice/transitivity** marker on the complement verb. Some of the more common trends here in are:

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10. When noun classifiers are combined with demonstratives, they can give rise to large series of gendered/classed 3rd-person pronouns.

(13) a. **'be/stay/stand' > progressive aspect > present tense**:
'He **is** at sitting' > 'He-**s** sitting'

b. **'have/come/finish' > perfect aspect > past tense**:
'She **has** it, it's made' > 'She has it made' > She-**s**-made it'

c. **'want/go' (request/promise) > irrealis modality > future tense:**
'I **will** (it), to leave' > 'I'**ll** leave'
'I'm **going** home, to do it' > 'I **gonna** do it'

d. **'know/think/guess' > epistemic modality**:
'You **think**, she did it?' > '**Think** she did it?'

e. **'say/hear/see' > evidential modality**:
'They **say**, she left' > '**Say** she left'

f. **'suffer' > passive marker**:
'He **suffered**, someone fired him' > 'He **suffered**-(being) fired'

g. **'make/let/get' > causative marker**:
'she **got** him, he left' > 'She **got** him to leave'

As one can see, some of the most elaborate verbal morphology sub-systems can arise through this de-verbal grammaticalization channel.

12.6.3.6 The rise of complex/embedded constructions

As can be seen from the discussion directly above (also ch. 4,7), syntactic complexity in the verb phrase — the embedding of one clause into the VP of another — arises when one verbal clause is recruited to perform a rather specific communicative function on another. Those functions, i.e. the adaptive motivation for VP-embedding, are extremely heterogenous (13a—g); and the ensuing syntactic development often gives rise to **clause union** and thus to **grammaticalization** of one of the two predicates, which then cliticizes to the other. The pre-condition for such development, one functional, the other structural, may be summarized as follows:

(14) **Preconditions for the genesis of complex verb phrases**:
a. **Functional evolution**: the rise of more abstract senses of the relevant predicates (verbs); the use of such abstract senses to modulate and enrich the meaning of propositions; first in direct speech-acts, then in attribution to third person in displaced-time contexts.

b. **Syntactic evolution**:
- prior rise of multi-propositional discourse (clause chains)
- prior use of mental predicates with nominal objects (as an analogical template)

Preconditions (14a) are the **semantic** precondition for grammaticalization. Preconditions (14b) are the **syntactic** precondition for embedding. Syntactic complexity, here the embedding of one clause into the verb phrase of another, is but a predictable by-product of these two independent developments.

The second major type of embedded clauses — restrictive REL-clause modifying a head noun in the NP — arose as the culmination of the grammar of referential coherence, as a device to handle three major types of **complex reference** (ch. 5,8). In the process, a conjoined/chained clause was recruited, and treated as background or presupposed information:

(15) **Major complex-reference functions of REL-clauses**:

a. **Supplying relevance-anchor to a new topical referent** (REF-indefinite):
'we saw *this* man, *he was standing near bar*' >
'we saw this man [*standing near the bar*]'

b. **Differentiation between contrasting similar referents**:
'cut *that* tree, *it has dry leaves*'>
'cut *the* tree [*that has dry leaves*]'

c. **Coming back to a referent after a temporal gap in discourse (definite)**:
'finally *the* man got up, *he was standing near the bar*' >
'finally *the* man [who was *standing near the bar*] got up'

The genesis of REL-clauses does not typically lead to clause union, though it often leads to the rise of specific subordinator or pronominal **morphology** (ch. 5; Heine & Kuteva 2007). Again, there are two pre-conditions for this development, both of them aspects of the rise of coherent multi-propositional discourse; one functional, the other structural:

(16) **Preconditions for the genesis of complex noun phrases**:

a. **Functional**: Deeming the information in the two clauses mutually relevant in three possible ways (15):
- one clause makes a referent in the other more salient (15a).
- one clause differentiates a referent in the other clause from a similar referent (15b).
- one clause can recall a referent in the other clause from episodic memory (15c).

b. **Structural**:
- proximity of the two clauses in a clause-chain.
- existence of word-size restrictive modifiers as analogical templates.

