

UC Berkeley

Dissertations, Department of Linguistics

Title

Constructional Grounding: The Role of Interpretational Overlap in Lexical and Constructional Acquisition

Permalink

<https://escholarship.org/uc/item/6nq6b18j>

Author

Johnson, Christopher

Publication Date

1999

Constructional grounding:
The role of interpretational overlap in lexical and constructional acquisition

by

Christopher Ronald Johnson

B.A. (University of Chicago) 1987
M.A. (University of California, Berkeley) 1993

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Philosophy
in

Linguistics

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, BERKELEY

Committee in charge:

Professor Charles J. Fillmore, Chair
Professor George P. Lakoff
Professor Dan I. Slobin
Professor Eve E. Sweetser

Fall 1999

**Constructional grounding:
The role of interpretational overlap in lexical and constructional acquisition**

© 1999

by

Christopher Ronald Johnson

Acknowledgments

Anyone who has had the chance to participate in the life of the Berkeley linguistics and cognitive science community has a lot of thanking to do. I must start with my dissertation advisor Charles Fillmore. His astounding insight into all issues lexical and grammatical, his kindness and patience, and his sly sense of humor have made my graduate experience enjoyable and deeply rewarding. George Lakoff deserves enormous thanks for being generally excited about ideas, for getting students talking to one another, and for taking such an active interest in my project, which never would have occurred to me if it weren't for his thoughts about the experiential grounding of language. Eve Sweetser's wise observations on metaphor and historical semantic change have been influential, and her detailed comments on draft chapters have no doubt improved this text dramatically. Dan Slobin's important ideas about early grammatical acquisition are what first drew me to child language, and his encouragement has really kept me going.

I also owe a lot to the Berkeley graduate students I have had the pleasure to get to know. Joe Grady was developing his theory of primary metaphor while the ideas in this dissertation were taking shape; when we discovered how much our work overlapped, it produced the exhilarating sensation that we were on to something. Since then I have benefited enormously from joint work and discussions with him. Kevin Moore listened to the arguments on the following pages when they were far too nebulous to be presented clearly; the fact that he was the first to understand them is a testament to his curiosity, patience, and insight. I also thank the rest of the creative cognitivists that I've had so many enlightening conversations with: Collin Baker, Nancy Chang, Michael Israel (also a friend and collaborator), Dan Jurafsky, Pam Morgan, Srini Narayanan, Sarah Taub, Nancy Urban, and many others.

I would also like to thank Susanne Gahl, Kevin Moore, and Joe Grady for their friendship and support throughout grad school.

The following scholars have my gratitude for responding to earlier versions of this work and making me think differently about it: Melissa Bowerman, Nancy Budwig, Eve Clark, Susan Ervin-Tripp, Gilles Fauconnier, Jerry Feldman, Adele Goldberg, Paul Kay, Ronald Langacker, Michael Tomasello, Elizabeth Traugott, and Mark Turner.

The FrameNet project deserves thanks for providing me with interesting paying work during the end stage of my graduate career, as does the International Computer Science Institute for providing a comfortable and stimulating home for the project, and the National Science Foundation for funding the project.

My parents Ronald and Louise Johnson deserve special notice for putting me through college and letting me pursue my own quirky and impractical interests there. And a toast to my friends Fred Zimmerman and Molly Watson for making sure I didn't spend all my time studying in Berkeley.

And thanks most of all to my wife Jordanna Bailkin, who finished her own dissertation with inspiring efficiency, and has done more than anyone to help me finish by just making me so happy.

TABLE OF CONTENTS

Chapter 1. Introduction	1
1.1 Linguistic theory and language acquisition	2
1.2 Linguistic signs and based-on relations	6
1.3 Constructional and cognitive approaches to language	9
1.4 Diachronic explanations for based-on relations	20
1.5 Arbitrariness and motivation in acquisition	24
1.6 Methodology	26
1.7 The structure of the dissertation	28
Chapter 2. Constructions and based-on relations	29
2.1 Introduction	29
2.2 The “What’s X doing Y?” construction (WXDY)	32
2.3 A brief look at WH-questions	38
2.4 The relation between WXDY and WH-questions	40
2.5 WH-questions and WXDY in child language	46
2.6 Detailed examination of data from one child	65
2.7 Discussion	77
2.8 A principled account of constructional form	78
Chapter 3. The theory of constructional grounding	80
3.1 Introduction	80
3.2 Constructional grounding defined	81
3.3 Deictic and existential constructions in English	84
3.4 How are deictic and existential sentences related?	89
3.5 The historical relation between deictics and existentials	94
3.6 Deictics and existentials in child language	95
3.7 Interpretation of data	112
3.8 What makes constructional grounding possible	115

3.9	Why constructional grounding happens	116
3.10	Reconciling motivation and arbitrariness	120
Chapter 4. Polysemy, constructional grounding, and conflation		122
4.1	Introduction	122
4.2	Polysemy and the mapping problem	127
4.3	Conceptual Metaphor Theory	129
4.4	Primary scenes and primary metaphor	138
4.5	The polysemy of <i>see</i>	143
4.6	Constructional grounding and WH-complements	158
4.7	Visual and mental uses of <i>see</i> in child language	168
4.8	General discussion: Conflation in the acquisition of <i>see</i>	182
Chapter 5. Learning principles and constraints		187
5.1	Introduction: Learning linguistic signs	187
5.2	Natural constraints in early semantic acquisition	191
5.3	Subscenes and primary scenes	203
5.4	Conflation, prototypicality, and learnability	216
5.5	Special issues in constructional acquisition	226
5.6	Conclusion	233
Chapter 6. Conclusion		235
References		238

Chapter 1: Introduction

It is quite illusory to believe that where language is concerned the problem of origins is any different from the problem of permanent conditions.

Saussure, *Course in General Linguistics* (1983 [1915])

Adopting a constructional view of grammar, this dissertation addresses the question of how one conventional linguistic sign—i.e., one lexical unit or grammatical construction—can be “based on” another. Typically, based-on relations between signs are regarded either as arbitrary results of historical change or as properties of a stable system used by adults. This work proposes a third view. Using longitudinal corpus data, it argues that certain signs are related primarily through a dynamic process in early acquisition rather than through static principles of the linguistic or conceptual system instantiated in the minds of adult speakers. In this process, which is called *constructional grounding*, a sign that is relatively easy for children to learn serves as the model for another more difficult sign, because it occurs in contexts in which it exemplifies important properties of the more difficult sign in a way that is especially accessible to children.

In order for two signs to be related through constructional grounding, there must be a particular type of relation between them, both as they exist in the language, and more specifically as they are used by adults speaking to children. Therefore, the phenomena discussed here require a complex explanation that depends both on the historical processes that shape language and on the cognitive and communicative processes involved in children’s acquisition of language. This work focuses on the acquisitional issues, but places them in a theoretical context that takes account of the relevant historical factors as well. In the general view presented here, a historical change leads to a new state of language in which two conventional signs overlap significantly in function and form. This relation between signs makes it likely that children will model one sign on the other in the acquisition process. Children who do take this learning path will form a conceptual

connection between the signs, and this will influence the way they use the signs as adults. As a result, the signs are likely to continue to overlap in form and function. Through this potentially iterative process, language structure and language learning influence and mutually reinforce one another.

1.1 Linguistic theory and language acquisition

While this dissertation is about children's acquisition of language, it is written from the point of view of a linguist—someone especially concerned with the detailed description of language as a system. Unlike most works on acquisition, it focuses as much on explaining why language has the properties it does as on explaining how children learn about those properties. The phenomena it examines suggest that these two issues are intimately related. The structure of language both reflects the way it has been learned and determines, to some extent, the way it will be learned.

When Saussure (1983 [1915]) characterized the aims of modern linguistics, he did so in terms of a dichotomy between two major approaches to the study of language: the diachronic and the synchronic. The diachronic approach examines historical processes, changes that occur in language over generations of time. The synchronic approach, on the other hand, describes language (or linguistic competence) as a stable system that is shared by members of a speech community at a given point in historical time. Only by means of such a structure is it possible to understand how language functions as a systematic means of communication for its users. The assumption of a stable structure makes sense, because language remains the same from one generation to the next more than it changes. The field of linguistics is to this day still strongly influenced by the basic dichotomy between synchronic and diachronic study, from which it has benefited enormously.

In this traditional division of theoretical labor in linguistics, however, the process of language acquisition is largely excluded as a focus of attention. The structure that synchronic linguistics takes as its object of study is assumed to characterize the language or

linguistic competence of adult speakers. This idea is stated perhaps most explicitly in Chomsky (1965): “Linguistic theory is concerned primarily with an ideal speaker-listener, in a completely homogenous speech-community, *who knows its language perfectly*” (p. 3) (my emphasis). Acquisition involves changes over time in children’s minds, so it does not fall within the domain of synchronic linguistics (which will sometimes be described here as *adult-synchronic* for that reason). But acquisition is not historical in the relevant sense, so it is not in the domain of diachronic study either.

All this is not to say that the *fact* of language acquisition is unimportant to linguists. In fact, since Chomsky (1965), it has been assumed to be one of the most important things to be explained by linguistic theory. However, in the view expressed in that work, and elaborated in later work (e.g. Chomsky 1981), the explanation of language acquisition is to be achieved through the characterization of adult knowledge of language. The underlying assumption is that such a characterization, if correct, will reveal what is universal about grammatical structure, and that these universal properties must be innate. That is, adult linguistic competence is assumed to be characterized, at the deepest level, by the same kind of knowledge that also exists in the mind of the prelinguistic child. There is therefore no real need to explain the *process* of acquisition, because acquisition is not in fact a process in any interesting sense; it is the mere realization of a structure that is there from the start. In this approach, it is precisely what is learned in the true sense that is deemed to be uninteresting from a linguistic point-of-view.

While this is not the only possible perspective on the issue, the conceptual problems that acquisition presents, given the assumptions of linguistic theory, provide some rationale for it. Historical linguistic change is a good example of a dynamic process, because its outcome is open, or at least not entirely predictable. It is difficult to think of acquisition as being dynamic in the same way, because its outcome is largely predetermined: a child internalizes the grammar of the language spoken around him or her. A truly dynamic explanation of acquisition must also explain its apparent teleological nature; if it involves

real change over time, how does it lead to the right result? In the nativist view expressed in the work of Chomsky and others, the right result is there from the beginning, supplied by the human genome.

Cognitive approaches to linguistics, because they emphasize the basis of language in general cognitive abilities, promise a more learning-friendly view of the acquisition process. Much of the work that has been done so far in these approaches, however, has maintained the traditional adult-synchronic characterization of its subject matter, casting its insights in terms of the notion of “conceptual structure” (see, e.g., Lakoff 1987—though see also Langacker 1987 for a discussion of this idealization, and a more dynamic view). Some researchers in child language and child development have enthusiastically adopted ideas from cognitive linguistics, but have used them mostly to describe processes that take place very early in childhood. For example, Mandler (1988, 1992) has investigated the usefulness of the notion of *image schema* (discussed in detail in Lakoff 1987 and Johnson 1987) to describe the conceptual abilities of infants, and Tomasello (1992) has applied ideas from Cognitive Grammar (Langacker 1987) and Construction Grammar (in particular, Goldberg 1995) to the language of children in the two-word stage.

Computer scientists have used cognitive-linguistic concepts to model aspects of early lexical acquisition (see, e.g., Regier 1996, Bailey 1997). These models focus on the types of cognitive abilities that prelinguistic children might have, and on the application of these abilities to simplified learning tasks.

All this work leaves a fairly wide theoretical gap between the processes that occur during acquisition and the complex and interesting properties that cognitive-linguistic and constructional analyses have revealed in the language of adults. Filling this gap will require more active attention to the interaction between the structure of language and the properties of the young mind learning it. This interaction is certainly complex, because linguistic structure is subject to one set of influences (historical change, discourse processes, etc.), and the properties of young minds are subject to another (see Slobin 1997 for a discussion

of this issue). It will be necessary to show how these two very different factors could conspire to produce the outcome of successful acquisition.

One promising direction for such a view is to consider the possible effect that the process of acquisition itself might have on linguistic structure. Every human language is learned by children starting in earnest before the age of two. This is a remarkable fact that is appreciated most often for what it says about the abilities of children, but is equally remarkable for what it suggests about the structure of language. If language is regarded as a cultural system subject to the kinds of evolutionary pressures that affect other cultural systems (see, e.g., Dawkins 1976, Dennet 1995), we would expect it to bear the stamp of all the young minds that have learned it. Or, to provide a more apt metaphor, we can think of the mind of the idealized two-year-old as a filter through which the simplest properties of every natural human language have passed, again and again (see, e.g., Deacon 1997). What kinds of properties would we expect language to have, keeping that fact in mind? We might expect its structures to reflect, in some indirect way, the limitations of the two-year-old mind. We might also expect it to have developed properties that make it easier for two-year-olds to learn (see, e.g., Newport 1990, Deacon 1997). Because the minds of two-year-olds are different from those of adults, we might even expect language to have a layering of functions, some appropriate for its youngest learners and some appropriate for its most advanced practitioners (see, e.g., Wittgenstein's (1958 [1953]) language-as-city metaphor, Silverstein's (1985) notion of *functional stratification*, and Vygotsky's (1986 [1934], p. 121) notion *pseudoconcept*).

One of the framing ideas of this dissertation is that the structure of language, because it has evolved as a system to fit the needs of human users, including human learners, provides certain paths that are easy for learners to follow. That is, the dynamic yet relatively predictable process of language learning is partly determined by properties that are built into the structure of language by historical processes. Such processes may of course relate to the way in which language has been learned by children in the past. In this

view, the structure and acquisition of language are more intimately related to one another than they are usually assumed to be.

An important thing to note in this connection is that the “structure” of language, in the sense that is relevant to acquisition, only manifests itself in the linguistic behavior of people¹. From a linguist’s point of view this structure might be quite abstract, but for young children it is always embedded in human activity and interaction (see, e.g., Wittgenstein’s notion of *language games* (1958 [1953])). The interactional contexts that characterize children’s linguistic input are a rich source of evidence about the meanings and uses of words and constructions, and figure prominently in the following chapters.

1.2 Linguistic signs and based-on relations

The special relation between language structure and language acquisition discussed in this dissertation is suggested by the kinds of based-on relations that hold between conventional linguistic signs (including grammatical constructions as well as lexical items). The prevalence of pairs of signs that are distinct but related in function and identical or almost identical in form is quite striking. Typically in such pairs there is an asymmetry, with one member being more basic or canonical, and the other being in some way derivative of the first. This is most evident in lexical polysemy, in which the same lexical form is used in basic and extended meanings, as in the following examples:

- (1) a. I don’t see their car.
 b. I don’t see the point of leaving.

Conventional phrasal and clausal patterns also occur in slightly different versions performing different but related functions:

¹ This point was eloquently made by Chris Sinha in a discussion period at the 6th International Cognitive Linguistics conference in Stockholm, July 1999.

- (2) a. There's the president over there! (deictic)
- b. There's a lot of work to be done. (existential)
- (3) a. I know *what you want*. (embedded interrogative)
- b. I want *what you want*. (free relative)

A great deal of theoretical attention has been devoted to based-on relations like these. Lexicographers and lexical semanticists have long debated the scope of and explanations for polysemy. Much work in cognitive linguistics has focused on the conceptual principles that underlie the relations between different senses of polysemous items (Lakoff & Johnson 1980, Brugman 1981, Lindner 1981, Lakoff 1987, etc). The metaphorical basis for the relation between the uses of *see* shown in (1), for instance, is discussed in Lakoff & Johnson (1980) and Sweetser (1990).

Relations between clause types, as in (2-3), are a central focus of early transformational grammar (Chomsky 1957, 1965, etc.) and therefore lie at the historical roots of modern theoretical syntax. They continue to be important in both transformational approaches and constraint-based approaches such as Construction Grammar and HPSG (Pollard & Sag 1994, etc.). Several early transformational analyses focus on the relation between locative and existential constructions in English (e.g. Fillmore 1968, Kuno 1971). A constructional analysis of deictic and existential *there*-constructions is presented in Lakoff 1987. Transformational grammarians have also treated the relation between embedded interrogative clauses and free relative clauses, as shown in (3), in derivational terms (see. e.g., Kuroda 1968).

Analyses like those mentioned above treat relations between signs as properties of the synchronic system attributed to adult speakers. When two word meanings or constructions are said to be related to one another synchronically, what is usually meant is that the knowledge that constitutes adult linguistic abilities represents the relation in some direct way, perhaps as a principled conceptual link or a productive rule or schema. In the traditional Saussurean dichotomy, this is one of the two types of explanations available for

such relations, or in fact for any linguistic facts. The other type of explanation is of course diachronic. In diachronic accounts, the shared form and related meanings of two signs are attributed to those signs having been derived historically from a common source, and can potentially be regarded as having no synchronic significance. Synchronic and diachronic explanations can, however, apply simultaneously to the same phenomenon. For example, the same semantic-conceptual principle, such as a metaphorical extension, might both motivate a historical change in meaning (and hence the emergence of a new sign from an old one) and also exist later in the minds of speakers as a motivating connection between the historically related signs (Sweetser 1990).

This dissertation discusses a third type of explanation for relations between signs, different from both diachronic and adult-synchronic explanations. The central idea behind this type of explanation is called *constructional grounding*. It maintains that young children may use one sign as a model for another in the learning process, due to the existence of frequent utterances in children's input that exemplify important properties of both. The based-on relation that is established in this way may be modified and weakened as the learning process continues, and may not therefore play as strong a role in the system that is eventually learned. Relations like this, which manifest themselves primarily in the acquisition process, are synchronic only in the sense that they affect contemporary speakers. Simply treating such relations as aspects of the adult system like other kinds of synchronic relation masks some of their most interesting properties. While constructional grounding relations are compatible with both synchronic and diachronic explanations, they are not reducible to either, and therefore add a new dimension to our understanding of the way in which one linguistic sign can be based on another.

The basic idea of constructional grounding is potentially relevant to many linguistic phenomena. Relations between signs like the ones shown in (1-3) can be regarded as part of an even more general tendency for linguistic forms and formal categories to serve multiple functions. This multifunctionality is ubiquitous, reflected not only in lexical

content words and phrasal and clausal constructions like those above, but also in the many uses of prepositions, case markers and other grammatical functors, and the suggestive but imperfect correlations between notional categories on the one hand and lexical classes such as Noun and Verb or grammatical functions such as Subject and Object on the other. Such incomplete correlations between linguistic form and meaning have been regarded as “imperfections” of natural language and potential sources of philosophical confusion (see, e.g., Wittgenstein 1981 [1921], Carnap 1959 [1937], etc.). They have also figured prominently in arguments about the essentially arbitrary, autonomous nature of syntax (see, e.g., Grimshaw 1981).

On the other hand, multifunctionality has been regarded by some developmental researchers as a reflection of deep properties of language and cognition. For example, Werner & Kaplan (1963) argue that the use of old forms for new functions is a general principle of human development and sign use. Slobin (1973) expresses a similar idea in his statement that “new forms first express old functions, and new functions are first expressed by old forms” (p. 184). In these views, multifunctionality relates in a natural way to development and learning. The present work adopts this latter perspective.

1.3 Constructional and cognitive approaches to language

The idea of constructional grounding is based on a number of theoretical beliefs and preferences that characterize constructional and cognitive approaches to language. In the most general terms, these beliefs revolve around the idea that language is a cognitive ability that serves the purposes of human communication and that depends upon and interacts with other cognitive abilities in deep and important ways. This perspective contrasts with the view that language is based on an autonomous cognitive faculty that is governed mainly by its own unique principles (see, e.g., Chomsky 1981).

Work in constructional, cognitive, and functional linguistics is diverse, and it is beyond the scope of this dissertation to present an overview. There are, however, some specific

ideas associated with these approaches that deserve special discussion, because they have so directly informed the present work.

The importance of basic scenes

Fillmore (1968, 1982, etc.) has long argued that schematic construals of simple types of events and situations play an important role in both grammatical structure and lexical meaning. In his Case Grammar framework (1968), basic clause types are defined in terms of case frames, which represent the participant roles of simple scene. One such scene involves a person acting on some object using an instrument (e.g. *Pat opened the door with a key*). Other work (e.g. Fillmore & Atkins 1992) has explored the ways in which similar but more restricted schematic representations underlie the meanings of individual predicating works and classes of words.

Slobin (1981, 1985, etc.) has argued for the importance of simple scenes, as experienced by children, in language acquisition. He suggests that the morphosyntactic means for expressing certain grammatical notions show a crosslinguistic tendency to be mapped by young children first onto such scenes. For example, transitive marking, he suggests, is first mapped onto a simple scene representing children's earliest experiences manipulating physical objects. This shows the potential semantic basis for children's early grammatical constructions.

Constructions: The role of conventional form-meaning pairings in grammar

Constructional approaches to grammar are based on the idea that the notion of *grammatical construction* plays an irreducible role in linguistic theory. Constructions have long been important in grammatical description. In traditional pedagogical grammars, constructions representing basic sentences types are presented as means for performing different kinds of speech acts, and other types of phrases and sentences are noted as conventionally expressing more specific kinds of meaning (see, e.g., Daudon 1962). In early

transformational grammar, basic clausal constructions play an important role in defining *kernel sentences* from which more complex constructions are derived through transformational rules (see, e.g., Chomsky 1957). However, in the later versions of transformational grammar that defined what is now known as the *principles-and-parameters* approach to syntax (e.g. Chomsky 1981), constructions are viewed as epiphenomena resulting from the interaction of innate abstract principles relating to different aspects of syntactic structure (e.g. thematic structure, Case marking, binding, etc.). Work in this tradition has treated the notion of grammatical construction as a pretheoretical one that does not play an important role in linguistic theory.

Proponents of the contemporary constructional view of grammar (e.g. Kay and Fillmore 1999; Fillmore, Kay & O'Connor 1988; Goldberg 1995; Lakoff 1987; Langacker 1987; Jurafsky & Koenig 1995; Michaelis & Lambrecht 1996; etc.), which will be referred to simply as *construction grammar*, argue that there are many important grammatical phenomena that cannot be accounted for without constructions. The arguments presented by these researchers focus on the fact that specific parameters of grammatical form can be conventionally associated with specific semantic and pragmatic properties. That is, linguistic signs—i.e. conventional form-meaning pairings—take on a great significance, because they constitute much of grammatical competence.

In construction grammar there is not a simple and strict dichotomy between the conventional meaning-bearing elements of language and the principles and rules by which they are combined into phrases and sentences. Rather, there are various patterns, ranging from simple morphemes to complex and abstract clausal structures, that can all be considered conventional and are meaningful to varying degrees. Something counts as a *construction* in this view if it is a linguistically relevant pattern that cannot be reduced to simpler patterns.

Not surprisingly, many constructional analyses have focused on patterns that are idiosyncratic. Gordon & Lakoff (1971) discuss a question-like construction that serves a

specific non-interrogative pragmatic function (shown in (4) below). Fillmore, Kay & O'Connor (1988) analyze the expression *let alone* (shown in (5)), which places highly specific constraints on the formal, semantic and pragmatic properties of clauses that it occurs in. Goldberg (1995) makes reference to unusual, productive uses of argument structure patterns to show that they must be regarded as conventional constructions. For example, (6) is unusual because the normal meaning of *sneeze* involves only one participant and the verb therefore occurs most often in intransitive contexts, e.g. *Pat sneezed*. In (6), *sneeze* seems to have the syntactic properties of a three-participant verb. In Goldberg's account, the syntactic pattern shown in (6) conventionally expresses the caused-motion meaning that is expressed in the sentence. Michaelis & Lambrecht (1996) analyze what they call *nominal extraposition* (in (7)) and discuss its relation to pragmatic issues of information structure. Kay & Fillmore (1999) discuss the "What's X doing Y?" construction (shown in (8)), a semi-idiomatic (i.e. idiosyncratic yet highly productive) clausal construction that bears a striking resemblance to WH-questions but performs the non-interrogative function of commenting on the incongruity of a situation (this construction is discussed in detail in Chapter 2). In the examples below, small capitals indicate prosodic peaks.

- (4) Why paint your house purple? (Gordon & Lakoff 1971)
- (5) He wouldn't give a NICKEL to his MOTHER, let alone TEN DOLLARS to a
COMPLETE STRANGER. (Fillmore, Kay & O'Connor 1988)
- (6) Frank sneezed the tissue off the table. (Goldberg 1995)
- (7) It's AMAZING the people you SEE here. (Michaelis & Lambrecht 1996)
- (8) What do you think your name is doing in my book? (Kay & Fillmore 1999)

These sentences all exhibit grammatical patterns that have conventional formal, semantic and pragmatic properties.

There are two primary reasons for this focus on unusual linguistic phenomena. First, in order to re-establish the importance of constructions in grammatical theory, it has been

necessary to identify and describe phenomena that are amenable to a constructional analysis but not to an analysis based on general, abstract grammatical principles. Second, there is a general belief among construction grammarians that an examination of unusual linguistic phenomena can reveal important properties of language that might be overlooked in an approach that focuses only on basic or canonical phenomena. Despite this focus on unusual constructions, construction grammar seeks to account for all aspects of linguistic structure, including general patterns such as the Subject-Predicate construction (see Kay & Fillmore 1999). Generalizations in construction grammar are typically expressed using some form of inheritance network. Kay & Fillmore (1999) use the *complete mode* of inheritance (see Flickinger, Pollard & Wasow (1985)), in which a more specific construction that inherits a more general one necessarily contains all the information in the inherited construction and adds some to it. Lakoff (1987), Goldberg (1995) and Michaelis & Lambrecht (1996) use *normal-mode* inheritance, in which one construction may inherit another but override some of the information associated with the inherited construction.

Construction grammar clearly has implications for language acquisition. If grammatical constructions are conventional signs, then grammatical acquisition consists largely of constructing the form-meaning pairings that make up the grammar as well as the lexicon of the target language. In this type of learning, children must focus not only on the formal properties of utterances, but on their semantic and pragmatic properties. This is different from the kind of acquisition process emphasized by proponents of the principles-and-parameters approach to grammar. In that view, properties of utterances that can be described in formal terms serve as triggers that set innately-specified parameters to the settings that characterize the target language. The meanings of utterances, and particularly their pragmatic properties, play a minimal role in this process.

A constructional view of grammar creates the need for an understanding of language acquisition that differs both from the view of grammatical learning as parameter-setting or general rule induction, and from the traditional view of lexical-semantic acquisition, based

on the paradigm case of simple monomorphemic words. Some of the most important aspects of this type of language learning will be the ways in which children establish relations between constructions. In this work I have chosen to focus on that issue, rather than on the acquisition of basic constructions (discussed by Slobin (1981), Tomasello (1992), and others). This reflects my belief that more complex constructions, and the ways in which they are based on simpler constructions, can teach us about the process of acquisition as well as about the general properties of grammar. I hope to show that some learning strategies that are especially appropriate for complex constructions may be at work in the acquisition of simpler constructions as well.

Metaphor, correlation, and grounding

The decision to focus on constructions that are based on simpler constructions also reflects an interest in the general notion of *grounding*, which is important in cognitive approaches to language. In the most general terms, grounding refers to the ways in which people relate the formal and abstract aspects of linguistic meaning and structure to abilities whose experiential and cognitive bases are better understood. Grounding is most explicitly discussed in the context of the *experiential* view of language and cognition advocated by Lakoff and associates (Lakoff & Johnson 1980, Lakoff 1987, Lakoff & Turner 1989, Lakoff & Johnson 1999, etc.), though is more implicitly a part of all linguistic analyses that explain properties of language in terms of other cognitive systems. For example, Berlin & Kay's (1991 [1969]) work on color terms provides evidence that linguistically encoded color categories in all languages have a basis in the physiology of the human visual system. The work of Rosch and associates (Rosch et al. 1976, Rosch 1977, Mervis & Rosch 1981, etc.) examines the ways in which categories for basic objects are grounded in their simple perceptual and functional-interactional properties.

In the view of some researchers (e.g. Lakoff & Johnson 1980, Johnson 1987, Lakoff 1987, Lakoff & Turner 1989, Sweetser 1990, Lakoff 1993, Grady 1997, etc.), metaphor

plays a significant role in the grounding of language. In this work, metaphor is regarded as a ubiquitous conceptual phenomenon whose influence is apparent throughout the lexicon and grammar of every language. Metaphor helps to ground linguistic structure and meaning because it involves grounding on the conceptual level. That is, it involves certain conceptual domains (*source domains*) being understood in terms of other ones (*target domains*). For example, the sentence in (9) suggests a metaphor in which tasks or responsibilities are understood in terms of things that have to be eaten:

(9) I would do it, but I already have a lot on my plate.

Correspondences between domains are expressed as mappings that relate specific elements of one domain to specific elements of another. In the metaphor underlying the above expression, the overall quantity of food on the plate corresponds to the general manageability of the speaker's responsibilities, and eating the food presumably corresponds to discharging those responsibilities.

It is generally recognized that a consistent type of asymmetry holds between the source and target domains related by metaphorical mappings, though this asymmetry has been characterized in slightly different ways. Lakoff & Johnson (1980) discuss it largely in terms of the traditional distinction between concrete and abstract, with concrete source domains typically being more closely related to direct bodily experience, and abstract target domains being further removed from such experience. In this view, source domains are good for generating inferences, and mappings allow inferences to be transferred analogically to target domains. Sweetser (1990), Grady (1997), C. Johnson (1997b), and Lakoff & Johnson (1999), on the other hand, place more emphasis on the idea that source domains are more intersubjective and target domains are more subjective, though just as directly experienced. In this view, important inferences arise from the unidirectional entailment relation between source and target domains.

Lakoff & Johnson (1980) propose that metaphorical abilities are based largely in correlations between different kinds of phenomena in human experience. For example, the

metaphor MORE IS UP, exemplified by expressions like (10), makes sense in light of the frequent correlation between a vertical rise (e.g. of a liquid in a container) and an increase in quantity.

(10) Internet stock prices are up again.

This kind of experiential correlation, proposed as a motivation for certain metaphors in Lakoff & Johnson (1980), plays a central role in Grady's (1997) theory of *primary metaphor*. In this theory, the vast majority of metaphors are motivated by correlations, either directly, or indirectly by being decomposable into metaphors that are.

Experiential correlations are also important for the ideas of constructional grounding and conflation, introduced in C. Johnson (1997a, 1997b, 1999) and discussed in detail in this dissertation. These ideas are based on the observation that correlations can influence children's earliest hypotheses about the meanings of linguistic forms, and that these early hypotheses can affect the subsequent acquisition process. For example, consider the verb *see* (discussed in detail in Chapter 4). In addition to its normal visual meaning (and a number of other meanings), it has a metaphorical mental meaning, as in the following example:

(11) I don't see the point of leaving.

See is also used regularly in contexts in which visual experiences correlate with salient mental experiences (in fact, the correlation is so strong between visual experience and the achievement of new states of awareness that this may be the rule rather than the exception). When children hear these uses, it is likely that they hypothesize that both visual and mental experience, as they are correlated in these contexts, are relevant to the meaning of *see*.

If this is the case, it may provide a special kind of motivation for the mental meaning of *see*. Visual experiences are relatively intersubjective compared to mental experience. In general, we are able to determine what others are visually attending to, and may be fairly confident in many situations that they are having visual experiences very similar to our own. In the context of acquisition, these properties make visual experiences especially

amenable to ostension. Mental experiences, being more subjective, are less likely to be the focus of joint attention in communicative interactions, and are therefore less amenable to ostension. However, the correlation between visual and mental experience means that the former can help to create a kind of deferred ostension (see Quine 1960) to the latter. That is, a linguistic form associated with visual experiences will, by extension, also be associated with mental experiences. The correlation between vision and awareness does not therefore only motivate a metaphorical mapping, but it also helps adults and children jointly identify a class of relatively subjective experiences and single them out so that children may encode them linguistically. The mental meaning of *see* can be understood to be motivated by this process.

Because the visual and mental meanings of *see* are separately conventionalized in adult speech, the early hypothesized meaning of *see* can be regarded as combining or *conflating* these conventional meanings. It will be shown that certain kinds of sentences with *see* have formal properties that make them especially well-suited to expressing the conflated meaning, and in fact are ambiguous for adults because they can be assigned sensible interpretations corresponding to either the visual or mental meaning of *see*. It is even possible, in the right kind of utterance context, for an individual use of such a sentence, as in (12), to allow either of two interpretations, or both simultaneously:

(12) Let's see what's in the box.

This sentence, uttered in a situation in which two people are about to open a box, could be interpreted as being both about a visual experience and about an event of finding out. This kind of situation will be referred to as *interpretational overlap*, and the contexts that make it possible will be called *overlap contexts*.

Because interpretational overlap occurs with utterances, the linguistic properties that make it possible are, in general, properties of sentences or clauses. We will see, in fact, that interpretational overlap can also involve clausal constructions. Overlap contexts are like the experiential correlations described above, except that they involve correlations not just

between different types of extralinguistic experience, but between different patterns of linguistic form as well. If there is an asymmetry between the meanings of two constructions involved in interpretational overlap (as there is between the mental and visual meanings of *see*), then the overlap contexts potentially allow children to ground both the formal and the semantic-pragmatic properties of one construction in those of another. This is the essence of the idea of *constructional grounding*, which is developed in the following chapters. In the simplest terms, constructional grounding predicts that one construction (the *target construction*) may initially be treated by children as a special case of another construction (the *source construction*), even if that is not the way the constructions are related in adult language. Interpretational overlap makes this possible, because utterances that exhibit it have the properties of source and target constructions simultaneously. For example, (12) has the properties of an expression about visual experience as well as the properties of an expression about mental experience.

A difference in emphasis between Construction Grammar and cognitive semantics

A constructional view of grammar, which emphasizes the importance of semantic and pragmatic factors in grammatical analysis, goes hand-in-hand with a general cognitive-functional approach to language. Some researchers have emphasized the ways in which relations between constructions resemble conceptually-motivated relations between lexical senses in polysemy networks (Lakoff 1987, Langacker 1987, Goldberg 1995, Michaelis 1994, etc.). However, there is a notable difference in emphasis between some versions of construction grammar (e.g. Fillmore, Kay & O'Connor 1988, Kay & Fillmore 1999) and cognitive analyses of polysemy. While the former focuses on the conventional or arbitrary properties of signs, the latter focuses on motivated connections between signs. This is largely due to the different rhetorical challenges that face each endeavor. Arguments for the existence of constructions must counter claims that grammar is based on general abstract principles and that constructions are epiphenomenal (as mentioned above). Showing that

there are constructions with completely unique properties achieves this aim very well. On the other hand, arguments for the principled conceptual basis of polysemy must counter the claim that the lexicon is a collection of arbitrary facts that must be learned separately. Showing that there are conceptual generalizations that relate senses of lexical items to one another serves this purpose.

The different emphases described above are not incompatible with one another, however. Motivated relations between signs are not the same as regular predictable relations, as Lakoff & Johnson 1980 and Lakoff 1987 point out, and what is unpredictable about them can be considered to some extent arbitrary. Arbitrariness and motivation are two sides of the same coin. Nevertheless, the analytical tools that have been developed in each approach tend to emphasize one of these properties at the expense of the other. On the one hand, the use of the complete mode of inheritance to characterize the relations between constructions in Fillmore & Kay's approach is not well-suited to capturing motivated relations between constructions that are based on anything other than the simple sharing of properties in the adult grammar. On the other hand, the approach taken by Lakoff and Goldberg, with its emphasis on general conceptual principles, often remains silent about conventional properties of constructions that do not fit the conceptual generalizations.

One of the goals of this dissertation is to bring these two approaches closer together by suggesting a different way to think about the role of motivation in linguistic structure. In accordance with the general adult-synchronic emphasis of theoretical linguistics, motivation is usually regarded as a property of a relatively stable semantic-conceptual system that is instantiated in the minds of adult speakers. The view of motivation proposed here relates it to the process of acquisition. Some motivated relations between signs, it is argued, exist most strongly in the early stages of acquisition, and are weakened as the child learns more and more of the conventional properties that distinguish one sign from another. In this way, motivated and arbitrary properties peacefully co-exist.

1.4 Diachronic explanations for based-on relations

The constructional and cognitive approaches to language have developed primarily as frameworks for synchronic linguistic analysis, and they characterize relations between signs in synchronic terms. As discussed above, the other basic mode of explanation for relations between signs is the diachronic one. According to this type of explanation, two signs may share properties by virtue of having been historically derived from a common source. This section examines some of the principles underlying this historical process. It will be argued that these principles are relevant, in a modified form, to the process of acquisition.

Context-induced reinterpretation

Utterances have pragmatic meanings as well as semantic ones. For example, consider the following sentence:

(13) Do you know how to change a tire?

Out of context, this sentence would be interpreted as a question about whether or not the addressee has a certain ability. Now imagine that this sentence is uttered by someone standing next to a car to someone else walking by on the sidewalk. In this situation, most people would interpret the sentence as a request for help.

The first interpretation depends upon the conventional meanings of the words and constructions in the sentence and how they go together. The second interpretation—i.e. the “request” interpretation—depends upon the situation in which the sentence is uttered, the speaker and addressee’s understanding of the general goals and principles of communication, and the addressee’s understanding of the speaker’s reasons for uttering the sentence. In context it may be said that the sentence is ambiguous between these two readings.

Sometimes a pragmatic ambiguity like this shows a high degree of correlation with a particular word or other linguistic form. The form in question might conventionally express

just the right meaning to allow the pragmatic meaning in question to be produced in context. It is possible, as a result, that the pragmatic meaning might come to be associated with the lexical item over time, until it can be considered a bona fide conventional meaning. This is a major type of semantic change, and has been studied extensively by Traugott (1986, 1988, 1989, etc.). If the old meaning and the new meaning both continue to exist in the language, this type of change can be one of the causes of polysemy. One example discussed in Traugott (1988) and Sweetser (1990) is the English word *since*, which is ambiguous between a temporal meaning and a causal meaning:

- (14) a. I've been working since you left.
b. They look funny together, since one is so short and the other so tall.

In (14a) *since* has a purely temporal meaning which might be paraphrased as 'from the time that.' In (14b) *since* does not have any temporal significance—rather, it expresses that the subordinate clause gives a reason for what is expressed in the main clause. How did this causal sense get associated with a word that used to be purely temporal in meaning?

Traugott points out that temporal *since* often invites an inference of causality, as in (15):

- (15) He's been miserable since he lost his job.

In this sentence, the temporal relation between the losing of the job and the state of misery, along with Grice's (1989 [1975]) maxim of relevance, implies that the former caused the latter. Similar uses have occurred with great enough frequency in the history of English, Traugott argues, that speakers have reanalyzed *since* as a form that explicitly encodes causality. Because originally the causal meaning of *since* was a pragmatic meaning—more specifically, a *conversational implicature*—the present causal meaning is an example of what Grice calls a *conventional implicature*, i.e. a conversational implicature which has become conventionalized.

A similar case of reinterpretation, discussed by Stern (1931), involves the word *quickly*. Originally this word modified only motion, as in *to run quickly*, but has taken on a

general temporal meaning that can apply to various types of activity, e.g. *to work quickly*.

As in the case of *since*, these meanings are combined in certain contexts:

(16) They rode up quickly.

In a use of this sentence, the fast rate of motion implies the temporal shortness of the ride. Benveniste (1966) treats this type of explanation of meaning change as a general principle of historical semantic reconstruction. He writes: 'In the presence of identical morphemes with different meanings, one must ask oneself whether there is some use in which the two meanings converge' (p. 249).

Context-induced reinterpretation bears some resemblance to the process of constructional grounding. Overlap contexts in the acquisitional scenario resemble the kinds of contexts that enable context-induced reinterpretation in the historical scenario. The meanings of target constructions are analogous to the pragmatic meanings that come to be conventionally associated with linguistic forms in historical semantic change. And in order for children to progress from the meanings exhibited by utterances in overlap contexts to the true meanings of target constructions, they must perform a reanalysis similar to what occurs historically.

Metaphorical extension

The main point of Sweetser's (1990, etc.) work on semantic change is that it may be motivated by the same kinds of metaphorical mappings that motivate synchronic polysemy. She makes an especially convincing case for this in her discussion of the directions of semantic change taken by various Indo-European perception words. Many have taken on meanings relating to various aspects of mental experience. The best explanation for this very general tendency seems to be that there is a natural association between the two conceptual domains in question which leads speakers to interpret and use perception words metaphorically for mental experience, and that these extended uses become conventionalized over time.

Historical changes based on metaphor can be very different from those based on context-induced reinterpretation. For example, the relatively recent innovation of using the word *virus* to refer to a type of malevolent software is based on an explicit recognition, on the part of speakers, of the analogy between actual viruses and such software programs, and not on contextually ambiguous uses. However, due to the role of correlation in some metaphors, metaphorical shifts can involve contextually-overlapping interpretations. Sweetser (1990) discusses this possibility in relation to perception verbs and their historical extensions. For example, she notes the tendency for words meaning 'hear' to come to mean 'obey', and suggests that it may be based on uses of those words to generate implicatures about compliance (for example, an adult may say *Do you hear me?* to a child who is not obeying a command).

Sweetser (1988) argues that the process of grammaticalization sometimes involves the metaphorical projection of topological aspects of meaning to domains of grammatical meaning. This idea is contrasted with the traditional view of grammaticalization as the result of semantic bleaching (i.e. loss of meaning). Sweetser illustrates this claim with reference to the development of the *go* future in English. Spatial *go*, she argues, refers to movement from a source location close to the speaker to a goal location far from the speaker. Movement from proximal to distal locations relates to futurity, because people know that, when they are traveling on a path, they will reach distal points after (i.e. in the future relative to) proximal points.

Sweetser argues that this correlation in experience has provided motivation for a metaphorical mapping between going and futurity which preserves certain aspects of the spatial meaning but not others. There are three inferences, in particular, that she argues are preserved in the mapping: (1) To go from one point to another in space or time, it is necessary to pass through all intermediate points. (2) The present is proximal in time as the source of movement is proximal in space. (3) One cannot move from distal to proximal in space or from future to present in time. These inferences characterize the topological

meaning of spatial *go* which is projected to the domain of temporal relations. There are other inferences about the spatial domain that are not preserved, e.g., one can turn around and retrace one's steps, whereas the equivalent is impossible in the temporal domain.

Since in the domain of spatial relations, the topological representation yields certain inferences (about prediction and intention) which are not part of the spatial meaning, it is not accurate to describe this as an instance of semantic bleaching. Meaning is not just taken away; it is also added by knowledge of the target domain in combination with the projected topological information. This discussion of the *go* future provides another example of the way context-induced reinterpretation and metaphorical projection can occur together.

1.5 Arbitrariness and motivation in acquisition

It was mentioned above that certain versions of construction grammar focus on the conventional nature of constructions. This has certain implications about acquisition. To say that something is conventional is to say that it cannot be predicted from any general principles and therefore must be learned as an independent fact.

The signs that exemplify this kind of learning in its most extreme form are monomorphemic words such as *cat*—the type of sign that Saussure used to illustrate the arbitrary nature of the linguistic sign. To learn a sign like this, a child must memorize a form, memorize a meaning, and associate the two. This is the basic process that is assumed to occur in simple ostensive contexts. I will refer to this kind of learning as *autonomous mapping* to emphasize the idea that what is learned is a relation between a form viewed in isolation and a meaning viewed in isolation. This notion, I believe, encapsulates some assumptions about how conventionality plays itself out in the acquisition process. For example, when it is claimed that an idiom is a “fixed” or “frozen” conventional expression, the implication, I think, is that it is learned through autonomous mapping, as if it were a monomorphemic word. Likewise, when it is argued that the relation between two senses of a word, or between two constructions, is “only diachronic”, the implication is that the two

senses or constructions are learned through autonomous mapping, or at least independently of one another. That is, there is nothing about the contexts in which one is learned that should relate to or call to mind the contexts in which the other is learned.

On the other hand, when one sign (a *target sign*) is motivated by another (a *source sign*), it presumably is not learned through autonomous mapping. That is, there is presumably something about the contexts in which the target sign occurs that relates to the source sign. It might be a purely passive perception of a resemblance or some other connection on the part of the child. For example, when a child learns that the word *leg* applies to parts of tables and chairs, he or she may notice that these furniture parts bear a functional and, to some extent, visual resemblance to human and animal legs, and this perceived resemblance might serve a mnemonic function.

A stronger type of motivation might be based on an active projection of properties of the source sign. This might even be achieved through a regular or semi-regular process resembling a morphological rule (see, e.g., Apresjan 1973, Nunberg 1979, Copestake & Briscoe 1995, etc.). For example, a child might know that there is a fairly general principle that allows object nouns to be used as verbs denoting actions performed with those objects (exemplified by words like *hammer*, *saw*, *chisel*, etc.). The child could apply this principle to a new word which she or he had never heard used as a verb.

Metaphorical extensions could in principle be like either of these two types of motivation in acquisition. On the one hand, children might hear a metaphorical use of a word, e.g. *see* used to talk about mental experience, and might passively recognize that it is metaphorically related to the literal use. On the other hand, a child might acquire, from general experience, a metaphorical mapping between the visual and mental domains, and might extend the word *see* to mental experience even before having heard it used that way.

There is, as discussed above, and explored in detail in the following chapters, an even stronger form of motivation that could manifest itself in the acquisition process, which is analogous to the way in which new signs come into existence historically. In this type of

motivation, the child might learn the properties of the target sign directly from uses of the source sign, due to experiential correlations in the contexts in which the source sign is used. In an acquisitional context, this may be the strongest possible kind of motivation, because it amounts to a stage of identity between the source sign and the target sign. It is the purpose of this dissertation to show that this kind of motivation exists.

1.6 Methodology

Constructional grounding is a hypothesis about a dynamic process that relates two constructions in acquisition. To test the hypothesis in the case studies that follow, I have looked for tendencies in the order in which the two constructions appear in children's speech, and for evidence of an intermediate stage, in which children produce utterances that show the properties of both constructions simultaneously.

This is certainly not an infallible methodology. It may well be the case that children do not use constructional grounding even if they exhibit these stages in their input. Hypotheses about learning strategies and mental representations must in this type of study remain highly speculative. By the same token, the absence of these stages does not necessarily mean that the constructional grounding hypothesis is incorrect, because it may be true of children's uses of input without being reflected in their productions. And the fact the existing longitudinal studies are incomplete of course means the data could be misleading in either direction—whole predicted stages or counterexamples might fall between the cracks.

All these imperfections notwithstanding, it is suggested that the patterns of data and the arguments presented offer strong preliminary support for the claims made in this dissertation. The reader is invited to examine the data and arguments with a critical but generous mind and decide whether or not this is true.

I used data from the following longitudinal corpora in the CHILDES archive (see MacWhinney 1995):

Table 1: Child language corpora examined in the study

child	age range	corpus	reference
Abe	2;4-5;0	Kuczaj	Kuczaj 1976
Adam	2;3-4;10	Brown	Brown 1973
Naomi	1;1-5;1	Sachs	Sachs 1983
Nina	1;11-3;11	Suppes	Suppes 1974
Peter	1;9-3;2	Bloom 70	Bloom 1974
Sarah	2;3-5;11	Brown	Brown 1973
Shem	2;2-3;2	Clark	Clark 1982

These are all the corpora from CHILDES with the following properties:

- They are naturalistic, longitudinal studies of individual children.
- They begin not too long after the second birthday.
- They cover at least a year.
- They include frequent recording sessions.
- They contain many examples of the constructions being examined.

