

# **Growth of a lexical network: Nine English prepositions in acquisition**

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## **Abstract**

The early development of multiple sense types for the English prepositions *in*, *on*, *at*, *to*, *for*, *from*, *with*, *by*, and *of* has been charted on the basis of longitudinal data obtained from the CHILDES corpus for two English-speaking children. In Cognitive Linguistics, prepositions are assumed to be complex lexical categories each associated with a range of polysemous senses. This set of prepositions was selected on the basis of differences in the concreteness of their locative meaning, their varying semantic transparency across a range of sense types, their differing grammatical function, pragmatic relevance, frequency of occurrence, and overall shared monosyllabic shape. While inter-prepositional correspondences and discrepancies are of some interest, the discussion focuses on intra-prepositional commonalities and differences between these two children and addresses implications findings like these have for researchers in cognitive lexical semantics. Even a broad picture such as this of the progress of lexical acquisition by two children calls into question the applicability of certain cognitive mechanisms such as metaphor, metonymy, and schematization deemed to be responsible for the (uni-)directionality of semantic extension observed historically. These mechanisms, while not claimed to be teleological, can take a linguistic form with a concrete lexical meaning and eventually render it reduced, abstract, and highly grammaticalized in function. Such mechanisms are also assumed to have motivated lexical organization synchronically, i.e., in the adult speaker's mental lexicon (as given in lexical network models in Cognitive Linguistics). However, the data presented here suggest that each child seems to have his or her own starting point within a lexical category – one which may not be conceptually basic – with additional senses appearing in a piecemeal fashion, usually as part of a favorite fixed expression, rather than

through stepwise semantic extension driven by processes such as metaphor and schematization.

*Keywords:* cognitive mechanisms, fixed expression, frequency, grammatical function, lexical acquisition, lexical category, linguistically motivated extension, locative meaning, metaphor, metonymy, monosyllabic, network model, non-basic sense, pragmatic relevance, prepositions, schematization, semantic extension, semantic transparency, sense types, uni-/directionality.

## 1. Introduction<sup>1</sup>

This paper is the initial report of a longitudinal study investigating how, when, and why two non-impaired, middle-class, American children have acquired different usages of locative particles, in this case, nine of the English prepositions.<sup>2</sup> Prepositions are widely asserted by cognitive linguists to be highly polysemous, and their multiple senses are assumed to be related semantically via a variety of construal mechanisms, including metaphor, metonymy, instantiation, schematization, image-schematic transformations, and so forth. Since this is the accepted wisdom in Cognitive Linguistics (henceforth, CL) and since I have long been interested in the meaning potential of locative terms, I have felt an imperative to investigate the nature of the early lexical acquisition of prepositions. By studying trends or sequences in a child's development of a lexical item, it is hoped that we can gain empirical grounds for evaluating many CL assumptions about polysemous lexical items, but at the very least have some in-

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2. An earlier version of this paper was presented at the "Workshop on Cognitive Approaches to Lexical Semantics" during the 16th Scandinavian Linguistics Conference held at the University of Turku, Finland, 15 November 1996.

dependent basis for formulating, testing, and evaluating our lexical models, especially network models.

The organization of this paper is as follows. In section 2, I make a case for bridging two separate gaps which weaken CL theory and which the discipline should begin to address as a maturing school of linguistic thought: (i) the gap between observations about what is essentially adult lexico-grammatical description (albeit semantically based) and child language data and (ii) the gap between theoretical claims and empirical evidence. While I do not presume that the fairly anecdotal and highly qualitative child language data presented here should actually influence the construction of theoretical models, I do believe that they can and should call into question many assumptions about semantic extension that are too often accepted unconditionally by adherents (e.g., that it is largely conceptually rather than linguistically motivated). In section 3, I recount how the language data for the two children in this study were collected, coded, and tabulated. I also summarize the findings in a general fashion. In section 4, I turn to specific points of similarity and contrast between the two children with respect to their learning to use a particular preposition. In section 5, I itemize factors which seem to affect the acquisition of multiple sense types for the nine prepositions under study here and, in section 6, I emphasize the need to incorporate these factors within a less unidimensional approach to the structure and evolution of lexical networks, that is, one based on multiple constraint satisfaction.