Once again syntactic complexity, in this case the embedding of one clause into the noun-phrase of another, arises as the by-product of other, adaptively-motivated developments rooted in the **representation of other minds** during communication.

Clause-size restrictive modifiers embedded in the NP, most typically REL-clauses, may have had an analogical syntactic antecedent — restrictive one-word modifiers, such as adjectives or nouns. The development of restrictive REL-clauses may have thus followed the progression (schematically):

(17) a. 'the big house' > 'the destroyed house' > 'the house that was destroyed'
b. 'the log house' > 'the cooking house' > 'the house where one cooks'

This is not to suggest that a REL-clause is derived from a noun or adjective by expansion. Rather, word-size restrictive modifiers supplied the **analogical template** that must have preceded the use of clause-size embedded modifiers. One could thus make a diachronic-typological prediction:

(18) "No language will have embedded restrictive REL-clauses unless it also has restrictive modifying adjectives and/or nouns".

As was noted in ch. 8, the acquisition by children of 'true' REL-clauses was preceded by the acquisition of verbless restrictive modifiers.

12.7 Neuro-cognitive evolution

12.7.1 Distributive multi-modular network of grammar

Grammar is the last to evolve and the most complex component of human communication. Its genesis has depended on multiple lower-level pre-adaptations. It is thus rather unlikely that grammar is subserved in the brain by a single neurological module, or coded by a single "grammar gene". Rather, grammar is supported in the brain by a vast distributed network that links, in various circuits, multiple pre-existing modules (Bookheimer 2002; Kaan 2008; Hagoort 2008). Those modules may have arisen initially for adaptive functions that had little to do with grammar or language, but were nonetheless amenable to partaking in the processing of this new complex mega-function.

The recruitment of pre-existing modules into a distributive network to perform new, complex functions has ample precedent in other limbic-cortical networks. The executive attention system is such a distributive network (Schneider & Chein 2003; Posner & Fan 2004). The visual information processing system is such a network (Ungerleider & Mishkin 1982; Kaas 1989; Mesulam 2000; Tucker

2008). The auditory processing system is such a network (Poremba *et al.* 2003, 2004). Semantic memory (lexicon) is such a network (Martin & Chao 2001; Bookheimer 2002; Badre & Wagner 2007). Given that most of these complex-distributive networks are pre-linguistic, and have been only later pressed into the service of language processing, the assembly of the distributive networks and sub-circuits of grammar from pre-existing modules — and sub-circuits — is natural.

The main neuro-cognitive modules that partake in the processing of grammar, reviewed earlier (ch. 11), are recapitulated below.[11]

(19) **Distributive brain-network for grammar:**

	Cognitive	Linguistic	Neurological
a.	semantic memory	words	BA 47; ventral network
b.	event representation	simple-clause syntax	BA44, anterior-STG/STS, hippocampus
c.	episodic memory	chained clauses	hippocampus
d.	working memory	syntactic buffer	posterior-parietal cortex, pre-frontal cortex
e.	ToM representation	communicative functions	???
f.	executive attention	relevance/topicality; perspective shifting	executive attention network
g.	complex-hierarchies	complex-clause syntax	BA45, posterior-STG/STS
h.	morphology	grammatical morphology	???
i.	timing module	temporal coordination	cerebellum (?)

As many have noted, most of these modules have their neuro-cognitive homologs in the pre-human primate brain (Friederici 2008; Kaan 2008; Hagoort 2008; Schmahmann, Pandya *et al.* 2007). They came on line at different evolutionary times, often adapted into their immediate pre-linguistic functions from older functions. Their older layers are intertwined with the projection of the cortex out of the limbic-thalamic mid-brain of pre-mammalians (Mesulam 2000). The genesis of grammar is the most recent elaboration of an old and perhaps still unfolding evolutionary story. In this vein, Bookheimer (2002) makes the following observation about lexical-semantic representation:

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11. The study of the neurology of grammar has reached an explosive stage, where new and more specialized sub-modules of the network are announced daily. For the purpose of the discussion here, it would suffice to note that grammar is represented in the brain by a number of multi-modular distributive circuits (Friederici 2008), and that its lower-level modules may still perform their pre-linguistic functions (Kaan 2008; Hagoort 2008).