Because the claims presented in this dissertation are about relatively subtle semantic properties of lexemes and constructions as they occur in natural adult-child interactions, the data must come from judgments about the interpretations apparently intended by adult speakers and those apparently made by children. This requires examining utterances in the contexts in which they occur, to the extent possible, and making plausible inferences on the basis of those contexts. As a practical matter this means examining the linguistic contexts and experimenters' comments which are available in the corpora.

A note on the corpus examples

The corpora in the CHILDES archive use a standard transcription format called CHAT. The conventions of this format differ in a number of ways from traditional orthography. These conventions include devices to represent children's pauses, unconventional pronunciations, unintelligible sounds, and other aspects of speaking that do not bear in any direct way on the issues examined here. For that reason I have chosen to regularize the corpus examples presented in the text to make them more readable. In certain cases I have made my best

guesses about what a child must have meant when she or he said something that was transcribed in an unusual way. For example, many child utterances include the word “dere”, and I have taken the liberty of assuming that this is equivalent to the word “there”. I am hoping that any oversimplifications I might have introduced into the data by making such assumptions can be forgiven, particularly since I look for very general tendencies that should not be strongly affected

1.7 The structure of the dissertation

Chapter 2 introduces the constructional grounding hypothesis with an examination of the semi-idiomatic “What’s X doing Y?” construction mentioned above (see example (8)).

Chapter 3 develops the hypothesis with reference to deictic and existential *there*-constructions in English, and discusses constructional grounding in more general theoretical terms. Chapter 4 discusses the relation between constructional grounding and lexical acquisition, and introduces the Conflation Hypothesis. Chapter 5 discusses some general implications of constructional grounding and conflation for theories of learning. Chapter 6 briefly summarizes major issues and future directions of research.

Chapter 2. Constructions and based-on relations

2.1 Introduction

This dissertation is concerned with the ways in which one conventional linguistic sign can be “based on” another. This issues comes up most frequently in discussions of lexical polysemy. Extended senses of lexical items are based on more basic senses, and the study of polysemy focuses largely on explaining systems of these based-on relations and the semantic and conceptual principles underlying them (Apresjan 1973, Brugman 1981, Lakoff 1987, Pustejovsky 1995, etc.). For these reasons, polysemy would be the obvious place to begin this investigation.

However, the strong tendency toward semantic and conceptual explanations that is typical of work on polysemy, especially by cognitive linguists, would tend to lead the investigation in familiar directions and make it more difficult to see what is novel about the ideas presented here. Therefore, I will first consider relations between signs that are somewhat different from typical polysemy relations. Later, I will return to the topic of polysemy and regard it in the light of what has been discovered.

To open the investigation, then, I will focus on an unusual grammatical construction, exemplified by the old joke:

(1) Diner: Waiter, what’s this fly doing in my soup?

Waiter: Madam, I believe that’s the backstroke.

(from Kay & Fillmore 1999)

This joke turns on the waiter willfully misinterpreting the diner’s ambiguous utterance, treating it as a regular WH-question while it is in fact something different. The diner’s intention is not to ask a question about the activity the fly is engaged in in the soup, but to express surprise and disapproval about the fact that the fly is in the soup. To realize this communicative intention, the diner uses a conventional, semi-idiomatic English

construction analyzed in detail by Kay & Fillmore (1999), who call it the “What’s X doing Y?” construction.

The properties of this construction (which will be abbreviated “WXDY”) are discussed in section 2.2. For the moment notice that it closely resembles WH-questions with the verb *doing*, but differs in meaning, because *doing* in the WXDY construction does not denote any activity, as the following examples suggest:

- (2) a. What are you doing just sitting there?
 b. What are your shoes doing on the bed?
 c. What are these red marks doing all over my paper?

Since *doing* does not express any activity, the question word *what* does not bind any activity argument, and these sentences are not genuine WH-questions. Rather, they exemplify a separate, but obviously related, conventionalized pattern of English.

There are several reasons why the WXDY construction provides a good introduction to the issues discussed in this dissertation.

First, WXDY is clearly based, in some way, on WH-questions.

Second, it is a clear example of a construction—the relatively complex type of linguistic sign that, according to construction grammar, plays an important role in linguistic competence. This type of sign has a complex form that might be specified at the phrasal or clausal level, but, like other signs, has conventional properties that cannot be explained as the result of combining other signs in a regular fashion.

Third and most importantly, while the relation between WXDY and WH-questions does not seem to be merely a historical artifact, for reasons discussed in section 2.6, neither does it lend itself to an explanation based on conceptual extension (Lakoff 1987), type inheritance (Pollard & Sag 1994), or other principles underlying the adult linguistic system. A description of these constructions as they exist in the grammar of adult speakers can capture the formal parallels between them, but cannot fully explain them, and must treat them as being largely the result of historical accident.

It is argued here that the relation between WXDY and WH-questions is a real and robust one for contemporary speakers, but that existing models of synchronic structure, focused as they are on the relatively stable properties of linguistic systems used by adult speakers, are not well suited to explaining it. Making sense of it requires a new understanding of the way in which two constructions can be related to one another. The new type of relation proposed here crucially involves the pragmatic, semantic and formal properties of constructions and the way these properties come into play in the process of language acquisition. While WXDY is conventionalized, it nevertheless seems to be based on particular *uses* of WH-questions in certain types of utterance context. This fact underlies not only the historical relation between the constructions, but also, it is argued here, the acquisition of WXDY by children.

We will examine corpus data suggesting that there is a strong tendency for children to learn WXDY by reanalyzing certain kinds of WH-question that are frequent in their input. That is, children “freeze” the formal and semantic-pragmatic properties of WH-questions as instantiated in certain utterances they hear, make minor adjustments to these properties suggested by context, and treat the result as the initial hypothesized representation of the WXDY construction. This relationship between WH-questions and WXDY depends upon a certain resemblance, but cannot be fully captured by a description of the constructions as they occur in the speech of adults. It is dynamic, rooted in the process that children go through to infer the properties of WXDY from linguistic input, and in the role that WH-questions play in this input. One could say that WXDY is “built from” WH-questions more than it is “based on” them in a synchronic sense. While WXDY has properties that clearly distinguish it from WH-questions in adult language, these properties are learned relatively late, coming only after children demonstrate a preliminary understanding of WXDY as a special case of WH-questions.

This kind of dynamic relationship between constructions, which I call *constructional grounding*, has not to my knowledge ever been explicitly proposed. Most (if not all)

discussions of relations between constructions have adhered to the dichotomy between adult-synchronic and diachronic explanations discussed in the introduction. For that reason it will be necessary to make a detailed and convincing case that constructional grounding exists. The purpose of this chapter is to show that it may be the only plausible explanation for the relation between WH-questions and WXDY. In later chapters it is argued that constructional grounding is involved in much more basic linguistic phenomena.

Like the experiential grounding discussed in cognitive approaches to linguistics (Lakoff & Johnson 1980, Lakoff 1987; Sweetser 1990, Grady 1997, etc.), constructional grounding occurs when something relatively complex and abstract is understood in terms of something simpler and more directly experienced. What is different about constructional grounding—what makes it *constructional*—is the fact that it is based on experiences with linguistic signs, and involves their formal properties as well as their conceptual and functional ones. While constructional grounding is compatible with experiential grounding and theories of conceptual motivation, as discussed in Chapter 4, it is a distinct phenomenon and has different implications. In particular, it offers a principled explanation for aspects of linguistic form that must otherwise be regarded as arbitrary and accidental.

2.2 The “What’s X doing Y?” construction (WXDY)

Let us take a closer look at the properties of WXDY, exemplified by expressions like the following:

- (3) a. What are you doing on the floor?
 b. What are you doing lying on the floor?
 c. I don’t suppose the police had anything to say about what their so-called detective thought the footprints were doing under the bedroom window
 ((c) From Kay & Fillmore 1999).

(3b-c) show that WXDY is distinct from actual WH-questions. (3b) is unlikely to be an actual question about the activity in which the addressee is engaged, because the phrase

lying on the floor is a description of that activity (to the extent that lying around can be considered an activity at all), and a cooperative answer to the question is not *Lying on the floor*, but something more along the lines of *I'm not feeling well*. That is, the question in (3b) indicates that the speaker believes there is something incongruous about the addressee's lying on the floor (Kay & Fillmore 1999), and expresses that an explanation is desired for this state of affairs. In this interpretation, the phrase *lying on the floor* is construed as a secondary predicate controlled by *you*, the subject of *doing*. It is a general property of the WXDY construction that the final predicate is controlled by the subject of *doing*. In (3c) it is even more apparent that *doing* does not denote an activity, because footprints cannot engage in activities. This example also shows that the construction licenses embedded interrogatives, and allows for the *what* constituent to be realized indefinitely far from the *doing* constituent, as is possible in genuine WH-questions.

Though WXDY is clearly distinct from normal WH-questions, note that (3a) is ambiguous—it could be an actual WH-question, in which case a reasonable answer would be something like (4a), or it could be an instance of WXDY, in which case a reasonable answer might be more along the lines of (4b).

- (4) a. I'm looking for my contact lens.
 b. I'm not feeling well.

A necessary condition for this kind of ambiguity is that the secondary predicate be construable in more than one way. In the WH-question interpretation, it must be construed as applying to the activity in which the subject of *doing* is engaged. In the WXDY interpretation, it must be construed as applying to the entity denoted by the subject of *doing*—in this case, the addressee. Only certain kinds of adjunct allow these two types of interpretation. For instance, (5) does not have the same kind of ambiguity, because the temporal adjunct *now* can only apply to an activity:

- (5) What are you doing now?

Locative adjuncts, as in (3a), can apply either to an activity or to an individual participant in an activity, so have the requisite ambiguity. Prepositional phrases headed by *with* also have the right kind of ambiguity:

(6) What are you doing with that knife?

If the *with*-PP in (6) is interpreted as an Instrumental phrase, the presupposition of the question is that the addressee is performing some action and is using the knife to do it (see, e.g., Jackendoff 1990). If (6) receives a WXDY interpretation, however, the *with*-PP merely indicates that the addressee has a knife. This interpretation of *with* is especially clear in postnominal uses:

(7) See that person with the knife?

Not only are locative phrases and *with*-PPs ambiguous, but in utterances like (3a), there is an entailment relationship between the two meanings: If a person is engaged in an activity on the floor, then that person is on the floor. Similarly, if a person is engaged in an activity with a knife, that person has a knife.

Because of this entailment relationship, sentences like (3a) and (6) can, in the right context, be ambiguous as utterances. That is, each can occur in contexts that would support both of its possible interpretations simultaneously. Imagine, for example, that Kate comes into a room and finds Leo on the floor moving around in an odd manner and utters (3a). In this situation, the WH-question interpretation would be appropriate because Leo would indeed be doing something on the floor and Kate might not know what it is. The WXDY interpretation could also be appropriate, because Kate might know very well what Leo is doing (say, looking for a contact lens) and may want to know why he is doing it (she may know that he lost his contact somewhere else, for example). Most importantly, If Kate does not know what Leo is doing, she is also likely not to know why he is on the floor, and finding out what he is doing will count as an explanation for why he is on the floor. Therefore, there is a real sense in which Kate could intend both the WH-question and the

WXDY interpretation at the same time, and in which Leo could intend an utterance like (4a) to answer both questions simultaneously.

This kind of ambiguity comes up most often in discussions of historical semantic change (e.g. Stern 1931, Traugott 1988, etc.). It is not often regarded as much of an issue in synchronic semantic analysis, though it has been recognized by some researchers (Apresjan 1973, Norvig 1988, Schütze 1997). It will be referred to as *interpretational overlap*—the idea being that each meaning of an ambiguous form corresponds to a certain set of contexts in which that meaning would be appropriate, and for some forms, these sets intersect or overlap. Interpretational overlap has a special significance in the context of child language acquisition, and plays an important role in constructional grounding.

What makes WXDY a “construction”?

As discussed in the introduction, a construction is a conventional form-meaning pairing that cannot be reduced to smaller, component form-meaning pairings—i.e., it is a minimal linguistic sign. In more traditional views of grammar, the role of minimal sign is reserved for morphemes (see, e.g., Bloomfield 1933). In a constructional view of grammar, minimal signs may be phrasal, clausal, and other grammatical patterns as well as morphemes. Such signs may be specified in terms of fixed constituent structure or more abstract patterns of grammatical dependencies. Construction grammar and Cognitive Grammar (Langacker 1987) are perhaps the most explicit and detailed articulations of this idea. HPSG (Pollard & Sag 1987, Pollard & Sag 1994, etc.), which is described by its developers as a “sign-based” theory of grammar, is also increasingly adopting a constructional point of view. These theories share the belief that parameters of grammatical form can be directly associated with parameters of meaning, broadly construed (including conditions on appropriate use and other pragmatic information).

Semi-idiomatic expression types like WXDY provide the strongest evidence for a constructional view of grammar, because they are complex and productive and cannot be

accounted for in terms of more general principles of combination and composition. The interpretational properties of WXDY cannot be attributed to conversational implicatures (see Grice 1989 [1975]) created by WH-questions, because many instances of WXDY cannot be interpreted as WH-questions, as Kay & Fillmore argue. WXDY consists of an idiosyncratic set of constraints that involve formal and semantic-pragmatic properties. It must have *doing* as its main verb, always in the *-ing* form, and it must begin with the question word *what*, which can be indefinitely far from *doing*, like an actual WH-word in a real question. *What* and *doing*, however, do not have the meanings they have in other contexts. This fact makes it difficult to provide an elegant compositional analysis of the construction.

These difficulties come up in the inheritance-based analysis that Kay & Fillmore present. They represent the entire syntactic structure of WXDY as an abstract clause, associating specific complementation or valence properties with the lexical head *be*: it is required to take the word *what* as its subject, and it takes a VP complement headed by *doing*. In the VP complement, the word *doing* also has constrained valence properties: it must take a Predicate complement whose subject is construed as being identical to the subject of *doing*. This complex pattern, consisting of the lexeme *be*, the lexical forms *what* and *doing*, and grammatical dependencies involving these elements, serves as a sign-vehicle that conventionally expresses a judgment of incongruity.

The representation of WXDY interacts with the Nonsubject WH-question construction and other constructions of English to yield the forms of actual occurrences of WXDY. In combination with the Inverted Clause construction, it licenses clauses of the form given in (8); otherwise it licenses sentences of the form given in (9):

- (8) a. What is the book doing on the table?
- b. [What₂...[BE [NP_{1,3} [doing<Subj:1, Obj:2> [Pred<Subj:3...>]]]]]?]
- (9) a. Do you know what the book is doing on the table?
- b. [What₂...[NP_{1,3} [BE [doing<Subj:1, Obj:2> [Pred<Subj:3...>]]]]]?]

(8b) and (9b) show important grammatical properties of non-embedded and embedded occurrences of WXDY, respectively. In these representations the predicating elements *doing* and *Pred* are followed by angled braces containing valence information in abbreviated form. These abbreviations merely state that *doing* requires a Subject and an Object, and that the Predicate requires a Subject (though not necessarily exclusively). The numbers after these abbreviations are indices; the elements bearing corresponding subscripts are construed as satisfying the valence requirements in question.

The Nonsubject WH-question construction inherits what Kay & Fillmore call the Left-isolation construction, which licenses the occurrence of the word *what* in its “extracted” or left-isolated position, and allows for the possibility of a long-distance relation between *what* and the verb whose valence element it satisfies (in this case *doing*). This possibility is represented by the ellipses in the representations above.

This analysis captures the relevant formal parallels: WXDY has the syntactic properties of WH-questions because it inherits the Nonsubject WH-question construction. However, the analysis does not explain *why* WXDY and WH-questions should be related in this way. Nor does it explain why the WXDY construction contains the words *what* and *doing*. Either it is necessary to treat these words, as they occur in this context, as separate idiomatic lexical items (along the lines of *aspersions* in *to cast aspersions*), or to find a way to relate them to the actual words *what* and *doing*. In the case of *doing* there is little semantic motivation for this. In the case of *what*, there is a degree of semantic motivation, since WXDY *what* may be said to carry interrogative force, but it does not have the referential properties of a real WH-word.

Kay & Fillmore address this issue only briefly. They suggest that WXDY *doing* is the present participle of the verb *do* without its meaning, and that WXDY *what* inherits the interrogative meaning of normal *what* but not its referential properties. In order to express the latter generalization, it is necessary to posit an abstract WH-word construction that expresses interrogative meaning but not referentiality, and to have normal *what* and WXDY

what both inherit this construction. Therefore, while this analysis captures the formal facts about the occurrence of *what* and *doing* in WXDY, it must use some ad hoc measures to do so.

The purpose of these comments is not to criticize Kay & Fillmore's analysis, without which this chapter could not have been written, but rather to show that there are limitations intrinsic to the synchronic characterization of WXDY and its relation to the other aspects of English that it brings into play. It is argued below that constructional grounding provides a satisfying explanation for the specific properties of WXDY, and for the unusual resemblance that it bears to WH-questions.

2.3 A brief look at WH-questions

To set the stage for the argument, in this section we will look briefly at the properties of WH-questions.

Normal WH-questions

In canonical "argument-extracting" constituent questions, an initial WH-word¹ precedes a clause in which one of the major predicating words is missing an argument. The WH-word functions as an operator that binds the missing argument in the semantic representation of the clause. In a canonical *what*-question, the word *what* binds some non-animate argument:

(10) a. What did you eat for lunch?

a'. [What₂ [did [you₁ [eat <Eater-Subj:1, Food-Obj:2> [for lunch]]]]]?]

b. What did you say to the professor?

b'. [What₂ [did [you₁ [say <Speaker-Subj:1, Content:2, Addressee-Comp:3> [to the professor]₃]]]]]?]

¹Or WH-constituent. I am ignoring questions such as *Which book did you read?* in this discussion.

In (10), the abbreviated valence representations of the underlined predicates contain participant role names like Eater and Food as well as grammatical functions like Subject (Subj) and Object (Obj). These participant role names are just suggestive mnemonics; the real content of the participant roles, it is assumed, would consist of their being slots in representations that have conceptual content (Fillmore 1982, Jackendoff 1990, Van Valin & La Polla 1997, etc.). The grammatical function of the Content role in (8b) is left unspecified, because it could be either Object or Complement.

In (8a) the word *what* corresponds to the Food argument of *eat*. In (8b) it corresponds to the Content argument of *say*. This is the typical role for *what* in questions—to stand in for an argument that is clearly missing from the following clause.

“What ...X DO?” questions

Questions with *what* and *do* are not canonical WH-questions, because in the normal type of answer to such a question, the constituent that corresponds to *what*—i.e. the one that provides the information for which *what* stands—is a verb phrase rather than an argument of a verb:

(11) Q: What did Pat do over lunch?

A: Pat **exercised**.

Some conventionalized uses of *doing*, however, make it possible to answer in a way that is parallel to a canonical WH-question:

(12) Q: What did Pat do?

A: Pat did **sit-ups**. OR: **Sit-ups**.

To do sit-ups can be analyzed as consisting of the normal verb *do*, which relates an Agent to an Activity, and the word *sit-ups*, which expresses the Activity argument. This is not surprising, because it can also denote an activity in other contexts:

(13) Sit-ups are tiring.

Examples like (12) suggest that the verb *do* takes two arguments: an Agent, i.e. someone who does something active on purpose, and an Activity:

- (14) a. What₂ [did [Pat₁ do<Agent-Subj:1, Activity:2>]]
b. Pat₁ [did<Agent-Subj:1, Activity:2> sit-ups]]

Normal activity verbs like *exercise*, it can be assumed, can also be used to answer questions like these, because they denote activities (in certain formal frameworks, they might be thought of as having an implicit Activity argument—see, e.g., Davidson 1980 [1967], Parsons 1990, Van Valin and La Polla 1997, etc.):

- (15) Pat₁ exercised(DO<Agent-Subj:1, Activity=exercise>).

Verbs that do not denote activities cannot be used to felicitously answer such questions:

- (16) a. What did Pat do last night?
b. ?? Pat thought there was a party.

Therefore it will be assumed that the word *what* in a normal “What...X DO?” question corresponds to the Activity argument of *do*, and that information about this argument is typically provided by activity verbs used in response to these questions.

2.4 The relation between WXDY and WH-questions

What explains the formal relationship between WXDY and WH-questions? It is of course very likely that they are historically related. In particular, it seems that WXDY resulted from the reanalysis of certain kinds of WH-question. The likely historical origin of the WXDY construction is briefly discussed below. However, it is argued that this historical relation is not sufficient to explain the very close parallel between the two constructions in contemporary English.

Conversational implicature and the historical development of WXDY

It is likely that the WXDY construction developed when pragmatic properties of certain questions became conventionally associated with the forms of those questions.

WH-questions can often be used to convey judgments of surprise or disapproval through conversational implicature (Grice 1989 [1975]):

- (16) a. What is this stuff on my shirt?
b. Who ate my sandwich?

In question like (16a-b), the fact that the speaker lacks the information represented by WH-words is closely associated with the fact that the speaker finds the situations in question incongruous. In (16a), the fact that the speaker does not even know the identity of the substance on her or his shirt emphasizes the fact that the substance does not belong there. In (16b), the important information conveyed by the question is that someone other than the speaker (and owner of the sandwich) ate the sandwich. In both of these cases, a genuine WH-question is used to pragmatically express a judgment of incongruity (coupled with disapproval).

This is a common enough use of questions that there are several somewhat formulaic expressions that seem to convey the same type of meaning conventionally—that is, they seem to express conventional implicatures:

- (17) a. What are you doing?
b. What have I done?
c. What was I thinking?
d. What are you wearing?

All these sentences can in principle be interpreted as genuine WH-questions, but they can also be used in such a way that their WH-question interpretations are overshadowed by the expression of incongruity that they convey. In (17a) the speaker might genuinely want to know what the addressee is doing, or might know what the addressee is doing, find it surprising or inappropriate, and want to call attention to it by asking about it. (17b) might

be uttered by someone who is uncertain about the effects of her or his actions, in which case it could be interpreted almost as a normal WH-question, but would more typically be used in situations in which the speaker knows exactly what he or she has done and believes that it was not a sensible thing to do. Similarly, (17c) might be uttered by someone who genuinely cannot remember why she or he made a particular decision, but is more likely to express disapproval about a bad decision. And (17d) might imply that the speaker really cannot identify an article of clothing, but is more likely to express that the speaker finds an article of clothing highly unusual.

All these examples show that it is a fairly general property of WH-questions that they can imply a judgment of incongruity. The WXDY construction relates to this general tendency. What makes it a grammatical construction is the fact that it consists of a specific set of formal parameters that are paired with this expressive function, and utterances that conform to these parameters convey the sense of incongruity even if they cannot be interpreted as actual WH-questions; therefore, the incongruity reading cannot be attributed to a conversational implicature based on a normal WH-question. The formal parameters of WXDY are in most respects more restrictive than those of WH-questions that express an incongruity implicature. WH-questions can occur with different verbs and question words, whereas WXDY always occurs with *doing* as its main verb and *what* as its question word. That is, it specifically resembles progressive “What...X DO?” questions.

As Traugott (1988), Traugott & Heine (1991), and others have argued, implicatures can often become conventionally encoded by linguistic forms through a historical process of pragmatic strengthening and reanalysis. The form of WXDY suggests that it emerged from such a reanalysis of progressive “What...X DO?” questions. Ellsworth (1999) presents historical corpus data that support such a reanalysis account. These data suggest that something like WXDY occurs as early as Middle English. The earliest attested uses are equivalent to (18):

(18) What are you doing here?

where what is clearly intended is an expression of surprise combined with the question ‘Why are you here?’. For reasons discussed in section 2.2 above, genuine questions like these can create the implicature that the speaker wants to find out why the addressee is present, in addition to or instead of finding out what the addressee is doing. These early utterances therefore seem to indicate a somewhat formulaic, reduced version of the WXDY construction that expresses a conventional implicature.

There are several properties that make the question *What are you doing here?* a perfect source for WXDY. Most importantly, it has a final predicate expression that can be construed in more than one way—i.e. as the location of an activity or as the location of the individual engaged in that activity—the person denoted by *you*. This is important because the possibility of two construals of the predicate invites a semantic reanalysis. Also, the predicate position, construed as applying to the subject of *doing*, provides a place for the speaker to describe the situation that he or she is intending to communicate an implicature about. While the simple question *What are you doing?* can express the implicature of incongruity just as easily as a question with a predicate expression can, it does not provide any similar means for describing the situation judged to be incongruous.

The presence of the words *what* and *doing* also would have facilitated the proposed reanalysis in two ways. First, the frequency of *do* means it is more likely to occur in this context than are other verbs, and is for that simple reason a better candidate for reanalysis than, say *eat*. Furthermore, the very general meaning of *do* makes it more likely to become semantically bleached (see, e.g., Bybee & Pagliuca 1985, Hopper & Traugott 1993). Also, because *what* in this context lacks the obvious referential meaning that it has when it corresponds to an object in a more typical constituent question (Q: *What did you use to prop open the door?* A: *That!*), it does not have as far to go, conceptually speaking, to become “bleached” into a fully non-referential element.

Finally, the deictic elements in this question (present tense progressive, second person, proximal *here*), all reflect utterance contexts in which the important pragmatic and semantic

properties of the question are correlated in the present moment. This means that the addressee is engaged in the relevant activity at the time of utterance, and therefore is located at the place where the activity is performed at the time of utterance, and furthermore that the speaker is likely able to see what the addressee is doing and may therefore not be requesting that piece of information.

Let us consider more explicitly what happens in the shift of construal behind the proposed reanalysis of the question *What are you doing here?*. Here is a representation of key features of the construal of this simple question:

- (19) What₂ [are [you₁ [doing<Agt-Subj:1, Act₃-Obj:2>
[here (LOC<Th-Subj:3, LM=deictic>)]]] ?

The question word *what* binds the Activity (Act) argument of the word *doing*. In the locative expression *here*, the Theme argument (Th) is also associated with the Activity argument of *doing*—that is, it is the location of the Activity that is in question. Because *here* is a deictic locative, its Landmark argument (LM) is specified as being deictic. That is, it identifies the location of an object not in terms of another object, but more directly in terms of the locations of the interlocutors in the context of utterance. The proximal deictic meaning of *here* in this context implies that the addressee is in the same location as the speaker.

Because the person to whom this question is addressed must be present, it follows that the locative *here* applies to that person as well as to the activity in which they are engaged. In general it is true that a person engaged in an activity is located where that activity is taking place, so any “What...X doing LOC?” question can be accompanied by the following inference, stated in terms of the binding representations proposed:

- (20) $x_1, y_2 (DO<Agt:1, Act:2>) \ \& \ y_3, z_4 (LOC<Th:3, LM:4>)$
 $\supset x_3, z_4 (LOC<Th:3, LM:4>)$

If this inference is applied to the interpretation of (17), the result is:

- (21) What₂ [are [you_{1,3} [doing<Agt:1, Act₃:2> here(LOC<Th:3, LM=deictic>)]]

That is, the Theme argument of the locative expression is understood to be bound to the subject of *doing* as well as to the Activity argument of *doing*. And, because the activity is ongoing at the time of utterance, and is taking place where the speaker is located, there is a high probability that the speaker is aware of what the addressee is doing. This can lead to the implicature that it is not the activity that the speaker wants to know about, which would tend to cancel or suppress the meaning of *doing*:

- (22) [What₂ [are [you_{1,3} [doing<Agt-Subj:1, Aet₃.Obj:2>
[here (LOC<Th-Subj:3, LM=deictic>)]]]]]

In the above representation, the coindices that express the binding of *what* and *you* to the Activity and Agent arguments of *doing* remain to capture the fact that those words maintain their grammatical relations to the word *doing*, even though the semantic relations have become irrelevant. Something like the structure in (22) seems to be a plausible representation for the early form of the WXDY construction identified by Ellsworth in Middle English (if adjustments are made for the somewhat different syntax of the older expressions). Over time this structure might have become generalized, first to include other locative predicates, and later to include non-locative ones:

- (23) [What₂ [BE [NP_{1,3} [doing<Subj:1, Obj:2> [Pred<Subj:3>]]]]]]

This structure, if allowances are made for a long-distance relation between *what* and *doing*, is identical to the one proposed by Kay & Fillmore for the WXDY construction. It has become conventionally associated with the pragmatics of incongruity and with the speech act goal of making a request for an explanation.

Why the relation between the constructions in more than just historical

It might be argued that the historical kinship summarized above is sufficient to explain the similarity in form between WXDY and WH-questions. Perhaps certain WH-questions were reanalyzed at some time in the past and gave rise to a construction which has now

fully diverged from the non-subject WH-question construction. This scenario, it is argued here, is highly unlikely.

First, the mere fact that the form and interpretation of WXDY is so closely related to that of certain questions, and in particular, the possibility of overlap utterances that are WH-questions but also can be interpreted as instances of WXDY, make it unlikely that learners would fail to notice a relation between the constructions. More importantly, the close resemblance between WXDY and WH-questions is not compatible with reasonable expectations about historical divergence, given the age of WXDY. In Middle English, when WXDY seems to have emerged, WH-questions had a different form than they have in current English. The Middle English counterpart of the modern WXDY construction resembled WH-questions at that time. As the form of WH-questions has evolved to its present state, WXDY has apparently evolved in parallel. If WXDY had truly diverged from WH-questions in the period of Middle English, but is now to be considered a “fixed expression”, then we would expect it to have the form of Middle English questions, not of contemporary questions. The fact that the forms of the WH-question and of WXDY have evolved together implies that they have been consistently related to one another by generation after generation of speakers, despite the fact that a synchronic description of the two constructions does not capture a clear motivated relation between them. Constructional grounding—a dynamic based-on relation that manifests itself in the acquisition process—seems to offer the only plausible explanation for such a long-standing but synchronically elusive relationship.

2.5 WH-questions and WXDY in child language

Below I present corpus data supporting the claim that constructional grounding is responsible for the relation between WH-questions and WXDY for current speakers. These data suggest that something like the historical reanalysis described above takes place in the process children go through to learn the WXDY construction.

Here is the scenario assumed by the constructional grounding hypothesis: Children begin answering WH-questions at a very young age, and begin asking them not much later. The basic properties of the WH-question construction are firmly in place well before children produce anything resembling WXDY. When children start making generalizations relevant to WXDY, they are likely to start with the ambiguous instances that can also be interpreted as questions, and to assimilate these to their general understanding of the non-subject WH-question construction. This is a natural thing to do, because in these overlap uses, a description of the activity that the question pertains to also counts as an explanation for the predication expressed by the Y constituent. As a result, the first steps in the acquisition of WXDY take place before the child recognizes it as a distinct construction—rather, it begins as a subtype of WH-question, and becomes differentiated from true questions over time.

If it is true that children learn the WXDY construction in this way, they should pass through the following chronological stages:

Stage 1: They produce WH-questions but no instances of WXDY.

Stage 2: They produce overlap utterances that could be WH-questions or WXDY.

Stage 3: They produce clear instances of WXDY.

That is, it should be the case that children produce WH-questions before they produce anything resembling the WXDY construction, and that they produce overlap utterances—utterances that can be interpreted as WH-questions or as instances of WXDY—before they produce any clear instances of WXDY.

Let us consider an alternative explanation for the acquisition of WXDY in which it is not assumed to be related to questions, except in superficial form. It would have to provide an alternative account of the fact that WXDY is regularly learned much later than questions. One possible explanation might simply be that the WXDY construction is abstract and difficult, and for that reason alone is learned later. However, if indeed it is difficult for children to learn, then explaining *how* they learn it is itself a challenge. Such an explanation

should exploit any special evidence that may be available to children in their linguistic input. The constructional grounding hypothesis makes a specific prediction about what kind of evidence is available, and this evidence would allow children to make a very constrained hypothesis about both the form and the meaning of the construction on the basis of what they already know. In the absence of an alternative explanation for the acquisition of WXDY, it may be unwise to claim that children do not make use of this evidence.

In order to test the predictions that constructional grounding makes about WXDY, I examined the following corpora from the CHILDES archive (see MacWhinney 1995):

Table 1: Child language corpora examined in the study

child	age range	corpus	reference
Abe	2;4-5;0	Kuczaj	Kuczaj 1976
Adam	2;3-4;10	Brown	Brown 1973
Naomi	1;1-5;1	Sachs	Sachs 1983
Nina	1;11-3;11	Suppes	Suppes 1974
Peter	1;9-3;2	Bloom 70	Bloom 1974
Sarah	2;3-5;11	Brown	Brown 1973
Shem	2;2-3;2	Clark	Clark 1982

These are all the corpora available through the CHILDES system that meet the following criteria: (1) They are longitudinal studies of individual children, (2) they start at a fairly young age (not too long after the second birthday), (3) they are in English, and (4) they are based on recordings that were done on a frequent basis.

From these corpora, I extracted every utterance containing the word *doing* produced by adult or child, with surrounding context. These data included all “What...X DO?” questions, all overlap utterances showing the properties of both WH-questions and WXDY, and all instances of WXDY—the three utterance types relevant to the study. I went through the data and identified the first occurrences of all three types for each child. The results are summarized in Tables 2 and 3. Table 2 shows the age at which each major utterance type

appears in the corpus for each child. Table 3 shows the three stages and presents examples from all the children in chronological order.

Table 2: Summary of the data from seven children

	Abe	Adam	Naomi	Nina	Peter	Sarah	Shem
Age range:	2;4-5;0	2;3-4;10	1;1-5;1	1;11-3;11	1;4-2;10	2;3-5;1	2;2-3;2
Corpus:	Kuczaj	Brown	Sachs	Suppes	Bloom70	Brown	Clark
Age of first question use of <i>doing</i>	2;4.24	2;3.18	1;8.0	1;11.16	2;0.7	2;6.13	2;2.16
Age of first overlap produced	2;7.15	2;4.30	2;3.17	2;9.26	2;2.14	—	2;7.10
Age of first WXDY produced	2;9.11	3;3.18	—	3;2.12*	2;4.14*	3;5.13	—

* These utterances, while they have the forms of overlaps, occur in contexts in which it is clear that they are intended as instances of WXDY.

Table 3: Stages in WH-question uses leading to WXDY

Stage 1: doing occurs in questions with or without what

Abe	2;5.24	What you doing?
Adam	2;3.18	Man doing.
Naomi	1;11.11	What doing?
Nina	1;11.16	Man doing.
Peter	2;0.7	What she doing?
Sarah	2;6.13	Hey, boy doing?
Shem	2;2.16	What are doing?

Stage 2: Overlaps: doing questions with final locatives or with-PPs

Abe	2;7.15	Momma, you doing with my fish?
Adam	2;4.30	What you doing there?
Naomi	2;3.17	What are you doing with it?
Nina	2;9.26	What he doing with the animals?
Peter	2;2.14	What are you doing...with wheels?
Sarah		---
Shem	2;7.10	What he's doing with the man?

Stage 3: WXDY: Semantic properties incompatible with WH-questions

Abe	2;9.11	What's that box doing up there?
Adam	3;5.0	What the eye doing here?
Naomi		---
Nina	3;2.12	What are they doing there? Why are they in the locked up place, Mommy?
Peter	2;4.14	What doing up there?
Sarah	3;5.13	What my jingle bells doing up there?
Shem		---

Summary

From Table 2 we can infer the following. Near their second birthday, children are likely to produce their first questions using the word *doing*. At some point during the third year, they are likely to produce their first overlap utterances—i.e., utterances of the form “What’s X doing PRED?”, where the PRED is a locative, a *with*-PP, or some other type that can be construed as applying either to an activity or to a person engaged in an activity. Some time after that—in certain cases not until after their third birthday—children are likely to produce a clear, unambiguous example of the WXDY construction.

Of the seven child corpora examined for this study, six are consistent with the predictions of constructional grounding. The only child who does not produce any overlap utterances before producing a clear instance of WXDY is Sarah. One other child, Abe, produces clear instances of WXDY quite early, but does produce one overlap utterance before that. Abe’s corpus has the latest starting age (2;4) of all of them, so it may begin after Abe has already learned the WXDY construction. Sarah, along with Adam, has the second oldest starting age. Therefore, eliminating the corpora with the oldest starting ages would improve the data dramatically.

In any event, Abe and Sarah seem to be very precocious with the WXDY construction, and it may well be the case that they do not learn it through constructional grounding. They do provide some evidence against constructional grounding as an absolute constraint on all children’s acquisition. It would be foolish, however, to predict that all children learn WXDY in the same way. It is a generally recognized fact that children have different learning strategies (see, e.g., Peters 1985), and different adults may use constructions with different frequency, affecting the child’s input. A weaker and more plausible prediction is that that formal and pragmatic relations between WH-questions and WXDY create a pressure for acquisition to follow a certain path, and that the effects of this pressure should be a general tendency, not a deterministic outcome. Target constructions are

conventionalized signs, after all, so they can always *in principle* be learned independently. And sometimes that may be what happens.

However, the data offer support for constructional grounding as a strong general tendency in children's acquisition of the WXDY construction. This tendency can be understood to result from a number of factors. First, WH-questions with *doing* are very common in child-directed speech (in fact, they are by far the most frequent use of the word *doing*). Most of them in the earliest stages simply have the form *What BE X doing?* Different types of adjunct expression are gradually added: locative, temporal, PPs headed by *to* introducing patients (*What are you doing to the kitty?*). Children seem to have a bias toward learning and producing adjuncts that can be associated with specific participants in perceptually present scenes (*to* marking patients, locative expressions, *with* marking possessive or comitative relations). Many of these adjuncts are the ones that are compatible both with WXDY and with WH-question interpretations.

It might be argued that the conditions that have been searched for in the corpora are too natural and expected, that it would be surprising *not* to find them and that the methodology is therefore biased to confirm the hypothesis. After all, locatives and *with*-PPs expressions are common in general—if a child learns a new construction in which they can appear, it should not be surprising to find them there. However, constructional grounding does not predict that something unnatural and unexpected occurs in adult-child interactions. On the contrary, it claims that certain existing relations between constructions are such that they naturally tend to result in acquisition taking a certain course. The naturalness of the predictions is part of the strength of the idea. If it seems that the WXDY construction could not possibly be learned in any other way than the one described here, this shows the motivation for the theory of constructional grounding.

Data by child

The tables below present a brief summary and discussion of the data from each child. They show the evidence that bears on the stages hypothesized above. The examples in the tables are selected and not exhaustive; however, they include the first examples of each significant type of utterance that is produced by the child i.e., the first overlap utterance, and the first clear instance of the target construction, if any. The child's age is given in the left column, followed by the utterances. Overlap utterances are in bold, and occurrences of WXDY are underlined. In addition to these key pieces of data, some other utterances of special interest are presented, but many tokens of particular types are omitted. For example, in the data for Abe, only one instance of *What you doing?* appears as the first utterance, but in fact Abe produced several more utterances just like this before producing any like the second one listed (*You doing work at home, Dad?*). While there are many omissions of this sort, the sets below do not omit any utterances that would provide counterevidence to the predicted stages. The purpose of these displays is to show the relative order in which different types of utterance emerge, presenting the main data from each child in a brief yet meaningful context.

Table 4: Abe (2;4-5;0) Kuczaj corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 2;4.24 Child: What you doing?
2;5.29 Adult: What's it doing in the refrigerator?
2;7.0 Child: You doing work at home, Dad?
2;7.15 Child: **Momma, you doing with my fish?**
2;9.5 Adult: **What were you doing outside...?**
2;9.11 Child: What's that box doing up there?
Child: What's those books doing up there?

This corpus has the latest starting age of all the corpora in the study: two years four months. At age 2;5.9, an adult utters to Abe, *What's it doing in the refrigerator?*. This has the characteristic form of overlap utterances, but it is clearly intended as an instance of WXDY, since the object in the refrigerator was presumably not engaged in an activity. This utterance suggests that Abe heard ambiguous instances of WXDY before beginning to produce such instances himself at age 2;7.15 (*Momma, you doing with my fish?*). At age 2;9.11, Abe produces utterances that, like the adult utterance at 2;5.29, resemble overlaps in form but clearly seem to be intended as instances of WXDY.

Table 5: Adam (2;3-4;10) Brown corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 2;3.18 Child: Man doing.
Child: Doing, Mommy?
- 2;4.3 **Adult: What are you doing with that chair?**
Adult: Adam, what are you doing back there?
- 2;4.30 Child: What shell doing?
Adult: What is the reel of tape doing?
Child: What that paper clip doing?
Child: What you doing there?
- 2;5.12 **Adult: What are you doing with the hot water?**
- 2;6.17 Child: What are you doing?
- 2;8.0 **Adult: What are you doing with the rocket?**
- 2;9.4 **Child: She doing on table.**
- 2;10.2 Child: What do you doing?
- 2;11.13 Child: What you doing, taking out?...What you taking out?
- 2;11.28 Child: What violin doing?
Child: What violin doing on his back?
- 3;2.9 Adult: What're you doing making such a mess on your face?
- 3;3.18 **Child: What she doing on her back?**
Child: What you doing looking at the furniture?
Child: What you doing with all those things in here?
- 3;5.0 Child: What the eye doing here?
- 3;9.16 **Child: Mommy, what are you doing with one?**
- 4;3.13 **Child: What are these two snakes doing here?**
Child: What are these two doing up here?
- 4;5.11 **Child: What he doing with mine?**
- 4;6.24 **Child: What you doing backwards?**
Child: What you doing standing up in my race?

Before producing the WXDY question *What the eye doing here?*, Adam hears several overlap questions, and produces the following overlap questions: *What you doing there?*, *She doing on table?*, *What violin doing on his back?*, *What she doing on her back?*, and *What you doing with all those things in here?*. The utterance *What violin doing on his back?* resembles an instance of WXDY, because a violin is an inanimate object and could not normally be thought of as doing anything. However, it is treated as an overlap because it seems to be an instance of an inanimate object being anthropomorphized. This is evidenced both by the use of the personal possessive pronoun *his* in reference to the violin, and by the preceding utterance *What violin doing?*, which could not be an instance of WXDY because it lacks a final predicate expression. Earlier Adam also says *What shell doing?* and *What the paper clip doing?*

It is a general feature of the language of young children that it contains references to inanimate objects as if they were living. Naomi's data (see below) includes such utterances as well. This tendency is noted by Piaget (1962, p. 253), who attributes it to a stage of "animistic" thinking. Personifications like this are encouraged by children's stories with anthropomorphized animals and objects, and sometimes by adult utterances. For example, the adult speaking to Naomi says *What is the recorder doing?*. Also, in the Shem corpus (see below), the adult asks the child, *What are those tools doing?*, trying to call the child's attention to the fact that they are falling down.

Table 6: Naomi (1;1-5;1) Sachs corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 1;8.0 Child: Doing?
- 1;10.17 Adult: What are you doing with the seashell?
Adult: What is the recorder doing...?
- 1;11.2 Child: Shoes doing?
- 1;11.11 Child: What doing?
- 1;11.17 **Adult: What are you doing with the vitamin bottle...?**
Adult: What are you doing with it?
- 1;11.21 Child: What's Mommy doing?
- 1;11.23 Child: Watchadoing?
- 2;0.18 Child: What's toy doing?
- 2;0.26 **Adult: What are you doing with the salt?**
- 2;3.17 **Child: What are you doing with it?** (tape recorder)
- 2;4.30 **Child: What's that doing in my ear?**
Child: What's the puppet doing here?
- 2;5.8 **Child: What's she doing here?**
- 2;9.9 **Adult: What's that doll doing there on its back?**
Adult: What's that one doing there?
- 3;2.10 **Adult: What are you doing out there?**
Adult: What's his tail doing there?
- 3;4.0 Adult: What's Beatle Bailey doing in the middle of Rip Curry?

Naomi does not produce any clear instances of WXDY, but hears and produces several overlap questions. Naomi also produces the anthropomorphizing questions *Shoes doing?* and *What's toy doing?*. One of the overlap questions Naomi produces, *What's that doing in my ear?*, resembles WXDY, but in the context it is impossible to tell what meaning is intended. In this utterance *that* does not clearly refer to anything; it seems that Naomi had a sensation in her ear, perhaps because she was sick (her mother asked here if she had taken her medicine), and perhaps believed that there was something in her ear causing the

sensation. In any event, to the extent that this utterance is interpretable, it has the properties of an overlap utterance.

Table 7: Nina (1;11-3;11) Suppes corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 1;11.16 Child: Man doing.
Child: Man doing on.
- 2;0.3 **Adult: What are you doing with the car?**
- 2;1.15 **Adult: What's he doing in the bathtub?**
Child: Rowing.
- 2;2.6 Adult: What were they doing in the water?
- 2;2.8 Child: What that girl doing?
Child: What's that boy doing?
- 2;2.8 **Adult: What was he doing with your blanket?**
Child: Biting.
- 2;3.18 Child: What are you doing, Mommy?
- 2;3.28 Child: He's doing the birthday cake.
- 2;4.26 Child: Look my doing, Mommy.
- 2;5.25 **Adult: What was he doing on the table?**
Child: Lying
- 2;5.26 **Adult: What's the car doing in the crib? Where is it going in the crib?**
- 2;5.28 Child: Look at him doing.
- 2;9.13 Child: He was doing hopping.
- 2;9.21 **Adult: What is the horsie doing in the house?**
- 2;9.26 **Child: What he doing with the animals?**
- 2;9.26 **Child: What is he doing with that thing?**
- 2;9.26 Adult: What's it doing up on the bell tower? Where does it belong?
Child: On the road.
- 2;10.6 **Child: What are those people doing right there?**
- 2;10.13 **Child: What's he doing there?**
- 2;10.21 **Child: What is he doing with it?**
- 2;10.21 **Adult: What are they doing in the barn?**
Child: I don't know.

- 2;10.28 Child: Look what the mouse is doing.
- 2;11.6 Child: What's he doing there to the elephant?
- 3;0.16 **Child: What are they doing there?**
- 3;1.7 Adult: What are you doing wearing pajamas in the middle of the day?
- 3;2.4 **Child: What are they doing there?**
 Adult: Chasing the bear, aren't they?
 Child: Why?
- 3;2.12 Child: What are they doing there? Why are they in the locked up place.
 Mommy?
- 3;2.16 **Adult: What are you doing with the baby?**
 Child: I'm putting her down like that for a rest.

Nina produces and hears several overlap questions before producing one apparent instance of WXDY: *What are they doing there?*. While this has the properties of overlap utterances, it seems to be intended as an instance of WXDY because it is followed immediately by a *why*-question that forces the WXDY interpretation. There is an interesting pattern leading up to this that might help explain how Nina, and indeed the other children, move from the WH-question to the WXDY interpretation. She begins by answering adult overlap questions, some of which seem to be intended as WXDY, consistently as if they were WH-questions. For example, at age 2;1.15, the adult asks, *What's he doing in the bathtub?*, and Nina answers, *Rowing*. Similar exchanges take place at ages 2;2.8 and 2;5.25. When Nina is 2;9.26, the adult asks an overlap question and immediately follows up with another question that suggests that a WXDY interpretation is what is intended. At age 3;2.4, Nina asks an overlap question to which the adult supplies a WH-question answer, and then Nina follows up with a *Why?* question, suggesting that her original intent had been to get an explanation. This sequence of exchanges suggests that Nina learns the WXDY interpretation for overlap questions partly through the conversational pattern consisting of an overlap question followed by another question that biases the interpretation of the original question toward one that closely resembles the meaning of WXDY.