## **2. Theoretical context: Can acquisition data say anything about lexical networks?**

The central assumption motivating the present study is that lexical acquisition data can contribute meaningfully to the discussion on the nature of lexical networks proposed by cognitive linguists. Whether explicitly stated as such or not, most lexical network models in CL are treated as representational models of the mental lexicon and are thus assumed to have some degree of psychological correspondence

and relevance.<sup>3</sup> Although CL per se is less a well-integrated and fully realized linguistic framework than a theoretical stance taken partly in opposition to more form-based or generative paradigms in the field, it is highly compatible with well-accepted findings in cognitive psychology having to do with categorization by prototype (cf. Rosch 1975, 1978; Lakoff 1987; Taylor 1989; MacLaury 1991). This is especially evident in CL research on individual lexical items and constructions. I think it would be fair to summarize the major CL assumptions about the lexicon as follows (cf. Lakoff 1987; Langacker 1987, 1991a, 1991b; Goldberg 1996):

- (a) most lexemes constitute complex categories having internal structure (i.e., all things considered, most words are polysemous, having multiple related senses);
- (b) the multiple senses of a lexical item are distributed non-randomly in some type of sense space, usually construed as a semantic network (i.e., the senses are organized horizontally around a prototypical sense or set of senses and vertically in relation to more schematic types or more specific tokens);
- (c) the most prototypical senses tend to be those which are experientially grounded (i.e., somehow conceptually basic);
- (d) additional senses (both abstract and novel ones) arise through either schematization or instantiation processes;
- (e) lexical boundaries are porous and often indeterminate (i.e., since natural category boundaries are fuzzy, a word's meaning should be ambiguous or indefinite at the periphery of the category);
- (f) and, more broadly, grammatical and lexical systems more or less directly reflect both conceptualization and conventional usage pressures rather than some innately given structural requirements.

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3. See Sandra and Rice (1995), Rice (1996), and Sandra (1998) for a full description and critique of lexical network models in CL.

In truth, however, it is rather disingenuous to refer to a separate lexicon in CL. Grammar and lexicon are construed more or less equivalently, if indeed they are construed at all as atomic subcomponents of linguistic knowledge. In short, grammar and lexicon are one and the same. Linguistic knowledge has been best and most pithily characterized as “a structured inventory of symbolic units” (Langacker 1987: 57) rather than as a constructive device. Essentially a list of symbolic resources that a speaker uses to produce and comprehend both conventionalized and novel utterances, this inventory contains both specific expressions and schematic ones based on abstracted usage patterns (the latter are similar, perhaps, to generative rules or constructional templates) noted by the language user. Some version of this general view is adopted by most researchers in CL.

Thus far, the output of CL research has been generally descriptive and overwhelmingly synchronic. Although multiple points of correspondence are emerging between CL and research in what has come to be called grammaticalization theory in terms of the import placed on conceptualization strategies for shaping linguistic form (cf. Croft 1995 or Jurafsky 1996 for an overview), there is still a wide gap between CL theory and psychological claims about the nature of linguistic representation and processing (cf. Sandra & Rice 1995; Cuyckens, Sandra & Rice 1997; Sandra 1998; and Rice, Sandra & Vanrespaille 1999). Nevertheless, there are a number of empirical proving grounds available to CL, each with its virtues and limitations. Diachronic studies have allowed scholars to propose non-teleological mechanisms of linguistic change, lexical shift and expansion, and grammaticalization, although these mechanisms do not necessarily enjoy any appreciable degree of psychological reality in the minds of contemporary speakers and therefore should not be deployed automatically as either synchronic or developmental explanations of data patterns. Cross-linguistic verification of cognitive linguistic hypotheses is also required. Although few proposals in the theory are intended to have predictive power or universal scope (by virtue of being wedded to usage-based description), this limited applicability is at odds with the theory’s general claims about cognitive motivation. Surely, the same mechanisms must be in evidence in a

broad range of linguistically diverse languages or the very cognitive basis of CL would be in doubt. *Controlled psycholinguistic experimentation* is obviously an efficient and reliable means for collecting data for testing hypotheses. However, the results from any single experiment are necessarily inconclusive due to the likely potential for methodological flaws or task-related artifacts. Neither cognitive psychology nor psycholinguistics as generally practiced seem especially equipped or predisposed to study the particulars of word meaning beyond obvious cases of homonymy (i.e., ambiguity resolution). Therefore, it is incumbent upon cognitive linguists to lead the way in asking psychologically testable questions of its theory and identifying relevant experimental stimuli. Finally (and this is the empirical arena under discussion in this paper), *child language acquisition studies* can possibly shed light on questions about the nature of word meaning in the mental lexicon and the soundness of CL models about lexical representation.