> "… One general principle appears to emerge consistently regardless of which category is under study … the brain regions identified do not appear randomly distributed, but rather **spatially proximal** to brain regions with strong sensory or motor association with the conceptual category …" (2002: p. 173; emphases added).

This is a fair rendition of the principle of **terminal modification**.

12.7.2 Neuro-adaptive plausibility of the evolution of grammar

Grammar sits at the very apex of an incredibly efficient, highly automated human communication system. It is a rapid processor for encoding the interlocutor's shifting deontic and epistemic states during communication. For the evolution of grammar to be neurologically plausible, it must be understood as an extension of well established and readily available pre-linguistic precursors.

The core adaptive function of grammar, the representation of other minds during communication, is by far the least understood aspect of its neuro-evolution. The following is thus, of necessity, a speculative attempt to articulate what must be, eventually, accounted for.

a. Conscious intentional organisms have an automatic co-activation relation between their **motor control** system and their **intention activation** system. This is a necessary correlate of the organism's capacity for intentional motion and action.
b. The work on the pre-motor **mirror neuron** system (Rizzolatti & Gentilucci 1988; Rizzolatti *et al.* 1996a, 1996b, 2000; Milner & Goodale 1995; Goodale 2000) suggests the existence of an automatic co-activation relation between the **motor** and **visual** systems, in both the pre-motor cortex and the dorsal visual trend.
c. In particular, the mirror-neuron literature suggests that viewing the actions of a conspecific automatically activates one's own motor system. Given (a) above, the co-activation of the visual and motor systems thus implies the co-activation of the intentional system. Put another way, **representations of one's own mind** can be activated by the motor and visual systems.
d. There are strong indications that monkeys, let alone chimpanzees and bonobos, already view their conspecifics as **intentional beings** (Cheney & Seyfarth 2007); that is, as beings whose actions are activated by their intentions.[12]

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12. In contrast, the representation in the pre-human primate mind of conspecific epistemic/belief states is not demonstrated in monkeys (Cheyney & Seyfarth 2007), and lags behind deontic/intentional representation in apes (Tomasello *et al.* 2005). The same temporal lag of the epistemic behind the deontic is also seen in children (Wellman 1990; Diessel 2005; see ch. 7,8).

e. All this taken together suggests a natural mechanism whereby viewing the interlocutor's **actions** will also activate a mental model, in the viewer's mind, of the interlocutor's **intentions**.
f. If it is true that the evolution of language piggy-backed on the pre-existing visual information processing streams and its limbic-anchored semantic and episodic memory systems (Givón 1995, ch. 9), as well as on the pre-existing motor system (Greenfield 1991), then grammar as an instrument of rapid encoding of the interlocutor's intentional states during communication now has a plausible evolutionary pathway: the three-way co-activation relation between the visual, motor and intentional systems.
g. The facts of evolutionary neurology (Mesulam 2000), language development (ch. 6,7,8), the diachrony of grammar (chs 3,4,5) and primatology (Premack & Woodruff 1978; de Waal 2001; Cheney & Seyfarth 2007) suggest that the mental representation of epistemic modality (belief) during communication was initially embedded in the mental representation of deontic modality (intention). Only later on does epistemic modality liberate itself from the deontic.

12.8 Closure: The genesis of syntactic complexity

The human communication system seems to be, on the face of it, a straight-forward combinatorial affair. Words are combined into clauses. Clauses are combined into multi-clause chains of coherent discourse. And coherent two-clause chains are condensed into complex-embedded clauses. One is thus tempted, like a good engineer, to propose the obvious: that the genesis of syntactic complexity progressed in an orderly combinatorial fashion, beginning with the atomic units of meaning (words), which are then combined into clauses, which are then combined into clause-chains; which can then be condensed into complex-embedded constructions. This certainly echoes the combinatorial system suggested by Tallerman (2007) or Bickerton (2008). The problem with this engineering approach to the genesis of syntactic complexity is that it does not capture the way the process happens in language ontogeny and language diachrony, or could have plausibly happened in language evolution.