Table 8: Peter (1;9-3;2) Bloom 1970 corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 1;10.15 **Adult: What are you doing over here, huh?**
- 1;11.7 **Adult: What are you doing in the block box?**
- 2;0.7 **Adult: What's Patsy doing with them?**
Adult: What's she doing in there?
 Child: What she doing?
Adult: What're you doing up there?
Adult: What're you doing with the microphone?
 Adult: What're you doing with your feet?
- 2;1.21 Child: Mommy, what you doing?
 Child: What doing my pants?
- 2;2.14 **Child: What're you doing...you doing with wheels?**
Adult: What're you doing with it (tape recorder) ? ...no, you
 leave it there, it's too heavy for you.
- 2;4.14 **Child: What doing up there?**
- 2;5.0 Child: What's this girl doing?
- 2;5.21 Child: Garage, garage, garage, where are you doing?
- 2;6.14 Child: See what's the mommy's doing.
 Child: I'm doing working on the railroad.
Child: Where's the people doing down there?
- 2;9.14 Adult: What was the little girl doing in the barrel?
 Child: Screaming.

Peter does not produce any clear examples of WXDY, but hears and produces several overlap questions. In the last utterance listed, the adult produces an overlap question presumably with a WXDY interpretation in mind, but Peter gives a response appropriate for a WH-question.

Table 9: Sarah (2;3-5;11) Brown corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 2;3.19 **Adult: What's it doing there?**
- 2;5.15 Adult: What were you doing over at Nana's last night?
- 2;6.13 Child: Hey, boy doing?
Adult: What's he doing here?
- 2;7.5 **Adult: What are you doing with my boots?**
Adult: What're you doing up there?
- 2;10.11 Child: What my doing?
- 3;0.27 **Adult: What were you doing across the street?**
- 3;1.3 Adult: What were you doing out there? You're not supposed to be out there,
are you?
- 3;1.10 **Adult: What are you doing with the cookie?**
- 3;1.17 Child: Crayon, doing crayons.
- 3;1.24 Adult: What are you doing with all the Kleenex, all the Kleenex out on your
bed and put it back in the box.
- 3;5.13 Child: What my jingle bells doing up there?
Adult: I put them up there.
- 3;7.30 Adult: What are you doing with the crackers in the refrigerator?
Child: ...I want to freeze them.
- 3;8.20 Child: Look what he doing.

Sarah produces a clear instance of WXDY without producing any overlap questions in the transcript. Her data provide the only evidence against the constructional grounding hypothesis.

Table 10: Shem (2;2-3;2) Clark corpus

bold indicates overlap utterances

underlining indicates instances of WXDY

- 2;2.16 **Adult: What are you doing with the sign?**
 Child: What are doing?
 Child: What is mommy doing?
 Adult: What're they doing there?
 Child: Watch my doing.
- 2;2.23 Child: Doing a tractor.
 Child: What doing?
- 2;3.2 Child: What I doing?
 Child: Up a here, what doing?
 Child: What people doing?
 Adult: What's he doing in the garage?
 Child: He's doing work in the garage.
- 2;3.16 Child: I show Cindy my sunflowers doing, okay?
 Adult: What's it doing under the table?
 Adult: What's the dog doing in the water?
- 2;3.28 **Adult: What's he doing with the bottle?**
 Adult: And what's he doing with the baby?
- 2;4.4 **Adult: What's he doing with it?**
 Adult: What's he doing in there?
- 2;4.25 Adult: What's it doing, sitting there?
 Child: Sitting there...and Shrew Bettina brush her head and go like that.
 Adult: What are they doing there?
- 2;5.2 **Adult: What are they doing with these big sticks?**
 Adult: What are they doing up here?
 Child: Doing pouring.
- 2;5.16 Child: What's somebody doing?
 Adult: What's he doing in the house?
- 2;5.23 **Adult: Three dogs and a party on a boat at night what are they doing on this boat?**

- Adult: What's he doing with it (a shovel) ?**
- Adult: What's he doing in this little thing?**
- 2;6.6 **Adult: What's it doing to the bed?**
 Child: It's doing to the bed.
- 2;6.27 **Adult: What are they doing with the snake?**
 Adult: What are they using for...what are they doing with the snake here?
- 2;7.10 **Child: What he's doing with the man?**
 Child: What is she doing with the critter (a book character)
 Child: And what is he's doing?
 Child: What's the hand doing?
- 2;7.26 **Child: What is the boy doing with that?**
- 2;8.3 **Adult: What's he doing in this house?**
- 2;8.15 **Child: Where's the...these people doing?**
- 2;8.20 **Child: What he's doing this?**
 Child: What do you think he's doing?
- 2;9.10 **Adult: What are you doing with that?**
 Child: I'm going like this.
- 2;9.19 **Child: Just what are you doing?**
- 2;10.2 **Child: What is daddy doing there?**
 Adult: What are they doing inside this car?
 Child: They eating?
 Adult: He said, "What are you doing in here, Huckle? You're not supposed to be in here."
- 2;10.25 **Adult: What do you think they're doing inside there?**
 Child: He's talking.
 Child: You know what I was doing at Hillary's house?
- 3;0.5 **Adult: What's she doing in that pumpkin shell?**
 Child: He wants to make a house for that one.
- 3;1.5 **Child: I'm just standing so I can watch what he's doing with my ham.**
- 3;1.27 **Adult: Shem, what are those tools doing?**
- 3;2.2 **Adult: What's he doing up there?**
 Child: He's going up in that tree.

Adult: ...but what was he doing in the water?

Child: He was going like this.

Shem produces and hears many overlap questions without getting to the stage of producing any instances of WXDY. He also answers overlap questions consistently as if they were WH-questions, until age 3;0.5, when he gives an answer that seems almost appropriate for a WXDY question, but definitely inappropriate for a WH-questions.

2.6 Detailed examination of data from one child

This section discusses in more detail the data from one child, Shem (Clark 1982), in order to examine the relation between adult input and the child's acquisition.

Table 10 summarizes all adult and child utterances from the Shem corpus that have at least the general grammatical properties of the "What's X doing..." portion of WXDY. This includes all possible instances of WXDY plus all present progressive questions, including embedded questions, of the form "What BE X doing?" with or without a final predicate Y expression. The left column lists different types of constituents appearing after the word *doing* in these sentences—i.e., different potential Y constituents. In the first line in the left column there is a zero indicating the absence of a Y constituent—i.e. a simple "What's X doing?" question. In the discussion below, special attention is paid to the utterances by adult to child, since these are more numerous than the child's productions, and show the examples on which the child's generalizations are based.

Table 11: Summary of utterances of the form “What’s X doing...?”

What's X doing -----?	<u>number of utterances</u>	
	<u>adult</u>	<u>Shem</u>
Ø	225	79
Loc PP	19	0
Temporal expression	14	0
<i>here</i>	13	0
<i>there</i>	11	1
<i>to</i> NP	8	2
<i>with</i> -PP	11	5
Present participial	1	0

Child utterances

Table 10 clearly shows that questions of the form “What’s X doing?” are very frequent relative to clear instances of the WXDY construction in Shem’s input. Shem asks many such genuine questions. Almost the only utterances that Shem produces which include post-*doing* constituents are those involving PPs headed by *with*. The exchanges below contain all the utterances produced by Shem that are possible instances of the WXDY construction (in bold).

(22) Child’s age: 2;7.10

Adult: First, we’ll have to separate the grain from its covering, the chaff, said the miller, and then he handed jack the stick. And what did jack do with it?

Child: **What he's doing with the man?**

(repetitive portion deleted)

Adult: Oh, they’re both trying to grind up the wheat.

(23) Child’s age: 2;7.10

Child: What’s...you tell...him **what is she doing with the critter?**

Adult: She’s measuring him.

(24) Child's age: 2;7.26

Child: That means... what is this?

Adult: Oh, that's a piece of string that he's pulling with a little ball of string on the end.

Child: And...**what is the boy doing with that?**

Adult: Well he's pulling it so then the little kitty will follow, and then...

Child: Yeah?

Adult: ...the kitty...the kitten will follow him home.

Child: Yeah.

(25) Child's age: 2;10.2

Child: **What is daddy doing there?**

(comment: Shem is looking at a picture)

Adult: Oh, he's just standing there at the curb. See, his shirt got all burned.

Child: Why?

(26) Child's age: 3;1.5

Child: I just...I'm just standing so I...so I can watch...the kit..., **what he's doing with my...with my ham.**

Adult: Watch who?

Child: The cat, what ...**what he's doing with my ham...**he's making spots in it.

Adult: In your ham?

Child: Yeah.

Adult: Where?

Child: Right over there!

(comment: Shem is fantasizing)

The prevalence of *with*-PPs in these examples is interesting, because the adult produces only 11 such sentences, compared to 14 in which there is a Temporal expression following

doing (Shem produces none of these), 24 in which *here* or *there* follows *doing* (Shem produces only one utterance with *there* following *doing*), and 19 utterances in which there is a Locative PP following *doing* (Shem produces none of these). This suggests that Shem has a strong tendency not to include an adjunct expression in “What’s X doing?” questions unless that adjunct is a frame-internal modifier (see Fillmore 1995), i.e., unless it predicates something of an individual participant in the activity implied by *doing*, as opposed to predicating something of the whole activity. If this is the case, the child’s interpretation of WH-questions is already in this respect similar to the conventional interpretation of WXDY, though differs from it in treating the word *doing* as denoting an activity. This aspect of the Shem’s interpretations is apparent both from the answers that he provides to overlap questions and also from his early novel responses to some “What...X doing?” questions, which suggest that he associates these questions with transitive events:

(27) Child’s age: 2;2.23

Adult: Yeah, that’s a man, what’s he doing?

Child: **Doing a tractor.**

(comment: The man’s riding a tractor)

(28) Child’s age: 2;2.23

Child: **I doing a choo like that.**

(comment: Shem takes out a puzzle piece, and says “choo”)

(29) Child’s age: 2;2.23

Child: Yeah, **I’s uh doing a truck.**

Adult: What?

Child: **I sure doing a truck...**

Adult: Yeah.

Child:...take apart?

(comment: Shem is playing with a truck puzzle)

What is most significant about examples (22-6) is that all they all show interpretational overlap—i.e., they can all be interpreted either as questions or as instances of WXDY. They all have the form of WXDY, though there is no unambiguous evidence that Shem intends a WXDY interpretation, since they can all be actual WH-questions as well. This supports the prediction of constructional grounding that a child will pass through an overlap phase in which WH-questions with important properties of WXDY serve as a bridge to the WXDY construction.

54 of the adult utterances in the corpus have all the formal properties of WXDY, and some of them are clearly intended as instances of WXDY. The others are either questions that happen by accident to match the form of WXDY, or overlap questions—i.e., genuine questions containing Y constituents to which the answers provide explanations for the states-of-affairs predicated by those Y constituents, along the lines of examples (3a-c). These observations are summarized in Table 11, and will become clearer as we consider actual examples from the corpus.

Table 12: Summary of adult utterances with form of WXDY

Adult utterances with formal properties of WXDY*:	54
Of these, number that...	
...are unambiguous examples of WXDY:	1
...are apparently intended as WXDY but could be Q's:	7
...appear to be true overlap uses**:	24
...are apparently intended as Q's but could be WXDY:	22

* Does not include utterances with a temporal expression following *doing*, or those with a PP headed by *to* following *doing*.
 ** By "overlap uses" is meant those uses for which a description of the activity counts as an explanation for the post-*doing* predication.

Adult utterances

Let us now consider the relevant adult utterances from the corpus—i.e., the utterances that adults produced, in the presence of Shem, having the general formal properties of “What...X doing?” questions. The only unambiguous use of WXDY, i.e., the only one that exemplifies the construction but could not be a WH-question, is the following:

(30) Child's age: 2;4.25

Adult: Is this her hairbrush?

Child: Yeah.

Adult: Here? **What's it doing, sitting there?**

Child: Sitting there an...and Shrew Bettina brush her head and go like that.

Adult: Shrew Bettina brushes her head, huh?

Child: And go like that.

What makes this an unambiguous use of WXDY is the fact that the Y constituent is a present participial form. Like example (3b) above, since it describes the “activity” in which the X constituent is “engaged,” it can hardly be a question about what that activity is. The fact that sitting there is not a true activity is further reason not to consider this a genuine WH-question.

Shem's response is more appropriate for a WH-question than for WXDY. He first repeats the Y constituent *sitting there*, perhaps because that comes closest to actually describing what the brush is doing. Then he makes a statement about what the storybook character Shrew Bettina did with the brush, which might or might not provide the kind of explanation that would be suitable as a response to WXDY. This example shows that, even though Shem was presented with relatively unambiguous evidence for a grammatical construction distinct from WH-questions, his first impulse was to answer it as if it were a normal question.

The data discussed below suggest that the child treats other instances of WXDY as questions. This is not surprising because all the other possible instances of WXDY in the

corpus have the properties of WH-questions. Some of these, as summarized in Table 2, are clearly intended as instances of WXDY by the adult, some are intended by the adult as questions but happen to have the formal properties of WXDY, and with some it is simply difficult to tell. We will consider examples from each of these categories.

First, here are example utterances that are clearly intended as instances of WXDY by the adults:

(31) Child's age: 2;5.23

(comment: A balloon with a basket)

Adult: **What's he doing in this little thing?**

Child: He's mad in that thing.

Adult: He's what?

Child: He's mad in that thing, he's mad in that thing.

(comment: Shem thinks the dog in the balloon looks mad)

Adult: He's mad in that thing?

Child: Yeah.

Adult: Yeah.

(32) Child's age: 2;8.15

Adult: ...and look at all these books. **What's he doing with all these books?**

Hm?

Child: He's reading them.

Adult: **Why?**

Child: One fell on the floor.

Adult: Yeah.

(33) Child's age: 2;10.2

Adult: (reading: Daddy arrived just in time to see Smokey save Huckle). See, there's daddy, just getting home from the grocery store. **What's lowly worm doing there? He's everywhere. Why is he in all the pictures?**

Child: Because he likes to go in it.

(34) Child's age: 3;0.5

Adult (reading: Peter, Peter, pumpkin eater, had a wife and couldn't keep her, put her in a pumpkin shell and there he kept her very well.) **What's she doing in that pumpkin shell?**

Child: He...he wants to make a house for that one.

Adult: For his wife?

Child: Yeah.

Adult: Too bad he doesn't have a real house.

(35) Child's age: 3;0.5

Adult: **What's he doing out in the street in his nightgown?**

Child: No ... I can't see the stairs because they're in the town.

(36) Child's age: 3;2.2

Child: A very nice kite.

Adult: What?

Child: A very nice kite!

Adult: A very nice kite, yeah, okay.

Child: Uhh!

Adult: There he is, **what's he doing up there?**

Child: **He's going up in that tree.**

Adult: **How did he get up there?** Did the wind blow him up there?

Child: No, no, he just got up from the bark.

Adult: From the bark?

Child: Yeah, and go up, up, up, and he hold on to there so he wouldn't go bump.

(37) Child's age: 3;2.2

(comment: Adult points at the next picture)

Adult: What's he doing? Is he sad?

Child: Why?

Adult: I don't know, why is he sad?

Adult: Cause he's got wet.

(comment: Adult laughs)

Adult: Why did he get wet?

Child: In the water.

Adult: **But what was he doing in the water?**

Child: **He was...he was going like this,** tuck them in.

Adult: Tuck them in?

Child: And...yeah,... go like this.

Adult: Oh, and tuck your hands in?

Child: Yeah.

In (31) Shem's response is not exactly appropriate for either a WH-question or WXDY. He does not describe an activity that the dog in the balloon is engaged in, but rather the dog's emotional state. This answer does not, however, provide any explanation for the fact that the dog is in a little basket—clearly what the adult was looking for. For this reason Shem's response is much closer to a WH-question response than to a WXDY response. In (32) we see an clear example of Shem interpreting a WXDY question as a WH-question. When he responds with a description of the activity that the reader is engaged in, the adult further prompts him for a WXDY answer by asking "Why?". (Recall the pattern in Nina's data suggesting a gradual routinization of this interactional pattern, which suggests the *ritualization* discussed in Haiman 1994). In (33) there is no response from Shem to the original question, but again the adult prompts for a WXDY response by paraphrasing the question as a *why*-question. In (34) Shem gives a response that looks very much like an appropriate WXDY response: he says something which might be construed as an explanation for Peter's wife being in the pumpkin shell. This may indicate progress in the correct interpretation of WXDY. In (35) Shem does not respond to the question at all. (36)

is another nice example of Shem interpreting a WXDY question as a WH-question, and then being further prompted for an appropriate WXDY response. And finally, in (37), the adult is clearly looking for an explanation for why the picture-book character is in the water, but Shem takes *What was he doing in the water?* as a real question, and responds *He was going like this* (presumably pantomiming a swimming stroke).

(31)-(37) are not just a carefully selected set of the most convincing example utterances in the corpus—they are *all* the adult utterances from the Shem corpus about which it can be determined from context, with a fair degree of certainty, that the adult intended a WXDY interpretation and not a WH-question interpretation (not including the one unambiguous instance of WXDY in (30)). For 4 out of 7 such utterances, Shem first gives responses which are more appropriate for WH-questions than for WXDY questions. In 3 out of the 7, the adult follows up by paraphrasing the WXDY question as a WH-question. These examples support the idea that Shem first treats instances of WXDY as normal WH-questions about activities. That is, he does not seem to recognize WXDY as a distinct construction, or if he does, he treats it as a subtype of normal WH-questions.

The following examples are true overlap questions. They are questions about activities, and the appropriate answers also count as explanations for the predicates expressed by the Y constituents, assuming those predicates apply to the subjects of *doing* as well.

(38) Child's age: 2;5.16

Adult: He's running inside the house, but what's he gonna do inside the house?

Child: Go wooooo weee.

Adult: Oh, so he got inside. **What's he doing in the house?**

Child: What's he doing?

Adult: What is he doing?

Child: Eating a cake in the bath tub.

Adult: Right.

(39) Child's age: 2;5.23

Adult: Three dogs and a party on a boat at night. **What are they doing on this boat?** They look pretty ridiculous.

Child: They pulling the little boat.

Adult: Pulling the little boat? What else?

Child: Is dry in that boat.

Adult: Drying there?

Child: Yeah.

(40) Child's age: 2;5.23

Adult: You know what this is don't you?

Child: A shovel.

Adult: Right, **what's he doing with it?**

Child: Is...is some in the ground, and this is playing.

Adult: They're playing, right.

(41) Child's age: 2;6.27-8

Adult: **What are they doing with the snake?**

Child:... that's a rope and that...

Adult: They're using him for a jump rope?

Child: Yeah.

Adult: What are they using for...**what are they doing with the snake here?**

Child: They slide off the snake...

Adult: They're sliding off the snake, that's right.

(42) Child's age: 2;10.2

Adult: **What are they doing inside this car?**

Child: They...they eating?

Adult: Yeah. They're gonna be eating in there.

There are more examples like this in the data (this is the most frequent type of utterance having the general formal properties of WXDY). The prevalence of overlap questions of this kind makes it rather unlikely that the child would not use WH-questions as a stepping-stone to the WXDY construction. That is, assuming Shem eventually recognizes that he has been making a mistake in giving responses like the ones in (33), (32), (36) and (37), it is unlikely that he would simply “delete” all the knowledge he has picked up about this subclass of WH-questions and construct the meaning of WXDY from scratch. To do that would be to squander what from some perspectives are scarce data for learning. Proponents of the view that it is a trivial matter for the child to isolate appropriate meanings and map them onto forms would have to deal with the fact that Shem persistently makes mistakes with WXDY.

In addition to the more interesting examples discussed above, there are numerous utterances in the corpus like the following, which are clearly intended as questions by the adult but which have the right form for WXDY:

(43) Child's age: 2;8.20

Adult: Oh, **what is he doing there?** Huh?

Child: He can't go up on the boy.

Adult: What's he doing, though?

Child: He... what's he doing?

Adult: What's he doing?

Child: What he doing?

Adult: Oops. He's licking that girl's face.

Though Shem does not clearly reach the point of having active mastery of WXDY before the end of this longitudinal study, we have seen what kind of early evidence for the construction was made available to him, and it is not unreasonable to assume that this evidence played some role in the subsequent competence that he presumably achieved. Unless the data above did not figure at all in his learning of the construction, there are good

reasons to hypothesize that Shem used utterances in which WH-question interpretations and WXDY interpretations overlap in order to start constructing a representation of the WXDY construction. First, the data show many instances of utterances involving interpretational overlap. Second, they show clear instances of Shem misanalyzing instances of WXDY as WH-questions. Finally, they show that Shem uses the “What’s X doing Y?” patterns in a way that is consistent with the predicted overlap stage. These uses suggest that he has begun to identify the properties of WXDY, but that he does not yet distinguish that construction from the nonsubject WH-question construction.

2.7 Discussion

The data in this previous sections suggest that children learn WXDY on the basis of WH-questions in the following steps:

1. They learn to answer simple WH-questions.
2. They encounter instances of WXDY, and try to interpret them as questions.
 - a. If they are unable to analyze these utterances as coherent WH-questions and are unable to interpret them, they are likely to ignore them.
 - b. If the utterances can be interpreted as questions (i.e., if they allow interpretational overlap), then they are treated as questions.
3. Children then notice a pattern with the subset of interpretable questions that contain adjuncts: answering them can provide an explanation for the predication expressed by the adjunct, and this explanation is in fact frequently sought by the asker. They may be assisted in noticing this by the adult habit of following a “What’s X doing?” question quickly with a *why*-question, which prompts for the type of explanation that is appropriate for WXDY.
4. With this knowledge, they are able to interpret unambiguous cases of WXDY, and are therefore prepared to master the construction.

This pattern resembles historical reanalysis, because the child begins with a single expression type (WH-question) and ends up with two as a result of reanalyzing a subset of the first. Of course, there are important differences between the historical origin and the acquisition which must be kept in mind. The most important of these differences, of course, is that in the historical genesis of the construction, speakers assigned a new meaning to the WXDY pattern that had not previously been conventionally associated with that pattern by anyone. In the acquisition of the construction, the meaning that the child learns to associate with the form is one that adults already associate with it—i.e., one that is already conventionalized in the speech community. However, part of the point of the data above is to show that, just because a particular form-meaning pairing is conventionalized in a speech community, it is not necessarily learned through autonomous mapping (discussed in the introduction). For various reasons, a related construction may be better suited to serve as the initial source of generalizations for children. In this case of WXDY, WH-questions serve as the best source of initial generalizations about it, because they are so much more frequent, and because they often exemplify important properties of WXDY in a way that makes those properties more accessible to children than they would otherwise be.

2.8 A principled account of constructional form

When the WXDY construction is simply analyzed as a conventional fact about adult English, it appears to be highly arbitrary. There are aspects of its form, such as the use of the words *what* and *doing* and the possibility of a long-distance relationship between them, that are not obviously motivated by the meaning of the construction. Even when it is recognized that the construction must have arisen historically through the reanalysis of WH-questions, these formal properties would still seem to be synchronically unmotivated. Learning such properties, both arbitrary and formally subtle, would seem to present an unusual challenge for children.

Constructional grounding explains how the apparently arbitrary properties of constructions such as WXDY may actually be a non-arbitrary result of a simple learning strategy. In the case of WXDY, the child learns the basic properties of WH-questions first. This establishes the principles that are involved in long-distance dependencies. Then the child is exposed to and begins to isolate the large subset of WH-questions that frequently carry the incongruity meaning as an implicature. At this stage the incongruity reading becomes conventionally associated with the formal properties of WH-questions. Then the child is exposed to similar expressions which for some reason cannot be interpreted as questions, and is prepared to recognize these as exemplifying a distinct construction. At this point, it is hypothesized, the child establishes the representation of this new construction by keeping all the properties of WH-questions which are consistent with the new utterances, and changing those which must be changed in the face of the evidence. The result is a construction whose form is motivated not directly by its meaning, but indirectly by the properties of the overlap, which serves as the first context of learning.

In the next chapter we will see that this learning scenario applies to constructions much less unusual than the WXDY construction.

Chapter 3. The theory of constructional grounding

3.1 Introduction

The major aim of this chapter is to show that constructional grounding is more than just an explanation for idiosyncratic constructions like the “What’s X doing Y?” (WXDY) construction. It seems to be at work in children’s acquisition of much more basic constructions. WXDY provided a convenient case study for introducing constructional grounding, because it is highly unusual and obviously derivative of WH-questions. Given these properties, it seems uncontroversial to suggest that WXDY is learned on the basis of WH-questions, which are so much more central to the grammar of English. The specific pattern identified in the child data—the progression from simple WH-questions to overlap questions to WXDY—is highly suggestive of a process of reanalysis by which children derive the properties of WXDY from WH-questions as instantiated in specific kinds of utterances. This learning process may provide the only plausible explanation for the relation between WXDY and WH-questions—a relation that is hard to account for in a traditional adult-synchronic way yet seems too robust to be the arbitrary result of a centuries-old historical shift.

This chapter examines English deictic and existential *there*-constructions, arguing that existentials are based on deictics through constructional grounding. While the existential construction has unusual properties that distinguish it from other more canonical clause types in English, it is far from idiosyncratic; it is quite frequent, and communicates a meaning that is so basic and so common crosslinguistically (see, e.g. Clark 1978) that we would expect every human language to provide some means of expression for it. Showing that the existential is grounded in the deictic would demonstrate that constructional grounding can have effects at a fundamental level of linguistic structure.

Deictic and existential *there*-constructions are given a detailed analysis in Lakoff 1987, which this chapter takes as a point of departure. Lakoff argues that existentials are based on

deictics, and more generally that the based-on relation is important in the analysis of grammatical constructions. The developmental perspective on deictics and existentials taken in this chapter supports Lakoff's view, and adds a dimension of explanation that is lacking in the adult-synchronic perspective he adopts.

3.2 Constructional grounding defined

It has been argued that interpretational overlap makes it possible for children to use one construction as their initial source of hypotheses about another construction. In the case of WXDY, the construction that children start with, what I will refer to as the *source construction*, is the WH-question construction. The construction about which they make hypotheses, what I will call the *target construction*, is WXDY. Their initial hypothesis about WXDY is generalized from a subset of the WH-questions that they hear. The reason they pick out a subset of WH-questions and use them as an acquisitional foundation for WXDY is that these WH-questions have special properties that set them apart from other WH-questions. In particular, they have the interpretive properties of WXDY: they convey the pragmatics of incongruity, and they can often be interpreted as requests for explanations for the situations described by their secondary predicates. These regular new features of their interpretation correlate with the special formal properties of being "What...X doing?" questions and having secondary predicates.

Why don't children simply generalize over the full set of occurrences of the target construction rather than relying on WH-questions? That is, why don't they learn WXDY through autonomous mapping? It has been argued that the utterances that exemplify the properties of the target construction and that are easiest for children to interpret happen to be overlap utterances, i.e. ones that can also be construed as instances of the source construction. The basic WH-question construction is learned early by children because it is very frequent in their input and because it relates to an immediate need that shapes face-to-face interaction: the need of one interlocuter for a particular piece of information from the

other. Because overlap utterances can be construed as instances of the already-mastered WH-question, they can very readily be assigned a structural analysis and an interpretation by children. Because they also have the properties of WXDY, they afford children a unique opportunity to associate these properties with the well-understood formal parameters of WH-questions as instantiated in the utterances in question.

However, going from the source interpretation to the target interpretation of these utterances requires the child to perform a reanalysis. When these utterances are construed as WH-questions, the words *what* and *doing* together imply an activity. In the WXDY interpretation, they do not. In the process of reanalysis, the child must perform a kind of figure-ground reversal, concluding that the new semantic-pragmatic information associated with the set of utterances—the pragmatics of incongruity—is the important or “in focus” information, and that some of the semantic-pragmatic properties of the source construction—those associated with the words *what* and *doing*—are irrelevant and can be ignored. This is not a significant truth-conditional change initially, because the conditions of use of the target construction are compatible with the situations underlying the overlap utterances.

Let us abstract the properties of constructional grounding from this particular case and consider them in general terms. Utterances construed as instances of a source construction, together with contextual information associated with those utterances, serve as the domain of generalization in the formation of the initial representation of a target construction—what is here called a *target proto-construction*.

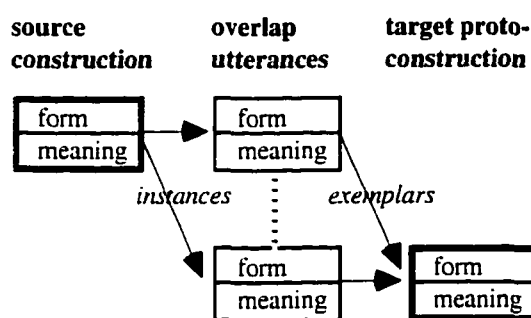


Figure 1

Figure 1 schematically represents the basic properties of constructional grounding. In this diagram, the source construction and the target proto-construction are represented as form-meaning pairs surrounded by boxes with bold lines (to indicate that they exist as generalizations or schematizations in the learner's mind). Utterances are represented as form-meaning pairs in plain boxes. The dotted line between these boxes is meant to suggest an arbitrary number of utterances presented to the child over time. The arrows represent two things about the utterances: first, that they are treated by the child as *instances* of the source construction, which, it is assumed, the child has already learned, and second, that they are used by the child as *exemplars* of the target construction, which the child needs to figure out. The target proto-construction—the child's initial hypothesis about the form and meaning of the target construction—is represented as a generalization over the overlap utterances.

In this view, learning target constructions consists of extracting or schematizing properties of utterances, i.e. individual episodes of linguistic communication. Langacker (1987) refers to such learning as *usage-based*. Connectionist or neural-network models offer the most sophisticated way of representing usage-based learning of this kind. The relation between constructional grounding and connectionist models is discussed in Chapter 6.

3.3 Deictic and existential constructions in English

Now that constructional grounding has been described in general terms, let us consider how it applies to another case: that of deictic and existential *there*-constructions.

In its main use, the deictic *there*-construction allows a speaker to call an addressee's attention to something in the immediate physical context of utterance. Often it is accompanied by a pointing gesture.

(1) There's the bus!

In this construction, the word *there* is a deictic locative expression.

The main use of the existential, on the other hand, is to inform an addressee of the existence or presence of some thing or situation:

(2) There's a concert today.

In this construction, *there* lacks its normal deictic locative meaning. In this respect it is similar to the words *what* and *doing* in the WXDY construction.

There are other semantic and syntactic properties that clearly distinguish these constructions from one another, and they will be discussed below. However, certain sentences have key properties of both deictics and existentials, making possible overlap utterances much like the ones we saw involving WH-questions and WXDY:

(3) a. There's a lake over there!

b. There's a dog with a sweater on.

In these sentences, the NPs are indefinite, suggesting that they refer to entities unfamiliar to the addressee. For that reason, (3a) can be used to simultaneously point out a lake to the addressee and inform the addressee of the existence of that lake. That is, it informs about existence by pointing out. Similarly, (3b) can both point out a dog with a sweater, and inform the addressee of the existence of such an unusual sight.

I refer to sentences like these as *overlap deictics*, since they so closely resemble existentials. Note that (3a) is especially difficult to distinguish from an existential (though there are intonation differences between the constructions, which are discussed below). In

this sentence, the predicate expression is a locative. Since the word *there* is also a locative, this sentence, if construed as a deictic, has a partially redundant specification of location. I refer to sentences like these as *double-locative overlap deictics*, and argue that they probably play a special role in the constructional grounding of existentials, because they invite children to seek a separate, non-redundant function for the word *there*.

In the following sections I examine the deictic and existential constructions in more detail, consider some analyses of the relation between them, and present evidence that the best explanation for the relation between them is that existentials are constructionally grounded in deictics like the ones in (3). The constructional grounding account is the only one that recognizes the pragmatic relation between the constructions illustrated by overlap utterances like these.

The central deictic and existential constructions

In Lakoff's (1987) analysis, deictics and existentials each comprise a radial category of constructions, and these radial categories are related to one another in complex ways. Examples of different types of deictics are listed in (4), and different types of existentials are given in (5) (these examples are taken from Lakoff).

- (4) a. There's Harry with the red jacket on.
- b. There goes the bell now.
- c. There's a nice point to bring up in class.
- d. Here's your pizza.
- (5) a. There's a masked man outside.
- b. There's been a man shot.
- c. There IS a Santa Claus.
- d. There's making dinner to start thinking about.
- e. There walked into the room a tall blond man.

It is beyond the scope of this chapter to examine all the different types of deictics and existentials. Rather, I will focus on central deictics and central existentials (exemplified in (4a) and (5a)). Central deictics are the ones associated with basic situations of pointing out, and are the first type produced by children. Central existentials are the ones that most closely resemble central deictics. Lakoff claims that central existentials are based on central deictics. All the arguments and data presented below support this claim. However, while Lakoff presents the based-on relation as a property of the grammatical system mastered by adult speakers, it is suggested here that the explicitly developmental perspective of constructional grounding helps to explain certain aspects of the relation between deictics and existentials that are more difficult to explain if the properties of adult English alone are taken into account.

The central deictic

The central deictic construction licenses sentences with the following structure: a deictic locative (*here* or *there*) is followed by a basic locative or motion verb (e.g. *be*, *sit*, *stand*, *go*, *lie*), an NP, and an optional Predicate expression (which Lakoff refers to as the *final phrase*). These examples are repeated from Lakoff:

- (6) a. There's Harry.
b. Here's Harry.
c. There sits Harry.
d. There goes Harry down the street.
e. There's Harry running around.

The function of this construction is to call an addressee's attention to some object or situation in the immediate perceptually-accessible context of utterance. Because deictics with *there* and the verb *be* are very frequent relative to other kinds, we might consider them the *prototypical central deictics*. They have the following form:

(7) [There <LOC<Theme:1, LM=deictic>> [BE NP_{1,2} (Pred<Subj:2,...>)]].

Prototypical central deictics begin with the word *there*, which identifies the location of a Theme argument deictically, i.e. relative to the positions of the speaker and hearer in an utterance context. The word *there* is followed by some form of the verb *be*, and that is followed by an NP which binds the Theme argument of *there*. The NP is followed by a Predicate expression whose subject or external argument it also binds. It is these deictics, rather than the full set of central deictics as defined by Lakoff, that occur regularly in child-directed speech, and on which existentials are constructionally grounded.

The central existential

The central existential construction licenses sentences with the following structure: the word *there* (not a deictic locative) serves as the grammatical subject of the verb *be*, followed by an indefinite NP followed optionally by a Predicate expression. This form can be represented in the following way:

(8) [There < $\exists$ <Theme:1>> [BE NP_{1,2} (Pred<Subj:2,...>)]].

Note the similarity to the prototypical central deictic. The function of the construction is to inform an addressee of the existence of some object or situation, or its presence in the general context of discourse:

- (9) a. There's beer. (in answer to: What do we have to drink?)
b. There's a dog in the yard.
c. There's a person in the corner with a funny hat on.

In (8), the unconventional use of the existential quantifier symbol $\exists$ is meant to stand for the existence-informing function performed by the construction. This function has been represented as a property of the word *there*, but should really be thought of as a property of the construction as a whole.

Definiteness and the pragmatics of the central deictic

While the basic function of the central deictic is always to call attention to something in the immediate context of utterance, its additional pragmatic properties can vary dramatically depending on the definiteness of the post-copular NP. When the NP is definite, the construction serves to point out the location of something that the speaker assumes the addressee is already aware of, and the locating function is focused. When the NP is indefinite, though, the construction serves simultaneously to point out the location of an entity and to introduce that entity to the addressee's consciousness. In these uses, the latter function competes with the locating function. Deictics with indefinite NPs may be more likely than definite deictics to include final predicate phrases, because when the referent of the NP is unknown to the addressee in an utterance, extra information, especially information about location, can help to identify it.

The difference between definite and indefinite NPs in the deictic construction is also reflected in intonational properties. When a deictic contains a definite NP, it is likely that the NP is topical and does not receive any focal stress (see, e.g., Lambrecht 1994):

(10) Where's the car?

THERE'S the car over THERE.

When the NP is indefinite, however, it is much more likely to be focused information and therefore to receive focal stress. In this situation, the focal stress on the NP may be greater than that on deictic *there*:

(11) *There's* a CAR in our yard.

Here, stronger stress is indicated by boldface type, and weaker stress by italics. The focal status of the NP in indefinite deictics is, both formally and semantically, an important factor in the constructional grounding of existentials, as discussed below. As Lambrecht points out, existential sentences expressthetic propositions—i.e., they do not pick out an entity and predicate something of it, but rather, report on a complete state of affairs (the presence of an entity in the scene of the current discourse).

3.4 How are deictic and existential sentences related?

The similarity between the deictic and existential *there*-constructions does not seem to be accidental. A strong crosslinguistic tendency for existentials to be related to locative expressions has been noted by many researchers (Kuno 1971, Lyons 1968, Clark 1978, Freeze 1992, etc.). This tendency might be regarded as a reflection of a deeper conceptualization of existence as being existence *in some place* (see Lyons 1968, Lakoff 1987). In English, of course, the connection is especially strong due to the presence of the word *there* in existential sentences. Though the conceptual connection between existence and spatial location is a tantalizing clue about the nature of existential sentences, it does not constitute an explanation for the specific way in which the grammatical form of the existential relates to that of the deictic in English. Early transformational analyses of English existentials attempt to account more specifically for this relation, but not with total success. We will briefly consider two such analyses later in this section. First, however, let us look more closely at Lakoff's analysis of the relation between deictics and existentials.

Lakoff's analysis of the relation between deictics and existentials

In Lakoff's analysis, the relation between deictics and existentials is treated as a matter of the "ecology" of the grammar (p. 556). It consists of two parts, one conceptual and one apparently arbitrary. The conceptual part concerns the meaning of *there*. Lakoff suggests that existential *there* designates a mental space (Fauconnier 1994 [1985]), and may therefore be related to deictic *there* through a conceptual connection that links a mental space of existence to physical space. This relation may be thought of as metaphorical, based on a mapping that is more directly reflected in the so-called *existence deictic*, in which "existence is understood as location in a conceptual space" (p. 543). Here is an example:

(12) There goes our last hope.

The second part of the relation between deictics and existentials is that “the central existential construction is based on the central deictic construction—that is, it takes its properties from the central deictic construction, except for those that are incompatible with the assumption that *there* designates a mental space” (p. 543–4). This part of the analysis is stipulated; it does not seem to have any precise conceptual motivation, aside from the implicit one that relates existence to location.

Lakoff attempts to use these two starting assumptions about the deictic and existential constructions to predict all the ways in which the existential differs from the deictic, some of which are listed in Table 1:

Table 1: Differences between the deictic and the existential

	<u>deictic</u>	<u>existential</u>
<u>properties of <i>there</i></u>		
refers to specific location	yes	no
contrasts with <i>here</i>	yes	no
occurs outside construction	yes	no
is a locative adverb	yes	no
is a grammatical subject	no	yes
has stress	almost always	almost never
<u>properties of construction</u>		
can be embedded	no	yes
can be negated	no	yes
can be questioned	no	yes

Some of these facts merely follow by definition from the assumption that existential *there* designates a mental space—in particular, the fact that existential *there* does not refer to a specific location and the fact that it is not a locative adverb. Some are predicted in a more

interesting way—for example, the fact that existential *there* does not bear stress can be explained by the fact that mental spaces are typically not the direct focus of attention, but rather serve as the background for entities located in those spaces.

There are some questions left unanswered by Lakoff's analysis, however. First, if the relation between deictic and existential *there* is conceptual in nature, a metaphorically-based case of polysemy, why does existential *there* designate a mental space? Because a mental space is not metaphorically equivalent to a location, the meaning of existential *there* cannot be based in a straightforward way on a metaphorical mapping from the meaning of deictic *there*.

Another question is why the central existential construction should take its properties from central deictics. Again, this is not something that follows from a metaphorical mapping—there are other constructions, such as the existence deictic, that seem to better exemplify a metaphorical relation between location and existence. Also, some of the predictions that Lakoff claims fall out from the two starting assumptions about deictics and existentials actually do not fall out and need to be stipulated. In particular, there is the prediction that existential *there* does not occur outside the existential construction. There is no particular reason why this should be the case.

Constructional grounding accounts for the main differences between deictics and existentials identified in Lakoff's analysis, and answers some unanswered questions as well. In the constructional grounding account, the central deictic is based on the central existential because (1) the central deictic, with the word *there*, is the deictic most frequently used in speech to children, and (2) it has an existential-like function when it occurs with indefinite NPs.

Children can reanalyze deictics with indefinite NPs—i.e., overlap utterances—to associate the existence-informing function with the deictic form. This reanalysis involves a shift in interpretation of the word *there*, away from a deictic locative meaning and towards an existence-informing meaning. This connection between meanings is not a metaphorical

one, but rather is based on close correlation within utterance contexts, and seems to provide a more motivated explanation for the semantic properties of existential *there*. In the next chapter, the importance of correlated dimensions of meaning, and the relation of such correlations to metaphor, are discussed in detail.

Finally, if children freeze the form of central deictics with indefinite NPs to derive the existential construction, that would explain why existential *there* does not occur outside that construction. Put differently, it is not strictly speaking the word *there* that acquires the existence-informing function in the reanalysis, but the whole constructional form, which includes the word *there*. In this sense, *there* is like *what* and *doing* in the WXDY construction. If *there* simply designated a mental space on its own, we would expect it to express that meaning compositionally in other contexts.

Lakoff refers to as the *minimal distinguishing properties* that separate existentials from deictics. While in deictics the first element is either *here* or *there* and this element refers to a real or abstract location, in existentials the first element must be *there* and it does not refer to any entity or location (p. 576-7). I would like to suggest that minimal distinguishing properties are the result of constructional grounding. The lack of alternation between *there* and *here* in the existential results from the recruitment of the form of *there*-deictics, which are more frequent. The lack of referential function of *there* in the existential is also a result of this recruitment—*there* loses its referential locative meaning when it becomes a part of the construction serving an existence-informing function.

The pragmatic relation between deictics and existentials, i.e. the fact that the deictic can be used with an existential-like function, and that deictic and existential functions may therefore overlap in individual utterances, is one of the key insights overlooked in an adult-synchronic analysis of the relation between the constructions. For that reason, the perspective offered by the theory of constructional grounding provides a new kind of argument to support Lakoff's general strategy of basing the existential on the deictic.

The transformational analysis of existentials

In this section I briefly consider two transformational analyses of the relation between English deictics and existentials. Early transformational grammar attempted to characterize complex clause types by relating them to simpler clause types through transformational rules. Analyses of existentials in this tradition derive them from deep structures corresponding to simple locative sentences. In analyses by Fillmore (1968) and Kuno (1971), the underlying structure from which existentials are derived has a single NP, a copula and a locative expression. In Kuno's analysis, the Locative expression comes first:

(13) LOC BE NP e.g. On the table is an apple.

In Fillmore's analysis, the NP comes first, and the locative expression is dominated by a Locative case node:

(14) NP BE LOC e.g. An apple is on the table.

In both analyses, there is a transformation that creates another Locative expression from the one in the underlying structure. In Kuno's analysis, the underlying Locative expression moves, leaving the locative proform *there* as a trace:

(15) LOC BE NP --> there_i BE NP LOC_i

In Fillmore's analysis, a transformation makes a copy of the Locative expression in subject position:

(16) NP BE LOC --> LOC_i NP BE LOC_i

Expletive *there* is then inserted under the initial locative case node.

Some more recent transformational analyses, while they do not have the same overt derivational relation between locative and existential sentences, treat existential *there* as a locative proform (Freeze 1992, Hoekstra & Mulder 1990).

The transformational analysis of existentials is unsatisfying for two reasons. First, it does not really explain why locatives and existentials should be related to one another at all. Even if one accepts the vague suggestion that "everything that exists exists in some location" (Lyons 1968), this does not explain why existentials should be derived from

locatives in the exact way they are, or why they should include the deictic locative *there*, as opposed to some other locative expression. More importantly, the transformational analysis fails to account for important properties of existentials, such as the fact that they can occur without locative expressions:

(17) There will be a debate between Gore and Bush.

Kuno notes the existence of such locative-less sentences and merely suggests that they contain a dummy LOCATIVE element that is replaced by *there*.

Constructional grounding does a better job of explaining both the parallel between deictics and existentials and the existence of non-locative existentials. First, if children actually learn existentials by generalizing over certain deictics, that explains exactly why existentials mimic deictics so closely in form. The occurrence of *there* rather than *here* can be accounted for by the fact that *there* is much more frequent in deictics addressed to children. Second, because constructional grounding views the relation between deictics and existentials as a dynamic one that manifests itself in the language acquisition process, it is compatible with the fact that existentials do not always occur with locative expressions, and that they have other properties that clearly set them apart from the central deictic (such as the ability to be embedded, negated, questioned, and so forth). It does, however, make the prediction that these properties will be learned relatively late by children, only after they have used overlap deictics as a source for their initial hypotheses about the existential. This prediction is clearly supported by the child data presented below.

3.5 The historical relation between deictics and existentials

Recall that one of arguments in favor of constructional grounding in the case of WXDY was the fact that the construction has maintained its parallels to the WH-question construction since at least Middle English. Given the difficulty of specifying a precise adult-synchronic relation between them, it would be difficult to say why this should be the case. The parallels between deictic and existential *there* are even more stable. Breivik

(1977) presents corpus data showing that existential *there* has been functionally distinct from deictic *there* since early Old English, but occurred then, as it does today, in contexts in which it could be confused with the deictic locative, which was likely pronounced in the same way. While Breivik presents these facts to shed doubt on the hypothesis of Jespersen (1984 [1937]) and Churchward (1956) that existential *there* was historically derived from locative *there*, they are in fact consistent with such a historical change having taken place before Old English, as Breivik admits.

Assuming that the existential *there*-construction did derive from uses of locative *there* at some time prior to the written records of English, what could possibly explain the persistence, to this day, of the close similarity between the constructions? Though some researchers have attempted to account for this relation primarily in conceptual terms, this connection would seem to be somewhat tenuous to support such a long-standing relationship, in the absence of more specific mechanisms for associating the two constructions on a formal level. Constructional grounding, however, offers what seems to be a viable explanation: the existential has never strayed very far from the deictic, because generation after generation has learned the existential by generalizing from uses of the deictic that have an existential-like function. That is, there have always been overlap deictics, and they have always helped people learn the existential.

3.6 Deictics and existentials in child language

Child language data support the claim that children base the central existential construction on the central deictic.