Only through converging lines of evidence will we be able to have any confidence in our claims about the conceptual forces which shape linguistic (and lexical) systems. Conversely, it could very well be the case that empirical results from these four domains of inquiry give us diverging accounts of polysemy, conceptual similarity and distance, and semantic extension. For example, it could be found that cognitive mechanisms which operate(d) diachronically and typologically are not the same as those which operate in the mind of the adult speaker or developing child. Carpenter (1992) discusses cases in which the historical evolution of classifier systems does not mirror children's acquisition of those systems, thus calling into question much of CL's tacit assumption that phylogeny recapitulates ontogeny when it comes to semantic extension (cf. Slobin 1985 [a position which he later repudiates in Slobin 1997]; Sweetser 1990; Ziegeler 1997). Whereas facts like these are not fatal to CL theorizing, they do require much needed refinement to claims about the interaction between cognition and language, especially when language is undergoing change as it does over broad expanses of time within a given speech community or over more compressed episodes in the mind of the developing language user.

As it stands now, much of the CL literature describing the prevalence of polysemy in synchronic analyses of lexical and constructional categories claims that semantic extension is motivated by cognitive processes such as metaphor, metonymy, schematization, pragmatic inference, and the like. This research is highly consonant with findings in grammaticalization theory and most cognitive linguists are comfortable with an implicit notion that the synchronic array of polysemy patterns reflects historical development (which of course encompasses not just conceptually based abduction processes [see Queller, this volume], but borrowing, frequency, and cultural pressures as well). Historical linguists as far back as Meillet (1912 [1958]) have proposed clines of grammaticality or diachronic hierarchies which predict that a strong degree of unidirectionality obtains cross-linguistically with respect to semantic and/or functional change. Examples abound in the grammaticalization literature showing how various grammatical affixes have evolved from some unbound lexical item in the following general fashion: content item > grammatical word > clitic > inflectional affix (Hopper & Traugott 1993: 7). However, each grammaticalization theorist seems to have posited his or her own cline or hierarchy of change.<sup>4</sup> The unidirectionality claim is by no means without exception, but it is a powerful predictor of which of two general senses of an item (e.g., a locative versus a conjunctive usage of an adposition) was likely to have emerged first historically. Moreover, unidirectionality as a claim does not mean that sense A will inevitably turn into sense B as it changes semantically or recategorizes into a different form class. Both the A and B senses of an item can co-exist and even evolve into separate, newer senses. Nevertheless, it is to grammaticalization the-

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4. Heine, Claudi and Hünnemeyer (1991) propose one whereby senses of an item or construction having to do with PERSONS outrank or are prior to those for OBJECTS > ACTIVITIES > SPACE > TIME > QUALITY. For Traugott (1982) and Traugott and König (1991), the hierarchy is not based on properties of the referent, but properties of the situation: EXTERNAL > INTERNAL, EXTERNAL/INTERNAL together > TEXTUAL/METALINGUISTIC, and all of the above > SPEAKER'S SUBJECTIVE BELIEF STATE. In short, usages having propositional content precede those with textual or expressive power.

ory (rather than CL) that we must turn for any explicit predictions about the order of emergence of different sense types of a linguistic form such as the nine English prepositions under investigation in the present lexical acquisition study.

Historically and typologically, there is a plethora of evidence accumulating that adpositions are notoriously polysemous and especially vulnerable to grammaticalization.<sup>5</sup> Multiple articles in the (1991) two-volume collection, *Approaches to Grammaticalization* edited by Traugott and Heine, attest to the fact that, all things being equal, adpositions evolve additional meanings and functions beyond their basic locative, lexical ones in the orders summarized in Table 1 (cf. in particular those studies by Hopper, Lichtenberk, Carlson, Genetti, and Craig).

*Table 1.* Some historically attested order-of-emergence patterns for divergent senses (S) and/or functions (F) of adpositions [ > = precedes ].