The first thing to remember is that *Homo sapiens* did not assemble its communication system from scratch. Rather, s/he built it on the pre-existing primate neuro-cognitive platform, a complex representational system that included semantic memory (words), event representation (clauses) and coherent multi-event episodic representation (clause-chains). The adaptive impetus that led *Homo sapiens* to go beyond this pre-human platform and launch a communication system was not rooted in the adaptive demands of **representation**, but rather of

communication; that is, in the need to transfer rapidly non-obvious, unshared information from one mind to another.

Second, the primate ventral and dorsal trends of visual information processing — object recognition (lexicon) and event/state recognition (propositions and multi-propositions), respectively — came to us already fully coupled. Objects were recognized as *participants* in some event/state. And events were recognized as having particular *types* of participants. The rich cross-connectivity between the two neural trends (Kaas 1989) suggests that one is never activated without the other. Events/states (dorsal trend) provided the **context** within which objects are perceived or construed as **adaptively meaningful**. The pre-human perception of objects — fauna, flora, inanimates — as adaptively relevant has always been couched in the context of some event or state: Where are they? What do they do? How do they interact with each other? And most relevant, how do they interact with *us*? What do *we* do with them? In the same vein, states and events are perceived or construed in *their* adaptively-relevant context, that of coherent scenarios that are relevant to *us*.

The third thing to remember is that well-coded words, although clearly the first step in the development of human communication and thus of syntactic complexity, were never used just to code concepts. This is because lexical words, while having **meaning**, by themselves carry no **message**. They are only useful in communication if they code propositional messages.

The first step in the genesis of syntactic complexity (see ch. 10) was not just taking words with lexical meanings and combining them into clauses with event/state meaning. Rather, it was taking single words that *already* coded event/state meanings and — relying on the immediate context — coding the other word(s) to yield a multi-word verbal clause. This is how adult speakers, be they native, pidgin speakers or Broca's aphasia patients, produce and interpret one-word clauses to this day, as a matter of course and in an amazingly well-governed fashion. And this is clearly how children still proceed from one-word verbless clauses to multi-word verbal clauses.

The upshot of all this is that an already complex pre-linguistic representational system gave rise, in stages, to a complex communication system. That is, just as pre-existing event/state representation was the cognitive launching pad for multi-word verbal clauses, so was episodic multi-event representation the launching pad for clause-chains; and so was complex episodic coherence the launching pad for the condensation of chained clauses into complex-embedded clauses.

The evolutionary sequence I have proposed here involves, at each stage, the recruitment of pre-existing, pre-linguistic brain modules to perform related-but-not-identical novel functions. And the process as a whole was driven by the

gradually-escalating adaptive pressures that motivated the rise of well-coded human communication.

The rise of embedded-recursive syntax is neither a puzzle of non-Darwinian evolution, as Hauser *et al.* (2002) would have it, nor in itself a direct adaptive-selected goal. Rather, it is the structural by-product of the adaptive pressures that motivated the genesis of grammar. Complex syntactic structure is but the global consequence of more mundane, local, adaptively motivated steps. In this way, the evolution of morpho-syntactic complexity is the story of how a complex mental representation launched a complex communicative behavior under specific adaptive pressures. It is also the story of assembling pre-existing neural processors into new and more complex circuitry in support of emergent new functions.

Within this overall story, the rise of syntaxis out of parataxis is but the last step in the gradual accretion of structural complexity. It is not primarily a shift from one structure (coordination) to another (subordination). Rather, it is a shift from performing communicative functions with relatively little dedicated structure, to performing them with explicitly dedicated structures. That is, a shift from relying on slow, error-prone attention-demanding contextual inferences to relying on more automated, rule-governed processing. Above all, it is the story of how meaningful adaptive information was gradually transferred from the surrounding context to the dedicated code.

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