Recall that it was argued that source constructions are relatively easy for children to learn because their interpretations are based on perceptible aspects of the immediate utterance context, and because uses of these constructions are often accompanied by intersubjective cues that help children identify the correct interpretation. This is nowhere more clearly true than in the case of the deictic construction. This construction, as is well known, is often

accompanied by a pointing gesture that helps the addressee find the talked-about entity in a particular location. It has been argued that infants as young as nine to twelve months are able to interpret such cues as pointing and direction of gaze (see, e.g., Baldwin 1993, p. 132).

For this reason the deictic construction is a very frequent feature of speech addressed to children. It is often used to coordinate joint attention toward objects and situations which then become discourse topics (see, e.g., H. Clark 1996).

The parallels between the central deictic and the central existential constructions suggest that existentials are grounded in overlap deictics. Consider the following diagram:

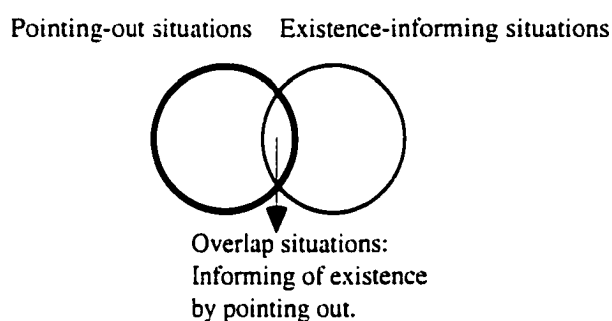


Figure 2

Figure 2 represents the sets of contexts in which the source and target constructions are felicitously used. The source construction—the deictic—is appropriate for situations of pointing out, represented by the circle on the left. This circle is bold to indicate that these situations are defined largely in terms of what is perceptually available to both conversational participants in the context of utterance, and can involve perceptual cues (e.g. pointing, directed gazing) that assist the addressee in identifying the speaker's meaning. The target construction—the existential—is appropriate for situations of informing an addressee of the existence of some entity or state of affairs. These situations are represented by the circle on the right. This circle is not bold, because existence-informing situations typically lack the intersubjective properties that characterize pointing-out situations.

The intersection of these sets includes the situations in which overlap deictics are appropriate. These are situations of informing an addressee of the existence of some thing or state of affairs by pointing it out. In the context of acquisition, these overlap utterances have the source-construction property of occurring regularly with perceptual cues that assist the child in interpreting them. They also exemplify the existence-informing function of existentials. This function is in fact closely correlated with the pointing-out function; as soon as the child looks where the adult is pointing, she or he sees the new entity or situation and becomes aware of it. Therefore, these overlap utterances give the child a rare opportunity to learn the existence-informing function of existentials by exploiting the same kinds of intersubjective cues that make the source construction relatively easy to learn. This is the learning advantage offered by overlap utterances in the constructional grounding view. It is discussed in more general terms in Chapter 5.

Are overlap utterances really enough like existentials to make this strategy work? As Lakoff points out, deictics and existentials are normally differentiated by the presence or absence of stress on *there*:

- (18) a. **THERE'S** a new **MERCEDES** across the street. (deictic)
 b. There's a new **MERCEDES** across the street. (existential)

This might make it seem that the above scenario is unlikely. However, there are a number of factors in the acquisitional context that lessen the significance of the contrast. Most importantly, it seems unlikely that the intonational difference alone would be sufficient to signal the existence of an entirely different construction to the child. This is especially true since the degree of stress that is placed on deictic *there* is variable. There are situations in which it is greatly diminished. For example, if several deictics are produced in succession, the non-initial ones can have unstressed *there*:

- (19) a. THERE'S my HAT!
b. There's my SHOE!
c. There's my WALLET!

Lakoff also argues that existentials cannot be accompanied by pointing gestures. However, in a discourse about a perceptually present situation, they can:

- (20) What animals are there in the picture? Well...
a. There's a dog, and
b. there's a cat, and
c. there's a pig...

Both of these conditions are typical of input heard by children. Speech directed to young children is full of repetition, as in examples (19a-c), and typically concerns aspects of the immediate physical context of utterance, as in examples (20a-c). These factors help to neutralize the contrast between deictics and existentials in children's input. The pragmatic properties of overlap deictics, as discussed above, contribute to this neutralizing tendency.

Predictions

If indeed children base the existential construction initially on their experiences with overlap deictics, they should pass through the following stages:

Stage 1: They produce deictics but no existentials.

Stage 2: They produce overlap deictics, which perform an existence-informing function. Ideally, these should include double locative overlap deictics.

Stage 3: They produce clear instances of existentials.

Utterances by the children

Table 1 summarizes the corpus data, giving the ages at which each major utterance type first appears in the speech of each child.

Table 1: Summary of the data from seven children

	Abe	Adam	Naomi	Nina	Peter	Sarah	Shem
Age range:	2;4-5;0	2;3-4;10	1;1-5;1	1;11-3;11	1;4-2;10	2;3-5;1	2;2-3;2
Corpus:	Kuczaj	Brown	Sachs	Suppes	Bloom70	Brown	Clark
Age of first deictic use of <i>there</i>	2;4.24	2;3.4	1;8.6	1;11.16	1;9.7	2;3.18	2;2.16
Age of first overlap produced	---	2;6.17	2;0.18	2;1.15	2;0.7	3;11.14 ???	2;2.16
Age of first clear existential produced	2;6.14	3;2.9	2;9.9	2;9.13	2;3.21	4;5.11	2;4.25

Table 2 shows, for each child, selected uses of the deictic construction, focusing on overlap uses, leading up to the first clear existentials (underlined). In most cases, the first clear existentials can be identified by virtue of properties that belong to the adult existential construction and not to the adult deictic construction (e.g. they are embedded, negated, questioned, etc.), though for some it is necessary to consider the meaning and context to infer that they are not used to direct attention the way the deictic normally is, and must be existential in meaning. Notice that for six out of seven children the stages predicted by the constructional grounding hypothesis are in evidence. That is, six children produce overlap deictics before producing unambiguous existentials. The only child who does not is Abe; as pointed out in the last chapter, his corpus has the latest starting age (2;4), so it is possible that it begins only after he has already mastered the existential construction (this is not implausible, since Peter and Shem both produce their first existentials before age 2;5). Abe's data were eliminated on the grounds that it begins too late, the support for the constructional grounding of existentials in deictics would be unanimous.

For most of the children, the overlap utterances include double-locatives that redundantly specify the location of what is pointed out. These are indicated in bold. The

corresponding table in the previous chapter included adult utterances to show that the children had models for the basic usage types they produced. In Table 2 the adult utterances have been omitted, though in the corpora there are adult models for all utterance types discussed here.

Table 2: Stages in deictic uses leading to existential

Stage 1: there used as a deictic locative in initial and final position

Abe	2;5.22	There he's lying down.
Adam	2;3.4	There boots dog.
Naomi	1;8.6	There's diaper.
Nina	1;11.16	Plate there.
	1;11.29	There baby monkey.
Peter	1;9.7	There it is.
Sarah	2;3.18	Girl there.
	2;6.3	There Mikie.
Shem	2;2.16	I want that one there.

Stage 2: overlap deictics (with indefinite NPs)

Abe		---
Adam	2;4.3	There water.
	2;6.17	There factory right there.
	2;9.18	There's one for you.
Naomi	1;11.16	There's a duck.
	2;4.30	There's a lollipop right there.
	2;5.8	There's cup for mom.
Nina	1;11.29	There baby monkey.
	2;0.24	There's a mommy.
	2;1.15	There's a table on the house.
Peter	1;9.7	There...wheel.
	2;0.7	There a new one.
		There's a tape right there.
Sarah	3;10.15	There's a monkey.
		There go go on a bed. ??
Shem	2;2.16	There's a radio over there.
	2;3.8	There's somebody going the scales.

Stage 3: first clear existentials

Abe	2;6.14	There's dust in my eyes.
Adam	3;2.9	Where there's a heel?
	3;4.18	Are there more down there?
Naomi	2;9.9	There was a big kangaroo.
	2;11.27	There's not enough room.
Nina	2;1.5	There was monkeys.
	2;9.13	There was a rabbit in Wellfleet?
Peter	2;3.21	Are there any girls in this book?
	2;5.0	There's money in here.
Sarah	4;5.11	Once there was a bear.
Shem	2;4.25	There wind anymore?
		There no wind anymore?
	2;5.16	There's no workies.

Some of these utterances are clearly existentials because they have grammatical properties that occur with the adult existential and not with the deictic: either they are interrogatives (*Where there's a heel?*, *Are there more down there?*, *Are there any girls in this book?*, *There wind anymore?*, *There no wind anymore?*), they are negated (*There's not enough room*, *There no wind anymore?*, *There's no workies*), or they are in the past tense (*There was a big kangaroo*, *There was monkeys*, *There was a rabbit in Wellfleet?*). Other utterances are classified as existentials because they do not make sense as deictics. In *There's dust in my eye*, the distal deictic is not appropriate. In *There's money in here*, a deictic interpretation results in a clash between *there* and *here*.

Tables 3-9 show the relevant utterances for each child in chronological order.

Table 3: Selected utterances by Abe leading to first existentials

bold indicates overlap deictics

underlining indicates unambiguous existentials

2;4.24 Put them right there.

2;5.22 There he's lying down.

2;6.14 There's dust in my eyes.

Abe is the only child who does not produce any overlap utterances before producing a clear existential. Recall, however, that Abe's corpus has the latest starting age of all the corpora in the study: two years four months. It may be the case the recordings of Abe began after he had already mastered the existential.

Table 4: Selected utterances by Adam leading to first existentials

bold indicates overlap deictics

underlining indicates unambiguous existentials

- 2;3.4 There boots dog.
 There bunny rabbit.
 No fire back there.
 Bear there right in here.
- 2;4.3 **There water.**
 Ball right there.
- 2;6.17 There we go...Cromer.
- 2;6.17 There Adam made that.
- 2;6.17 **There some donuts go in there.**
- 2;6.17 **There factory right there.**
- 2;6.17 There Jiminy Cricket there.
- 2;9.18 **There's one for you.**
- 3;0.25 **There another one.**
- 3;2.9 Where there's a heel?
- 3;2.9 **There's some meat in there.**
- 3;4.1 **There's another snake.**
- 3;4.18 Are there more down in there?

Adam produces several overlap utterances before producing his first clear existential. The overlaps include the double-locative overlap deictic *There factory right there*, in which there is a redundant specification of the location of the pointed-out object that might prompt the child to seek a non-locative function for the initial deictic *there*.

Table 5: Selected utterances by Naomi leading to first existentials

bold indicates overlap deictics

underlining indicates unambiguous existentials

1;8.6	There's diaper.
1;10.10	There's Mommy.
1;10.11	In there.
1;10.18	There it is.
1;10.19	Kitty's mouth there.
1;10.25	Put them in there.
1;11.16	There's a duck.
2;0.18	There some for Mommy.
2;4.30	There's a lollipop right there.
2;5.8	There is Susie right there.
2;5.8	There's cup for Mom.
2;5.8	There's a fox in the box.
2;7.16	And there's more electricity.
2;8.14	There's some more books.
2;9.9	<u>There was a big kangaroo.</u>
2;11.13	<u>There's not enough room.</u>
3;3.27	<u>...because there's two Erics.</u>
3;3.27	<u>Sometimes there's three Erics.</u>

Naomi also produces several overlap deictics before producing clear existentials. Her overlaps include the double-locative overlaps *There's a lollipop right there* and *There's a fox in the box*.

Table 6: Selected utterances by Nina leading to first existentials

bold indicates overlap deictics

underlining indicates unambiguous existentials

- 1;11.16 Plate there.
Many trees.
Adult: Yes, there're many trees.
Child: There. There many trees. Many.
Adult: There are many trees there.
- 1;11.29 There baby monkey.
Baby monkey there.
- 2;0.10 There's the water.
- 2;0.24 **There's a mommy.**
More puppets in there?
- 2;1.6 More in there.
There's a more.
- 2;1.15 **There's a table on the house.**
There's another table.
There...a bathtub.
Where's mommy there?
Adult: What's beside the door?
Child: A light. **There's a light.**
More food's there.
Adult: There's a stove there.
Child: **There's a stove there.**
Adult: That's right.
Child: Stove there.
There's another.
Adult: ...what I liked best were the monkeys.
Child. There was monkeys. Was monkeys climb on that balloon.
- 2;1.22 Little girl in here see.
In a my...I play my doll house.
And there is a row of peoples.

- 2;1.29 No more dogs in there.
Adult: There's a hole in that puzzle, isn't there?
Child: **There's another hole.**
- 2;2.6 **There's a bear monkey up a tree.**
- 2;2.28 **There's a rabbit there.**
- 2;5.26 **There's a space for the plate.**
- 2;9.13 There was a rabbit in wellfleet?
There're two pictures in there?
- 2;9.21 There's two cowboys, mommy.
- 2;9.26 Now there are porches.

Nina produces a few overlap deictics before producing any existentials, including the double-locative overlaps *There's a table on the house* and *There's a stove right there*. At 1;11.16, there is an interesting exchange in which Nina echoes an adult existential, isolating the word *there* as if it were a locative. This exchange resembles some of the exchanges in Chapter 2 in which children mistake instances of WXDY for genuine questions.

Table 7: Selected utterances by Peter leading to first existentials

bold indicates overlap deictics

underlining indicates unambiguous existentials

- 1;9.7 There.
 There...wheel.
 There it is.
 Sit there.
- 1;10.15 Top there.
 There more...button.
 Tape...on there.
 Tape on there.
 In there...boys...in there.
- 2;0.7 No monkey there.
 There a new one.
 There's a tape right there.
 There's a tape go around right there.
 There a mommy right there.
- 2;1.21 Another one in there.
- 2;2.14 No **there's a tape recorder right there.**
 There's another one...right there.
 Right there ...screwdriver ...right there.
 There's a wheel in there.
 There the wheels...over there.
 There's the tape recorder right there.
- 2;3.0 **There's another one.**
- 2;3.21 Right there are chairs.
 There's a hole in there.
 A radio right there.
 There drums too.
 Are there any girls in this book?
- 2;5.0 Adult: What else is in here?
 There's money in here.

There's some girls in here.

There's a numbers in there.

There's a money in here.

There's a noise.

2;5.21 **There's an animal in a hole.**

2;7.14 Adult: Is there a fire in the car?

No...there's no fire.

Peter produces several overlaps before producing any existentials. Almost all of them are double-locative overlaps: *There's a tape right there*, *There a mommy right there*, *There's a tape recorder right there*, *There's another one right there*, *There's a wheel in there*, and *There's a hole in there*. Peter's first clear existential is an interrogative: *Are there any girls in this book?* He also produces utterances similar to double-locative overlaps, but with *there* as the initial word and *here* as the final locative expression; this mismatch suggests that Peter intends *there* to have its existence-informing interpretation.

Table 8: Selected utterances by Sarah leading to first existentials

bold indicates overlap deictics

underlining indicates unambiguous existentials

2;3.18	Girl there.
2;6.3	There Mikie.
2;10.2	A toy in there. Nothing in there.
2;11.13	A water in there? A pennies in there?
3;0.25	No juice in there.
3;10.15	There's a monkey.
3;11.14	There go go on a bed. (the meaning of <i>go go</i> is unclear)
4;3.9	There's one crayon. There's Donna right there.
4;5.11	<u>Once there was a bear.</u> There's a hole in the bowl.
4;9.2	There's nothing on in the pages.

Sarah produces what seems to be a double-locative overlap before producing her first existential: *There go go on a bed*. It is not certain that this is a conventional central deictic, because it is not clear what the intended interpretation of *go go* is, and whether it should be analyzed as a nominal or a verbal expression. The only clear existential that occurs in Sarah's data is *Once there was a bear*, which is clearly a formulaic expression learned in a story-telling context. After this there is another double-locative overlap: *There's a hole in the bowl*.

Table 9: Selected utterances by Shem leading to first existentials

bold indicates overlap deictics
underlining indicates unambiguous existentials

- 2;2.16 There.
 It go there.
 I want that one there.
 There's a radio over there!
- 2;3.2 **There's food by the 'frigerator.**
- 2;3.8 **There's somebody...going the scales.**
- 2;4.4 **Outside outside there's blocks.**
- 2;4.25 There wind anymore?
- 2;4.25 There no wind anymore?
- 2;4.25 **There something in there.**
- 2;5.16 There's no workies.
- 2;5.23 **There is a hole to go in and out.**
- 2;5.30 **There's paint up there.**
- 2;6.6 **There's tennis racquet there.**
- 2;6.27-8 **There's an apple on there.**
 There's a palm tree here.
 There's a snake there.
- 2;7.10 **There is two.**
- 2;7.18 There is no mouth.

Shem produces a few overlaps before producing existentials. The overlaps include the double-locatives *There's a radio over there* and *There's food by the 'frigerator*. Many more double-locative overlaps are produced after the first existential occurs.

3.7 Interpretation of data

These data support the constructional grounding analysis of the relation between existentials and deictics. The stages shown in Table 2 suggest that children use the existence-informing function served by overlap deictics to form their first hypotheses about the existential construction. Recalling Figure 1, we can represent the process they might go through in the following way:

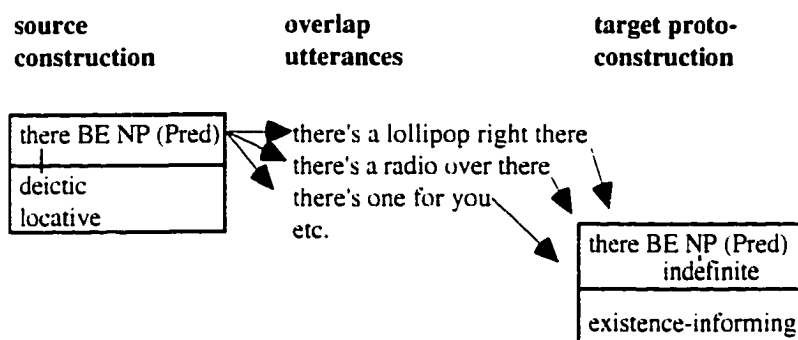


Figure 3

Children begin using *there* as a deictic locative. Many initially use it only in clause-final position, like other predicate expressions (adjectives, participles, verbs, etc.), but eventually all start using it in the clause-initial position characteristic of the deictic construction. At this stage, deictics with indefinite NPs can serve an existence-informing function while they are serving a pointing-out function, and therefore closely resemble existentials. Children might begin to use the deictic construction in its existence-informing function, and come to associate this function with the deictic construction form as it occurs with indefinite NPs. At this point, the redundant specification that we find with double-locative overlap deictics might encourage the child to find a new function for the initial locative *there*, and the new existence-informing function might be the most obvious candidate. At this point, children might posit the proto-existential. Then they would have a well-understood hypothesized form for the existential construction, and would be well prepared to learn the properties that distinguish it from the deictic.

This shift in meaning over developmental time shows the same kind of unidirectionality that has been claimed to characterize metaphor and historical semantic change. In particular, it resembles the tendency noted by Traugott (1987, 1988) for meanings concerned with the “external described situation” (in this case, the physical context of interaction) to lead to meanings concerned with the “cognitive described situation”.

If someone wanted to explain the acquisition of deictics and existentials assuming that they are not related to one another by children, i.e., based on the idea of autonomous mapping, they would have to account for the fact that existentials are always learned after deictics. To account for this, they might argue that the existential meaning simply is not conceptually available to the child until a certain age. However, there is evidence that the real obstacle to the child’s acquisition of existentials is a matter of mapping the meaning onto the right form. There are child utterances other than deictics that occur before the existential construction emerges and that seem to have an existential-like function. For example:

(21) Adam, age: 2;3.4

No fire back there.

(22) Nine, age: 2;1.29

No more dogs in there.

(23) Peter, age: 2;0.7

No monkey there.

(24) Sarah, age: 2;10.2

Nothing in there.

These sentences all seem to report on the absence of an entity in a particular location, which would call for the existential but not the deictic in adult speech. They have the same form as existential sentences without the expletive *there*, but many of them also have the same form as other early negative sentences with NPs and Predicates:

(22) Adam, age: 2;3.4

No I see truck.

If children have a communicative intention comparable to adults, why don't they just use the existential? The answer to this would seem to be that, despite having heard instances of the existential, and despite having the intent to communicate about existence (in a location), they have not been able to get this particular form and function matched up with one another. The absence of stress on *there* in the existential construction might be one cause for this difficulty. In any event, the obstacle seems to result from the challenge of the mapping problem rather than from conceptual development.

Transformations revisited

Recall that the transformational analyses examined above derive existentials from locative deep structures, thereby capturing the structural relation between these types of sentence. However, like most transformational analyses, they are not actually well-motivated as synchronic descriptions of English, which includes non-locative existentials such as *There's a concert today*. Also, the transformational analyses fail to capture the interesting *functional* parallels between existentials and deictics with indefinite NPs, especially those with double specification of location.

The constructional grounding analysis, on the other hand, recognizes both the formal and functional parallels between existentials and deictics. These parallels, while they exist in adult language, manifest themselves much more strongly at a stage before children have mastered the existential construction and therefore before they know the properties that distinguish existentials from deictics. The data we have examined suggests that children exploit these parallels in acquisition, building up their understanding of the proto-existential construction from uses of the deictic, which they understand. In this process of building, they mimic, to some extent, the derivational stages that are posited by the transformational analyses. All the children in our study begin by using *there* in simple locative statements.

Not surprisingly, many of these have indefinite NPs. Because deictics with indefinite NPs serve both to point out an entity in space and to introduce it to someone's awareness, such deictics give children the opportunity to associate a new existence-informing function with the deictic form. Most if not all of the children (there are some questions about Sarah's data) then progress to a stage in which they produce deictic locatives with an additional locative expression at the end. These expressions suggest a weakening of the locative meaning of the initial *there*, and an attendant strengthening of its existence-informing function. Finally, the children progress to a stage in which they produce clear existentials, in which *there* has been completely severed from its locative function.

3.8 What makes constructional grounding possible

As we have seen, constructional grounding depends on the existence of *overlap utterances*, which simultaneously exemplify important properties of two separate constructions. An important precondition of constructional grounding is that there be constructions in the target language that are related in such a way as to make overlap utterances possible. The existence of such relations between constructions would seem to be an odd conspiracy of factors: why would the structure of adult language, which is shaped by all kinds of discourse pressures and historical processes, have exactly the right properties to enable this highly specific acquisitional phenomenon? The full answer to this question is, of course, complex, but in its simplest outlines it is intuitive. The conditions that enable constructional grounding are the natural result of recognized processes of historical change, namely, those that depend on context-induced reinterpretation (see Stern 1931, Hopper & Traugott 1993, Heine et al. 1991, Traugott 1988, etc.).

Consider again the case of WXDY. Let us assume that the historical scenario like the one discussed in the last chapter, in which WXDY resulted from a reanalysis of WH-questions based on a conversational implicature that became conventionalized, is correct. What would be the immediate likely result for the language? The most likely result seems to

be that people would produce instances of the construction that maximally resemble the instances that led to the reanalysis in the first place, because these would be the only attested examples of the construction. That is, people would produce overlap utterances—instances of the new construction that could also be construed as instances of the old construction (which is indeed what seems to have happened in the case of WXDY—earliest examples are equivalent to *What are you doing here?*).

What are new generations of language learners likely to do in such a situation? They are likely to have trouble recognizing that the new construction is a separate construction at all, because the most frequent occurrences in their input, or perhaps the only occurrences, would be ambiguous. Hence, they are likely to treat the new construction as a subtype of the old construction at first, which means that they, too, would be likely to produce overlap utterances. This process might be iterated over numerous generations. Eventually, the new construction would acquire new properties suitable to its new function. These would likely arise from adult-to-adult interaction (see, e.g., Slobin 1997) and would therefore likely be manifested in such interactions. This means even after such properties developed they might not have much effect on early acquisition—they might be encountered relatively late in the process. Therefore, even after two constructions have diverged historically, it is still possible for them to be related through constructional grounding.

The above scenario suggests that the existence of overlap utterances can be explained partly as a result of people's tendency to produce instances of a construction similar to instances they have heard (see, e.g., Tomasello's (1992) discussion of conservative learning). Another explanation comes from the way in which constructional grounding helps the learner. This is discussed in the next section.

3.9 Why constructional grounding happens

The previous section suggested an explanation for the fact that there are constructions in English that allow interpretational overlap and thereby make constructional grounding

possible. Even if this explanation is correct, why should children use constructional grounding as an acquisitional strategy?

The answer to this question has already been briefly discussed. If we examine pairs of constructions that closely resemble one another, and in particular, those that allow interpretational overlap, we usually find a strong asymmetry, with one being much more closely associated with immediate perceptions and intentions in face-to-face interaction. The claim of constructional grounding is that overlap utterances provide optimal conditions for children to learn more abstract and difficult constructions by leveraging knowledge they have already acquired about more basic constructions. Being more closely related to immediate perceptions and intentions, the basic constructions are easier for children to interpret and are learned earlier. This is both because immediate perceptions and intentions are an important and favored discourse topic starting at a very early age, and because they are relatively easy to map onto linguistic forms, being salient aspects of utterance contexts with a high degree of intersubjective availability. Often gestures and other intersubjective cues can be used to help children identify these meanings.

A subset of the child's experiences with source constructions also allow target interpretations. In these overlap experiences, the target interpretation is often strongly implied by the source interpretation. These overlap experiences, therefore, have the following properties: (1) they involve the use of a familiar set of formal parameters, (2) an interpretation can easily be assigned to this set of formal parameters on the basis of the types of intersubjective cues mentioned above, and (3) the resulting interpretation often strongly implies the target interpretation—the new interpretation that that child must assign to the set of formal parameters in question. Generalizing from Figure 2, we can represent these properties graphically in the following way:

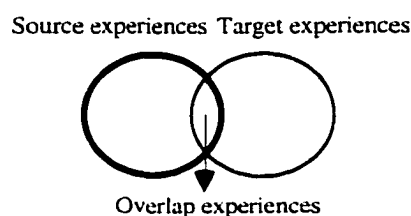


Figure 4

The circle on the left represents the child's set of experiences with the source construction. The fact that it is bold indicates that these experiences are highly intersubjective in nature and often come with intersubjective cues to help the child identify the appropriate meaning. The plain circle on the right represents the full set of situations in which the target construction is used by adults; most of these situations do not provide the child with clear intersubjective clues about the meaning of the construction. The overlap experiences offer the advantages of other uses of the source construction, but also exemplify important properties of the target. Interestingly, this learning advantage has the same logic as semantic bootstrapping (see Grimshaw 1981, Pinker 1984). The relation between constructional grounding and bootstrapping is discussed in Chapter 5.

It is suggested here (and discussed in Chapter 5) that certain natural factors affect the ease with which forms can be mapped onto meanings. Meanings that are exemplified in the context of utterance are easier to acquire than meanings that are displaced in space or time from the context of utterance. Meanings that are perceptible in the context of utterances are easier to acquire than meanings that are only subjectively experienced or can only be inferred. We can think of these factors as a set of filters on the children's linguistic input. Source constructions are the ones that best make it through these filters. Target constructions have properties that make them get filtered out, for the most part, in early acquisition. Overlap utterances are special, because they are the instances of target constructions that make it through the filters.

These conditions suggest that the child can "freeze" the analysis assigned to the overlap utterances regarded as instances of the source construction, make minor adjustments to this

analysis on the basis of the new implied target interpretation, and then attribute the resulting structure and meaning to a the new target construction. In the case of WXDY, this process would explain how children easily learn that it has the same long-distance dependencies as WH-questions. After this, the child can acquire properties of the target construction that are not exemplified by the overlap experiences. This general learning strategy, it is argued, might be simpler than trying to extract the form and meaning of the target construction from the full set of its uses. In fact, for certain target constructions, such as the WXDY construction, overlap uses are the most likely starting point for the child because they occur earlier and are far more frequent in the child's input than are unambiguous uses of the target.

The learning advantage offered by constructional grounding contributes to the explanation given above for the existence of interpretational overlap. Suppose that there are two constructions whose meanings are not highly intersubjective the way source construction meanings tend to be. If one of these constructions is related to a source construction through constructional grounding, we would expect it to be learned earlier than the other. From the point of view of the cultural evolution, such a construction would have an adaptive advantage. Since it would be learned earlier, it would be more likely to become an entrenched part of the language. We might expect this entrenchment to manifest itself, at least in part, through a high degree of historical robustness.

The cases of WXDY and the existential offer some support to this idea. For a rather idiosyncratic construction, WXDY has a long history. As discussed in the last chapter, it has precedents as far back as Middle English. Existentials offer even better support for the historical longevity of constructions learned through constructional grounding. As discussed above, there is evidence that existential and deictic *there* have been identical since before Old English, and have always occurred in contexts in which they are potentially ambiguous.

3.10 Reconciling motivation and arbitrariness

Part of the value of constructional grounding is that it allows us to reconcile the notion of motivation with the fact that constructions have arbitrary properties. In the constructional grounding account of existentials, it is both the case that the deictic motivates the existential in the acquisition process, and that the existential has properties which may have nothing to do with the deictic. In a historical context, these properties presumably emerged after the existential construction emerged. In an acquisitional context, it is hypothesized, they are learned only after the child has taken advantage of the motivating properties of the deictic construction.

This kind of motivation differs from that normally discussed in cognitive linguistics and, in fact, in all kinds of synchronic studies. As a matter of course it is assumed that motivation, if it exists at all, is to be captured as a property of a static adult-synchronic system. In cases in which two constructions are closely parallel but also have incompatible properties, this assumption only leaves a few choices: (1) The shared properties can be attributed to some abstract construction that is shared by the two more specific constructions but never instantiated independently. (2) The constructions can be related by some synchronic principle that accounts for the ways in which they differ. (3) The constructions can be treated as two distinct and arbitrary form-meaning pairings whose resemblance is "purely historical" (or simply coincidental). Choices (1) and (2) treat the relation between constructions as a synchronic fact in the traditional sense, and choice (3) treats it as a historical artifact that has no bearing on the synchronic state of the language.

Constructional grounding differs from all these choices. It shows that motivation is not only a property of language as it understood and used by adults. It can also be a factor that affects the construction of language in developmental time. Language exists differently in speakers' minds at different developmental stages, and the representation of an individual sign might change from one stage to another. This means that the relations between that sign and other signs might also change. We have seen how such shifts in relations between

signs might be encouraged by the structure of language itself. Due to an interaction between the demands of semantic acquisition on the one hand, and the formal and semantic properties of source and target constructions on the other, signs may be much more closely related to one another early in the acquisition than they are by the time a learner achieves adult competence. In fact, very early in the acquisition process, two signs may be so closely related as to be indistinguishable from one another. This is what happens in constructional grounding. In the overlap stage, the child does not distinguish between the source and target construction. Rather, we might say that the source and target are *conflated* at this stage, and that the target emerges from the source through a process of *differentiation*. In the next chapter we will consider the implications of conflation and differentiation for our understanding of polysemy.

Chapter 4. Polysemy, constructional grounding, and conflation

4.1 Introduction

In Chapter 2 it was observed that lexical polysemy provides the most obvious cases of based-on relations between signs, but the topic of polysemy was deferred. This chapter takes it up, and considers what constructional grounding contributes to the understanding of the way children learn polysemous verbs. The case study presented here focuses on visual and mental meanings of the verb *see*, illustrated by (1a) and (1b):

- (1) a. I see you.
 b. I see what you mean.

These meanings are normally understood to be metaphorically related to one another. Lakoff & Johnson (1980), for example, consider (1b) an instance of the conceptual metaphor they call KNOWING IS SEEING (exemplified also by vision words other than *see*). This study therefore provides the opportunity to explore the way constructional grounding relates to conventional metaphorical language.

While it may seem that lexical acquisition should be much simpler than the acquisition of grammatical constructions, the phenomena discussed in this chapter are in some respects more complex than the ones examined in the last two. Those case studies involved clausal constructions, which made it possible to consider the effects of constructional grounding more or less independently of any larger syntactic context. Due to the important relation between verb meaning and verb argument structure, however, the syntactic contexts of verbs cannot be ignored. Furthermore, the meanings of common verbs like *see* reflect basic concepts, and their polysemy structures reflect independent conceptual principles. Therefore, it will be necessary to consider the relation between constructional grounding and more general issues regarding argument structure and semantic acquisition.

The Conflation Hypothesis

It is argued here that uses of *see* like (1b) are not learned the way it is usually assumed that metaphorical expressions are learned. That is, *see* is not learned in purely “literal” contexts and then extended to metaphorical contexts on the basis of some perceived similarity, parallelism, or structured correspondence to the literal contexts. Rather, it is argued here that children hypothesize an early meaning for *see* that combines or *conflates* aspects of meaning normally associated with different senses of the verb in adult language, including the literal and metaphorical senses. This idea is referred to as the *Conflation Hypothesis*. In this view, children’s eventual achievement of the distinct adult senses arises not through the extension of a fixed basic sense to a new meaning via conceptual principles, but through a process of differentiating use types from one another.

This of the term *conflation* is inspired in part by Talmy’s (1985) use of it in discussions of semantic typology. Given an inventory of the kinds of concepts that tend to be lexicalized crosslinguistically, it is possible to make generalizations about whether two (or more) such notions tend to be incorporated into one meaning associated with a single form—i.e. conflated—or whether they tend to be expressed by separate forms in a language. For example, in English and many other languages like it, there is a tendency for Motion and Manner to be conflated; verbs like *walk*, *hop*, *saunter*, etc. express both information about directed movement and information about the way in which that movement takes place. French and similar languages, on the other hand, tend not to conflate these meaning elements but to express them separately. Thus, in English we say *They ran into the house*, but in French it is necessary to say *Ils sont entrés dans la maison en courant*—‘They entered the house running’—in which the verb *entrer* expresses directed Motion and the present participle of the verb *courir* expresses Manner of motion. The term *conflation* has also been used in the context of grammatical acquisition by Slobin (1985), who observes that Basic Child Grammar, and grammars in general, allow for confluations of meanings to be expressed by individual forms.

This dissertation is concerned not with typological generalizations but in language-internal tendencies in acquisition. In this context, the term *conflation* characterizes an early state of a sign compared to the adult state. In the early state, it is argued, meaning components that can be expressed separately by adults in different contexts are regularly expressed together in the same contexts by children who use the form in question.

Conflation results from a number of interacting factors. First and most importantly, there are natural correlations in children's experience between phenomena that exemplify what adults would regard as distinct conceptual categories and domains. One that is relevant to *see* is the correlation between visual experience and states and changes of awareness. Correlations of this kind can be a motivating factor in the establishment of conventional metaphorical mappings between different conceptual domains (Lakoff & Johnson 1980, 1999; Lakoff 1987; Johnson 1987; Sweetser 1990; Grady 1997), and they can serve as the basis for metonymic shifts in meaning historically (Stern 1931, Traugott 1988, Hopper & Traugott 1993, Heine et al. 1991, etc.). They can also, it is argued here, influence children's mapping of forms onto meanings, causing them to hypothesize word meanings that fail to reflect distinctions made by adults. Crucially, this effect is reinforced by constructional grounding. In acquisition, the syntactic contexts of verbs are an important source of information about verb meanings (Brown 1957, Gleitman 1993, etc). In particular, different kinds of complements can characterize different meanings of the same verb. If a complement that occurs with a verb shows interpretational overlap, it may encourage or reinforce a hypothesized meaning for the verb that shows a corresponding overlap.

The conflation of mental and visual *see*

While clearly metaphorical uses of *see* are not common in child-directed speech, there are very common uses that exemplify important properties of the metaphorical sense while simultaneously exemplifying properties of the basic visual sense. These are uses of *see*

followed by a WH-complement, which can occur in overlap contexts in which they are ambiguous for adults. For example, in (2) the WH-complement can be construed either as referring to a physical entity, or as denoting what I will call a *mental proposition*. The first interpretation corresponds to a free relative clause analysis of the WH-complement and a literal interpretation of *see*, as in (2a), and the second to an embedded interrogative clause analysis of the WH-complement and a metaphorical interpretation of *see*, as in (2b):

(2) Can you see what's in here?

a. free relative clause analysis:

Can you see [_{NP} what's in here]? = 'Can you see the thing/stuff in here?'

b. embedded interrogative analysis:

Can you see [_S what's in here]? = 'Can you tell what's in here?'

Ambiguous occurrences of WH-complements like this are a frequent feature of speech addressed to and produced by children. It is likely, as we will see in section 4.6, that most children do not at first distinguish between free relative clauses and embedded interrogative clauses. They tend to use WH-complements in contexts that are compatible with both kinds of interpretation. In these contexts, the WH-complements can be understood both to refer to physical entities and to characterize knowledge about those entities. Later they are reanalyzed so that they may denote mental propositions independently of any particular physical context. That is, embedded interrogative complements seem to be constructionally grounded in free relatives (which is somewhat surprising, given their obvious relation to main-clause questions). Because the earliest uses of WH-complements with *see* participate in the overlap stage of this constructional grounding process, they combine properties of the free relative and embedded interrogative readings. As a result, the meaning attributed to *see* as it occurs with such complements combines properties of the visual and mental meanings that are distinct for adults. That is, the mental sense of *see* is constructionally grounded in the visual sense. This linguistically reinforces the independent tendency for

visual and mental experience to be associated in the minds of children as a result of their frequent correlation.

The Conflation Hypothesis predicts that children's uses of *see* will develop according to the same kinds of stages that we have seen in other cases of constructional grounding:

Table 1: Stages predicted by the Conflation Hypothesis

Stage 1: Visual core. Children use *see* in relation to a variety of situations involving visual experience, and often involving salient mental experience as well.

Stage 2: Overlap. Children begin to use *see* with WH-complements in relation to situations involving visual experience. In these utterances, the WH-complements refer to visible entities, but their meanings direct attention to mental propositions that visual experience introduces into conscious awareness, thereby setting a precedent for the metaphorical use of *see*.

Stage 3: Differentiation. Children begin to use the *see* + WH-complement pattern in non-visual situations, showing that they have differentiated the mental meaning of *see* from the visual meaning.

We will see evidence for these three stages in section 4.7.

Since *see* is one of the two earliest vision verbs to be learned by children (*look* being the other), there is a sense in which the constructional grounding of mental *see* in visual *see* in fact grounds the whole KNOWING IS SEEING metaphor as a linguistic convention for children. That is, because the pattern of *see* + WH-complement directly encodes the kind of correlation between mental and visual experience that motivates the metaphor, it sets a developmental precedent for visual vocabulary to be applied to the mental domain.

4.2 Polysemy and the mapping problem

The view presented in this chapter is based on the premise that young language learners face a non-trivial task in finding the right meanings to associate with the linguistic forms that they hear in their input. Clark (1993) calls this task the *mapping problem*. In the context of the acquisition of polysemous words like *see*, it can be regarded as having at least the following two components: the *delimitation problem* and the *differentiation problem*.

The delimitation problem

The delimitation problem is the problem of how the child selects the correct properties of exemplar utterance contexts to associate with a given linguistic form. Suppose a child is able to associate a form with a set of experiences that all happen to correctly exemplify the meaning of that form. It is likely that these experiences will share properties that are irrelevant to the meaning of the form, as well as properties that are relevant. How does the child know which are which? This is essentially the problem recognized by Quine (1960) in his discussion of the indeterminacy of reference, and has been addressed by various child language researchers, including Gentner (1978), Gleitman (1993), Markman (1989), and Tomasello (1992), who refers to it as the *packaging problem*.

Delimitation of lexical meaning may be achieved through two different means. One is the natural clustering of cognitive activity into relatively discrete concepts, which will be called *conceptual delimitation*. The other is positive linguistic evidence that certain contextual factors are unnecessary to a meaning, which will be called *linguistic delimitation* (Langacker (1987, p. 403) refers to this as *cancellation*). Conceptual delimitation is most clearly illustrated in the learning of basic level object categories (Rosch et al. 1976). Because simple objects can be easily delimited from the contexts in which they occur on the basis of perceptual and interactional properties, and because they have a relatively permanent existence, names for such objects are among the first words learned by children.

Conceptual delimitation is sometimes discussed in the guise of “constraints” on semantic acquisition, such as Markman’s (1989) “whole object constraint”. While conceptual delimitation may not be much of a problem for simple object nouns, it may very well be a problem for verbs, which denote dynamic and relational entities that are often fleeting and not delimitable on perceptual grounds alone (see, e.g., Gentner 1978, Tomasello & Kruger 1992, etc.).

Linguistic delimitation differs from conceptual delimitation, because it involves the child paying close attention to the contexts of the utterances in which a form occurs in order to infer which aspects of the contexts are relevant. A use of a form in a context in which some aspect of meaning is clearly not relevant provides positive evidence to the child that that element is not an essential part of the meaning of that form.

The differentiation problem

While the delimitation problem comes up for all linguistic signs, the differentiation problem is relevant only to polysemous forms. It is the problem of how the child learns to make all the distinctions among conventional senses of a form that are made by adult speakers. Polysemous verbs potentially exhibit a number of different but closely related senses or conventional usages in the input to the child. While there might be good reason to distinguish these in adult language, the evidence for distinctions between them might be scarce or non-existent in the input that is meaningful and useful to very young children. In cases of metaphorical polysemy, as we will see below, the task is further complicated by the experiential correlations that can motivate metaphors. If these correlations are properties of children’s earliest learning experiences with the forms, then the assumption that source domain meanings are earliest becomes potentially problematic, given the delimitation problem. Children may initially fail to distinguish different senses because their properties may overlap, resulting in conflation. The different senses might become differentiated from one another only later in the acquisition process.

4.3 Conceptual Metaphor Theory

The ideas in this chapter developed from an interest in work on conceptual metaphor theory by Lakoff & Johnson (1980), Lakoff & Turner (1989), Sweetser (1988, 1990), and others. In this approach, metaphorical expressions are argued to be based on relations best expressed at the conceptual level, i.e. *conceptual metaphors*. A conceptual metaphor is analyzed as a systematic correspondence or *mapping* between two conceptual domains between which there is a *conceptual asymmetry*. One is termed the *source domain*, because it serves as the source of vocabulary and inferences, and the other is called the *target domain*, because it is the domain to which vocabulary and inferences are extended. In the earlier work taking this approach, the asymmetry between source and target is usually characterized in terms of the relatively traditional distinction between concrete and abstract concepts, with concrete domains being more closely related to direct physical experience, and abstract domains being further removed from such experience. Later work develops this characterization and places more importance on properties such as intersubjective accessibility and salience in describing the asymmetry between domains (see, e.g., Grady et al. 1996, Grady 1997, Johnson 1997b, Sweetser 1990, etc.).

In a metaphorical mapping, specific elements of one domain are mapped onto specific elements of the other. The source domain is assumed to be an especially rich source of inferences that may be transferred to the target domain, given certain constraints (Lakoff & Turner 1989, Lakoff 1990, Lakoff 1993, etc.). This transfer of inferences is believed to serve a useful function in cognition. I will refer to this idea as the *cognitive utility of the source domain*. It has been proposed as an explanation for the *unidirectionality* of metaphorical mappings, i.e., the fact that certain domains regularly serve as a source of vocabulary for others, and not vice versa.

Experiential bases of metaphor

Many conceptual metaphors are assumed to have an *experiential basis*, which is a correlation in experience between phenomena exemplifying the source and target domains which motivates a mapping between those domains. The parade example of an experiential basis is the one argued in Lakoff & Johnson 1980 (hereafter L&J 1980) to underlie the metaphor MORE IS UP, exemplified by sentences like (3):

(3) Prices have *gone way up*.

People frequently experience a correlation between an increase in a quantity of objects or substance and an increase in the height of the objects or substance in a pile or a container. This correlation is the experiential basis of the MORE IS UP metaphor. That is, it provides the experiential motivation for creating a metaphorical association between the domains of verticality and quantity, in which greater quantity is directly correlated with greater height. We might represent the experiential basis of this metaphor in the following way:

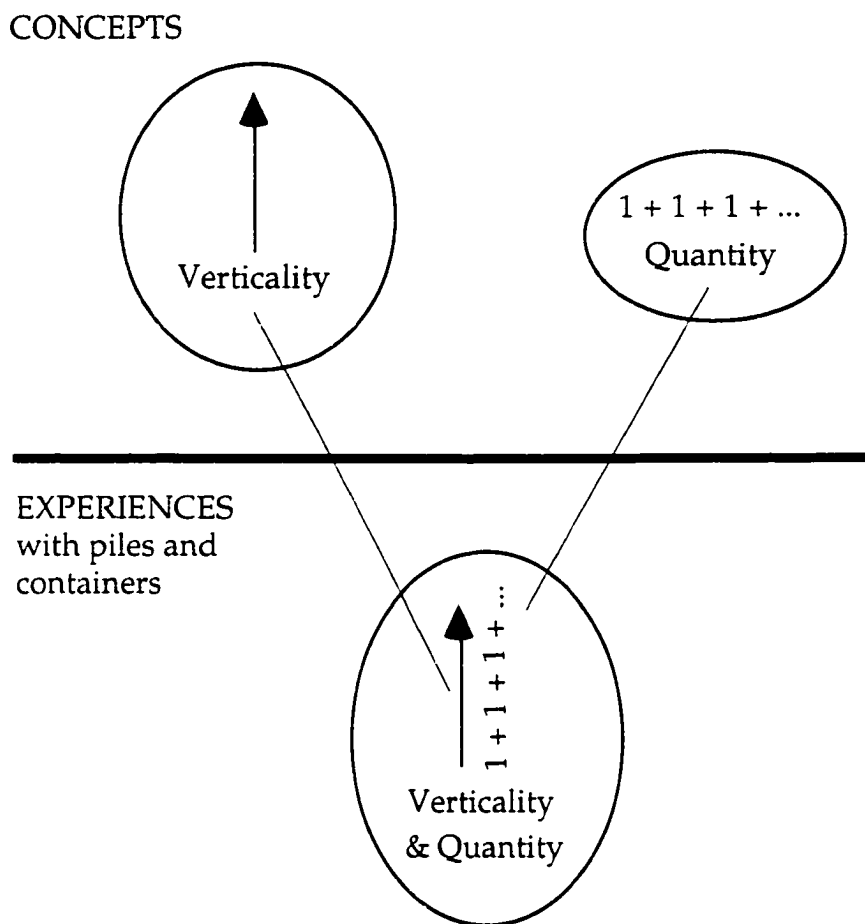


Figure 1

Verticality and quantity are conceptually distinct notions, yet they are correlated very closely in a particular set of experiences. These experiences, in the view of conceptual metaphor theory, lead to a new conceptual representation—a mapping—that captures this correlation. This mapping is so natural as to seem almost non-metaphorical. The ubiquity of the experiential basis provides one explanation for the naturalness of the metaphor.

Most of the metaphorical mappings proposed in L&J 1980 and related work, and perhaps most metaphors in general, are not as simple and clearly motivated as the MORE IS UP metaphor. Rather, they tend to involve much more complex domains and more numerous correspondences between them. For example, another metaphor discussed in

L&J 1980 is ARGUMENT IS WAR (perhaps more aptly named ARGUMENT IS COMBAT, as suggested in Sweetser 1990). It is exemplified by the following expressions:

- (4)
- a. Your claims are *indefensible*.
 - b. He *attacked every weak point* in my argument.
 - c. His criticisms were *right on target*.
 - d. I *demolished* his argument.
 - e. I've never *won* an argument with him.
 - f. You disagree? Okay, *shoot*!
 - g. If you use that *strategy*, he'll *wipe you out*.
 - h. He *shot down* all my arguments.

(examples from L&J 1980, p. 4)

The mapping for this metaphor involves at least the following correspondences:

- Arguing is engaging in physical battle.
- People arguing are combatants.
- Trying to discredit another's viewpoint is physically attacking that person.
- Trying to uphold a viewpoint is defending against an attack.
- Claims of an argument are physical things that need to be protected in battle.
- Objections or rebuttals to someone's claims are weapons or projectiles.

This metaphor, unlike the metaphor More is Up, does not have a clear experiential basis. Most people do not experience battle at all, let alone experience it in correlation with actual argument. Nonetheless, this complex mapping represents an attempt to make the broadest possible generalization about the expressions in (4a-h). The fact that conceptual metaphor theory makes such generalizations possible, in fact, is one of the strongest arguments in favor of it. To emphasize its potential for generalization, proponents of the theory have stressed the idea that metaphorical mappings are conceptual in nature and that they exist independently of individual lexical meanings. Treating them in this way also accounts for novel extensions of the metaphor, such as *She is a linguistics ninja master*.

For this reason, the experiential correlations that motivate metaphorical mappings, when they are recognized at all, have generally been assumed to adhere in general prelinguistic or nonlinguistic experience. Prior to earlier versions of the present work (see, e.g., C. Johnson 1997, 1999), there had been no prediction that they should have an effect on the initial mapping of individual lexical forms onto meanings by children.

To summarize the position of conceptual metaphor theory, then, we may think of a metaphorical expression as involving at least three important and distinct relations. One is the *literal association* between a linguistic expression and the source domain (e.g., the association of the expression *go up* with the domain of verticality). Another is the *mapping* between the source and target conceptual domains. Another is the *metaphorical extension* of the linguistic expression to the target domain (e.g., the extension of *go up* to the domain of numerical quantity in *Prices have given way up*). While all these relations are important, the mapping relation has received most of the attention in conceptual metaphor theory. Literal associations of forms with source domains have been assumed as preconditions for metaphorical extensions, for which mappings have borne most of the explanatory burden.

Metaphorical extension in historical meaning change

The explanatory value of metaphorical mappings is especially clear in a historical context. Sweetser (1990) shows how conceptual metaphor theory can help to account for types of historical semantic change that are common cross-linguistically. One general tendency is for forms related to aspects of sensory and bodily experience to develop meanings related to mental experience. For example, words related to physical holding tend to acquire meanings related to understanding, as illustrated by Fr. *comprendre* 'understand,' from Lat. *comprehendere* 'seize.' Such a historical shift can be partially explained if we posit a stage of polysemy in which both senses were present and related by a metaphorical mapping in the minds of speakers, in which understanding was conceptualized in terms of

the manipulation of an object. English *grasp* is presently in such a stage of polysemy; as a noun it can mean either ‘grip,’ as in (4a) or ‘understanding,’ as in (4b).

- (5) a. I don’t have a firm grasp on the handle.
b. I don’t have a firm grasp on the issues.

The literal use of *grasp* in (5a) seems to be somewhat less natural than the metaphorical use in (5b), which suggests that this form is undergoing the same kind of change that has led to Fr. *comprendre*. We may think of the change as consisting of three stages: one in which the form is associated with the source domain, a pivotal stage in which a mapping between source and target domain motivates the extension of the form to the target domain, and a final stage in which the target domain sense is completely conventionalized and the source domain meaning may be marginal or entirely obsolete (though as Traugott has argued (1986), it is not uncommon for source and target meanings to co-exist for a long time).

Metaphorical extension in acquisition

It has been observed (e.g. in Sweetser 1990) that literal or source-domain senses of polysemous forms, which are typically the oldest senses historically, often seem to be the first learned by children. This parallel, and the theoretical assumptions about metaphor described above, suggest that metaphorical mappings motivate the learning of extended senses of polysemous forms the same way they motivate historical changes in the meanings of forms. That is, given that a literal association and a mapping are offered as a kind of explanation for an observed metaphorical extension, we might assume that the literal association and the mapping precede and motivate an extension in acquisition. This idea will be referred to as the *Metaphorical Extension Hypothesis*. The stages predicted by this hypothesis are shown in Table 2:

Table 2: Stages predicted by the Metaphorical Acquisition Hypothesis

Stages 1 and 2 (relative order not important):

Literal meaning. First the child encounters the form in contexts that clearly and unambiguously exemplify the source domain, and on the basis of these experiences associates the form with its literal meaning.

Mapping. Independently of this, the child forms a metaphorical mapping between the source domain and the target domain. This mapping may or may not have a direct experiential basis.

Stage 3: Extension. Motivated by the mapping, the child extends the form to a new domain, i.e. interprets and/or uses the form in contexts that are very different from the ones in which the form was first encountered.

These stages are different from the those predicted by the Conflation Hypothesis (shown in Table 1), which recognizes that the process of constructional grounding may affect the acquisition of individual words, because they do not involve children producing utterances that combine properties of the literal and metaphorical meanings of a word. Rather, the implication is that children extend words abruptly on the basis of mappings between clearly distinct domains, as often occurs in adult extensions.

An example of the view captured by the Metaphorical Acquisition Hypothesis is found in H. Clark 1973, where it is argued that children learn temporal meanings of prepositions by first mapping them onto spatial relations and then extending them on the basis of a metaphorical correspondence between space and time. This view has also been proposed as a possible explanation for unconventional extensions of forms by children (Clark & Carpenter 1989). The idea that extension in acquisition is parallel to extension in a historical context is quite natural given the general explanatory role played by metaphorical mappings in conceptual metaphor theory.

It is argued here that the parallel between historical change and acquisition is misleading in certain interesting cases. If extension in acquisition works like extension in a historical context, it must be the case that a literal meaning and a metaphorical mapping precede the acquisition of a metaphorical sense motivated by the mapping. This presupposes that very young language learners have the same conceptual domains that adults have, the same mappings between them, and the same relations between forms and source domains. That is, all the other crucial aspects of conceptual and semantic structure must be assumed to be in place before metaphorical senses of words are acquired. These assumptions are not obviously valid, especially as they apply to certain kinds of metaphor.

The Metaphorical Extension Hypothesis as a cognitivist theory of acquisition

The assumptions of the Metaphorical Extension Hypothesis are compatible with the *cognitivist* position in language acquisition, as described by Bowerman (1993), which maintains that semantic acquisition is largely a matter of finding forms for pre-existing concepts.

In a critique of this view, Bowerman presents convincing arguments that semantic acquisition is more complicated than this. If language learners simply map forms onto concepts that develop independently of language, then we would expect early semantic representations to be more or less identical cross-linguistically. However, the meanings of words even for simple actions can differ in surprising ways across languages. Bowerman demonstrates this with reference to English and Korean expressions for putting on and taking off articles of clothing. Such expressions in Korean, unlike their counterparts in English, encode tightness of fit between an article of clothing and the body part that it is worn on. Very young children learning Korean are sensitive to this and use the terms correctly. This demonstrates that such terms are not merely mapped onto concepts that any child would associate with their experiences with clothing. Rather, it suggests that children need to attend carefully to the contexts in which forms are used in order to learn which

aspects of those contexts are encoded by the forms and which are not. This kind of learning, based on what Slobin (1996) has termed *thinking for speaking*, differs from one in which children simply find linguistic forms to express discrete concepts that they have already formed.

In short, the work of Bowerman, Slobin and others suggests that a theory of semantic acquisition cannot be entirely conceptually driven—that is, it cannot be based on the idea that children simply find forms to express independent concepts. It is necessary to explain how children learn exactly what conceptual distinctions are encoded in the language they are learning. Such distinctions might be reflected in general facts about the semantic organization of a particular domain (such as those observed by Bowerman) or by the properties of individual signs and the relations between them.

The Metaphorical Extension Hypothesis is a conceptually driven view of the role of metaphor in acquisition. That is, it assumes that conceptual source domains and a conceptual mappings between those domains and target domains capture most of what there is to say about metaphorical expressions. A view of acquisition that pays more attention to the conventional properties of these expressions, which are not all motivated by general principles or mappings and must therefore be learned on the basis of the contexts in which those signs occur, is bound to provide a more satisfying explanation for the acquisition of conventional metaphor as a linguistic phenomenon. Such a view must keep in mind the challenge of identifying the right meaning for a form. As we will see in the sections below, this means it cannot even be taken for granted that literal or source domain meanings, as they are understood in adult language, are the first acquired by children.

The Conflation Hypothesis argues that learning contexts involving experiential correlations, and the occurrence of the ambiguous contexts that characterize constructional grounding, can affect acquisition such that children assign meanings to forms which incorporate “literal” and “metaphorical” interpretations simultaneously. The result is that children form associations between forms which are polysemous for adults and their

“metaphorical” interpretations which are not motivated by complex mappings on the conceptual level. Rather, they can be understood to *constitute* mappings in a nascent form. This view is closely related to Grady’s (1997) theory of *primary metaphor*, discussed in the next section.

4.4 Primary scenes and primary metaphor

In primary metaphor, basic mappings do not consist of numerous correspondences across complex conceptual domains, but rather of close correspondences between more basic experience types that are correlated in simple scenes. That is, Grady’s theory makes a principled distinction between metaphors like MORE IS UP, which would count as a primary metaphor, and those like ARGUMENT IS WAR, which does not have a clear experiential basis and would count as a *compound metaphor*, based on a rich mapping that should in principle be decomposable into a number of interacting primary metaphors.

There is a clear affinity between Grady’s view and the kind of phenomena that permit interpretational overlap. Consider the scene that might underlie an utterance of the form given in (2) (repeated below as (6)):

(6) Can you see what’s in here?

a. free relative clause analysis:

Can you see [_{NP} what’s in here]? = ‘Can you see the thing/stuff in here?’

b. embedded interrogative analysis:

Can you see [_S what’s in here]? = ‘Can you tell what’s in here?’

Perhaps an adult is showing the child a box with something in it, and utters (6). The child looks in the box, finds out what it contains, and perhaps tells the adult. In this simple scene, the visual experience of seeing the thing(s) in the box is simultaneous with the mental experience of learning what the box contains. These two components of the scene go together so naturally that it is almost strange to consider them two different types of experience—they are really aspects or dimensions of one simple momentary experience. A

child interpreting an utterance like (6) would not have any reason to believe that it asks about a purely visual experience, as opposed to a more inclusive event involving both visual and mental experience.

Grady and Johnson (1997) and Grady (1997) refer to such scenes as *primary scenes*, and the component dimensions as *subscenes*. Primary scenes are the basis for the simple mappings that constitute primary metaphors. When they are combined with the right linguistic conditions (those that enable constructional grounding), they also make interpretational overlap possible, and can lead to conflation. Conflation, therefore, can involve the direct linguistic encoding of primary scenes.

In primary scenes, meaning components that characterize the source and target domains of metaphor come together in such a way that the relation between them is based on spatiotemporal contiguity, and may therefore be considered more metonymic than metaphorical. Therefore these scenes allow children the opportunity to progress from one meaning to the other using the same kind of reanalysis that they use in more clearly metonymic cases of overlap. Ample evidence for this view is provided in section 4.7.

Unidirectionality revisited: learning from examples

As discussed above, an important issue for conceptual metaphor theory has been the unidirectionality of metaphor, i.e. the fact that vocabulary is consistently transferred from domains that are more physical, perceptual, intersubjective, and/or psychologically salient to domains that are less so, and not vice versa. In many discussions, this tendency is attributed to the cognitive utility of the source domain, i.e. the idea that source domains are better for the purposes of reasoning, and that inferences generated in the source domain may be transferred to the target domain.

This idea assumes that the relevant inferences are domain-internal. That is, a source domain inference first and foremost characterizes knowledge about the source domain, but the mapping between source and target suggests corresponding knowledge in the target

domain. Putting it somewhat simplistically, what this means for individual instances of reasoning is that a person compares some target domain situation to a hypothetical source domain situation, performs a relevant inference that leads to additional knowledge in the source domain, and applies the inference analogically to the target domain situation, on the basis of the metaphorical correspondences specified by the mapping between domains. This is roughly the way Narayanan's (1997) computational model of metaphorical reasoning works, for example. Lakoff & Johnson 1999, in fact, hypothesize that source domains, as instantiated in the brain, have more neuronal connections than target domains do, and are therefore better suited for making inferences. This way of thinking about source domains might suggest that a single inference pertaining to a single situation would not involve both domains of a metaphorical mapping simultaneously.

This is exactly what is possible in primary scenes, however. For example, if someone sees something it can be inferred that they are aware of it and have some knowledge of it, if the level of water goes up in a glass it can be inferred that there is more water in the glass, and so forth. In this kind of inter-domain inference, the cognitive utility of the source domain is not relevant, because the target domain is reasoned about directly. Such inferences, in fact, suggest a new perspective on unidirectionality, especially as it applies to primary metaphor, conflation, and constructional grounding. It may be largely a function of the importance of certain classes of exemplar experiences in the learning process. This issue will be discussed in detail in Chapter 5, but will be briefly considered here.

Experiences that are the most useful for semantic acquisition are those that involve highly intersubjective phenomena, because adults must use linguistic forms in contexts in which children can easily infer their meanings from what is contextually salient. When adults use forms that relate to their own subjective experiences, children are not necessarily able to infer their meanings very easily. Using forms that relate to children's subjective experiences might be better, but adults do not have direct access to such experiences, and therefore are not able to reliably use appropriate forms at the right times. The intersubjective

contexts of utterances offer the most reliable opportunities for adults to use forms in a way that children can readily understand.

As an example of this point of view, consider Wittgenstein's (1957) discussion of the incoherence of the idea of a "private language", in which he considers a behaviorist position on the learning of word meanings. A child cannot learn the meaning of the word *pain* ostensively, based on reference to the subjective experience of pain, for two reasons. First, the word must be applicable to other people's pain, to which the child does not have direct access, and adults do not have direct access to the child's states of pain, which they would need for the ostensive teaching to take place. Instead the meaning of *pain* must be learned via what is more overtly observable for both parties, i.e. pain behaviors such as wincing, crying, and the like.

Source domain meanings are more perceptual in nature and therefore more closely related to intersubjective experiences than are target domain meanings. For example, it is easier to see a rise in the level of liquid in a container than it is to detect a change in the volume of a liquid, and it is easier to tell what someone is looking at than it is to tell what they are thinking. The earliest linguistic expressions that are learned by children strongly tend to relate to intersubjective phenomena like these¹. That is not to say, however, that children delimit the meanings of such expressions the same way that adults do. Rather, while they may use intersubjective phenomena to identify which situations to associate with these expressions, they may understand and represent such situations in a holistic fashion, exploiting their rich correlational structure, analogously to the way the correlational structure of experiences with simple physical objects gives rise to basic level object categories (Rosch et al. 1976). Therefore, relatively subjective aspects of these experiences might play an important role in the way they are represented, even if they do not figure as

¹ That is not to say that early forms do not relate to emotions and intentions. Such meanings can be fairly readily communicated in a non-verbal and highly intersubjective way (crying, reaching, etc.).

strongly in the way they are intersubjectively identified and associated with linguistic forms.

In this view, the intersubjective aspects of individual episodes serve as *indices*, in the semiotic sense (see, e.g., Pierce 1955 [1897]), of basic experience types for the purposes of learning. This indexing function may be reinforced by adult input, because, as H. Clark (1996) and others have observed, speakers constantly exploit indexical possibilities in their conversational interactions. Perhaps adults can exploit the natural indexical properties of intersubjective phenomena to speak indirectly to children about more subjective phenomena, achieving a kind of indirect ostension.

Since visual experiences serve as natural indices for changes of awareness, it is likely that this has a strong effect both on the way the verb *see* is used by adults speaking to children, and on the way children interpret it. It is difficult to talk to young children about mental experiences directly because such experiences are relatively private. Therefore, adults may use situations involving visual experience, and forms from the visual domain, to talk to children indirectly about certain kinds of mental experience, before children have even learned any mental vocabulary. Visual situations provide a perfect opportunity to do so, due to the correlation between visual and mental experiences of certain kinds and to the intersubjective nature of visual experience and related behavior, such as direction of gaze.

It need not be the case that adults exploit this strategy consciously, however. In a sense the strategy is built in to the language and the way adults and very young children interact. If it assumed that adults make a general effort to speak to very young children about what is easily available to them in contexts of utterance (Clark 1999 provides some discussion of this), and use the expressive possibilities that language allows them given this simple constraint, the structure of language, as it has been shaped by constructional grounding, in a sense takes care of the rest. These issues will be discussed more in Chapter 5.

4.5 The polysemy of *see*

Let us turn to the discussion of *see*, a highly polysemous verb. Here are examples of a number of different uses of *see*, many of which might be regarded as distinct conventional senses (based partly on Baker 1999):

- | | | |
|-----|---|---------------------------|
| (6) | a. Pat saw Kim. | Basic visual sense |
| | b. I'll see if I can open that jar. | 'Determine' sense |
| | c. He saw that she was working too much. | 'Recognize' sense |
| | d. See to it that your mother gets this package. | 'Ensure' sense |
| | e. Are you seeing anyone?. | 'Date' sense |
| | f. I can't wait to see my family. | 'Visit' sense |
| | g. Let me see you to the door. | 'Accompany' sense |
| | h. See , the boy is crying. | Demonstrative sense |
| | i. I see your point. | Metaphorical mental sense |

There are also other uses of *see* not listed here. It is beyond the scope of this chapter to give this complex verb a complete polysemy analysis, which is an enormous task fraught with conceptual difficulties (valiant efforts include Alm-Arvius 1993 and Baker 1999). The acquisitional phenomena discussed below, in fact, suggest some reasons for the difficulty. I will focus more specifically on the metaphorical use of *see* illustrated in (6i) and consider the way in which it arises in the acquisition process. Some of the other uses will be briefly considered in relation to the metaphorical use.

At this point in the argument the term *sense* has begun to alternate with the term *use*, and there is a reason for this. *Sense* implies a distinct meaning that is firmly established as a linguistic convention, and is most appropriate to use in reference to adult language. *Use*, on the other hand, suggests a less specific kind of pattern that can be detected in the syntactic context and interpretation of an item, without making any commitments about whether or not the pattern should be attributed to linguistic convention. The Conflation Hypothesis essentially argues that, from the child's point of view, what begin as different

uses of a single word become different senses over developmental time. It is therefore misleading to suggest that a child is exposed to different senses of the verb *see*. Rather, the child is exposed to different uses, often characterized by different syntactic properties, and must learn which of these are senses. As we will see, this process can take longer for certain senses than it does for others.

Polysemy and valence

One thing to notice about the list of examples in (6a-i) is that many of the different interpretations of *see* are characterized by particular syntactic frames (see, e.g., Landau & Gleitman 1985, Baker 1999, Paul 1982, etc.):

- | | | | |
|-----|----|---------------------------|---|
| (7) | a. | Basic visual sense | [<i>see</i> NP] |
| | b. | 'Determine' sense | [<i>see if</i> -clause] |
| | c. | 'Recognize' sense | [<i>see that</i> -clause] |
| | d. | 'Ensure' sense | [<i>see PP-to</i> (<i>that</i> -clause)] |
| | e. | 'Date' sense | [<i>seeing</i> NP] |
| | f. | 'Visit' sense | [<i>see</i> NP] |
| | g. | 'Accompany' sense | [<i>see</i> NP <i>PP-to</i>] |
| | h. | 'Demonstrative' sense | [<i>see</i> , S] or [<i>see</i> NP?] or [S, <i>see</i> ?] |
| | i. | Metaphorical mental sense | [<i>see</i> NP] |

That is, what might be considered different senses of a verb often correspond to combinations of that verb with different argument structure or *valence* patterns. In a lexicalist view of grammar (e.g. Bresnan 1982), the different patterns are attributed to different meanings of the verb, because argument structure in general is assumed to be “projected” from verb meaning. In a constructional view of grammar and lexicon, the possibility exists that the argument structures themselves carry meaning (as discussed most thoroughly in Goldberg 1995), and the semantic contribution made by a construction may overlap entirely with that of the verb, or it may be almost entirely orthogonal to it. This

makes the whole idea of a “sense” somewhat complicated, because the combination of a particular verb with a particular argument structure, and the meaning expressed by that combination, might have any of a number of different explanations.

This can be illustrated with a few examples. In the basic visual sense of *see*, we do not think of the syntactic argument structure, i.e. the fact that the verb takes a direct object, as being responsible for the meaning of simple transitive uses of the verb. Rather, given that *see* is a two-participant verb, and given how common the basic transitive argument structure is in English, it is not surprising that *see* would take a direct object. In the ‘determine’ sense, on the other hand, it is reasonable to suggest that the *if*-clause is largely responsible for the meaning, because an *if*-clause independently expresses a meaning related to a yes-no determination of the truth or validity of a proposition in some particular context. And in the case of the ‘ensure’ sense, as in *See to it that the cat gets fed* or *See to your cat’s happiness*, the argument structure neither follows from the meaning, nor is it responsible for it in a quasi-compositional sense. Rather, it seems that the whole pattern, consisting of the verb *see*, a PP complement headed by *to*, and the possibility of the preposition having an extraposed clausal complement, is a construction that conventionally (and somewhat arbitrarily) expresses the ‘ensure’ meaning. And, of course, some senses of a verb, such as the ‘visit’ sense, are not distinguished by unusual syntactic properties at all, but are distinguished by their meanings alone—e.g., the sentence *We saw Susan* is ambiguous between a basic visual reading and a ‘visit’ reading.

These complexities notwithstanding, what ultimately matters for a constructional analysis of the polysemy of a verb is whether or not each particular use is conventional—i.e., whether it is predictable from general principles or other constructions, or whether on the other hand it has properties that are independent of other facts about the language and must therefore be learned independently. Even if the meaning of one use of a verb seems to be largely attributable to the argument structure construction characterizing

that use, it may still be a conventional fact about the verb that it *can* occur in combination with that construction.

In a usage-based model of acquisition (Langacker 1987), conventionality is a matter of degree and depends largely on the acquisition process. For a given language learner, if he or she hears a verb used frequently in combination with a given argument structure, then that is a conventional property of the verb, whether or not the construction makes a predictable contribution to the meaning of the expression. However, as we saw in Chapters 2 and 3, a particular recurrent clausal pattern, such as a verb in combination with a given argument structure, may regularly generate certain pragmatic properties that come to be associated with that pattern conventionally. This is true both in the history of the language and in its acquisition. For this reason, it should not be surprising to find that different patterns such as those listed in (7a-i) should have conventional properties not attributable either to the verb or to the argument structure. That is, such patterns are often constructions in their own right. A conventional combination of a verb and an argument structure, taken to conventionally express a particular meaning, will be referred to as a *sense-construction*.

The issue of how to partition meanings among the verb, the argument structure, and the sense-construction that results from their combination is of course relevant to the analysis of verb senses in a constructional account of the lexicon, and bears on the generalizations that could characterize a speaker's grammar. However, as was the case with the WXDY construction in Chapter 2, and with the existential construction in Chapter 3, we will find that certain properties of verb senses like those listed in (7a-i) make more sense if we consider the dynamic process of language acquisition than they would if we tried to account for them only by describing a stable system attributed to adult speakers.

One form, one meaning?

The discussion above suggests that a verb is not unlikely to have a different interpretation in each different syntactic context in which it occurs. This is at odds with certain proposals

that have been made about how children's semantic hypotheses may be constrained. Clark (1987), for example, has suggested that young language learners assume that a single form has only one meaning. This is clearly not true as an absolute rule, as Clark (1993) herself later points out, because children must learn to use homonymic forms. For example, children have no trouble learning the difference between the plural marker (e.g. *the dogs ran away*) and the possessive marker (e.g. *the dog's dish*).

In the view of the Conflation Hypothesis, there is a certain amount of truth to both tendencies described above. That is, it is likely that children initially, in the absence of evidence to the contrary, hypothesize a single meaning for a form, and abandon that hypothesis when the force of evidence for linguistic delimitation requires hypothesizing two (or more) distinct meanings. In cases of homonymy such as the one involving the possessive and plural markers, linguistic delimitation would very quickly distinguish the two signs, because they would be used in such different contexts that the child would be able to quickly distinguish their semantic properties. In the case of verbal polysemy, however, the evidence that differentiates senses is often subtle and sometimes contextually ambiguous. For that reason, it may take a certain amount of time for a particular use-type to be recognized as a conventional sign. Before it is, instances that the child encounters might be assimilated to the original meaning assigned to a form, provided they are consistent with that meaning. This will become apparent in the discussion below of the relation between visual and mental uses of *see*.

Visual and mental meanings of *see*

The mental sense of *see* is part of a much more general tendency for vision-related expressions to be used to talk about mental experience. L&J 1980 call this the KNOWING IS SEEING metaphor, and give the following examples (p. 48):

- (8) a. I *see* what you're saying.
- b. It *looks* different from my *point of view*.

- c. What is your *outlook* on that?
- d. I *view* it differently.
- e. Now I've got the *whole picture*.
- f. Let me *point something out* to you.
- g. That's an *insightful* idea.
- h. That was a *brilliant* remark.
- i. The argument is *clear*.
- j. It was a *murky* discussion.
- k. Could you *elucidate* your remarks?
- l. It's a *transparent* argument.
- m. The discussion was *opaque*.

Clearly the italicized expressions in these examples exhibit a wide range of types of relation to the domain of vision. Some, such as *see*, *look*, *picture*, *point out*, *clear*, *murky*, *transparent*, *opaque*, relate fairly directly to visual experience. Others, such as *outlook*, *insightful*, and *elucidate*, relate indirectly if at all to visual experience. Words of such varying degrees of conventional association to the source domain appear to be in different stages of the same historical semantic tendency, as Sweetser (1990) discusses. It is difficult, to say the least, to determine exactly how the robust generalization provided by the KNOWING IS SEEING metaphor relates, synchronically, to the specific conventional properties of these expressions. To simply regard them all as similar reflections of a synchronic conceptual mapping is certainly a mistake.

What is needed is a way to relate the ideas of conceptual metaphor theory to the specific, conventional properties of linguistic expressions. Much work in metaphor theory has focused on the broader conceptual generalizations, and little work has focused on the issue of conventionality. Primary scenes, constructional grounding, and conflation may be useful in this regard, as we will see in the following sections. Some visual words—*look* and *see* in particular—relate in a very direct to the experiential basis of the KNOWING IS

SEEING metaphor in the acquisition process. These words, not coincidentally, also happen to be the earliest visual words learned by all the children whose corpora are examined here (and, it might be inferred, by children in general). This suggests that they may play an important role in the establishment of conceptual metaphor as a conventional semantic phenomenon.

What distinguishes literal and metaphorical meanings of *see*?

It is not an entirely straightforward matter to decide what counts as a metaphorical use of a word and what does not. The most obvious property that distinguishes metaphorical uses of *see* is that they do not denote situations involving actual vision. This can be true of many uses of *see*, however, and some of these seem much “more metaphorical” than others. It is therefore not sufficient to merely recognize use types that occur in non-visual situations.

This difficulty suggests that the distinction between metaphorical and literal use types is sometimes overestimated. On the one hand, the fact is overlooked that use types of *see* that can be clearly metaphorical also occur in contexts in which vision is an important and relevant factor. That is, the non-visual nature of the purportedly metaphorical usage patterns is overstated. On the other hand, the degree to which the literal use of *see* lacks the properties of the metaphorical use is also overstated. Sweetser (1990) points this out in reference to truth-conditional approaches to meaning: “in any objective truth-conditional understanding of vision and knowledge, seeing is accomplished by visual neural response to physical data, while knowing (whatever it may be) has no particular dependence on the visual modality. One sees objects and events; one knows propositions, and not always because of past visual input” (p. 5). A good example of the view described by Sweetser is provided by this passage from Pinker (1994):

“verbs like see that can take either objects or clausal complements do not exhibit a single content meaning across these frames: ‘see NP’ does not mean the same thing as ‘see S’. The latter is not even a perception verb: I see that the meal is ready does not

entail vision. (Clearly not, because you can't visually perceive a proposition.)

Similarly, I feel that the fabric is too smooth does not entail palpation; it's not even compatible with it. And Listen! I hear that the orchestra is playing is quite odd. (These observations are due to Jane Grimshaw.) Clearly there is a commonality running through each of these sets, but it is a metaphorical one; 'knowing' can be construed metaphorically as a kind of 'perceiving' (p. 401, footnote).

In this passage, Pinker treats all the following sentences as being similarly metaphorical:

- (9) a. I see that the meal is ready.
 b. I feel that the fabric is too smooth.
 c. I hear that the orchestra is playing.

There is no recognition that (9a-c) are in fact very different from one another: (9a) would almost certainly be used in a situation involving visual perception—it would be very strange for someone to utter it, for example, if they had been told that the meal was ready. (9b), on the other hand, would be used only in a situation involving an intellectual, aesthetic or emotional judgment, and never in a situation involving tactile sensation. And the *hear* + *that*-clause pattern shown in (9c) is a conventional way to express that someone has learned something by having it told to him or her. That is, it is likely to involve hearing, but only indirectly.

Pinker seems to base the claim that (9a-c) are all metaphorical on the assumption that their clausal complements are entirely incompatible with perceptual meanings. In fact, given Pinker's assumption that "there may be a universal mapping between the meaning of a frame and the syntax of that frame" (ibid, p. 402), we might expect that the mere occurrence of the verbs *see*, *feel* and *hear* with *that*-clause complements should be sufficient to signal to children that these are mental and not perceptual uses of these verbs. This seems unlikely. If clausal complements are simply incompatible with perceptual interpretations, it is difficult to see what accounts for the fact that (9a) and, to a lesser extent, (9c) have a preference for contexts involving vision and hearing, respectively. In

fact, in the corpus data on adult input examined below, the *see* + *that*-clause pattern is used by adult to child *only* in visual contexts. Also, the existence of overlap interpretations of the *see* + WH-clause pattern, in which the complement seems to simultaneously refer to a visible object and characterize propositional knowledge about that object, suggests that these meanings are not incompatible and are in fact complementary in the right contexts.

Overlap of visual and non-visual properties in the senses of *see*

Several of the syntactic patterns corresponding to non-visual senses of *see* listed above also occur regularly in contexts in which visual experience correlates with the kind of experience that characterizes their extended meaning. For example:

- (10) a. *see* + *if*-clause (related to 'determine' sense)
e.g. I'm going to see if there's milk in the fridge.
- b. *see* + *that*-clause (related to 'recognize' sense)
e.g. I see that there's no more milk.
- c. *see* + NP(human) (related to 'visit' sense)
e.g. Let's go over and see Pat.
- d. *see* + WH-clause (related to metaphorical mental sense)
e.g. Can you see what's in the box?

The pattern corresponding to the 'determine' sense in (10a) is frequently used in contexts in which determining is through visual means. Similarly, the one corresponding to the 'recognize' sense is often used to talk about situations in which a person is aware of a proposition by virtue of seeing a physical situation. The 'visit' sense is almost always used in reference to contexts in which a person makes visual contact with a someone else, though the attending social contact is more relevant. And, as has been briefly mentioned, and will be discussed more below, the pattern characteristic of the metaphorical mental sense of *see* occur in visual situations in which visual and mental experience are equally relevant.

It is likely, as we will see below, that many of these observations can be attributed to conflation and constructional grounding. The use types of *see* exemplified above may all be grounded in the basic visual meaning of *see*. That is, despite the fact that adults do not restrict the use of these patterns to visual situations, such situations may play an important role in the establishment of these sense-constructions as conventional representations for speakers.

Overlap utterances: *see* + WH

In both L&J 1980 and Sweetser 1990, the main metaphorical examples of *see* that are cited have it followed by a WH-complement:

- (11) a. I see what you're saying. (L&J 1980, p. 48)
- b. I see what you're getting at. (Sweetser 1990, p. 5)

These are clearly metaphorical uses of the *see* + WH-clause pattern, because their clausal complements do not refer to visible entities. There are other uses of *see*, such as the 'determine' sense, that concern mental experience, but these are not brought up as metaphorical examples. This reflects something significant about WH-complements. On the one hand they can be construed as referring to physical entities, so they seem to be parallel to the NP objects that normally occur with the basic visual sense of *see* (e.g. *I see the bus*). In this respect they resemble other less ambiguously metaphorical uses of *see* such as *I see your point*. On the other hand, they are clausal and are therefore especially appropriate for expressing mental propositions. This combination of properties in fact reflects a syntactic ambiguity that such complements have in adult language. As pointed out earlier, the referential meaning of the WH-complement corresponds to a syntactic analysis as a free relative clause, and the mental proposition meaning corresponds to an embedded interrogative analysis. This ambiguity can occur in individual uses of the WH-complement, as we saw in (2) (repeated below as (12)):

(12) Can you see what's in here?

a. free relative clause analysis:

Can you see [_{NP} what's in here]? = 'Can you see the thing/stuff in here?'

b. embedded interrogative analysis:

Can you see [_S what's in here]? = 'Can you tell what's in here?'

Section 4.6 provides evidence that the earliest interpretations assigned to WH-complements by children are closer to a headless relative reading than to an embedded interrogative reading, though they probably combine properties of both. For that reason, utterances like the ones above constitute the overlap in the constructional grounding of the metaphorical mental sense of *see* in the basic visual sense. Before we examine the child data, however, let us consider in more detail the way these overlap utterances relate to the 'determine' sense of *see*.

The 'determine' sense: *see if* vs. *see WH*-

The 'determine' sense of *see* means something very much like 'find out':

(13) a. Let's see if there's milk in the fridge.

b. Let's find out if there's milk in the fridge.

As in example (13a) above, this sense is frequently used in contexts in which the finding out would likely be achieved through visual means. It is therefore possible that this sense is grounded in the visual use of *see*. However, it is not limited to visual contexts:

(14) Let's see if the milk is cold.

Since this sense of *see* concerns propositional knowledge (e.g., the knowledge that the milk is or is not cold), and it is not restricted to visual contexts, it seems very much like the metaphorical mental sense of *see*. However, it is not usually cited as a metaphorical use of the verb. One reason is probably the fact that it is not parallel to the visual use in important respects. That is, it has properties, other than the fact that it is used in non-visual situations, that distinguish it from the basic visual use of *see*.

Foremost among these properties is the *if*-complement, which cannot under any circumstances refer to a visible entity. In clearly metaphorical uses of a verb, we generally expect its complementation or modification properties to be compatible with non-metaphorical uses. This is the case, for example, with most of the italicized expressions in (8a-m) that are actually used in literal visual contexts:

- (15)
- | | |
|---|--|
| a. I <i>see</i> what you're saying. | I <i>see</i> what you're holding. |
| b. It <i>looks</i> different from my <i>point of view</i> . | (could be literal) |
| c. What is your <i>outlook</i> on that? | (not used in literal contexts) |
| d. I <i>view</i> it differently. | ? I <i>view</i> it through binoculars. |
| e. Now I've got the <i>whole picture</i> . | I painted <i>the whole picture</i> . |
| f. Let me <i>point something out</i> to you. | (could be literal) |
| g. That's an <i>insightful</i> idea. | (not used in literal contexts) |
| h. That was a <i>brilliant</i> remark. | That was a <i>brilliant</i> flash. |
| i. The argument is <i>clear</i> . | The water is <i>clear</i> . |
| j. It was a <i>murky</i> discussion. | It was a <i>murky</i> pool. |
| k. Could you <i>elucidate</i> your remarks? | (not used in literal contexts) |
| l. It's a <i>transparent</i> argument. | It's a <i>transparent</i> box. |
| m. The discussion was <i>opaque</i> . | The mixture was <i>opaque</i> . |

This expectation of a syntactic parallel between literal and metaphorical uses of a word is a result of the idea of a mapping in combination with principles of compositional semantics. In a metaphorical use of a verb, the complements of the verb should denote elements of the target domain meaning that are involved in the metaphorical mapping. That means there should be corresponding elements in the source domain. According to the invariance hypothesis (Lakoff 1990), the elements of different domains that correspond to one another in a metaphorical mapping are of the same very general types: entities map onto entities, relations map onto relations, and so forth. That means we would expect them to be expressed in both domains by the same basic types of constituents, with NPs expressing

entities, verbs expressing events and other relations, adjectives expressing properties, and so forth. Because an *if*-clause cannot refer to a visible physical entity, it is difficult to construe *see* followed by an *if*-clause as metaphorical.

The lack of metaphorical quality of the *see* + *if*-clause pattern, then, is likely due the semantic properties of *if*-clauses. These properties, in fact, have aspectual consequences. While the basic visual sense of *see* can be used statively, or *imperfectively*, in Langacker's (1987) terminology, the 'determine' sense is *perfective* in Langacker's sense—i.e., it denotes an event construed as involving change over time. Therefore it cannot be used statively:

(16) * I see if there's milk in the fridge.

This is not due either to the meaning of *if*-clauses alone, or to the meaning of *see* alone, since both of these can occur in stative contexts:

(17) a. I wonder if there's milk in the fridge.

b. I see something on the ceiling.

Perfectivity is thus a property of the *see* + *if*-clause sense construction. This makes sense if the construction is indeed based on situations in which a person has a visual experience and thereby determines something, because such situations necessarily involve a change from one mental state to another. In situations like this, seeing causes an event of finding out, and can be understood to metonymically stand for this event.

Unlike *if*-clauses, WH-complements can occur with *see* with an imperfective reading, as well as with a perfective reading.

(18) a. I see what's in the box.

b. I'm going to see what's in the box. (perfective construal possible)

Future-directed contexts are compatible either with perfective or imperfective readings:

(19) a. I'm going to see if there's milk in the fridge.

b. I'm going to see the Brooklyn bridge.

For this reason, it is difficult in principle to distinguish between the metaphorical mental sense of *see* and the ‘determine’ sense in future-directed contexts:

- (20) a. I’m going to see if there’s something in the box.
b. I’m going to see what’s in the box.

Both of these uses of *see* can be paraphrased by *find out*:

- (21) a. I’m going to find out if there’s something in the box.
b. I’m going to find out what’s in the box.

Because the *if*-clause is not compatible with an imperfective reading, it makes (21a) unambiguous, while (21b) is ambiguous.

As we will see in the child language data below, the perfective ‘determine’ sense of *see*, which we can think of as being metonymically motivated, emerges much earlier in acquisition than does the imperfective metaphorical mental sense. That is, children start producing non-visual ‘determine’ uses of *see* before they start producing non-visual metaphorical uses.

This can be explained by conflation and sense differentiation through linguistic delimitation. It has been suggested that the acquisition of *see* begins with the following hypothesis: it always applies, extensionally, to situations involving vision, but its meaning is not delimited the way the “literal” sense of *see* is—i.e., intensionally it is not characterized, as the adult visual sense arguably is, by the notion that visual experience is separable from mental experience in these situations. Rather, the intensional meaning of *see* at this stage consists of a holistic representation of seeing situations that includes mental experiences that are naturally a part of such situations. In this view, the child’s identification of non-visual senses of *see* need not involve extending it to a new domain, but might consist more in isolating aspects of mental meaning that are there from the beginning.

To achieve this, the child can use processes of reanalysis similar to the ones we examined in Chapters 2 and 3, and the process of linguistic delimitation, in which positive

linguistic evidence demonstrates that certain aspects of meaning are not essential to (or indeed are incompatible with) the semantic representation of the verb. These processes apply to all the senses of *see* that are grounded in visual *see*. The ‘determine’ sense emerges early because it is characterized by *if*-complements. They provide unambiguous evidence for a meaning that is distinct from the normal, imperfective visual meaning of *see*, even when they are used in visual situations (like (13a)), because they do not denote visible entities, and are in general only compatible with perfective readings. That is, they force the child to hypothesize a new perfective sense of *see* in which it bears a different kind of relation to its complement than it does in normal visual uses. Because an *if*-clause cannot represent a visible entity, the child is forced to a metonymic interpretation of sentences like (19a) which means something like ‘find out by seeing.’ Once this occurs (and it apparently occurs at quite a young age), the child may be understood to have a metonymic ‘determine’ sense of *see* established, and this sense quickly becomes reanalyzed such that it can denote perfective finding out even in non-visual contexts.

The imperfective metaphorical sense of *see* is slower to emerge because it is characterized, in the input to the child, by ambiguous uses of WH-complements. These complements can denote visible entities and are not restricted to perfective contexts, so they do not challenge children’s original hypothesis about *see* when they occur in visual contexts.

Interestingly, then, the very properties that make the metaphorical mental sense of *see* metaphorical—i.e., its parallels to visual *see*—are also responsible for its slower differentiation from visual *see*. This fact provides strong additional evidence for the Conflation Hypothesis that converges with overlap evidence like that presented in previous chapters.

4.6 Constructional grounding and WH-complements

As mentioned above, WH-complements occur in contexts in which they can be construed either as free relative clauses or as embedded interrogative clauses. It is argued here that these two complement types participate in a process of constructional grounding, with free relatives serving as the source construction and embedded interrogatives as the target.

This case of constructional grounding is complicated somewhat by the fact that WH-complements are an embedded version of a construction that also occurs in main clause contexts. As discussed in Chapter 2, children learn to ask WH-questions quite early. What is the relation, then, between main clause WH-questions and embedded questions on the one hand, and between main clause WH-questions and free relatives on the other?

Intuitively, WH-questions would seem to be closer in meaning to embedded interrogatives than to free relatives. But this is not necessarily the case. Embedded interrogatives are a significant abstraction from main clause questions. The relationship between main clause questions and their answers is an instrumental one: people utter questions in order to elicit answers. The relationship between embedded questions and answers, however, is a symbolic one, i.e. embedded questions denote either questions or answers construed as abstract mental entities:

- (22) a. I asked Pat who was at the door.
a'. = 'I asked Pat the question: Who is at the door?'
b. I told Pat who was at the door.
b'. = 'I told Pat the answer to the question: Who is at the door?'

A free relative refers to an entity (when it is used referentially), and simultaneously characterizes that reference as an answer to a potential question (i.e. as an entity that is bound to an open argument position in a proposition) (as in (23a)). When free relatives are used predicatively, they perform just the second function (as in (23b):

- (23) a. Pat always eats what I eat.
b. That's what I ate for lunch yesterday. (pointing to something)

Both embedded interrogatives and free relatives, then, clearly relate to main clause questions yet have properties that distinguish them semantically from main clause questions. It is argued here that most children do not make a distinction between these two types of embedded WH-clause in the earliest stages of acquisition. Because free relatives can refer to physical entities and embedded interrogatives cannot, however, the former are more suited to serve as a source construction, and accordingly, children's earliest uses of embedded WH-clauses tend to have the referential properties of free relatives.

As in the other cases of constructional grounding that we have considered, these constructions have various properties that distinguish them from one another, including different distributions. Because they are both embedded constructions, the most important distributional generalizations about them concern the predicates that govern them. Embedded interrogatives commonly occur only with predicates in the following classes: communication (e.g. *ask, tell*), cognition (e.g. *know, wonder*), and perception (e.g. *look, see*). These are the classes of predicate that normally take complements expressing mental propositions. In these contexts, a WH-complement denotes knowledge that can be characterized as an answer to a question:

- (24) a. I wonder who won the prize.
a'. 'I want to know the answer to the question: Who won the prize?'
b. Tell me who won the lottery.
b'. 'Tell me the answer to the question: Who won the prize?'

Free relatives, on the other hand, occur with a wider variety of predicates, because they are equivalent to NPs. In the context of free relatives, WH-words are relative pronouns (without antecedents), while in the context of embedded interrogative they are normally analyzed as question words of the same kind that occur in non-embedded contexts.

Some researchers (e.g. Kuroda 1968) have pointed out that the suffix *-ever* only attaches to the relative pronoun WH-words and not to the question words. This fact makes it easier to identify free relatives by comparing them to paraphrases with the *-ever* suffix:

- (25) a. I'll visit whoever I want to visit.
 b. ? I'll visit who I want to visit.
- (26) a. I'll eat whatever I want to eat.
 b. I'll eat what I want to eat.
- (27) b. I'll put the box wherever I want to put it.
 a. I'll put the box where I want to put it.
- (28) a. I'll eat whenever I want to eat.
 b. I'll eat when I want to eat.
- (29) a. I'll do it however I want to do it.
 b. *I'll do it how I want to do it.
- but
- c. I like how you've decorated the place.
 d. Let me see how you walk with crutches.
- (30) a. * I'll do it whyever I want to do it.
 b. * I'll do it why I want me to do it.

As these data show, some WH-words work better as antecedentless pronouns (without the *-ever* suffix) than others. *What* works the best, and *where* and *when* also work very well. *How* works only under certain circumstances, and *who* does not work well. *Why* cannot be used as a pronoun with or without the *-ever* suffix.

The word *how* exhibits a Manner/Means ambiguity (discussed in Goldberg 1995) that is distinct from yet related in an interesting way to the difference between a referential and a non-referential reading. Manner is a more physical property than Means. It can characterize, for example, the shape of the trajectory of a moving object, whereas Means deals with more abstract notions of causation. When a Means is visible, it is only because it has Manner-like properties. For example, in a sentence like (31), the aspect of the meaning of the *how*-expression which corresponds to something visible to the speaker is the most Manner-like aspect of its meaning:

(31) I carefully watched how the chef cut the scallops.

We will see below that the WH-words that are produced earliest by children in embedded clauses are also the ones that work best as pronouns, and the contexts in which they occur support their NP-like interpretations.

WH-complements in child language

The data in Tables 2-8 show a very interesting pattern in children's earliest productions of WH-complements. For six of the seven children in this study, the earliest embedded WH-clauses occur governed by *see*, *look*, *find* or *show*. The meanings of these verbs, especially at this stage of acquisition, are closely related to situations involving perception. This is obvious in the case of *see* and *look*, but is also true for *find* and *show*: to find something is typically to encounter it through visual, haptic or other perceptual searching, and to show something is typically to allow someone else to see it. As a general tendency, only after WH-complements are first used by children with perception-related words like these do they occur with mental verbs like *know*. This in itself is not surprising, since it is a well-established fact that children tend to learn common perception words before learning cognitive words (see, e.g., Bartsch and Wellman 1995). However, the consequences for WH-complements are interesting: since perception words concern both responses to physical entities and states and changes of awareness of such entities, the earliest occurrences of WH-complements tend to be compatible with free relative interpretations (despite the fact that free relatives are usually considered a more marginal construction of English) as well as embedded interrogative interpretations.

Not only are the earliest WH-complements of most of the children governed by predicates that are compatible with free-relative readings—they also have intrinsic properties that make them like free relatives. The WH-words that occur in the earliest WH-complements produced by the children are *what*, *how*, and *where*—those that work as relative pronouns and that can refer to visible entities (*when* also works as a relative

pronoun, but refers only to non-visible temporal entities). This provides additional evidence that these earliest WH-complements have the referential properties of free relative interpretations. The fact that *who* does not occur suggests in fact that they may be based largely on free relative models in the adult input. Many of them are also compatible with embedded interrogative interpretations, however, in the sense that they denote mental propositions that answer relevant questions. For example, consider the following actual example from Table 2:

(32) Show me how to make animals.

- a. free relative interpretation: ‘Let me see the actions you perform to make animals.’
- b. embedded interrogative interpretation: ‘Teach me the answer to the question: How do you make animals?’

In this utterance, the WH-complement has the properties of both a free relative and an embedded interrogative. In the free relative interpretation, the word *how* denotes something like the Manner in which an action is performed. This is what the adult would be able to allow the child to literally see. In the embedded interrogative interpretation, *how* denotes something more like a Means by which something is achieved. But of course, these interpretations go together: by watching what the adult does, the child learns how animals are made.

The above observations about the following tables strongly support the hypothesis that embedded interrogatives are constructionally grounded in free relatives. The tables show all the earliest embedded WH-clauses for each child in chronological order. In Stage 1 uses, WH-clauses only occur governed by perception-related verbs. In Stage 2, they are governed by the mental verb *know*. This is the first mental verb to be used by each child. Only the first few mental uses are shown for each child—just enough to demonstrate the beginning of a new stage. The WH-clauses are underlined in these examples, and the verbs that govern them are in bold. Formulaic expressions (e.g. parts of nursery rhymes and songs) and

those with single-word WH-complements are not counted and appear in italics. Because some of the utterances are unconventional it is hard to know whether they contain WH-complements or not. Questionable uses like this are included in the tables and categorized according to their apparent meanings, though the results would be the same if these examples had been left out.

Table 2: Abe's earliest embedded WH-clauses in chronological order

Stage 1

- 2;5.0 **Look** what Jean gotted for me.
- 2;5.7 **Look** what's in here.
- 2;5.7 **Look** what I find!
- 2;6.4 **Show** me how to make animals.
- 2;6.10 You want to **see** what it is?

Stage 2

- 2;6.18 I **know** what good ice what goes in there
- 2;7.15 **Know** what I like to do?
- 2;9.11 You **know** who sent my Mommy this?

Table 3: Adam's earliest embedded WH-clauses in chronological order

Stage 1

- 2;4.3 **See** what bear?
- 2;4.3 **See**...what happened.
- 2;4.30 **Show** shopping what in there.
- See**...what else...fell down...Mommy?

Stage 2

- 2;7.14 **Know** what they eat?
- 2;11.13 You **know** with you what dat?
- 2;11.13 I don't **know** where caboose is.

Table 4: Naomi's earliest embedded WH-clauses in chronological order

Stage 1

- 1;10.10 *Tenne how.* (=Tell me how? no full complement)
2;3.19 I **finded** where the swing is.

Stage 2

- 2;8.14 I don't **know** where your buttons are.

Table 5: Nina's earliest embedded WH-clauses in chronological order

Stage 1

- 2;2.28 I **show** you what that rabbit on the head.(missing verb?)

Stage 2

- 2;3.18 *Twinkle star I wonder what you are.* (formulaic)
2;3.18 **Know** what happen?
2;3.18 *I wonder what you are.* (formulaic)
2;3.18 *How I wonder what you are.* (formulaic)
2;3.18 *Twinkle star wonder what you are.* (formulaic)
2;3.18 You **know** what these things are called?

Table 6: Peter's earliest embedded WH-clauses in chronological order

Stage 1

(Peter's first embedded WH-clauses are in Stage 2):

Stage 2

- 2;3.21 Adult: Do you know what it is?
 Child: **Know** what is.
2;4.14 **Know** where Daddy is.

I said don't **know** where Daddy is.

Know what that is.

Table 7: Sarah's earliest embedded WH-clauses in chronological order

Stage 1

- 2;9.29 That...what do.
2;8.2 *Know what?* (idiomatic, no full complement)
2;11.2 *Tell me what you think of me.* (formulaic)
3;1.3 *See how good?* (special scalar use of how)
3;1.24 *You know what?* (idiomatic, no full complement)
3;1.17 I **look** how a shoes.
3;2.10 **Look** what I did.

Stage 2

- 3;2.23 That's what you told me last night.
3;3.13 I don't **know** where it is.

Table 8: Shem's earliest embedded WH-clauses in chronological order

Stage 1

- 2;2.16 Gup (go up?)...den uh **see** what n doing n go beep.
2;3.21 Wanna **see** how walk.
2;3.21 Turn it on and **see** how works.
2;3.28 Going **show** how to walk. (repeated)

Stage 2

- 2;4.25 That's what she did.
2;4.25 Oughta **know** where my blocks go.
2;5.2 You **know** what this is?

All the children except Peter first produce what are here called Stage 1 uses of WH-complements. i.e. uses in which they can plausibly be interpreted as referring to visible

entities. In this stage, in which embedded WH-complements occur only with perception verbs, there is no evidence that the children make a distinction between the free relative and the embedded interrogative as constructions. This is different from the previous cases of constructional grounding that we have seen, in which the properties of the source construction are clearly established first, and the target construction makes its first appearance in children's productions as a subtype of the source construction. We could think of the earliest uses of WH-complements as already exemplifying the overlap stage. That is, we might think of free relatives and embedded interrogative as being conflated in the earliest stage of acquisition.

Look and see

See and *look* are the first vision words learned by children. Both of them occur frequently in what can be called *demonstrative* uses, which are in fact among the first to appear in children's speech. In the Stage 1 examples above, *see* occurs both demonstratively (*See what else fell down?*) and in its more standard usage (*Wanna see how walk*). *Look* occurs only in its demonstrative usage (*Look what's in here*).

In demonstratives, the verb occurs in initial position without a subject, as in an imperative. However, demonstrative *see* and *look* have properties that distinguish them from imperatives as well as from each other.

The verb *look* normally does not take a direct object. Rather, it takes a PP headed by *at* or some other directional PP:

- (33) a. * Pat looked the clock.
 b. * Pat looked what I was doing.
 b. Pat looked at the clock.
 c. Pat looked down the hall.

Demonstrative *look*, however, always takes a WH-complement that refers to something visible:

- (34)
- a. Look who just walked in the door.
 - b. Look what I have.
 - c. Look where Pat is standing.
 - d. ?? Look when that guy fell down.
 - d. Look how that tire is wobbling.
 - b. ?? Look why I'm here.

The function of demonstrative *look* is to call an addressee's attention to some visible entity or situation. It relates to the normal meaning of *look*, because it actually directs someone to perform an act of looking, but must be considered a special sense-construction, because it is pragmatically much more restricted and has different complementation properties. The type of complement that demonstrative *look* takes, in fact, is quite interesting: it has the properties of the overlap WH-complements that play a pivotal role in the constructional grounding of embedded interrogatives in free relatives. Therefore, the demonstrative *look* construction might be regarded as a conventionalized by-product of this constructional grounding process.

Demonstrative *see* is similar to demonstrative *look* in that it serves to direct an addressee's attention to some visible entity or situation. However, it differs from demonstrative *look*, because it combines a directive speech act force with a question. It has the rising intonation of a question and can be felicitously followed by an answer, whereas demonstrative *look* has the intonation of an imperative and cannot be felicitously followed by an answer:

- (35)
- a. Q: See what I have in my hand?
A: Yes.
 - b. Look what I have in my hand.
*A: Yes.

In addition, demonstrative *see* can also be used metaphorically, but demonstrative *look* cannot:

- (36) a. See why I think Frege is wrong about the sense of sentences?
 b. *Look why I think Frege is wrong about the sense of sentences.

This difference might be related to the different speech act forces of the two types of demonstrative. A person can be directed to pay attention to something in the immediate utterance context, but cannot be directed to know something. However, to be asked if one knows something is perfectly natural. Therefore, demonstrative *see* is much better suited to be reinterpreted as being about knowledge than is demonstrative *look*.

4.7 Visual and mental uses of *see* in children's input and production

This section presents corpus evidence supporting the Conflation Hypothesis. In this study, the analysis of the data is a little more complicated than in the last two chapters. In addition to identifying the progression from source to overlap to target, it is also necessary to keep in mind the difference between the metaphorical use of *see* and other uses that can occur in non-visual situations—in particular, the ‘determine’ use. While there are utterances that involve overlap between the imperfective visual use of *see* and the imperfective mental use, there are also utterances that show a three-way overlap involving these two use types as well as the ‘determine’ use type. These are the utterances in which *see* is followed by a WH-clause in a future-directed context that is compatible with either a perfective or an imperfective reading:

- (37) Let's see what's in the fridge.

As discussed above, sentences like these show two distinct sources of overlap between a visual and non-visual interpretation. One is the possibility that the complement of *see* may denote a visible entity (as in *I see what's in your hand*). The other is the possibility that the combination of *see* and its complement may denote a mental event to which vision bears a metonymic relation (as in *I'll go see if there's milk in the fridge*). Because these two sources of overlap come together in sentences like (37), we will consider such sentences separately from imperfective ones like (18a).

How adults use *see* when speaking to children

In order to provide a picture of the kind of linguistic evidence that is available to young children learning the verb *see*, this section examines all the uses of *see* by both adult and child in Clark's Shem corpus, and shows the frequencies of different use types.

The Conflation Hypothesis makes a fairly strong prediction about the acquisition of *see*, namely, that the child has the opportunity to learn the mental metaphorical use through uses in which visual and mental interpretations overlap. This means, of course, that there should be such overlap uses in children's input. Due to the complications described above, clausal complements in general have the potential to exhibit visual/mental overlap for the child, so they are first considered together as constituting a single use type, and then are broken down into separate subtypes. Below, the different use types that are frequent in the corpus are listed and described. Table 9 gives their relative frequencies, and Tables 10-14 show the breakdown of the use types in which *see* is followed by a clausal complement.

Demonstrative: *See* followed by a phrase with question intonation, or *see* with question intonation followed by a clause:

- (38) a. See the baby?
b. See, she wants the ball.

The primary function of *see* in both of these contexts is to call someone's visual attention to an entity or situation.

Visual: *See* followed by an NP that refers to a visible entity. These include uses in which the NP is followed by a Predicate of some kind, including a gerundive VP or a bare stem VP. While it is an interesting issue the ways in which these differ, semantically and syntactically, from the normal *see* + NP pattern, it is not especially relevant to the discussion here, so these uses are grouped together.

- (39) a. Can you see the page?
b. I see a dog.

- c. I see a dog running across the yard.
- d. Did you see that dog run across the yard?

Tag: Like Demonstrative uses with a clause, except *see* occurs after the clause rather than before:

- (40) The cat is wearing a hat, *see*?

See + clause: *See* followed by a clausal complement (either an *if*-clause, a WH-clause, or a non-interrogative finite clause):

- (41) a. I see what you have in your hand.
 b. Let me see what you have in the bag.
 c. Let's see if there's anything in the bag.
 d. I see there's something in that bag.

See?: A use of *see* as a complete utterance with question intonation. Resembles the Demonstrative use, except what it is being demonstrated is not described by the speaker, but is rather contextually understood.

I see: *I see* occurring alone or as a separate intonational phrase:

- (42) a. I see.
 b. Oh, I see, it's all gone.

Let's see: *Let's see* occurring alone or as a separate intonational phrase:

- (43) a. Let's see...
 b. Let's see, what do we have here?

Visit: Metonymically refers to visiting a person:

- (44) Let's go see Mommy at work.

Misc: All other uses of *see*, including formulaic ones.

- (45) See you later!

Table 9: Relative frequencies of different uses of *see* in the Shem corpus

<u>USE TYPE</u>	<u>ADULT</u>		<u>CHILD</u>	
	<u>number</u>	<u>% of total</u>	<u>number</u>	<u>% of total</u>
Demonstrative	331	28%	42	17%
Visual	265	23%	123	48%
Tag	158	14%	11	4%
See + clause	122	10%	16	6%
See?	104	9%	22	9%
I see	51	4%	1	<1%
Let's see	46	4%	3	1%
Visit	30	3%	12	5%
Misc.	59	5%	24	9%
total	1164	100 %	254	100 %

Observations about the table.

The most frequent uses of *see* by adults are Demonstratives (28%). Due to their similar semantic-pragmatic functions, Demonstrative, Tag and lone question-intonation uses of *see* could be lumped together in the same category, which would then make up half (51%) of the adult uses of *see*. Semantically and pragmatically, these uses are very similar to overlap uses, because, while they serve to direct an addressee's visual attention to something, they also serve to make the addressee aware of a new object or situation (not entirely unlike the overlap deictics discussed in the Chapter 2). For that reason, if the child hypothesized a meaning for *see* that conflated visual and mental dimensions of meaning, Demonstrative uses would certainly not challenge that hypothesis in any way.

Uses of *see* followed by a clausal complement constitute about 10% of adult utterances (these do not include demonstrative uses in which *see* is set off in a separate intonational phrase, e.g. *You see, he's on the floor*). Of these, most occur in contexts involving visual experience. Table 10 presents the percentages. Because clausal complements include *if*-clauses, WH-clauses and non-interrogative finite clauses, Table 11 shows the relative frequencies of these different types, and Tables 12-15 show how frequently each of these types is used in visual and non-visual contexts.

Table 10: Adult uses of *see* + clause by visual/non-visual distinction

Used in visual context:	84	69%
Used in non-visual context:	38	31%
Total:	122	100 %

Table 11: Adult uses of *see* + clause by complement type

<i>if</i> -clause	74	61%
WH-clause	43	35%
non-interrogative finite clause	5	4%
Total:	122	100 %

Table 12: Adult uses of *see* + *if*-clause by visual/non-visual distinction

Used in visual context:	36	49%
Used in non-visual context:	38	51%
Total:	74	100 %

Table 13: Adult uses of *see* + WH-clause by visual/non-visual distinction

Used in visual context:	43	100%
Used in non-visual context:	0	0%
Total:	43	100 %

Table 14: Adult uses of *see* + finite clause by visual/non-visual distinction

Used in visual context:	5	100%
Used in non-visual context:	0	0%
Total:	5	100 %

Table 15: Adult uses of *see* + WH-clause by perfective/imperfective distinction

Used in perfective context:	23	53%
Used in imperfective context:	20	47%
Total:	43	100 %

As Table 14 shows, all the adult uses of *see* with a non-interrogative finite clause complement are in visual contexts, i.e. contexts in which the speaker (they are all first person singular) is aware of a proposition by virtue of seeing a situation:

(46) Child's age: 2;3.16

I see you got a little piece of dirt on it, here.

(47) Child's age: 2;5.16

Yeah, I see you fell right down.

(48) Child's age: 2;6.6

I see you got scratches...the other leg...did she scratch you again ?

(49) Child's age: 2;5.27-8

Ooh, I see you're taking out only that one kind, right ?

(50) Child's age: 2;7.26

I saw that your mommy was just making some tea when I got here.

This lends credence to the claim that the 'recognize' sense (the same one discussed in the Pinker quote above) is grounded in visual situations in the acquisition process. This suggests that finite clause complements are not incompatible with perceptual interpretations.

Likewise, as Table 13 shows, all the occurrences of *see* with a WH-clause are in visual situations. About half of these are in perfective contexts, in which they are compatible with the 'determine' sense characteristic of the *see* + *if*-clause pattern, and the other half (roughly) are in imperfective contexts in which they most clearly resemble metaphorical mental senses. Here are some examples:

(51) Child's age: 2;3.2

Can you **see** what's in here? (Showing child the little window on a tape-recorder)

(52) Child's age: 2;3.16

Oh, I **see** what you wanted. (In response to child's request to go get a toy)

(53) Child's age: 2;4.25

(looking at a book together)

Adult: who's that?

Child: A man's taking a purse to...back to the bunny, and taking a purse...she's mad.

Adult: Yeah, I can **see** why.

(54) Child's age: 2;5.2

Now you push that and **see** what happens

(55) Child's age: 2;6.6

(Child is looking out the window at a little balcony opposite)

Child: Yeah, yeah.

Adult: Oh, I **see** where you wanna go, okay.

(56) Child's age: 2;7.10

Adult: She's measuring him.

Adult: She's **seeing** how long he is.

Child: Yeah, measure...

(57) Child's age: 2;9.27

Child: That?

Adult: What is this thing?

Child: You put pennies in it, and it goes like that.

Adult: Oh, maybe I have some pennies we can put in and **see** how it works.

(58) Child's age: 2;10.2

(looking at a picture book):

Let's turn the page and **see** what happens.

(59) Child's age: 2;11.28

(doorbell rings)

Oh, let's **see** who's there.

(60) Child's age: 3;1.27

Child: No...no, no!

Adult: Well, do you want this to close or to open?

Child: Tape it to there, right there.

Adult: Oh, I **see** what you mean! So you want this to go like this.

Child: Yeah , that's right.

(61) Child's age: 3;1.27

Adult: But if you take that tape off, then the top will fall apart, it won't be like a
little roof anymore, **see** what I mean?

Child: There, it stays together.

Comments

These data suggest that adult uses of *see* to children have the right properties to support the grounding of various non-visual senses of the verb in visual uses. While the vast majority of adult uses occur in visual contexts, there are various use-types that exhibit important properties of non-visual senses, including the metaphorical mental sense. All the uses in which *see* is followed by a clausal complement, in fact, provide the child with a precedent for using this visual verb in reference to situations that involve the mental apprehension of a proposition. In the cases of *see* with a WH-clause and *see* with a non-interrogative finite clause, all the child-directed uses nonetheless have a possible visual interpretation. That is, these uses regularly combine properties of visual *see* and mental *see*. Most interestingly, they include overlap uses of expressions, such as *I see what you mean* (example (60)), that are strongly associated with the metaphorical sense of *see* and may be used relatively infrequently in such a visual way in adult-to-adult speech.

While straightforward visual uses of *see* followed by an NP comprise only about 23% of the utterances with *see* by adults, they make up almost half of Shem's utterances. It is therefore clear that these visual uses have a special salience for him. Nonetheless, he produces some utterance that fall into each of the use types most frequently produced by adults. This is not surprising, because the high percentage of overlap utterances in the adult input means that these use types can be assimilated to the visual meaning that the child assigns to *see*, assuming this visual meaning is vaguely enough delimited that it may allow for mental aspects of meaning in addition to visual ones. If the child had a metaphorical understanding of the *see* + WH-clause pattern at this state, we would expect to find unambiguously mental uses of this pattern—ones that could not be assigned a plausible visual interpretation. But we do not. If, on the other hand, the child had learned only the literal meaning of *see*, we would not expect to find the full range of use-types in the child's productions. This suggests that the child indeed assimilates the overlap uses produced by the adult to a holistic visual meaning.

Evidence for overlap

The following tables show the evidence that all the children in this study produce overlap uses of *see* before they produce metaphorical uses. Table 16 shows the evidence for the grounding of the metaphorical use of *see* in visual uses. Stage 1 shows overlap uses, in which *see* is followed by a WH-complement, the WH-complement could be taken to refer to a physical entity, and a stative/imperfective interpretation is likely. Stage 2 shows utterances that are at least similar to metaphorical ones. These have the same properties as the overlap uses, except the WH-complements do not clearly refer to visible entities (though in some cases these involve a metonymic relation between seeing and mental apprehension).

The data for Stage 1 would be much more abundant if they included uses of *see* followed by a WH-complement that are ambiguous between an imperfective and a future-directed perfective reading. These utterances are shown in Table 17.

Table 16: Stages in children's uses of WH-clauses

Stage 1: Overlap uses: visual uses of *see* + WH-complement

Abe	3;2.1	See what I made?
	3;2;21	I don't see where this one goes.
	3;4.1	Daddy see see what I'm doing?
	3;4.8	I can't see what I'm doing.
	3;4.19	See where I'm pointing?
	3;6.4	Did you see what that girl had to cut pizza?
	3;8.21	See how many?
Adam	2;7.14	See what else fell down, Mommy?
	2;11.28	I see what happens.
	3;3.18	See what's happening?
	3;4.18	See what happens?

	3;5.0	See what I did?
	3;5.15	See what he doing?
	3;6.9	See what I got in my hand?
	3;6.9	See how I write?
	3;10.15	See what happens?
	3;11.14	Mommy, see what I see?
	4;1.5	See how you do it?
	4;3.9	Hey, let me see what you have today. See, Mommy, see what my horse told me to do? Mommy, let me see what she has now.
	4;3.13	See what fish do? See what's on the back?
	4;7.29	See what happens?
	4;9.2	See what I can make? See what else I can make?
	4;10.2	See what I made? See what else?
Naomi	2;8.23	See what is in here.
	2;9.9	See how they run.
	3;3.27	Wanna see how I eat the paper?
Nina	2;4.26	See where my monkey is.
	2;9.21	See what he doed?
	2;10.28	See how I eat it.
	3;2.21	And I saw where he was.
Peter	2;6.14	See what's in here. See what's the mommy's doing.
Sarah	3;5.13	See what's in it.
	3;6.16	See how this works?
	4;0.5	See what I done to these.
	4;2.1	You want to see how I make a "k"?
Shem	2;2.16	See what n doing n go beep.
	2;10.2	They see where Huckle and they blow that horn.

Stage 2: Non-visual uses of *see* + WH-complement

(complements do not clearly refer to visible entities)

Abe	3;9.12	Mom, I see what's the problem.
	3;10.7	I didn't see what was the matter with it.
	4;3.7	Oh I see what you mean.
	4;9.24	See what I mean?
Adam	4;10.2	You see a magic way to do it.
Naomi	3;4.0	You see why these things are getting rust in them.
Nina	---	
Peter	---	
Sarah	4;5.8	And you'll see what I will mean.
	4;9.19	You see what I doing in my school now?
Shem	---	

Table 17: Overlaps ambiguous between imperfective and perfective interpretations

Abe	2;7.15	I want to see what's in there.
		Let's see what's in the glue.
	2;10.3	I want to see what's in it.
	3;2.26	I want to see...what's under there.
		Then I will see how big I am.
	3;5.17	I'm going to see where the band was right?
	3;7.15	I wanted to see who was ringing.
	3;8.28	Want to see how fast I could run, Mom?
Adam	3;1.9	Press it...surprise...and see what's in it.
	3;2.9	I want to see what's going on in there.
	3;3.4	Let's see what happens.
	3;4.18	You open this Mommy...and see how it goes.
	3;7.7	Let's do the other one and see what happens.
	3;8.0	She gonna let me see what in bag.
	4;3.9	Let me see what else I would want.
		Let me see what happens when I turn the light off.

		Mommy, can I see who it is?
		I want to see where I can put some more.
		Let me see what you have today.
		Let me see what you have there.
		Mommy, let me see what see has now.
	4;6.24	You want to see what happens?
		See what I can get for a mother.
	4;7.0	I want to take off the top and see what happens, OK?
		You would like to see how it works?
		I want to see what's happening.
	4;7.29	I want to see what happens if you put on on there...
		See what happens?
	5;2.12	Now, let's see what's gonna happen.
		Keep on growing and I want to see what happens.
Naomi	2;8.23	See what is in here.
	3;3.27	Wanna see how I eat the paper?
Nina	2;4.26	See where my monkey is.
	2;10.28	I just opened that think and see what was in there.
	2;11.16	Let's close the door and see what happens.
	3;1.6	Let's see what's in there.
Peter	2;521	Let's go and see who's in my room.
	2;6.14	See what's in here.
Sarah	3;5.13	See what's in it.
	4;2.23	See who has one.
	4;3.19	I see what happens then.
Shem	2;3.21	Want to see how walk.
		Turn it on and see how works.
	2;7.18	...see what is in the flower, okay?
	2;8.15	Let's get down...and see what I do in my room.
	2;10.2	They see where Huckle and they blow that horn.
	2;11.1	You turn the page and see what he's doing.
		You turn the page and see what will happen.

- 2;11.10 See how we got these chairs?
 We'll see what's in the kitchen...
- 3;1.27 I'm going...to see what's the trouble.

Discussion of overlap data

Not all the children in the study achieve the stage of producing clearly metaphorical uses of *see*. Those that do, however, all produce numerous overlap uses of *see* followed by a WH-complement before producing the metaphorical uses that they produce. Even when children do produce what seem to be clearly metaphorical uses (e.g. *I see what you mean*), these uses are metonymically related to visual situations—that is, despite the fact that the complements of *see* in these uses do not clearly denote visible entities, the contextual situations underlying these utterances involving being or becoming aware of a proposition by seeing a physical situation.

These data contrast markedly with those for children's uses of *see* with an *if*-clause. Not only do non-visual uses of this pattern emerge earlier than non-visual uses of *see* + WH-clause, but in fact there is no evidence that children prefer a visual interpretation for this pattern at all. The following examples show the children's first uses of the *see* + *if*-clause pattern:

Table 18: Children's earliest uses of *see* + *if*-clause

Abe	2;6.14	Look at the story <i>see if you can match up the story with the pictures on here.</i>
Adam	3;7.7	Child: Who are you gonna talk? Adult: To my children. Child: <i>To see if they alright?</i> Adult: Yes.

Nina	2;10.6	<i>No, I want to go to what that thing and see if I'm tall.</i>
	3;1.4	<i>Now let's see if it fit.</i>
	3;3.1	<i>Let me see if there's something else in her bag.</i>
Peter	1;9.7	<i>Let's see if this little cow would like to ride the see+saw.</i>
Sarah	4;2.23	<i>Let me see if I can touch you.</i>
Shem	2;7.18	<i>Yeah, see if this broke.</i>
	2;9.27	<i>Let me see if I want.</i>

Nina and Shem are the only children who first use the pattern in what could potentially be visual situations. For Abe, Adam, Peter, and Sarah, the first uses are in reference to non-visual situations. Naomi does not produce any examples of the *see + if*-clause pattern.

These data may be due either to the fact that *see + if*-clause is used frequently in non-visual ways to children, or to the fact that *if*-clauses cannot denote visible entities, or to a combination of these factors.

4.8 General discussion: Conflation in the acquisition of *see*

Let us review the Conflation Hypothesis and the Metaphorical Acquisition Hypothesis in light of the data from the last section. The Conflation Hypothesis predicts that children pass through an intermediate stage in which they produce uses of *see* that combine properties of its visual meaning with properties of its metaphorical mental meaning. The Metaphorical Acquisition Hypothesis does not predict any such intermediate stage, but rather, that *see* should be learned and used first in one type of context and then extended abruptly to a very different type of context. This second view of acquisition corresponds more closely to the standard idea of what metaphor is, and follows quite naturally from the representation of metaphor as a mapping between distinct conceptual domains.

The general pattern in the corpus data favors the Conflation Hypothesis over the Metaphorical Acquisition Hypothesis as an explanation for children's acquisition of mental uses of *see* such as (1b). All seven children in the study produce uses of *see* that combine properties of the literal and metaphorical senses before they produce any unambiguous metaphorical uses. The overlap uses that they produce include utterances like *I don't see where this one goes*, *See what else fell down Mommy?*, *I see what happens*, *See what I can make*, and so on. In utterances like these, the WH-complements refer to visible entities but also characterize mental propositions of the kind that would typically be expressed in metaphorical uses of *see*.

More generally, the data suggest that if a given use-type *can* be used in reference to visual situations (even when it is not restricted to such situations), that is likely to be the way it is first used both to and by children. WH-clause and non-interrogative finite clause complements of *see* show a very strong tendency to be used in reference to visual situations in the input, despite the fact that they do not entail vision in adult language. When used in this way, they also have properties that characterize their non-visual mental meaning, because they highlight the phenomenological overlap between seeing an object or situation and achieving a particular state of awareness. This overlap allows children to learn important properties of the mental use of *see* by generalizing from utterances that they can interpret on the basis of their original visually-based meaning for the word.

These facts suggest that children do not need (and indeed may not have sufficient evidence) to distinguish all the different conventional senses that can be identified in adult *see*, some of which entail vision and some of which do not. Assuming that children are biased to assign just one meaning to a verb until they encounter clear evidence for more than one meaning, it seems likely that they assimilate the different uses of *see* they hear to a single inclusive meaning that involves vision as well as the states and changes of awareness that naturally accompany it. Such a meaning is relevant to the demonstrative use of *see* and the 'recognize' use as well as the overlap use of *see* + WH-complement.

The *see* + *if*-clause pattern seems to be the major exception to the tendencies described above. It is just as likely to be used in non-visual as visual situations, by both adults and young children. One possible explanation is the fact that *if*-clauses cannot be interpreted as referring to visible entities. The *if*-clause complement may therefore differentiate the 'determine' use of *see* very early, because it is not compatible with the stative/imperfective visual meaning of *see*.

What then does the Conflation Hypothesis suggest about conceptual metaphor theory? First, it offers strong support for the idea that metaphorical mappings can be based on correlations in experience (Lakoff & Johnson 1980). At the same time, it suggests that these correlations have implications that have not been previously discussed in the conceptual metaphor literature. Lakoff & Johnson (1980), Lakoff (1987), and Johnson (1987) focus specifically on the conceptual consequences of general experiential correlations, and not on the influence they might have on the form-meaning mapping problem. For example, in Johnson (1987) there is a discussion of the experiential basis of the metaphor *Purposes are Physical Goals*. This metaphor, Johnson argues, is motivated by the pairing in experience between motion to a goal and the achievement of a purpose. In line with his general discussion of the grounding of basic schemata, Johnson emphasizes the pervasiveness of this kind of experience and of the conceptual structure that results from it. "From the time we can first crawl," Johnson writes, "we regularly have as an intention getting to some particular place, whether for its own sake, or as a subgoal that makes possible some other activity at that place" (p. 115). Johnson is concerned not with what children learn from their experiences with language, but with what they learn from their experiences in general.

The Conflation Hypothesis is concerned with what children learn from their experiences with language. Partly this is a matter of definition—it is a hypothesis about lexical acquisition. But there is theoretical significance to this difference in emphasis. Experiential correlations do not simply lay the conceptual groundwork for semantic acquisition, but can

themselves serve as semantic learning contexts. This means that the concepts characterizing target domain meanings can be associated with forms through indirect ostension, and need not be projected on the basis of conceptual mappings that are derived from and independent of experiential correlations.

Furthermore, some experiential correlations are actually the result of communication. This is most obvious in the grounding of existentials in deictics; there can be no correlation between pointing out and informing of existence without communicative acts of pointing out. This is true, though in a more subtle way, in the acquisition of *see* as well. This verb is used to direct attention as well as to report on visual experiences. When an adult directs a child's visual attention to an object or situation, it might be clear to the child that the adult intends to evoke a new state of awareness. The child's understanding of the adult's communicative intention in such episodes is therefore partly responsible for the correlation between visual and mental experience. There would not be as much motivation for the child to associate visual experience with salient mental states and changes of state if vision were not invoked in communicative contexts like these.

These observations all suggest that metaphorical mappings should not be regarded, in a developmental context, as independent conceptual facts that steer the course of language acquisition. Rather, they are partly constructed by the process of semantic acquisition—i.e., by the child's mapping meanings onto linguistic forms. It is not implausible to suggest that the learning of *see* and *look*, the first two vision verbs learned by children, is partly responsible for the KNOWING IS SEEING metaphor as a conventional property of English. The fact that both words can be used in contexts that combine visual and mental meanings is significant, because these words establish the acquisitional precedents for all vocabulary from the visual domain.

The Conflation Hypothesis offers a new view of the relation between metaphor and acquisition, but does not offer an alternative explanation for the phenomena captured by the KNOWING IS SEEING metaphor. Recall that one of the striking features of conceptual

metaphor theory is that it makes generalizations about classes of linguistic expressions rather than about individual lexical items and idioms. There are many expressions related to the KNOWING IS SEEING metaphor that could not plausibly be accounted for by the Conflation Hypothesis, e.g. *We found your remarks illuminating*. However, the Conflation Hypothesis does show that there are alternative explanations for some of the properties of lexical meanings that conceptual metaphor theory seeks to explain in terms of general principles of conceptual relatedness. These alternative explanations rely on the properties of the contexts in which lexical items are learned, suggesting that it is worthwhile to pay more attention to the role that language learning plays in the connections between different related meanings of polysemous words. The next chapter discusses in more general terms the ideas about semantic acquisition that underlie constructional grounding and the Conflation Hypothesis.

Chapter 5. Learning principles and strategies

5.1 Introduction: Learning linguistic signs

The case studies in the last three chapters have featured a number of important recurring themes concerning language acquisition. This chapter places them in a more fully articulated theoretical context, and discusses some of the principles of learning that might underlie constructional grounding and conflation.

One theme is the importance of the properties of individual episodes of linguistic communication in shaping the language acquisition process. All the phenomena examined here suggest that semantic acquisition does not consist of labeling discrete pre-formed conceptual categories with linguistic forms, but rather of inferring the conventional meanings and pragmatic functions of forms on the basis of the contexts in which they are used. Constructional grounding suggests that even after representations of conventional signs are established, they can still be modified through further linguistic experience and give rise to new conventional signs as a result.

Another theme is the difficulty of separating lexical and grammatical acquisition. Grammatical constructions often have specific meanings and pragmatic functions, as several researchers have argued (Lakoff 1977; Fillmore, Kay & O'Connor 1988; Goldberg 1995; Michaelis & Lambrecht 1996, etc.). Learning them involves constructing form-meaning mappings, which has sometimes been assumed to characterize lexical acquisition alone. By the same token, the properties of words, particularly verbs, are closely linked to the syntactic contexts in which they occur. Therefore lexical acquisition crucially involves the properties of grammatical constructions. These facts are not compatible with a theory that treats grammatical acquisition as the induction of very general rules or the setting of universal parameters, and lexical acquisition as the learning of everything conventional and idiosyncratic in language.

What is needed is a general theory of the learning of linguistic signs, which involves identifying all the conventional meanings that are communicated by adults and all the relatively stable formal patterns that express these meanings. This view must account for all types of constructions, and should include a natural way to explain the phenomena associated with constructional grounding and conflation.

The required model will have many properties of the usage-based schematic network model proposed by Langacker (1987, 1988), which incorporates ideas from early connectionist models. It represents grammar as a set of symbolic units (i.e. form-meaning pairings) organized into a complex network, and includes representations of conventionalized instances of patterns as well as schematic generalizations over these instances. Here is a passage from Langacker 1987 describing the model:

Our characterization of schematic networks has emphasized their “static” properties, but it is important to regard them as dynamic, continually evolving structures. A schematic network is shaped, maintained, and modified by the pressures of language use. The locus of these pressures is coding, i.e. the interactive relationship—in the form of categorizing activity—between established conventional units and the specific usage events they are invoked to sanction. In the final analysis, a schematic network is a set of cognitive routines, entrenched to varying degrees: despite our inevitable reifications, it is not something a speaker has, but rather what he does (p. 382).

This passage is meant to characterize the general dynamic nature of Langacker’s grammatical model. Though this model is proposed as a characterization of adult grammar, its dynamic properties make it especially relevant to acquisition. One property in particular that bears on the phenomena examined in this dissertation is the notion of *entrenchment* (i.e. degree of conventionality). A symbolic unit, such as a lexical meaning or a grammatical construction, is entrenched to the extent that it is frequently employed or *activated* in a speaker’s linguistic experience. This idea makes it easy to understand how linguistic subregularities, such as particular context-bound interpretations of lexemes, can

become conventionalized separately from the more general patterns they instantiate. The general logic of entrenchment provides a good foundation for the strategy of searching for relations between constructions in the dynamic process of acquisition. The less entrenched a symbolic unit, the more likely it is to be modified by subsequent usage events. Since the grammars of beginning language learners show a minimal state of entrenchment for all symbolic units in the language being learned, the earliest usage events that children experience should, in this model, have an exaggerated potential to affect their grammars, compared to later usage events. This meshes nicely with the claim made here that certain motivated relationships between signs manifest themselves most strongly very early in the acquisition process.

In any event, the relevance of Langacker's model to acquisition is obvious; it suggests that learning involves having one's early hypothesized representations of signs progressively modified and refined through continued exposure to additional usage events. As shown in previous chapters, the properties of usage events that are relevant to acquisition are many and varied, and include the frames that shape interaction between adults and young children, the kinds of discourse topics that are favored in such interactions, and the relative availability of different contextual factors for linguistic encoding. They may also involve aspects of linguistic form. As we have seen in the cases of constructional grounding, a particular pattern of instantiation of a given construction—e.g., instantiations of the non-subject WH-question construction of the form “*What BE X doing PRED*”—may become entrenched in the acquisition process and take on conventional properties not associated with the original construction.

I believe that the linguistic phenomena discussed in this dissertation lend support to the dynamic approach adopted by Langacker and in connectionist models more generally. The most promising models seem to be those that incorporate structured representations as well as weighted connections between them—i.e. those that adopt a *structured or constrained connectionist* approach (see, e.g., Feldman, Fanty, and Godard 1988, Regier 1996, Bailey

1997, Narayanan 1997, etc.). The structured aspects of such models can represent cognitive abilities that are innate or prelinguistic. For example, the models of Narayanan and Bailey incorporate representations resembling the kinds of motor-control schemas that it is reasonable to attribute to beginning language learners.

Lakoff and Johnson 1999, building on these models, their own earlier work, the conceptual blending work of Fauconnier (1997) and Turner (1996), and the work of Grady (1997) and C. Johnson (1997b, 1999), have proposed an *integrated theory of primary metaphor*, which speculates that most conceptual metaphors may be blends of primary metaphors learned through conflation. In their model, an instance of conflation is implemented as a neural connection between two neural subsystems, each instantiating a different conceptual ability, which develops when those subsystems are simultaneously activated on a regular basis. For example, the learning of the metaphor *More is Up*, discussed in the last chapter, might be based on the formation of connections between a neural subsystem that is involved in detecting and reasoning about verticality and one involved in reasoning about quantity. In experiences of the kind that presumably motivate this metaphor, these neural subsystems are used simultaneously—i.e. they are *coactivated*—and neural connections can develop between them through the process of *recruitment learning* (see, e.g., Bailey 1997).

The relation between the ideas in this dissertation and connectionist and other neurally-inspired models of language acquisition is of great interest to me, but I will leave it to scholars more familiar with the workings of these models to speculate about the specific ways in which they might be used to represent linguistic knowledge and the way it is learned. Instead, this chapter will focus in more general terms on some of the principles and constraints that might apply to the learning process, assuming a dynamic model of the general type proposed by Langacker. The intention will be to show that constructional grounding and conflation are well motivated by such principles and constraints.

5.2 Natural constraints in early semantic acquisition

It is obvious that certain kinds of meanings are more accessible to young children than others are. To some extent this is a reflection of general conceptual development and the order in which concepts emerge in children's minds. It is also due to the fact that some concepts are easier to associate with linguistic forms. As argued by Slobin and others, the ease with which a given concept can be linguistically encoded by a young child depends not just on properties of the concept itself, but also on properties of the form or formal system used to express it linguistically. Grammatical notions that are associated with complex morphology, for example, are likely to be learned later than those associated with relatively simple morphosyntactic means of expression (Slobin 1985). As discussed earlier, it is also the case that certain meanings are more easily encoded linguistically because they are more readily available to both interlocutors in canonical face-to-face interactions. These meanings are typically associated with intersubjective perceptible cues that either interlocutor could use to identify them. Intersubjective availability of this kind is a matter of degree, and less available meanings might become more so if they are correlated in a reliable way with more available meanings, because the process of interpretation that takes place in normal conversation exploits the indexical or metonymic possibilities created by correlations (see, e.g., H. Clark 1996). These possibilities are also available in child language acquisition, and seem to be largely responsible for the phenomena associated with constructional grounding and conflation.

The factors that limit children's early semantic representations and their mapping of such representations onto linguistic forms are referred to here as *natural constraints* on semantic acquisition. This term is proposed for factors that can be attributed to conceptual abilities that can uncontroversially be attributed to very young children—i.e. *natural categories*. The main restriction on natural categories is that they be able in principle to serve as the basis for acts of categorization. This restriction simply follows the definition of a conceptual category as it appears in certain developmental and other psychological contexts. For

example, Schlesinger (1982) writes: “a concept has been acquired only to the extent that one knows what belongs to it and what does not” (p. 92, see also Rosch 1977, etc.). Some language acquisition researchers have proposed general grammatical acquisition strategies involving natural constraints; a notable example being Slobin’s (1985) *Operating Principles* of language acquisition. The ideas in this chapter are intended as a contribution to this line of research.

Semantic bootstrapping proposals (see, e.g., Grimshaw 1981, Macnamara 1982, Pinker 1984, etc.) provide examples of constraints that are not natural in the sense described above. They exist to solve a paradox that arises from the assumptions of Universal Grammar (UG) (see, e.g., Chomsky 1981, etc.), which attributes to children formal syntactic categories such as phrase types (e.g. NP and VP). These categories are defined in any given language in terms of morphosyntactic properties that a child cannot know before having learned the language. The paradox, therefore, is the fact that a child needs to identify instances of these categories in order to make generalizations about them and thereby set parameters of variation appropriately for the language in question, but the child’s lack of formal knowledge of the language would seem to make this task impossible. If a child does not know where in a sentence to look for an NP, how can the child make generalizations that will lead to such knowledge?

Semantic bootstrapping proposals solve this problem by exploiting the strong correlations between formal categories and the natural semantic-conceptual categories they tend to express. For example, Grimshaw’s (1981) *Canonical Structural Realization* (CSR) states that young children tend to assume that certain types of meanings will be expressed by the grammatical forms that express them canonically. For example, children might assume that physical objects are referred to by the syntactic categories N and NP. Using this assumption, they can begin to make generalizations about the grammatical properties of these formal categories. This is an example of a constraint that is not natural, because the formal categories N and NP cannot be used by prelinguistic children as the basis for acts of

categorization (this is what creates the bootstrapping paradox in the first place). Semantic bootstrapping and its relation to the issues in this dissertation are discussed further in section 5.3.

The problem of induction

The kinds of natural constraints of present concern are those that influence the way in which children are able to learn semantic categories from exemplars. In order to do this, the child must identify which properties of the exemplars define a category as a whole and thereby extend to other members. In the philosophical literature this is known as the *problem of induction*. One of the best known discussions of this problem is Quine 1960, which evokes the following hypothetical scenario: An ethnographer visits an unknown culture and tries to learn the language. There is no common language shared by the ethnographer and the members of that culture, so initial learning must be based entirely on ostension. A native language informant points to a rabbit and says “Gavagai”, and the ethnographer infers that this is the word for ‘rabbit’. What underlies this assumption? It is not that the ostensive act unambiguously exemplifies the category ‘rabbit’ and no other. There are countless other meanings that are equally compatible with the ostensive act, because there are countless concepts that can be exemplified by the experience of seeing a rabbit, such as ‘undetached rabbit part’ and ‘temporal stage of a rabbit’. No matter how many incorrect hypotheses might be eliminated by additional ostension to other rabbits in other situations, there will always be multiple hypotheses remaining as possibilities.

While this problem as stated may seem somewhat farfetched from a linguistic perspective, since it is clear that only certain kinds of concepts would be relevant to human purposes, it is important that these ideas be taken seriously by theorists who wish to make statements about the kinds of strategies used by young children to learn semantic categories. These theorists must be very specific about what exactly makes categories

relevant to human purposes, and what kinds of categories children should be predisposed to have.

Semantic constraints

Several child language researchers have considered the kinds of constraints that might simplify the induction problem by reducing the number of hypotheses about meaning entertained by children.

For example, Markman (1989) proposes the Taxonomic and Whole Object Assumptions as two related constraints on children's acquisition of words. The Taxonomic Assumption specifies that children expect words to refer to different entities of the same type. The Whole Object Assumption states that children expect unknown words to refer to whole objects, and not to events, relations, properties, parts of objects, or other kinds of category. Together these constraints would ensure, for example, that a child would hypothesize that *Gavagai* refers to rabbits in general, rather than to a specific rabbit, undetached rabbit parts, or the property of furriness.

Another constraint discussed by Markman is the Mutual Exclusivity Principle, which states that children assume categories to be mutually exclusive, i.e. that members of category A will not be members of category B, and vice versa. Markman suggests that Mutual Exclusivity is a more general version of Slobin's (1973) principle of one-to-one mapping, which states that children assume that each morpheme in a sentence corresponds to one underlying semantic notion, and each semantic notion to one morpheme.

Building on her own earlier work, Clark (1993) presents a detailed discussion of semantic constraints, distinguishing conceptual constraints (i.e. constraints on categories expressed in language) from lexical and pragmatic constraints (constraints on word meanings and word use). Conceptual constraints include those mentioned above, as well as the Basic-level assumption that words pick out categories at the basic level (Rosch et al. 1976), and the Equal-detail assumption that words pick out equally detailed instances of

object categories. Two proposed lexical constraints (from Clark 1987) are the Single-level assumption, which states that children use words as if their meanings were all at the same taxonomic level, and the No-overlap assumption, which states that children do not allow meanings of words to overlap. Two proposed pragmatic constraints are Conventionality—the assumption that speakers expect certain meanings to be expressed by certain conventional forms, and Contrast—the assumption that every difference in linguistic form marks some difference in meaning.

While all the constraints above are based on some empirical observations about children's early word use, many of them have clear exceptions, and must therefore be regarded only as very general tendencies, if they are valid at all. For example, the Whole Object Assumption obviously does not hold for any words that do not refer to objects. The existence of this constraint may reflect the fact that the learning of terms for objects has long been taken as the prototypical type of semantic learning (and in fact several of the other constraints, such as the Basic-level constraint, may be much more appropriate for object categories than other kinds of categories). Quine's problem of induction, after all, is stated in terms of the ostensive definition of an object term, and many other discussions of semantic acquisition have focused exclusively on object terms.

Children do not only learn names for objects, however. The first words learned by children fall into various classes (see, e.g., Tomasello 1992), many of them being verbs or verb-like (i.e. predicating words of other kinds). Of course, there are some parallels between the learning of verbs and nouns, and in fact Clark (1993) proposes constraints on verb learning that are exactly analogous to those for nouns: the Whole-action assumption, the Type assumption, the Basic-level assumption, and the Equal-detail assumption. However, several researchers have pointed out that the problems of learning verb meanings are quite different from those of learning noun meanings (Clark 1993, Gentner 1982, Maratsos 1990, Tomasello 1992). Humans are equipped with various abilities that make the identification of certain kinds of discrete physical object categories relatively simple.

These are the abilities on which the notion of basic level categories (Rosch et al. 1976) is based, and underlie Markman's "whole object constraint". They are largely perceptual in nature, and may include, for example, edge-detection abilities built into the visual cortex (see, e.g., Marr 1982). Events, actions, and other relations are seldom amenable to the same kinds of perceptual delimitation. While some simple actions might correspond to innate motor control schemas (see, e.g., Narayanan 1997), other kinds of relational notions would seem to be much more difficult to identify and delimit. The dynamic nature of these categories is largely responsible for the difficulty. The mere fact that they involve a temporal dimension means that they require different kinds of delimitation strategies. Event categories might be relatively difficult to define ostensively, because events can be unexpected and short-lived. Also, because event categories are concerned with "what happens", they bring into play intrinsically abstract notions such as causality. All these observations suggest that verb learning may be subject to its own kinds of constraints. Some specific proposals about such constraints are made below.

Demonstrational contexts and intersubjectivity

All proposals about semantic constraints are intended to solve the problem of induction, which is based on the idea that early semantic acquisition relies heavily on ostension. That is, it is generally assumed that children map the linguistic forms they hear onto observable properties of the utterance contexts in which they occur. This general view has two specific implications. One is that some kind of associative learning, based on spatiotemporal contiguity between forms and phenomena exemplifying their meanings, plays an important role in acquisition. The other is that intersubjective phenomena that can easily be identified by both participants in canonical face-to-face interactions should be easier for children to associate with forms than other kinds of phenomena, because establishing the right conditions for correct associations depends both on adults' ability to use forms at

appropriate times, and children's ability to attend to the appropriate phenomena when forms are used.

Though there is little doubt that such factors are indeed important in early acquisition, some researchers have cautioned against relying too heavily on them. Gleitman (1993), for example, presents several arguments against the viability of "observational learning" (the term she uses for associative learning based on utterance contexts) as a basis for semantic acquisition. Some of the strongest evidence against it comes from a study done by Landau and Gleitman (1985) on blind children's acquisition of the words *look* and *see*. Despite the fact that blind and sighted children have very different perceptual experiences to serve as the basis for word learning, blind children use these visual terms in a way that strongly resembles the way sighted children use them. What could account for this? Gleitman suggests that both blind and sighted children learn the meanings of verbs from the syntactic contexts in which they occur. Pinker (1994), in a response to Gleitman's article, argues (correctly, in my judgment) that this is not possible in principle, because there are many verbs, each presumably with its own meaning, and many fewer syntactic frames.

The data in Gleitman's article suggest in fact that observational learning is important in semantic acquisition, but that it works better when it is used in combination with information about syntactic context, and that it might involve observation of factors other than the ones that might be most expected to characterize the meanings of words. The blind child in Landau and Gleitman's study interprets the verbs *look* and *see* as denoting haptic rather than visual perception. Gleitman hypothesizes that this must mean these verbs were used to the child in contexts in which there were objects nearby that could be explored haptically by the child. The assumption behind this is that haptic exploration for blind children, like visual exploration for sighted children, is the most important source of new knowledge about the physical environment, and that the words *see* and *look* crucially relate to the discovery of such knowledge (these assumptions are very similar to the ones underlying the Knowing is Seeing metaphor and the Conflation Hypothesis).

Gleitman's initial analysis of the input data shows that these words were no more likely to be used in this condition than other words. However, when Gleitman distinguished utterances on the basis of the syntactic patterns they instantiated, it became clear that demonstrative uses of these verbs (as discussed in Chapter 4) in fact always occurred in the appropriate condition, and other uses of the verbs, such as *Let's see if Granny's home* and *You look like a kangaroo*, were the ones that skewed the results. Both of these examples differ in meaning from demonstrative *look* and *see*; the first is an instance of the 'determine' sense of *see* discussed in the last chapter, and the second is a sense of *look* that means something like 'resemble'.

Gleitman's results in fact suggest that children do use observational learning, but that they are sensitive to what were described in the last chapter as *sense constructions*. That is, they do not necessarily map a single meaning onto a verb form, but rather are sensitive to the different meanings that correlate with different argument structure properties.

Questions about the role of ostensive learning in verb acquisition are raised by Tomasello & Kruger (1992), who show that certain verbs are most successfully learned by children not when they are used during the actions they name, but when they are used prior to those actions. This strategy would only seem to be useful, however, for actions and other kinds of events that can be anticipated by adult speakers. Some verbs, e.g. *break* or *fall*, might be used more frequently after the events they name.

Arguments such as these do not show that semantic learning does not depend heavily on the properties of utterance contexts, but merely that the type of associative learning strategies attributed to children cannot be too simplistic. What is needed is an extended notion of ostension that accounts for the special properties of different kinds of meanings (other than the meanings of object nouns) and for the subtleties of linguistic form involved in expressing meanings. This notion should take into account not only the child's role in ostensive events, but the adult's role as well; that is, it should incorporate the observation that intersubjective properties are important. The term that I will use for contexts that

support this extended notion of ostension is *demonstrational*, the idea being that in such contexts, it is possible for adults to demonstrate to children the meaning of what they are saying.

The degree to which a child must depend on demonstrational contexts for learning depends on the other sources of information that are available. The other major potential sources of information—syntactic context, discourse context, morphology, knowledge of lexical classes, etc.—all presuppose significant linguistic knowledge, which is the main thing that a prelinguistic child lacks. Therefore it seems likely that semantic acquisition is maximally dependent on demonstrational contexts in the initial stages, and becomes less so over time.

What kinds of qualities make relational meanings easy to demonstrate? This section proposes three general preferences that might characterize children's early hypotheses about the meanings of verbs and constructions: Perceptual Transparency, Temporal Locality, and Causal Simplicity.

Perceptual Transparency

An important property of demonstrational contexts, like all ostensive contexts, will be their general availability to perceptual observation and experience (see, e.g., H. Clark's (1996) discussion of the importance of perceptual experience in establish a common ground for communication). In the British empiricist tradition (see, e.g., Locke 1964), all knowledge is assumed to come from perceptual experience. Though more modern views of knowledge regard this view as untenable, much work in child language development is based on the idea that the view applies to very young children. Piaget (1952, etc.), who has been enormously influential in the field, argues that children pass through a stage of development, the *sensorimotor* stage, in which all cognitive abilities revolve around recognizing physical objects and configurations and interacting with the physical environment on a motor level. Cognitive routines at this stage are not conceptual (i.e.

representational), but become so in later stages when they are “interiorized” and severed from the physical contexts in which they arise.

Recent theoretical work in development has challenged the assumptions of Piaget, but has continued to recognize the important role played by perceptual experience in early learning. Mandler (1992), for example, argues that infants have the ability to analyze simple perceptual experiences and extract image-schemas from them. She discusses eight image schemas characterizing simple physical events:

- (1) *self-motion*—(a simple, schematic representation of) an object initially at rest and then starting to move without being caused to move by any external force.
- (2) *animate motion*—an object moving not in a simple straight trajectory, but in an uneven one, often in a rhythmic or semi-rhythmic (somewhat irregular) fashion.
- (3) *link*—one object connected to another such that the motion of the second is contingent on that of the first.
- (4) *caused motion*—an object moving when another moving object comes in contact with it.
- (5) *agency*—like caused motion, but where the object which comes into contact with the other object, causing it to move, exhibits animate motion.
- (6) *containment*—an object in the interior portion of another object with an interior, a boundary and an exterior.
- (7) *going in*—an object moving and coming to a position in the interior of a container.
- (8) *going out*—an object starting to move from a position in the interior of a container, and moving to a position in the exterior of the container.

These image schemas characterize simple perceptually-available events, some of which may provide the basis for the earliest forms of more abstract concepts such as animacy and agency.

Other researchers have related perceptual properties more specifically to the learning of lexically encoded categories. Clark (1973) attributes children’s overgeneralizations of

certain words to the mistaken use of perceptual properties as criteria for category membership. Keil (1989) describes a very general tendency for children to initially place great importance on “characteristic” properties rather than “defining” ones in hypothesizing word meanings, and to shift gradually to the defining features that more correctly characterize the adult meanings. In Keil’s examples, characterizing features are typically much more available to simple perceptual observation than are defining ones. For example, young children believe that surgery can change a skunk into a raccoon, while older children believe that a raccoon must have raccoon parents. Carey 1985 observes that young children base their understanding of the meaning of *alive* on observable behavior such as movement, and believe that plants are not alive because they do not move.

Some researchers have made similar observations about the importance of perceptually available features as factors in the learning of verbs. For example, it has been proposed that children first learn words for simple changes of state that can be perceived, and then learn words for more abstract changes of state (Edwards and Goodwin 1986). Gentner (1978) notes that two frequent meaning components of verbs of English are actions and changes of state. She predicts that action components should be easier for children to learn, since they correspond to potential perceptual aspects of contexts in which the verbs are learned. Gentner reports on a study in which children were asked to name different actions with *stir*, *shake*, *beat*, and *mix*. The first three of these denote a type of action and do not have a specific change of state component. *Mix*, on the other hand, does not denote a specific action but does denote a specific change of state. Young children were more successful in correctly naming *stir*, *beat* and *shake* actions, and treated *mix* as if it, too, were an action verb.

All the findings described above support the idea that children base their early semantic hypotheses on dimensions of meaning that are perceptible in contexts of utterances. In the view proposed here, this is due more to the need for demonstrable contexts to have a high degree of intersubjectivity, than to children’s inability to grasp non-perceptual concepts.

Temporal locality

Another important quality that makes states and events demonstrable is temporal locality. Demonstrability is based in part on spatiotemporal contiguity with the contexts of learning. Therefore, states and events that exist in their entirety during an utterance, shortly before an utterance, or shortly after it should be more demonstrable than those that do not. Things that happened in the past or that will happen in the future are less demonstrable than things that are happening right now. Also, things that take a very long time to happen are less demonstrable than things that happen, or that can be registered, within the time span of a brief verbal interaction (but that last long enough to actually be observed), because the former extend further in time from the contexts of utterances.

As with all the tendencies discussed here, temporal locality is a matter of degree and should be a preference in mapping rather than an absolute constraint. Given a range of potential meanings for a form in some set of learning contexts, the most temporally local meaning should be the preferred one, all else being equal (though this preference competes with the other preferences mentioned). There is some evidence from children's grammatical acquisition to support this. Slobin (1994), for example, has argued that British children learn the present perfect by first mapping it onto currently available resultant states, and later extend it to denote past events with current relevance. Similarly, it has been observed that children tend to learn English passives by first mapping participles onto resultant states (Borer & Wexler 1987). Israel, Johnson & Brooks (in preparation) observe the same tendency, and argue that it is due to the temporal locality and perceptual transparency of present resultant states. Later development of the passive, in their view, depends partly on children learning that the participles relate systematically to verbs denoting events that cause such resultant states. In both of these cases, children first select a meaning that is available to them in learning contexts, and use this meaning as the foundation from which the correct adult meaning is constructed.

Causal simplicity

The property of temporal locality is closely related to another important property: *causal simplicity*. The notion of causal simplicity or directness has played a role in various discussions of lexical versus phrasal causatives (Fodor 1970, Lakoff 1977, Dowty 1979, etc.). Croft (1991) defines an *atomic event* as one involving only a single type of causation and a single aspectual type, and argues that events that are lexicalized tend to be atomic events. His typology of causation recognizes four types: physical (typified by “billiard ball” causation between two inanimate objects), volitional (or mental-to-physical causation, e.g. moving one’s arm intentionally), affective (or physical-to-mental causation, e.g. being frightened by a loud noise), and inductive (or mental-to-mental causation, e.g. persuading someone of the truth of a proposition). The general linguistic tendency for lexical causatives to denote atomic events suggests causal simplicity as another constraint on lexicalization in acquisition, though some modifications to the idea are necessary, as suggested in section 5.3.

The three preferences above reflect the need for children to associate the utterances they hear in an appropriate way with discrete events and states that are spatiotemporally contiguous with those utterances. Perceptual Availability relates most strongly to spatial contiguity and to the need for meanings to be intersubjective. Temporal Locality expresses children’s preference for states and events that are temporally contiguous with utterance contexts, and also relates to the need to delimit these states and events. Causal Simplicity primarily addresses the need to delimit events. In the next section it is argued that these three preferences shed light on the role of primary scenes and subscenes in acquisition.

5.3 Subscenes and primary scenes

Slobin (1981, 1985) has emphasized the important role played by simple experiential scenes in early language acquisition. For example, he argues that the morphosyntactic means of expressing transitivity in different languages tend to be associated first by

children with a Manipulative Activity Scene. This is a simple experiential Gestalt involving notions of simple objects, physical actions with the hands, perceptions of changes of location or state, and other aspects of children's early experiences manipulating physical objects. Slobin also argues that the early understanding of possession might be based on a Figure-Ground Scene characterizing a spatial relation of proximity between two entities. This is suggested both by the fact that many languages conflate the expression of these two notions in the same forms, and by the fact that children sometimes use locative forms for possession even in languages that provide different means of expression for these two notions.

Simple scenes like these relate both to the semantic constraints discussed above and to the notions of *primary scene* and *subscene* discussed in Chapter 4. This section examines primary scenes and subscenes in more detail and considers their relevance to the three semantic constraints and their general role in semantic acquisition. It is argued here that primary scenes have the consequence of making abstract meanings conform to the three constraints, thereby making those meanings easier to encode linguistically.

The example of a primary scene that came up in Chapter 4 was the one that characterizes the overlap of visual and mental interpretations of utterances such as *Do you see what's in the box?* In this simple scene, a person looks at an object or situation and immediately becomes aware of something as a result. A change of perceptual experience correlates exactly in time with a change of mental state. These two aspects or dimensions of the scene are its subscenes. This primary scene can be represented in the following way:

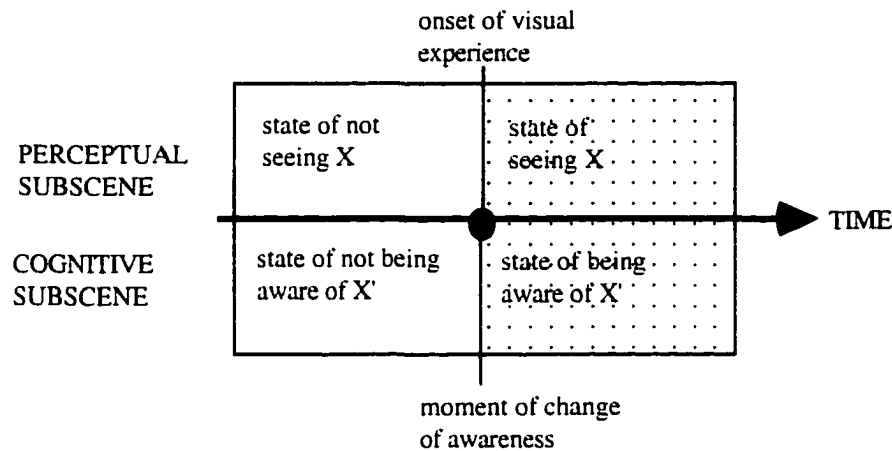


Figure 1

In this diagram, the horizontal dimension, moving from left to right, represents time. The black dot represents the single moment when the two changes of state simultaneously occur. This diagram is meant to capture some simple facts, largely aspectual in nature, about this scene either as it is experienced or as it is imagined and attributed to someone else's experience.

The function of primary scenes in state and event lexicalization

An interesting property of primary scenes like the one shown in Figure 1 is the fact that it can conform fairly closely, though in an unusual way, with the constraints on basic lexicalizable states and events discussed above. It is perceptually available due to the properties of seeing events: someone who sees has a perceptual experience, and it is often possible to determine something about another person's visual experience on the basis of perceptually available clues, such as the direction of that person's gaze. The primary scene in Figure 1 is also temporally local, or at least potentially so, because it involves an instantaneous change of state that might occur immediately before, during, or immediately after a relevant utterance, such as one based on the verb *see*. Finally, this scene can be regarded as causally simple, though only if this notion is modified somewhat from the way

it is used in Croft 1991. In Croft's discussion, causal simplicity entails only a single type of causation and a single causal event.

In Figure 1, each subscene is an atomic event in Croft's sense, and includes a moment when one state changes to another. These moments in the two subscenes are simultaneous because they correspond to what can be viewed as a single causal event: light carrying the information of a visual scene hits the retina and the scene enters the perceiver's consciousness. However, this event can be construed as an instance of physical causation or of affective causation, because the person who sees can be construed as either a physical or a sentient being. Therefore a single cause in the physical subscene has an effect in both the physical and the cognitive subscenes, with the result that the cognitive subscene has the same temporal structure as a simple physical event by virtue of being causally connected to a simple physical event.

Primary scenes can therefore be regarded as providing the child with special opportunities to linguistically encode relatively abstract meanings, since in them, abstract subscenes share the simple temporal and causal properties of physical subscenes. Forms whose meanings are primarily exemplified by physical subscenes might take on more abstract dimensions of meaning as a result of the correlations that occur in primary scenes, and might be reanalyzed so that they can express these meanings independently. This is what seems to occur with the verb *see* in acquisition.

The function of primary scenes in interpretational overlap and reanalysis

The role that primary scenes play in the linguistic encoding of relatively abstract meanings depends on the possibility of interpretational overlap and subsequent reanalysis. For interpretational overlap to occur, it must be possible to simultaneously attribute two meanings to an utterance at the same time, and these two meanings must have the right kind of compatibility to cohere into a single sensible interpretation. The closely aligned aspectual properties of primary scenes facilitate this kind of compatibility.

For example, consider the argument made in Chapter 2 about the reanalysis of WH-questions to derive WXDY. It was claimed that the progressive form of *doing* provides one of the important properties that make reanalysis possible, that is, utterances like (1a) and (2a) are more likely to be reinterpreted than utterances like (1b) and (2b):

- (1) a. What are you doing in my room?
- b. What did you do in my room?
- (2) a. What are you doing with that knife?
- b. What did you do with that knife?

This difference can be attributed to the fact that the progressive form *doing* creates a stative-like atelic activity meaning for the whole utterance. This is closer to the stative depictive interpretation of the adjunct that characterizes WXDY, and this fact makes it easier to entertain both possible interpretations of the adjunct expression at the same time. It is more difficult to simultaneously entertain two interpretations of the PPs when one relates to a punctual event and the other denotes a durative state. The aspectual mismatch between interpretations in the (b) sentences means they do not cohere into a single basic scene.

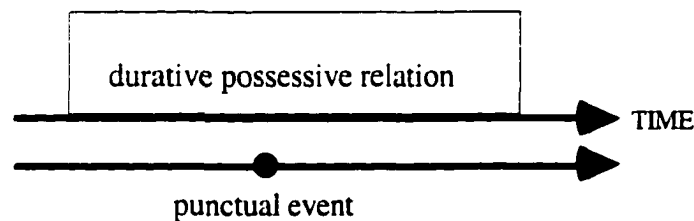


Figure 2

In the (a) sentences, on the other hand, the two interpretations are aspectually compatible and do cohere into a simple scene.

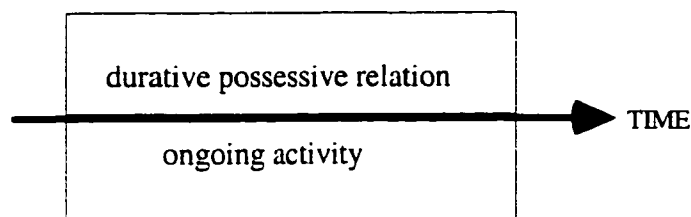


Figure 3

This is one reason why “What ...X do?” questions in the progressive serve as a good basis for the WXDY construction, and those in the simple past do not.

Primary scenes are a special type of conceptual alignment

Primary scenes are special cases of the kind of structured correlation that can serve as the basis for reanalysis more generally. Langacker (1987) discusses Stern’s (1931) account of the historical reanalysis of Middle English *bedes* ‘prayers’ to yield the precursor of the modern word *beads*. This reanalysis, Langacker argues, can be regarded as a special case of extension through similarity, though the similarity holds not directly between prayers and beads, but between their conceptualizations in the context of church practices in Middle English times. People used to keep track of prayer cycles by counting the balls on a rosary; in this mnemonic function, there was a structured correspondence established between the prayers in a cycle and the parts of the rosary, and the word for the former was metonymically extended to refer to the latter. There is a similar structured correspondence between subscenes in a primary scene, but the structure is largely aspectual in nature, and characterizes a simple experience-type, or a conceptualization based on one.

Reanalysis in child language and in history

It has been argued extensively in this dissertation that acquisition involve a process that resembles the kind of reanalysis that leads to historical change. There are, however, some clear differences between the historical and acquisitional contexts, and these relate to the properties of primary scenes.

First, in a historical context, changes may result from coincidental or culture-specific juxtapositions. The extension of *bedes* from ‘prayers’ to ‘beads’ is one example—due to the limited nature of the context in which the correspondence between beads and prayers held, it does not seem that this particular metonymy would play any significant role in language acquisition, because it is unlikely to recur on a regular basis in children’s experience.

Second, historical changes are often based on implicature, but it does not always make sense to talk about implicature in the context of child language acquisition. One reason is that implicature depends for its existence on a form having an established conventional meaning from which the implicature arises, and often in acquisition this conventional meaning cannot be taken for granted even for the source form; it is an aspect of what needs explaining. For example, to claim that the mental interpretation of *see* is based on an implicature in the early stages implies that the child recognizes a purely visual meaning that is distinct from the mental meaning and that give rise to the implicature.

For this reason, in order to relate reanalysis to the process of language acquisition, it is useful to make a distinction between two types of reanalysis. One type is very clearly based on implicature (e.g. the *since* example discussed in the introduction). In the other type, what may be described as implicature can also be described as a phenomenological overlap. Stern’s (1931) example with *quickly* may be such a case. While it is possible that someone may use an inference to get from one interpretation to another of a sentence like *They rode up quickly*, along the lines of “If they were traveling quickly they must not have taken much time to get there,” it is also possible that the immediate experience of a short time period may have been mapped directly onto the form *quickly* through associative mechanisms. Of course, implicature and phenomenological overlap may correlate with one another because they have the same cause. In the case of *see*, for example, there is a causal relation between seeing and coming to understand which underlies possible inferences, but

this causal relationship can also be an experiential or phenomenological one in the kinds of experiences discussed above.

Primary scenes capture both of the properties that are needed for reanalysis in child language acquisition: they describe simple scenes that are likely to recur in a child's experience, and they characterize conceptual connections that involve phenomenological overlap, not just inference.

The bootstrapping function of primary scenes

It has been argued that the correlations between different kinds of experiences in primary scenes help children lexicalize the meanings exemplified by target experiences, which otherwise might be difficult to lexicalize. The logic of this process resembles the logic of semantic bootstrapping (Grimshaw 1981, Pinker 1984), despite the fact that it is motivated by very different kinds of concerns. It is therefore appropriate to discuss the theoretical principles of learnability underlying semantic bootstrapping proposals, and to consider their relation to the proposals made in this dissertation. Many discussions of learnability focus on syntactic principles stated in terms of the formal categories assumed to be innately specified by Universal Grammar (see, e.g., Grimshaw 1981). However, the logic of learnability proposals arises from very general considerations of the role of evidence in learning, and applies in principle to learning problems that do not concern innate formal categories (see, for example, Regier 1996 on the relevance of learnability considerations to the acquisition of spatial terms). The parallels between constructional grounding and conflation on the one hand and semantic bootstrapping on the other are too obvious to ignore, so they are examined in this section.

The Subset Principle

The Subset Principle, discussed by Gold (1967), Berwick (1985), and others, pertains to the optimal way to learn a grammar. It is inspired by the generally accepted observation

that children do not rely heavily on negative evidence when learning a language—i.e., they are not explicitly told which sentences are ungrammatical. If this is true, it must be the case that the child's hypotheses are constrained in such a way that positive evidence—examples of grammatical sentences—will suffice to disprove them if they are wrong. This is guaranteed if the child always hypothesizes a grammar that is a subset of the target grammar, i.e. one that licenses a subset of the grammatical expressions of the target grammar (represented in A).

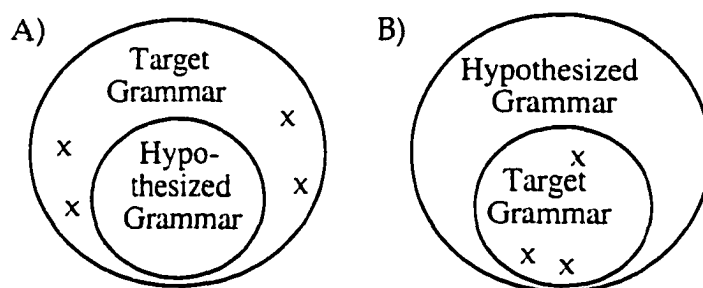


Figure 4

If this strategy is followed, then there are numerous expressions (represented by the x's in A) the child can hear which belong to the target grammar but not the hypothesized grammar, and each of these provides evidence that the hypothesized grammar must be modified. Compare this to the case in which the child hypothesizes a superset of the target grammar (as in B). In this case there is no positive evidence that will disprove the child's hypothesis, because every new expression that the child encounters (represented by the x's in B) is in the hypothesized grammar as well as the target grammar, and therefore does not help the child decide between them.

The general logic of this problem can also apply to semantic acquisition, though with some caveats. There are many potential sources of information about semantic representations, so it is not clear how relevant the "no negative evidence" restriction is to semantic acquisition. However, it seems reasonable to assume that a strategy of semantic acquisition that does not rely on negative evidence would be more efficient than one that

does. This assumption might be used to decide between different hypotheses about semantic acquisition that otherwise seem to be equally compatible with the facts, because adherence to the Subset Principle comes with a learning mechanism that is easy to understand. It is the same mechanism that Langacker (1987) calls *cancellation*, and was discussed in the last chapter as *linguistic delimitation*. There are precedents for applying the Subset Principle to semantic acquisition. For example, Gleitman (1990) points out that a child who hypothesizes a superordinate meaning for a word that subsumes the actual meaning will never receive any evidence to the contrary. For example, if a child initially hypothesizes that *duck* means 'bird', then no number of additional ostensive events with *duck* will provide evidence to the contrary, since every duck is in fact a bird.

Let us consider, then, how the Subset Principle must be interpreted to apply to semantic acquisition. Here is Figure 4 changed to reflect semantic acquisition:

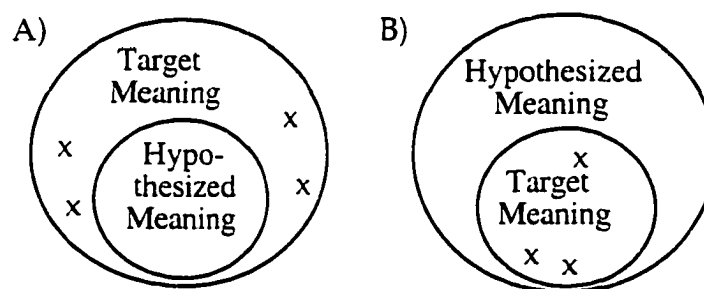


Figure 5

In Figure 5, the x's represent not grammatical sentences but instances of pairing a given form correctly with a given meaning. That is, they represent good examples of the use of a sign. The circles represent hypotheses about the meaning of the sign, with the area of the circles representing the extension implied by that meaning. Diagram B represents the situation described by Gleitman (1990): the extension of the hypothesized meaning completely includes the extension of the correct meaning, with the result that all additional exemplars will be insufficient to disprove the hypothesis. Diagram A, on the other hand,

shows the result of hypothesizing a meaning that is more restricted, extensionally, than the correct meaning. Such a hypothesis can be easily disproven by additional correct examples.

Gleitman correctly points out that it is unreasonable to assume that children always initially hypothesize meanings with the most restrictive extensions, and that in fact they seem to favor meanings that fall somewhere in the middle of a taxonomic hierarchy, such as basic level object terms. This observation is most relevant to the relations between meanings that are taxonomic in nature, e.g. the relation between the meaning of *bird* and the meaning of *duck*.

However, the Subset Principle may shed some light on children's learning of extended senses of words. In the discussion of the Conflation Hypothesis it was argued that children may assign meanings to forms that are "richer" than the correct meanings—that is, they may contain more information about learning contexts than just that which characterizes their "literal" meanings. This can be seen as a result of maximizing episodic memory in the learning of word-meanings, which has been shown by some researchers to be an optimal strategy. Richards and Goldfarb (1986), for example, present a connectionist model of the development of semantic memories from episodic memories. They suggest that the child's most efficient strategy for forming semantic memories when it is unclear what are the appropriate features of episodes to encode is to encode as many as possible. This strategy is supported both by the performance of their model and by an apparent lack of limitation on overall capacity for episodic memory among humans.

Richard's and Goldfarb's learning strategy is supported by the Subset Principle and may be a plausible basis for conflation. If children hypothesize meanings for words that combine properties of different senses of those words, the hypothesized meanings will be extensionally more restricted than the target meanings. For example, if a child hypothesizes that the word *see* denotes situations that involve both a visual experience and a salient state or change of awareness, this conflated meaning would be more restricted either than the "literal" meaning of *see*, which denotes only vision, or the metaphorical meaning, which

denotes only mental states or changes in the absence of vision. In section 5.4 below, this line of argument is used to evaluate claims made by Clark and Carpenter (1989) about the acquisition of the preposition *from*.

Semantic bootstrapping

Another issue in learnability, briefly discussed above, is semantic bootstrapping. Bootstrapping proposals (see Pinker 1984) address the question of how children are able to make generalizations about the relatively abstract categories (grammatical functions, lexical classes, etc.) that are relevant to grammatical principles. For example, in order to make generalizations about the possible syntactic behavior of the Subject of a sentence, a child must be able to recognize tokens of the category Subject. However, since Subjects are defined in distributional terms, the child would seem to have to use the syntactic information that he or she is trying to acquire in order to identify instances of the category. Such categories therefore pose a learning paradox, requiring children to “pull themselves up by their own bootstraps.” Bootstrapping proposals offer possible solutions to this paradox.

The strategy of all bootstrapping proposals is to attribute to the child an assumed correlation between the relatively abstract grammatical category and another category which is less abstract. Since instances of the latter are easier to recognize, they help the child recognize instances of the former. Prosodic bootstrapping proposals (see Pinker 1984) claim that grammatical categories are marked by prosodic features of the child’s input. Semantic bootstrapping proposals claim that grammatical categories are assumed by the child to be correlated with semantic categories, which are natural categories in the sense discussed above.

In the first explicit semantic bootstrapping proposal, Grimshaw (1981) suggests that children learn lexical classes by exploiting their canonical associations with general ontological categories like “object” and “action.” She argues that an innately-specified

language acquisition device (LAD) contains principles like the following: Assume any expression denoting an object is a noun, and any expression denoting an action is a verb. If the child follows such a strategy, he or she will be correct often enough to make useful initial observations and hypotheses about the true distributional definitions of these lexical categories.

As Berwick (1985) points out, bootstrapping guarantees a type of adherence to the Subset Principle. Whenever the child assumes a strict correlation between categories where in the adult language there is only a loose one, the child's grammar will be more restricted with respect to that correlation than the adult's grammar is. For example, the only NPs that children will recognize initially, in Grimshaw's proposal, are those that refer to physical objects. However, NPs can also be used to refer to other entities—events, states, times, etc. Therefore, a young language learner using Canonical Structural Realization to bootstrap into a language will recognize only a subset of the actual NPs in that language.

The plausibility of semantic bootstrapping proposals depends largely on the properties of linguistic input available to young children. For example, if it were not the case that all (or virtually all) the physical objects referred to in the child's input were referred to with NPs, there would be no reason to believe that bootstrapping would work. But in fact the implication "if object, then NP" is quite a reliable one. The question might arise, then, why formal categories should be innate at all; it would seem that they could be learned, given the correlations that make bootstrapping possible, through relatively empiricist strategies. Some researchers (e.g. Braine 1992, building on Schlesinger 1988) have in fact suggested that children begin with a categories that are defined purely in semantic terms, e.g. as referring to objects, and extend these categories gradually through a process of "semantic assimilation". This proposal seeks to ground syntactic categories in natural conceptual categories, and in that respect is an important precedent for the theory of constructional grounding. It is discussed briefly in section 5.5.

5.4 Conflation, prototypicality, and learnability

Because what has been called a conflated meaning for a word combines different properties of extended uses of the word, it calls to mind prototype theory (Rosch 1977), and indeed may be considered one kind of prototype. An acquisitional interpretation of prototype theory is that children first base their categories on prototypical exemplars that share a maximal number of properties, and then extend categories to more peripheral members that lack some of these properties. This is what happens in the acquisition of *see*, according to the Conflation Hypothesis—children first associate it with a meaning that combines visual and mental dimensions, and then extend it to denote either of these independently of the other.

There are three important ways in which a conflated representation is different from a prototype, however. First, it crosses boundaries between what adults regard as distinct lexicalized meanings and in fact distinct conceptual domains. We do not consider the adult mental use of *see* to refer to non-prototypical cases of seeing—rather, we recognize that it lacks the essential property of seeing situations that they involve visual perception. For that reason we say this use is metaphorical, involving two different domains. For the most part we consider a prototype a “best example” of an individual category, but a conflated prototype has an intrinsically hybrid nature. This is partly explained by the second distinguishing feature of conflated prototypes, which is that they are lexically or constructionally encoded, and necessarily involve interpretational overlap. In this sense they are best examples not of conceptual categories, but of particular kinds of linguistic meanings, and it is therefore not surprising that they should cross conceptual boundaries.

Finally, other cases of prototypicality lack the asymmetric nature of conflation. For example, Fillmore (1982) gives a prototype analysis of the verb *climb*. In the prototypical case, to climb is to move upwards with a clambering motion of the arms and legs. However, the verb can be used to describe either effortful upward motion without clambering, as in (3a), or clambering without upward motion, as in (3b):

- (3) a. The airplane climbed to 10,000 feet.
- b. The crisis counsellor climbed out on the ledge.

In these cases of deviation from a prototype, there is no discernible asymmetry between the components of meaning. Therefore there is no reason to believe that this kind of prototype serves any bootstrapping function in semantic development. In conflation, on the other hand, there is a clear asymmetry between the meaning elements that are conflated with one another, and this is assumed to play a role in acquisition. In the next section, we will see how the idea of conflation, together with the learnability considerations discussed above, can account for certain observations about children's novel uses of the preposition *from*.

Conflation and learnability: A case study

In this section, the relation between the Conflation Hypothesis and the learnability issues discussed above is examined with reference to Clark and Carpenter 1989 (hereafter C&C), which contains important observations about the preposition *from*, the range of senses exhibited by it in English (and by similar forms crosslinguistically), and the novel uses to which children put it. Besides what C&C call its Locative sense¹, as in *He knocked the butter from the table*, *from* also has a Temporal sense, as in *from now until four o'clock*, a Causal sense, as in *to collapse from a heart attack*, and a number of other senses in adult usage. In addition to these, children sometimes produce novel uses of *from* with an apparent Agentive sense, as in *He isn't going to get hurt from those bad guys*, with a Comparative sense, as in *Herb's the tallest from me*, and with a few other senses that do not occur in adult usage. C&C suggest that these facts point to an *emergent category*, which they call SOURCE, that subsumes the conventional senses of *from* and the child's

¹ In this section the terms "Location" and "Locative" are applied, as in C&C's paper, to all uses of *from* that describe spatial origins of motion.

novel uses, either as a superordinate category to them, a feature shared by all of them, or a feature of the Locative sense that is metaphorically extended to all the others.

It is argued here that the learnability considerations discussed above suggest a different story, which also seems to be supported by the data presented by C&C. The syntactic novelty of certain early child uses of *from* makes them seem semantically novel as well. However, the situations described by these uses share a number of properties with those described by certain Locative uses. These properties are all potential aspects of the meaning associated with *from* by children, and some happen to correspond to adult senses of *from*. Perhaps, then, the novel uses and certain adult senses are based on a single conflated prototype representation of the meaning of the preposition.

If indeed the child first learns a conflated prototype as the meaning of *from*, it may be that the more physical aspects of the meaning—those corresponding to perceptible facts—assist the child in learning the more abstract aspects of meaning that are correlated with them. Such exploitation of correlations, as we have seen, resembles semantic bootstrapping, though the categories that the child learns as a result are semantic rather than syntactic ones. This learning strategy, based on correlations of potential semantic dimensions which are encoded as separate senses in adult language, conforms to the Subset Principle, because the resulting hypotheses about semantic representations are always extensionally more restricted than the target semantic representations. The implied learning strategy in C&C's proposal, on the other hand, does not conform to the Subset Principle.

The acquisition of *from*

Let us consider the possible role of correlations in the acquisition of non-spatial senses of *from*, including the temporary acquisition of novel uses by the child. Recall some of the uses discussed by C&C, not all of which correspond to conventional adult senses in English:

Location

e.g., *I'll get something from my Lego box*

Time

e.g., *back from fishing*

Agent (child only)

e.g., *He isn't going to get hurt from those bad guy*

Cause

e.g., *Who gets sick from eating seeds?*

Possessor (child only)

e.g., *That's a finger from him*

Standard of Comparison (child only)

e.g., *This ear is longer from the other ear*

Prior Event

e.g., *They prevented the dogs from getting out*

C&C observe tendencies in the order in which children acquire these uses of *from*. Most notably, the Locative use always precedes all the other uses. C&C suggest that there is a single category, which they call SOURCE, that relates all the other categories. They suggest three views of how the category SOURCE might be represented. One view, which they call the *taxonomic view*, treats SOURCE as a category with all the other more specific categories subordinate to it:

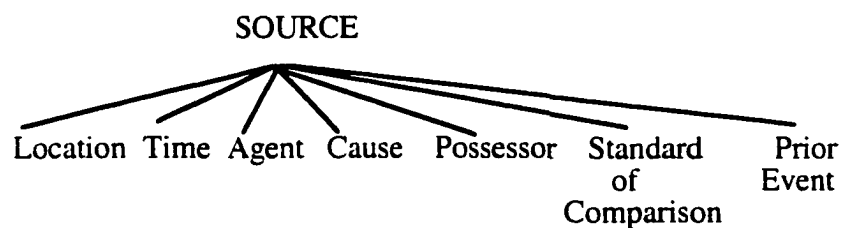


Figure 6

Another view, which they call the *property view*, treats SOURCE as a property that all the more specific categories have in common. This might be represented by making SOURCE a feature in a decomposition of each of the more specific categories, e.g.,

Location = (+ SOURCE, + SPATIAL, etc.)

Time = (+ SOURCE, + TEMPORAL, etc.)

Agent = (+ SOURCE, + ANIMATE, etc.)

etc.

Yet another view is the *metaphorical view*. Like the property view, this view treats SOURCE as a property of the Locative use. In this view, however, SOURCE is not shared by all the other uses, but is metaphorically extended to them.

Learnability and the child's data

Let us consider how learning might work with C&C's taxonomic and property proposals. Suppose the child first associates *from* with Location. When the child encounters a Cause use of *from*, one of two things might happen. The child might correctly recognize that the utterance describes a situation exemplifying Cause as well as a number of other concepts, and notice that Causes and Locations are both types of SOURCE (or that they both have the feature + SOURCE). This perceived similarity between Cause and Location, which is already associated with *from*, might help the child identify the former as the correct meaning to associate with *from* in this use.

The problem with this scenario is that it provides no explanation for why the Location use of *from* should be learned first. If Causes are transparently recognizable as such, we might predict that Cause uses of *from* are learned as early as Location uses, which they are not.

The other thing that might happen when the child encounters a Cause use of *from* is this: He or she does not recognize the situation as exemplifying Cause, but tries to infer the meaning from the Location sense of *from*. In this case the child might conclude that the

meaning is subsumed under the superordinate category SOURCE, but would have no evidence for which of the more specific SOURCE categories it was. Here the Subset Principle comes into play: Extensionally the meaning SOURCE is a superset of all the other categories (Location, Agent, etc.). If the child hypothesizes this general category as the meaning of *from*, then the contexts of the specific uses will not be of much help in deciding on a more specific meaning, since they all exemplify SOURCE.

The problem with the taxonomic and property views, then, is that they treat SOURCE as an abstract category to which the other categories belong, and it is not clear what the conceptual content of that category is. The metaphorical view, as C&C describe it, does not explain *why* the property SOURCE is metaphorically extended from the Locative sense to the other senses.

It is argued here that all the senses of *from* listed above are not related by a single abstract category SOURCE. Rather, Location, Agent and Cause uses are related the same way the visual and non-visual senses of *see* are, i.e., by being exemplified together in the child's learning contexts. If this were indeed the case, I argue, it would give the child an advantage in the acquisition of the Cause use. Other uses, such as the Temporal and Comparative ones, seem to have different probable acquisitional explanations that will not be discussed here.²

The first novel uses by the child (Damon), as reported in C&C, offer evidence that the Location use may bootstrap the Cause use, with the Agent use as a kind of intermediate stage the child goes through.

² The child's novel Comparative use, e.g. *Herb's the tallest from me*, is probably based on adult uses like *They are different from you*, which C&C mention. The child may assume *from* is a general Comparative marker when exposed to such sentences, and only later learn that it is idiosyncratically selected by *different* in this context.

Damon's first novel use mentioned in C&C, from age 2;2,3, is *These fall down from me*, uttered after he had pushed some pieces of sandwich off a plate. C&C code this as an Agentive use, but notice that it could be coded as either a Location use or as a Cause use. Physically the sandwich moved away from Damon (or at least from Damon's hand), Damon was the Cause of it moving and falling, and Damon was an Agent. This use is evidence for a prototype representation that conflates the three semantic dimensions in question. At age 2;5,10 Damon said *They scared from me* after he had rushed at some birds and they had, presumably, flown away. Again, this is coded by C&C as an Agentive use, but it could be coded as a Location use or as a Cause use. These uses, though novel, have the same potential semantic dimensions as uses of *from* involving transfer of an object from a person (e.g. *I got this from Mommy*). We might hypothesize that Damon's uses of *from* at this stage are based on such prototypical uses, with the clause nucleus expressing a resultant state, and the PP headed by *from* expressing something that is a Location (i.e. an origin of motion), a Cause and an Agent.

At 2;7,11 Damon said *he isn't going to get hurt from those bad guys*, in which the *from* phrase expresses something that is a Cause and an Agent but not a Location in any direct or literal sense. At 2;8,3 Damon utters *That's from I put a thing on it*, and at age 2;10,23 he utters *If I talk too much, I be tired from doing that*, which resembles the adult Cause use of *from*. In these uses *from* marks a Cause that is neither an Agent nor a Location.

The following table summarizes these observations about Damon's early novel uses of *from*:

Table 1: Damon's earliest novel uses of *from*

age	child utterance	semantic dimensions
2;2,3	<i>This fall down from me</i>	Location, Agent, Cause
2;5,10	<i>They scared from me</i>	Location, Agent, Cause
2;7,11	<i>He isn't going to get hurt from those bad guys</i>	Agent, Cause
2;8,3	<i>That's from I put a thing on it</i>	Cause
2;10,23	<i>I be tired from doing that</i>	Cause

The sequence of Damon's early novel utterances suggests that he begins with a meaning of *from* that includes the semantic dimensions Location, Agent and Cause. This meaning may then be altered in the following way: When Damon encounters a use of *from* in which one of the dimensions is clearly missing, he assumes that the other dimensions are still present. For example, *You got this from Grandma*, uttered when Grandma is not present and there is no perceptible motion of the object in question, may lead the child to conclude that there is a use of *from* for which only the Agent and Cause dimensions are relevant. At this stage, a use like *I have a headache from the noise* could lead the child to infer that there is a use for which the Agent dimension is not relevant but the Cause dimension is.

This account of Damon's acquisition of the Cause sense of *from*, in which it is bootstrapped by prototypical uses of the Location sense, better matches the optimal learning strategy represented by the Subset Principle than do any of the representations proposed by C&C. Since the proposed prototype meaning contains the three semantic dimensions of Location, Agent and Cause, it is more specific than any of the individual concepts. That is, it is extensionally a subset of the target meaning (Cause). Under this account, the adult Cause use of *from* can be derived in a straightforward way from the proposed prototypical use of *from* on the basis of positive evidence.

What sort of thing is a “conflated” meaning?

Though it appears that the labels “Location,” “Agent,” etc. are being used above as semantic features, I don’t quite intend them that way. They are meant to stand for target senses that are *exemplified* by particular situation types. That is, the lists of labels next to Damon’s first novel uses are meant to stand for representations of experience-types that exemplify those notions, not for Damon’s actual concepts. What is important is the idea that multiple target senses can be exemplified by the same experience-type, though the experience-type may have a unity for the child that makes it more basic than the senses that it gives rise to. This characterization of the early meaning of *from* as something relatively undifferentiated from which adult senses emerge resembles Slobin’s (1985) claim that children first associate grammatical functors with prototypical scenes that are unanalyzed relative to the eventual meanings associated with those functors in adult language.

A note on conflation and conceptual development

Developmental psychologists (e.g. Werner & Kaplan 1963) recognize that the process of development, as it is normally understood in biological and psychological contexts, implies a progression from a relatively undifferentiated state to a relatively differentiated one. For example, infants begin life with a small number of general-purpose responses to their environment (sucking, grasping, etc.), and slowly learn to differentiate separate functional actions, partly on the basis of experience. One of the big challenges in developmental work is to show how later, more complex abilities arise from simpler ones. Piaget (1952), for instance, offers an elaborate theory of intellectual stages in which earlier sensorimotor abilities serve as the basis for later intellectual ones.

Constructional grounding and conflation clearly imply the existence of a developmental process in language acquisition. These phenomena involve a progression from a relatively undifferentiated state, in which two conventional signs are not distinguished from one

another, to a differentiated state in which they are. This process involves more complex linguistic abilities built on or “emerging” from simpler ones.

It is important, however, to take note of the differences between these phenomena and those pertaining to general conceptual development. There is a difference between what is here called *conflation*, and what developmental psychologists call *conceptual non-differentiation* (see, e.g., Carey 1985). Non-differentiation implies the lack of an ability on the part of the child to differentiate two types of phenomena. For example, Smith, Carey, and Wiser (1985) claim that young children are not able to distinguish between weight and density.

Conflation does not suggest a general inability on the part of the child to distinguish two types of phenomena in experience. In the case of *see*, for example, it is not argued that the child is unable to differentiate, in principle, a visual experience from a non-visual experience of changing awareness. This might imply, for example, that a child becoming aware of something through hearing would classify that experience the same way as an experience of becoming aware by seeing, by extension confusing hearing with seeing. This seems highly unlikely. What conflation argues is that children do not recognize the distinction between seeing and becoming aware, in the experiences in which they are closely correlated, as one that is relevant to the linguistic encoding of those experiences. The child recognizes the verb *see* as applying to a class of experiences involving both vision and becoming aware just as he or she recognizes the word *cup* as applying to a class of experiences involving the correlation of experiences of holding cups, drinking out of them and seeing their shape (these are the types of properties that are relevant to the characterization of ‘cup’ as a basic-level category—see Rosch et al. 1976). The child does not confuse a cup’s shape with its function; rather, these properties of cups cohere in a reliable way in a single recurring experience-type, and the child treats them as all being relevant to a single semantic category. Similarly, the child need not be confused about the difference between doing something with the eyes and something happening in the

conscious mind; rather, visual experiences and changes of awareness cohere for the child in a single recurring type of experience. Notions of “pure” vision and “pure” mental experience likely become more salient as children develop general theories to make sense of these different aspects of experience (see, e.g., Gopnik & Meltzoff 1997, Carey 1985, Carey & Spelke 1994).

5.4 Special issues in constructional acquisition

A tenet of the constructional approach to grammar is that grammar and lexicon are not clearly distinct. Both include conventional form-meaning pairings. Accordingly, the principles of acquisition discussed above apply to signs in general—both verbs and more complex grammatical constructions. It would be a mistake, however, to assume that there is nothing special to say about the acquisition of phrasal and clausal constructions compared to the acquisition of words, because the complexity of constructions introduces special difficulties and issues into the mapping problem.

The purpose of this section is to briefly discuss some of these issues. It is beyond the scope of the present work to go into great detail about all the theoretical questions that arise in a constructional view of acquisition. The theory of constructional grounding, as presented in previous chapters, is the major contribution this dissertation has to make to such a view, and it applies only to certain kinds of constructions—relatively complex ones that are based, in the appropriate way, on other simpler constructions. In the following discussion, however, we will see that the division between complex and simple constructions is itself not that clear, and that constructional grounding may have more potential as an explanatory mechanism than first meets the eye.

Mapping and constructions

In lexical-semantic acquisition, the child’s mastery of lexical forms is often assumed to be trivial (ignoring the complexities of morphology); identifying the right meanings is taken to

be the main challenge. Some constructions have such unusual and idiosyncratic formal properties, though, that learning their forms might be almost as difficult as learning their meanings. In some cases, such as WXDY and the existential *there*-construction, constructional grounding can provide a principled explanation for a form that might otherwise seem complex, arbitrary, and difficult to learn. In the constructional grounding account, the formal properties of an independent construction, as instantiated in particular utterances, are “recruited” to characterize the target construction being learned.

Complex constructional forms, in addition to being potentially difficult to identify correctly, also add difficulty to the mapping problem, because unlike words, they have subconstituents that must be included in the mapping in a systematic way. This suggests an additional learning constraint, specifically relevant to such constructions, which I will call Compositional Simplicity. This constraint states that the part-whole structure of an utterance will correspond to the part-whole structure of a scene described by an utterance (see, e.g., Haiman 1985 on the importance of iconicity in syntax). This constraint would work in conjunction with the other three constraints proposed above—Perceptual Transparency, Temporal Locality, and Causal Simplicity—such that the preferred interpretations of subconstituents in phrasal or clausal constructions would be as denoting simple visible objects and relations that are parts of larger scenes (this relates to Slobin’s (1985) Operating Principles).

A small piece of evidence for this came up in the discussion of the WXDY construction in Chapter 2. Recall that Shem, the subject of the more detailed longitudinal study, preferred particular kinds of adjunct phrases as Y phrases: namely, those that could be construed as denoting simple scenes involving visible participants in the larger scenes denoted by utterances. He produced no temporal adjuncts, which do not pertain either to visible entities or to participants in scenes. These were among the most frequent adjuncts in adults’ “What’s X doing ____?” questions, however. Shem did produce five *with*-PPs, however, which pertain to the physical presence of an additional participant in a scene. That

is, in an utterance like *What is the boy doing with the snake?*, the phrase *with the snake* can be construed as denoting the presence of a snake in the scene of the boy doing something, and perhaps the fact that the boy is holding the snake. Therefore, the Y constituents favored by Shem offer some support for a Compositional Simplicity constraint working in concert with the other three proposed constraints.

Additional evidence comes from Duchan & Lund (1978), who address the issue of whether *semantic relations* serve as the basis of children's earliest meanings for linguistic forms. Semantic relations are Case-frame like notions such as Possession, Instrument, and the like. Their study investigates the adequacy of such notions for describing children's understanding of Verb + *with* + NP expressions. They identify a number of functions served by *with* in adult speech (including instrument, inanimate accompanier, animate accompanier, manner of action, and possession) and find that these categories do not account well for three-year-old children's uses of *with*. Instead, these children seem to use *with* to mark either objects that are present only when the activity denoted by the verb is occurring, or objects or persons which are continuously present during the activity. The Compositional Simplicity constraint therefore seems to correspond to some genuine observations about child language. It may be, however, that it only applies to certain kinds of constructions—perhaps relatively basic constructions that are learned early by children. Learning a target constructions through constructional grounding involves a violation of the Compositional Simplicity constraint. In the grounding of existentials in deictics, for example, the word *there* loses the simple and direct locative meaning that it expresses productively, and becomes part of a larger constructional form that expresses a much more abstract meaning.

Basic and complex constructions

The theory of constructional grounding, as it has been presented, implies that there are two kinds of constructions: complex ones that are based on other constructions, and basic ones that are not. Constructional grounding is a hypothesized explanation for the way in which some complex constructions are learned, and might therefore supplement existing work on constructions in child language, which has focused mostly on basic constructions.

Slobin (1981), for example, argues that canonical sentence forms, such as simple Subject-Verb-Object sentences in English, are the earliest sentence forms learned by children, and are mapped onto basic event schemata. Such schematic might be based on prototypical events of object transfer, physical manipulation (i.e. the Manipulative Activity Scene discussed above), voluntary movements, and other simple events that are experienced in a fairly direct and holistic way and are especially salient to children.

Tomasello (1992) presents a somewhat different view of early constructions called the *Verb Island hypothesis*. It claims that grammatical acquisition in the early stages (i.e., during the second year of life) consists of associating specific “verbs” (i.e. predating or valence-bearing words) with representations of simple, specific event-types. The resulting signs, Tomasello argues, do not participate in paradigmatic relations at this early stage, but serve as isolated structures around which early utterances are built. True constructions, he suggests, are schematic generalizations abstracted from verb islands.

These two views illustrate one of the issues that must be faced in a constructional view of acquisition, which is the correct level of generality of children’s earliest hypotheses. Slobin’s notion of canonical sentence forms implies that children have some way of representing such forms, whether in terms of grammatical functions, lexical classes, or even just positional slots associated with some fairly general semantic constraints. Tomasello’s Verb Island Hypothesis claims that children do not begin by extracting such schematic sentence forms, but rather, build their earliest patterns around individual predating words (followed or preceded by positional slots for their “arguments”). This

implies that children are ultimately able to extract from these specific structures the sentence patterns that characterize productive properties of adult language.

These issues regarding children's earliest constructions bring up questions about what kinds of categories are innate, or at least can plausibly be attributed to prelinguistic children. In principles-and-parameters models of acquisition, as discussed above, grammatical categories such as NP and VP are assumed to be innately specified, despite the fact that these are not natural categories—i.e., they cannot be used by children as the basis for acts of categorization. A theory of acquisition that wishes to use only natural categories must find some way to account for the patterns that are normally expressed, in linguistic analyses, in terms of such formal grammatical categories. Slobin's approach mentions categories such as Subject and Object, but presumably does not intend them to be interpreted as primitives in the characterization of simple sentence schemata. Tomasello's approach avoids formal categories, but does not explain how such categories ultimately arise from verb islands.

Some scholars have specifically addressed this issue. Schlesinger (1988), for example, proposes a "semantic assimilation" account of the development of the category Subject, which he argues is based on the category Agent. Semantic assimilation claims that children slowly learn to assimilate more and more phenomena to an initially semantically-defined category. In the case of Agent, Schlesinger claims, they do so by virtue of any of three features of prototypical Agents: motion, cause, and control. Subjects in general tend either to have one or more of these features or to be learned in relation to particular verbs in contexts where one or more of these features is present. The verb *taste*, for example, in has an active meaning as well as a non-active one; it may suggest the physical action of putting something to one's mouth and taking a little in, as in *He tasted the soup*, or it may more specifically denote a state of perception, as in *He tasted/could taste pepper in the soup*. Schlesinger argues that children may first take note of the more intersubjective active interpretation, registering *taste* as an action verb whose main participant role has all three

properties of prototypical Agents. An NP expressing this role would therefore be a clear proto-Subject. The main participant role of the non-active version of *taste* can presumably be assimilated to this proto-Subject category by virtue of the fact that it shares other important semantic properties with the active taster role (in particular, the fact that it refers to the person having a taste experience). This suggestion about the role of semantic assimilation in learning the verb *taste* bears a close resemblance to the conflation account of the acquisition of *from* discussed above—not only does it suggest a prototype structure for the meaning of *taste*, but it suggests an asymmetry among the features defining the prototype, and a bootstrapping-like function played by certain of these features.

Braine (1992) uses Schlesinger's semantic assimilation approach to argue that Pinker's (1984) bootstrapping theory of phrase-structure acquisition can be reformulated so that it does not make reference to innate syntactic categories. In Pinker's theory, certain semantic categories, assumed to be available to the child prelinguistically, have innate default assignments to particular syntactic ones. For example, words denoting objects are assumed to be Nouns, and words denoting actions are assumed to be Verbs. Using this principle and innate X-bar theory, Pinker claims, children are able to construct simple phrase-structure rules such as $S \rightarrow NP VP$ and $VP \rightarrow V NP$. These PS rules can be used to parse additional data to which the semantic default assignments do not apply. Therefore the child is able to get started in the process of learning the formal system of syntax.

Braine argues that the assumption of innate syntactic categories and innate default assignments of semantic categories to syntactic categories is unwarranted. He claims that children form something like PS rules directly on the basis of semantic categories, positing such rules as an Object-Phrase rule and an Action-Phrase rule. These rules give way to syntactic rules as more and more semantic types of expression are assimilated to them. Braine's theory has the advantage of positing as innate only certain semantic categories (i.e. natural categories), while Pinker's theory requires innate semantic and syntactic categories.

The work of Schlesinger and Braine is an important precedent for the ideas of constructional grounding and conflation, and suggests ways in which they might be applied to more basic grammatical constructions. Recent work by Israel, Johnson and Brooks (in preparation) follows this direction. It examines seven longitudinal child corpora for tendencies in American children's acquisition of English passive constructions. The stages apparent in this data bear a striking resemblance to the cases of constructional grounding that we have seen in this dissertation, though in a somewhat more complex form. The first passive-like utterances that children produce involve stative uses of passive participles, e.g. *car broken*. At this stage, there is no evidence in children's productions that such participles have any properties that distinguish them from adjectives (cf. *car wet*). This could be understood as a case of conflation, but in this case it is not a conflation of senses of a single word, but rather of two complete lexical classes (passive participles and adjectives). At the next stage, children produce participles in combination with auxiliaries (*It's broken*, *It got broken*). These auxiliaries do not provide evidence for the differentiation of participles from adjectives, because they also occur with adjectives (*It's wet*, *It got wet*). At this stage, there is a conflation of two constructions associated with *get*—the *get*-inchoative and the *get*-passive. Finally children show evidence of differentiating the passive constructions by using them to describe events rather than states and resultant states.

In this apparent case of constructional grounding, passive participles as a class are grounded in adjectives, and the *be*-passive and the *get*-passive are grounded in the *be*-stative and the *get*-inchoative constructions, respectively. All the source constructions in this relatively elaborate case of constructional grounding can be associated with simple resultant states that are present and salient in utterance contexts. Because true passives denote events, which can be very short-lived, rather than states (e.g. *The mouse got eaten by the cat*), they are less likely to be uttered in spatiotemporal contiguity with the situations that exemplify their meanings. By the Temporal Locality constraint, then, states would tend to be preferred as the basis for the meaning of participles.

5.5 Conclusion

In this chapter we have considered a number of learning preferences that may apply to children's early hypotheses about simple relational meanings. These preferences—Perceptual Transparency, Temporal Locality, and Causal Simplicity—are uncontroversial proposals about the types of relational meanings that are especially well-suited to be mapped onto forms in demonstrational contexts. The properties of primary scenes happen to satisfy these constraints very well, which means that they are good candidates to serve as the basis for children's early semantic hypotheses. Furthermore, the correlations that primary scenes encapsulate would seem to facilitate a kind of bootstrapping process. The aspects of primary scenes that are intersubjective and especially accessible to children serve as natural indices or metonyms for the more abstract, less accessible aspects of meaning that are also exemplified in such scenes. If children hypothesize conflated representations around these natural focal points of semantic acquisition, they end up linguistically encoding concepts that might otherwise be difficult to encode in the early stages of acquisition. These relatively abstract aspects of children's initial semantic hypotheses can come to be expressed independently by the forms that first express them in combination with simpler aspects of meaning, largely as a result of linguistic delimitation. This learning procedure, in which elements of meanings are "eliminated" from semantic representations through positive evidence rather than "added" through extension, conforms to the Subset Principle, and is therefore especially efficient.

Primary scenes, and the proposed learning strategies that are based on them, are relevant to all three case studies that have been examined in this dissertation, though are not meant to exhaustively characterize the properties of utterance contexts that lead to constructional grounding. In the case of deictics and existentials and in the case of *see*, the source constructions are very directly related to perceptual experience, and primary scenes play a

very direct role in reanalysis. In the case of WXDY, however, primary scenes are only indirectly relevant, in that they partially characterize children's apparent preferred interpretations of adjunct expressions. The meaning of the source WH-question construction, however, is not that directly related to perceptual experience; the fact that it is a basic construction must be accounted for by independent factors, such as frequency and importance in structuring verbal interactions. Nevertheless, I hope to have shown that constructional grounding and conflation, as general phenomena, are well-motivated not only by the data from the last three chapters, but also by the simple theoretical proposals made in this chapter.

Chapter 6: Conclusion

The primary aim of this dissertation has been to show that linguistic structure is not only something that belongs to adults. There are motivated connections between signs that seem to exist especially for children, so to speak. That is, children are most strongly influenced by them, and might actually have something to gain from them. Through the process of constructional grounding, they are able to make good hypotheses about the forms and meanings of relatively difficult constructions, and therefore to acquire certain kinds of conventional linguistic abilities earlier than they might otherwise be able to.

In order to understand how constructional grounding is possible, it is necessary to explain both why there should be conventional constructions that are related to one another in just the right way to enable it, and why those relations between constructions should have the affect on learning that they apparently do. I hope to have proposed at least plausible answers to both of these questions, though the learning issue has obviously received most of the attention here. The reason there are relations between constructions that have the right properties for constructional grounding, it has been suggested, is because the process of context-induced reinterpretation, long recognized as one of the most important sources of historical semantic change (Stern 1931, Benveniste 1971, Heine et al. 1991, Traugott 1988, etc.), necessarily results in exactly those kinds of relations. The events of interpretation that give rise to changes of this kind have the properties of interpretational overlap, except that the target interpretation is not yet conventionalized. After the historical process of reinterpretation has taken place, the result is a new state of language in which there are two conventional signs whose meanings and forms must in principle be able to overlap in certain contexts (because such overlap is what gave rise to the relation between the signs in the first place). Sometimes the contexts in question are rather restricted, as in the *bedes* example discussed by Stern (1931), and are relatively unlikely to recur in a consistent way for multiple speakers and multiple generations.

Sometimes, however, the contexts of overlap are not at all restricted, and in fact recur on a regular basis in most people's experience. In this case, speakers might regularly encounter utterances that have the same overlap properties that gave rise to a relation between two overlapping constructions. This is the situation that makes constructional grounding possible in principle. The more basic and common the overlap contexts are, the more likely they are to occur in speech addressed to young children. The youngest speakers who hear overlap utterances are the ones most likely to have trouble disambiguating them, because they have the least knowledge of the conventional properties that distinguish the overlapping constructions. Sometimes the evidence for a distinction between two constructions might be unavailable to children due to general cognitive and communicative limitations. In this case, children might hypothesize a construction that combines properties of the overlapping constructions. This is what seems to happen initially in all three cases examined in this dissertation, as shown by the longitudinal tendencies in the children's productions. Before producing any clear instances of the "What's X doing Y?" construction, children produce actual WH-questions that have the pragmatic properties of that construction. Before producing existentials, they produce deictics with the pragmatic properties of existentials. And, in the case of *see*, before using it metaphorically to talk about mental experience, they use it in ways in which its visual meaning relates in important ways to mental experience.

When children learn a target construction in this way, they establish the strongest possible link between it and the source construction: a link of identity. Therefore, constructional grounding strongly supports the idea, proposed in many cognitive-linguistic analyses, that there are important motivating connections between conventional signs. As children learn the properties that distinguish the target construction from the source construction, the link of identity is necessarily weakened. Therefore, constructional grounding also shows how two related constructions can have incompatible properties. It just predicts that these properties are learned by children after the motivating link of identity

is established. There is no reason to believe that the effects of this link disappear entirely, however. Once a speaker has learned a construction in contexts in which it overlaps with another construction, there will always be a strong precedent to use the construction in that way. Therefore, a child who relates two constructions through constructional grounding is likely to become an adult who at least occasionally produces overlap utterances.

Because constructional grounding relates both to historical processes and to acquisition in this way, it makes it possible to understand why there should be historically persistent relations between constructions that are difficult to explain in purely adult-synchronic terms. It also helps to explain how language acquisition can both be a dynamic process and lead to a relatively predictable result, because it shows how certain properties of adult language in a sense guide children along a particular learning path.

What kinds of consequences does constructional grounding have for linguistics and for the study of child language? More than anything, it suggests that these two enterprises should be integrated with one another as much as possible—and much more than they currently are. While linguists should continue to look for adult-synchronic principles to explain the patterns that they observe, they should look to acquisition when these principles seem to be inadequate. And while acquisition researchers should continue to focus on children's abilities, they should also consider the possibly profound effects that the structure of language can have on the acquisition process.

References

- Alm-Arvius, Christina. 1993. The English verb *see*. Gothenburg Studies in English. Göteborg: Acta Universitatis Gothoburgensis.
- Apresjan, Jurij D. 1973. Regular polysemy. *Linguistics* 142:5-32.
- Bailey, David. 1997. A computational model of embodiment in the acquisition of action verbs. Ph.D. dissertation, Computer Science Division, EECS Dept., University of California, Berkeley.
- Baker, Collin. 1999. Seeing clearly: Frame semantic, psycholinguistic, and cross-linguistic approaches to the semantics of the English verb *see*. Ph.D. dissertation, Linguistics Department, University of California, Berkeley.
- Baldwin, Dare A. 1993. Infant contributions to the achievement of joint reference. In Paul Bloom (ed.), *Language acquisition: Core readings*, 129-153.
- Benveniste, Emile. 1971. Problems in general linguistics. Coral Gables: University of Miami Press.
- Benveniste, Emile. 1971. Semantic problems in reconstruction. In *Problems in general linguistics*. Coral Gables: University of Miami Press, 249-264.
- Berlin, Brent and Paul Kay. 1991 [1969]. Basic color terms: Their universality and evolution. Berkeley: University of California Press.
- Berwick, Robert C. 1985. The acquisition of syntactic knowledge. Cambridge, MA: The MIT Press.
- Bierwisch, M. 1981. Basic issues in the development of word meaning. In Werner Deutsch (ed.), *The Child's Construction of Language*. New York: Academic Press.
- Bolinger, Dwight. 1965. The atomization of meaning. *Language* 41:555-73.
- Booth, J. R. and W. S. Hall. 1994. Development of the understanding of the polysemous meanings of the mental-state verb *know*. *Cognitive Development* 10:529-549.
- Borer, Hagit and Kenneth Wexler. 1987. The maturation of syntax. In Thomas Roeper and Edwin Williams (eds.), *Parameter setting*. Dordrecht: D. Reidel Publishing Co.
- Bowerman, Melissa. 1974. Learning the structure of causative verbs: A study in the relationship of cognitive, semantic and syntactic development. *Proceedings of Research in Child Language Development* 8:142-78.
- Bowerman, Melissa. 1989 [1993]. Learning a semantic system: What role do cognitive predispositions play? In Mabel Rice and Richard L. Schiefelbusch (eds.), *The teachability of language*, 133-69. Hillsdale, NJ: Erlbaum. Reprinted in Paul Bloom (ed.), *Language acquisition: Core readings*. Cambridge, MA: MIT Press.

- Braine, Martin D. S. 1992. What sort of innate structure is needed to “bootstrap” into syntax? *Cognition* 45:77-100.
- Breivik, Leiv Egil. 1977. A note on the genesis of existential *there*. *English Studies* 58(4):334-348.
- Breivik, Leiv Egil. 1989. On the causes of syntactic change in English. In Leiv Egil Breivik and Ernst Håkon Jahr (eds.), *Language change: Contributions to the studies of its causes*, 29-70. Berlin: Mouton de Gruyter.
- Bresnan, Joan. 1982. *The mental representation of grammatical relations*. Cambridge, MA: The MIT Press.
- Bresnan, Joan and Jane Grimshaw. 1978. The syntax of free relatives in English. *Linguistic Inquiry* 9(3):331-391.
- Brown, Roger. 1958. How shall a thing be called? *Psychological Review* 65:14-21.
- Brown, Roger. 1973. *A First Language: The Early Stages*. Dordrecht: Kluwer.
- Brugman, Claudia. 1981. *Story of over*. M.A. thesis, Linguistics Department, University of California, Berkeley. Indiana University Linguistics Club.
- Bybee, Joan L. and William Pagliuca. 1985. Cross-linguistic comparison and the development of grammatical meaning. In Jacek Fisiak (ed.), *Historical semantics and historical word formation*, 59-83. Berlin: de Gruyter.
- Caramazza, A. and E. Grober. 1976. Polysemy and the structure of the subjective lexicon. In C. Rameh (ed.), *Semantics: Theory and application*. Georgetown University Round Table on Language and Linguistics. Washington, D.C.: Georgetown University Press.
- Carey, Susan. 1982. Semantic development: The state of the art. In Eric Wanner and Lila R. Gleitman (eds.), *Language Acquisition: The state of the art*, 347-389. Cambridge: Cambridge University Press.
- Carey, Susan. 1985. *Conceptual change in childhood*. Cambridge, MA: The MIT Press.
- Carey, Susan and Elizabeth Spelke. 1994. Domain-specific knowledge and conceptual change. In Lawrence A. Hirschfeld and Susan A. Gelman (eds.), *Mapping the mind: Domain specificity in cognition and culture*, 169-200. Cambridge: Cambridge University Press.
- Carnap, Rudolph. 1959 [1937]. *The logical syntax of language*, trans. Amethe Smeaton (Countess von Zeppelin). Paterson, NJ: Littlefield, Adams & Co.
- Choi, Soonja and Melissa Bowerman. 1991. Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition* 41:83-121.
- Chomsky, Noam. 1957. *Syntactic structures*. The Hague & Paris: Mouton Publishers.
- Chomsky, Noam. 1965. *Aspects of the theory of syntax*. Cambridge, MA: The MIT Press.

- Chomsky, Noam. 1981. Lectures on government and binding: The Pisa lectures. Dordrecht: Foris Publications.
- Clark, Eve V. 1973. What's in a word? On the child's acquisition of semantics in his first language. In Timothy E. Moore (ed.), *Cognitive development and the acquisition of language*, 65-110. New York: Academic Press.
- Clark, Eve V. 1977. Strategies and the mapping problem in first language acquisition. In John Macnamara (ed.), *Language learning and thought*, 147-168. New York: Academic Press.
- Clark, Eve V. 1978. Locational: Existential, locative and possessive constructions. In Joseph H. Greenberg (ed.), *Universals of human language*, vol. 4: Syntax, 85-126. Stanford, California: Stanford University Press.
- Clark, Eve V. 1982. The young word maker: A case study of innovation in the child's lexicon. In E. Wanner and L. R. Gleitman (eds.), *Language acquisition: The state of the art*, 390-428. Cambridge: Cambridge University Press.
- Clark, Eve V. 1993. *The lexicon in acquisition*. Cambridge Studies in Linguistics 65. Cambridge University Press.
- Clark, Eve V. and Kathie. L. Carpenter. 1989. The notion of SOURCE in language acquisition. *Language* 65:1-30.
- Clark, Eve V. 1999. Acquisition in the course of conversation. To appear in Adele E. Goldberg (ed.), *Studies in Linguistic Sciences, Special Issue, Forum Lectures 1999*, LSA Summer Institute.
- Clark, Herbert H. 1973. Space, time, semantics and the child. In Timothy E. Moore (ed.), *Cognitive development and the acquisition of language*, 27-63. New York & London: Academic Press.
- Clark, Herbert H. and Deanna Wilkes-Gibbs. 1986 Referring as a collaborative process. *Cognition* 22(1):1-39.
- Clark, Herbert H. 1996. *Using language*. Cambridge: Cambridge University Press.
- Copestake, Ann and Ted Briscoe. 1995. Semi-productive polysemy and sense extension. *Journal of Semantics* 12:15-67.
- Croft, William. 1991. *Syntactic categories and grammatical relations*. University of Chicago Press.
- Cruse, D. A. 1986. *Lexical Semantics*. Cambridge University Press.
- Daudon, René. 1962. *French in Review*, Second Edition. New York: Harcourt Brace Jovanovich, Inc.
- Dawkins, Richard. 1976. *The Selfish Gene*. Oxford: Oxford University Press.

- Deacon, Terrence W. 1997. *The symbolic species: The co-evolution of language and the brain*. New York, London: W. W. Norton & Co.
- Deane, Paul. 1988. Polysemy and cognition. *Lingua* 75:325-361.
- Dennett, Daniel C. 1995. *Darwin's dangerous idea: Evolution and the meanings of life*. New York: Simon & Schuster.
- Dirven, Reni. 1985. Metaphor as a basic means of extending the lexicon. In Wolf Paprotti and Reni Dirven (eds.), *The ubiquity of metaphor*, 85-119. Amsterdam: Benjamins.
- Dowty, David. 1979. *Word meaning and Montague Grammar*. Dordrecht: Reidel.
- Duchan, Judith and Nancy J. Lund. 1978. Why not semantic relations? *Journal of Child Language* 6:243-251.
- Edwards, D. and R. Goodwin. 1986. Action words and pragmatic functions. In S. Kuczaj and M. Barrett (eds.), *The development of word meaning*. New York: Springer-Verlag.
- Ellsworth, Michael. 1999. The History of the "What's X doing Y?" construction. Unpublished ms., University of California, Berkeley.
- Ervin, Susan M. and Garrett Foster. 1960. The development of meaning in children's descriptive terms. *Journal of Abnormal and Social Psychology*. 61(2):271-5.
- Fauconnier, Gilles. 1994 [1985]. *Mental spaces: Aspects of meaning construction in natural language*. Cambridge: Cambridge University Press.
- Fauconnier, Gilles. 1997. *Mappings in thought and language*. Cambridge: Cambridge University Press.
- Feldman, Jerome, Mark Fandy, and Nigel Godard. 1988. Computing with structured neural networks. *IEEE Computer* 21:91-104.
- Fillmore, Charles J. 1968. The case for case. In Emmon Bach and Robert T. Harms (eds.), *Universals in linguistic theory*. New York: Holt, Rinehart and Winston., Inc.
- Fillmore, Charles J. 1975. An alternative to checklist theories of meaning. *Proceedings of the First Annual Meeting, Berkeley Linguistics Society*, 123-131.
- Fillmore, Charles J. 1982. Frame semantics. In Linguistic Society of Korea (ed.), *Linguistics in the Morning Calm*, 111-138. Seoul: Hanshin.
- Fillmore, Charles J. and Beryl T. Atkins. 1992. Toward a frame-based lexicon: The semantics of RISK and its neighbors. In Adrienne Lehrer and Eva Feder Kittay (eds.), *Frames, fields and contrasts: New essays in semantic and lexical organization*. Hillsdale, NJ: Erlbaum.
- Fillmore, Charles J. Towards a descriptive framework for spatial deixis. In Robert J. Jarvella and Wolfgang Klein (eds.), *Speech, place and action: Studies in deixis and related topics*. Chichester and New York: John Wiley and Sons.

- Fillmore, Charles J. and Paul Kay. To appear. Construction Grammar. Stanford: CSLI.
- Fillmore, Charles J., Paul Kay & Mary Catherine O'Connor. 1988. Regularity and idiomaticity in grammatical constructions: The case of *let alone*. *Language* 64:501-538.
- Flickinger, Daniel, Carl Pollard, and Thomas Wasow. 1985. Structure-sharing in lexical representation. In *Proceedings of the 23rd annual meeting of the Association for Computational Linguistics*, 262-267. Chicago: Association for Computational Linguistics.
- Fodor, Jerrold A. 1970. Three reasons for not deriving *kill from cause to die*. *Linguistic Inquiry* 1:429-438.
- Frank, Rita E. and William S. Hall. 1991. Polysemy and the acquisition of the cognitive internal state lexicon. *Journal of Psycholinguistic Research* 20(4):283-304.
- Freeze, Ray. 1992. Existentials and other locatives. *Language* 68(3):553-595.
- Geeraerts, Dirk. 1993. Vagueness's puzzles, polysemy's vagaries. *Cognitive Linguistics* 4(3):223-272.
- Gentner, Dedre. 1978. On relational meaning: The acquisition of verb meaning. *Child Development* 49:988-998.
- Gentner, Dedre. 1982. Why nouns are learned before verbs: linguistic relativity versus natural partitioning. In Stan A. Kuczaj II (ed.), *Language development, vol. 2: Language, culture, and cognition*, 301-334. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Gentner, Dedre and Mary Jo Rattermann. 1991. Language and the career of similarity. In S. A. Gelman and J. P. Byrnes (eds.), *Perspectives on language and thought: Interrelations in development*, 225-277. London: Cambridge University Press.
- Gleitman, Lila. 1993. The structural sources of verb meanings. In Paul Bloom (ed.), *Language acquisition: Core readings*. Cambridge, MA: The MIT Press.
- Gold, E. M. 1967. Language identification in the limit. *Information and Control* 10:447-74.
- Goldberg, Adele. 1993. Another look at some learnability paradoxes. In Eve V. Clark (ed.), *The proceedings of the 25th annual child language research forum*. Stanford: CSLI.
- Goldberg, Adele. 1995. *Constructions: A Construction Grammar approach to argument structure*. Chicago: University of Chicago Press.
- Gopnik, Alison and Andrew M. Meltzoff. 1997. *Words, thoughts, and theories*. Cambridge, MA: The MIT Press.
- Gordon, David and George Lakoff. 1971. Conversational postulates. *Proceedings of the 7th annual meeting of the Chicago Linguistics Society*, 63-84.

- Grady, Joe, Sarah Taub and Pam Morgan. 1996. Primitive and compound metaphors. In Goldberg, Adele (ed.), *Conceptual Structure, Discourse and Language*. Stanford: CSLI.
- Grady, Joseph and Christopher Johnson. In press. Converging evidence for the notions of *subscene* and *primary scene*. Proceedings of the 23rd annual meeting of the Berkeley Linguistics Society.
- Grady, Joseph. 1997. Foundations of meaning: Primary metaphor and primary scenes. Ph.D. dissertation, Linguistics Department, University of California, Berkeley.
- Grice, Paul. 1989 [1975]. *Logic and conversation*. In *Studies in the way of words*. Cambridge, MA: Harvard University Press.
- Grimshaw, Jane. 1981. Form, function, and the language acquisition device. In C.L. Baker and J. J. McCarthy (eds.), *The logical problem of language acquisition*, 165-182. Cambridge, MA: The MIT Press.
- Haiman, John. 1994. Ritualization and the development of language. In William Pagliuca (ed.), *Perspectives on grammaticalization*. *Current Issues in Linguistic Theory* 109. Amsterdam/Philadelphia: Benjamins.
- Haiman, John. 1985. *Natural syntax: Iconicity and erosion*. Cambridge: Cambridge University Press.
- Heine, Bernd, Ulrike Claudi, and Friederike Hünemeyer. 1991. From cognition to grammar: Evidence from African languages. In Elizabeth Closs Traugott and Bernd Heine (eds.), *Approaches to grammaticalization, volume 1: Focus on theoretical and methodological issues*. Amsterdam: Benjamins.
- Hoekstra, Teun and Rene Mulder. 1992. Unergatives as copular verbs: Locational and existential predication. *The Linguistic Review* 7:1-79.
- Hopper, Paul J. and Elizabeth Closs Traugott. 1993. *Grammaticalization*. Cambridge: Cambridge University Press.
- Jackendoff, Ray. 1990. *Semantic structures*. Cambridge, MA: The MIT Press.
- Jespersen, Otto. 1984 [1937]. *Analytic syntax*. Chicago: University of Chicago Press.
- Johnson, Christopher. 1997a. The acquisition of the "What's X doing Y?" construction. In E. Hughes, M. Hughes, and A. Greenhill (eds.), *Proceedings of the 21st annual Boston University Conference on Language Development*, vol. 2, 343-353. Somerville, MA: Cascadilla Press.
- Johnson, Christopher. 1997b. Learnability in the acquisition of multiple senses: source reconsidered. Proceedings of the 22nd annual meeting of the Berkeley Linguistics Society, 469-480.

- Johnson, Christopher. 1999. Metaphor vs. conflation in the acquisition of polysemy: The case of *see*. In Masako K. Hiraga, Chris Sinha and Sherman Wilcox (eds.), *Cultural, typological and psychological issues in cognitive linguistics*. Amsterdam/Philadelphia: Benjamins.
- Johnson, Mark. 1987. *The body in the mind: The bodily basis of meaning, imagination and reason*. Chicago: University of Chicago Press.
- Katz, Jerrold J. and Jerry A. Fodor. 1963. The structure of a semantic theory. *Language* 39:170-210.
- Kay, Paul and Charles J. Fillmore. 1999. Grammatical constructions and linguistic generalizations: The *What's X doing Y?* construction. *Language* 75(1):1-33.
- Keil, Frank C. 1986. Conceptual domains and the acquisition of metaphor. *Cognitive Development* 1:73-96.
- Keil, Frank C. 1989. *Concepts, kinds and cognitive development*. Cambridge, MA: The MIT Press.
- Keil, Frank C. 1994. Explanation, association, and the acquisition of word meaning. In Lila Gleitman and Barbara Landau (eds.), *The Acquisition of the Lexicon*, 169-198. Cambridge, MA: MIT Press.
- Kempson, Ruth. M. 1977. *Semantic theory*. Cambridge: Cambridge University Press.
- Kilgarriff, Adam. 1992. Polysemy. Ph.D. thesis, University of Sussex, CSRP 261, School of Cognitive and Computer Science.
- Kuno, Susumo. 1971. The position of locatives in existential sentences. *Linguistic Inquiry* 2(3):333-78.
- Kuroda, S.-Y. 1968. English relativization and certain related problems. *Language* 44: 244-266.
- Lakoff, George. 1970. A note on vagueness and ambiguity. *Linguistic Inquiry* 1:357-359.
- Lakoff, George. 1977. Linguistic Gestalts. *Proceedings of the 13th Annual Meeting of the Chicago Linguistics Society*, 225-235.
- Lakoff, George. 1987. *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago: University of Chicago Press.
- Lakoff, George. 1986. Cognitive models and prototype theory. In Ulric Neisser (ed.), *Concepts and conceptual development: Ecological and intellectual factors in categorization*. Emory Symposia in Cognition 1. Cambridge: Cambridge University Press.
- Lakoff, George. 1990. The invariance hypothesis: Is abstract reason based on image schemas? *Cognitive Linguistics* 1:39-74.

- Lakoff, George. 1993. The contemporary theory of metaphor. In Andrew Ortony (ed.), *Metaphor and thought*, 2nd edition, 202-251. Cambridge: Cambridge University Press.
- Lakoff, George and Mark Johnson. 1980. *Metaphors we live by*. Chicago: University of Chicago Press.
- Lakoff, George and Mark Johnson. 1999. *Philosophy in the Flesh: The embodied mind and its challenge to western thought*. Basic Books.
- Lakoff, George and Mark Turner. 1989. *More than cool reason: A field guide to poetic metaphor*. Chicago and London: The University of Chicago Press.
- Lambrecht, Knud. 1994. *Information structure and sentence form*. Cambridge Studies in Linguistics 71. Cambridge: Cambridge University Press.
- Landau, Barbara and Lila R. Gleitman. 1985. *Language and experience: Evidence from the blind child*. Cambridge, MA: Harvard University Press.
- Langacker, Ronald W. 1986. Abstract Motion. *Proceedings of the 12th annual meeting of the Berkeley Linguistics Society*, 455-471.
- Langacker, Ronald W. 1987. *Foundations of cognitive grammar*, vol. 1: Theoretical prerequisites. Stanford University Press.
- Langacker, Ronald. 1988. A usage-based model. In B. Rudzka-Ostyn (ed.), *Topics in cognitive linguistics*, 127-161. Amsterdam: Benjamins.
- Lindner, Susan Jean. 1981. A lexico-semantic analysis of English verb particle constructions with "out" and "up." Ph.D. dissertation, University of California, San Diego. Published by Indiana University Linguistics Club.
- Locke, John. 1964 [1690]. *An essay concerning human understanding*. Cleveland: Meridian Books.
- Lyons, John. 1977. *Semantics*. Cambridge University Press.
- Lyons, John. 1968. A note on possessive, existential and locative sentences. *Foundations of Language* 3:390-96.
- MacWhinney, Brian. 1995. *The CHILDES project: Tools for analyzing talk*. Hillsdale, NJ: Erlbaum.
- Macnamra, J. 1982. *Names for things: A study of child language*. Cambridge, MA: Bradford Books/The MIT Press.
- Mandler, Jean. 1988. How to build a baby: On the development of an accessible representational system. *Cognitive Development* 3:113-136.
- Mandler, Jean. 1992. How to build a baby, 2: Conceptual primitives. *Psychological Review* 99:587-604.
- Maratsos, Michael P. 1990. Are actions to verbs as objects are to nouns? On the differential semantic bases of form, class, category. *Linguistics* 28:1351-1379.

- Markman, Ellen. 1989. *Categorization and naming in children: Problems of induction*. Cambridge, MA: The MIT Press.
- Mervis, Carolyn B. and Eleanor Rosch. 1981. Categorization of natural objects. *Annual Review of Psychology* 32:89-115.
- Michaelis, Laura A. 1994. A case of constructional polysemy in Latin. *Studies in Language* 18: 45-70.
- Michaelis, Laura and Knud Lambrecht. 1996. Toward a construction-based theory of language function: The case of nominal extraposition. *Language* 72(2):215-247.
- Newport, Elissa L. 1990. Maturational constraints on language learning. *Cognitive Science* 14:11-28.
- Newport, Elissa L. 1991. Contrasting conceptions of the critical period for language. In S. Carey and R. Gelman (eds.), *Epigenesis of mind: Essays on biology and cognition*. Hillsdale, NJ: Lawrence Erlbaum.
- Norvig, Peter and George Lakoff. 1987. Taking: A study in lexical network theory. *Proceedings of the thirteenth annual meeting of the Berkeley Linguistics Society*, 195-206..
- Norvig, Peter. 1988. Interpretation under ambiguity. *Proceedings of the 14th annual meeting of the Berkeley Linguistics Society*.
- Nunberg, Geoffrey. 1979. The non-uniqueness of semantic solutions: Polysemy, *linguistics and philosophy* 3:143-184.
- Nunberg, Geoffrey. 1992. Systematic polysemy in lexicology and lexicography. *Euralex '92 Proceedings II*, 387-396.
- Parsons, Terence. 1990. *Events in the semantics of English: A study in subatomic semantics*. Cambridge, MA: The MIT Press.
- Paul, Peter. 1982. Homonyms, semantic divergence and valency. *Lingua* 58:291-307.
- Peirce, Charles Sanders. 1955 [1897]. *Logic as semiotic: The theory of signs*. In J. Buchler (ed.), *The philosophical writings of Peirce*, 98-119. New York: Dover Books.
- Peters, Ann M. 1985. Language segmentation: Operating Principles for the perception and analysis of language. In Dan I. Slobin (ed.), *The crosslinguistic study of language acquisition, volume 2: Theoretical issues*, 1157-1256. Hillsdale, London: Erlbaum.
- Piaget, Jean. 1952. *The origins of intelligence in children*. New York: The Norton Library.
- Pinker, Steven. 1984. *Language learnability and language development*. Cambridge, MA: Harvard University Press.
- Pinker, Steven. 1989. *Learnability and Cognition*. Cambridge, MA: MIT Press.

- Pinker, Steven. 1994. How could a child use verb syntax to learn semantics? In Lila Gleitman and Barbara Landau (eds.), *The acquisition of the lexicon*, 377-410. Cambridge, MA: The MIT Press.
- Pollard, Carl and Ivan A. Sag. 1987. *Information-based syntax and semantics*. Stanford: CSLI Publications.
- Pollard, Carl and Ivan A. Sag. 1994. *Head-driven Phrase Structure Grammar*. Stanford: CSLI Publications.
- Pustejovsky, James. 1995. *The generative lexicon*. Cambridge, MA: The MIT Press.
- Quine, W. V. O. 1960. *Word and Object*. Cambridge, MA: The MIT Press.
- Regier, Terry. 1996. *The human semantic potential: Spatial language and constrained connectionism*. Cambridge, MA: The MIT Press.
- Richards, D. Dean and Jaime Goldfarb. 1986. The episodic memory model of conceptual development: An integrative viewpoint. *Cognitive Development* 1:183-219.
- Rosch, Eleanor, Carolyn B. Mervis, Wayne D. Gray, David M. Johnson, and Penny Boyes-Braem. 1976. Basic objects in natural categories. *Cognitive Psychology* 8:382-439.
- Rosch, Eleanor. 1977. Human Categorization. In N. Warren (ed.), *Advances in cross-cultural psychology*. London: Academic Press.
- Ruhl, Charles. 1989. *On monosemy: A study in linguistic semantics*. State University of New York Press.
- Sachs, J. 1983. Talking about the there and then: The emergence of displaced reference in parent-child discourse. In K. E. Nelson (ed.), *Children's language*, vol. 4. Hillsdale, NJ: Erlbaum.
- Saussure, Ferdinand de. 1983 [1915]. *Course in General Linguistics*, eds. Charles Bally and Albert Sechehaye, trans. Roy Harris. La Salle, IL: Open Court.
- Schlesinger, Izchak M. 1988. The origin of relational categories. In Yonata Levy, Izchak M. Schlesinger and Martin D. S. Braine (eds.), *Categories and processes in language acquisition*, 121-178. Hillsdale, NJ: Erlbaum.
- Schütze, Hinrich. 1997. *Ambiguity resolution in language learning*. CSLI Lecture Notes Number 71. Stanford: CSLI.
- Silverstein, Michael. 1985. The functional stratification of language in ontogenesis. In J. V. Wertsch (ed.), *Culture, communication and cognition: Vygotskian perspectives*, 205-235. Cambridge: Cambridge University Press.
- Slobin, Dan I. 1973. Cognitive prerequisites for the development of grammar. In C. A. Ferguson and D. I. Slobin (eds.), *Studies of child language development*, 175-208. New York: Holt, Rinehart & Winston.

- Slobin, Dan. I. 1977. Language change in childhood and in history. In J. Macnamara (ed.), *Language learning and thought*. New York: Academic Press
- Slobin, Dan I. 1981. The origins of the grammatical encoding of events. In Werner Deutsch (ed.), *The child's construction of language, 185-200*. New York: Academic Press.
- Slobin, Dan I. 1985. Crosslinguistic evidence for the language-making capacity. In *The crosslinguistic study of language acquisition, volume 2: Theoretical issues*, 1157-1256. Hillsdale, London: Erlbaum.
- Slobin, Dan I. 1994. Talking perfectly: Discourse origins of the present perfect. In William Pagliuca (ed.), *Perspectives on grammaticalization. Current Issues in Linguistic Theory* 109. Amsterdam/Philadelphia: Benjamins.
- Slobin, Dan I. 1996. From 'thought and language' to 'thinking for speaking'. In J. J. Gumperz and S. C. Levin (eds.), *Rethinking linguistic relativity*, 70-96. Cambridge: Cambridge University Press.
- Slobin, Dan I. 1997. The origins of grammaticizable notions: Beyond the individual mind. In *The crosslinguistic study of language acquisition, vol. 5: Expanding the contexts*. Mahwah, NJ: Erlbaum.
- Smith, Carol; Susan Carey, and Marianne Wiser. 1985. On differentiation: A case study of the development of the concepts of size, weight, and density. *Cognition* 1(3):177-237.
- Stern, Gustaf. 1931. *Meaning and change of meaning: With special referent to the English language*. Bloomington: Indiana University Press.
- Sweetser, Eve E. 1986. Polysemy vs. abstraction: Mutually exclusive or complementary? *Proceedings of the 12th annual meeting of the Berkeley Linguistics Society*, 528-50.
- Sweetser, Eve. 1988. Grammaticalization and semantic bleaching. In Shelly Axmaker, Annie Jaissier, and Helen Singmaster (eds.), *Proceedings of the 14th annual meeting of the Berkeley Linguistics Society*, 389-404.
- Sweetser, Eve V. 1990. From etymology to pragmatics: Metaphorical and cultural aspects of semantic structure. *Cambridge Studies in Linguistics* 54. Cambridge University Press.
- Sweetser, Eve V. 1995. Coalignment in metaphorical systems. Paper presented at the 4th International Cognitive Linguistics Conference, UNM-Albuquerque.
- Talmy, Leonard. 1985. Lexicalization patterns: semantic structure in lexical forms. In Timothy Shopen (ed.), *Language typology and syntactic description, volume III: Grammatical categories and the lexicon*, 57-149. Cambridge: Cambridge University Press.

- Tomasello, Michael. 1992. *First verbs: A case study of early grammatical development*. Cambridge: Cambridge University Press.
- Tomasello, Michael. 1998. The return of constructions. *Journal of Child Language* 25: 431-442.
- Tomasello, Michael and Michael Jeffrey Farrar. 1986. Joint attention and early language. *Child Development* 57:1454-1463.
- Tomasello, Michael and Ann Cale Kruger. 1992. Joint attention on actions: Acquiring verbs in ostensive and non-ostensive contexts. *Journal of Child Language* 19: 311-333.
- Traugott, Elizabeth Closs. 1974. Explorations in linguistic elaboration; language change, language acquisition, and the genesis of spatio-temporal terms. In John M. Anderson and Charles Jones (eds.), *Historical linguistics I*, 263-314. Amsterdam: North Holland
- Traugott, Elizabeth Closs. 1986. From polysemy to internal semantic reconstruction. *Proceedings of the 12th annual meeting of the Berkeley Linguistics Society*, 539-50.
- Traugott, Elizabeth Closs. 1988. Pragmatic strengthening and grammaticalization. In Shelly Axmaker, Annie Jaisser, and Helen Singmaster (eds.), *Proceedings of the fourteenth annual meeting of the Berkeley Linguistics Society*, 406-416.
- Traugott, Elizabeth Closs. 1989. On the rise of epistemic meanings in English: An example of subjectification in semantic change. *Language* 65(1):31-55.
- Traugott, Elizabeth C. and Ekkehard König. 1991. The semantics-pragmatics of grammaticalization revisited. In: Elizabeth Closs Traugott and Bernd Heine (eds.), *Approaches to grammaticalization, volume 1: Focus on theoretical and methodological issues*. Amsterdam: Benjamins.
- Traugott, Elizabeth Closs and Bernd Heine (eds.). 1991. *Approaches to grammaticalization, volume 1: Focus on theoretical and methodological issues*. Amsterdam: Benjamins.
- Tuggy, David. 1993. Ambiguity, polysemy, and vagueness. *Cognitive Linguistics* 4(3):273-290.
- Turner, Mark. 1991. *Reading minds*. Princeton University Press.
- Turner, Mark. 1996. *The literary mind: The origins of thought and language*. New York: Oxford University Press.
- Vygotsky, Lev. 1986 [1934]. *Thought and Language*, ed. Alex Kozulin. Cambridge, MA & London: The MIT Press.
- Weinreich, Uriel. 1980 [1963]. On the semantic structure of language. In *On semantics* (edited by William Labov and Beatrice S. Weinreich), Chapter 3, pp. 37-96.
- Werner, Heinz and Bernard Kaplan. 1963. *Symbol formation: An organismic-developmental approach to language and the expression of thought*. New York: Wiley.

- Wittgenstein, Ludwig. 1981 [1921]. *Tractatus logico-philosophicus*, trans. D. F. Pears and B. F. McGuinness. London & Henley: Routledge & Kegan Paul.
- Wittgenstein, Ludwig. 1958 [1953]. *Philosophische Untersuchungen / Philosophical Investigations*, trans. G. E. M. Anscombe. Oxford: Basil Blackwell.