S1/F1	>	S2/F2
concrete	>	abstract
transparent <i>(i.e., referring to present situation)</i>	>	opaque <i>(i.e., non-referring; wholly conventionalized)</i>
spatial <i>(e.g., locative, directional)</i>	>	non-spatial <i>(e.g., dative, instrumental, purpose)</i>
spatial adposition	>	temporal particle <i>(e.g., conjunction, complementizer)</i>
lexical usage	>	grammatical usage
use in specific collocation	>	generalized application

The gap between CL theory and psychological claims about lexical polysemy is especially notable with respect to the nature of language acquisition, either by children or second language learners. There is a

5. These two findings are, of course, not at all independent.



general lack of research by cognitive linguists on the subject of acquisition (Carpenter 1992 and Ziegeler 1997 are rare exceptions), despite assertions elsewhere that the general cognitive approach is usage-based and speaker/conceptualizer-centered (cf. Tomasello 1992: 2–8). Indeed, the theoretical CL literature contains only a handful of explicit claims about the acquisition process, so few in fact that I will indulge in quoting one at length here:

...[the] model is said to take a “bottom up” approach. What this amounts to is a redistribution of emphasis: instead of being almost solely concerned with general rules and principles, we must also give substantial weight to their arrays of conventional instantiations, investigating the actual extension of the patterns in question and the factors that influence it. Furthermore, since patterns are abstracted from specific instances, we need to investigate the schematization process. We know, for example, that *speakers learn and manipulate specific expressions; but we do not know, in any direct way, precisely what degree of schematization they achieve, i.e. how abstract and general the rules are that they manage to extract from more specific structures. I suspect that speakers differ somewhat in this regard, and do not invariably arrive at the highest-level schemas that the data would support.* In any event, the omnipotence of high-level generalizations is not a matter of apriori necessity. Though regularities are obviously noted and employed in the computation of novel expressions, it is quite conceivable that low-level schemas are more important for this purpose than highly abstract schemas representing the broadest generalizations possible. If high-level schemas are extracted, they may be of only secondary significance, serving more of an organizing function than an active computational one. (Langacker 1991b: 265; emphasis mine)

CL lacks an explicit theory about the time-course, nature, and mechanics of language acquisition except for the rather minimalist comment by Langacker and statements by Tomasello which speak of CL’s compatibility with cognitive and socio-cognitive models of acquisition. In short, the claim that grammar is meaning- and usage-based as well as experientially grounded, while sensible and plausible and accepted as an article of faith by adherents of CL, must be supported with empirical evidence. Grammar is deemed to be conceptually based, but such a claim may prove as vulnerable as the long vilified Derivational Theory of Complexity, the difference being that

the primary domain under consideration is not one of structural, but conceptual complexity. More flesh needs to be put on a statement like the one given above if it is to carry any degree of descriptive let alone explanatory weight. In the absence of any other explicit claims about the acquisition of prepositional sense types in the CL literature, we could take the individual, pairwise, and *historical* orderings in Table 1 as a set of hypotheses about the order of emergence of sense types by *children*. Unfortunately, few of these specific ordering relations are borne out by the developmental data reported on in section 4 below. The theoretical ramifications of this incompatibility between historically prevalent patterns and the actual patterns of emergence shown by the two children in the present study are addressed in section 5.

### 3. Data collection and analysis

Previous developmental studies on lexical and grammatical acquisition have typically included data from select prepositions, notably *in* and *on*, concentrating especially on their basic spatial senses. Although Brown (1973) and Clark (1973) drew attention to the acquisition of prepositions early on, comparatively little work has been conducted on this word class. Most extant research has looked at the category *interlexemically*, comparing the overall onset patterns of different prepositions (cf. Johnston & Slobin 1979; Dromi 1979; and Furrow, Murray & Furrow 1985/6) rather than *intralexemically*, comparing onset patterns of different senses of a single preposition. There are a few notable exceptions of studies which have looked beyond the purely spatial in examining prepositional usage by young children (cf. Bloom, Tackeff & Lahey 1984; Tomasello 1987; and Clark & Carpenter 1989). I have long been interested in lexicosyntactic properties of prepositions as a class, including their extended uses. In this study, the acquisition of the prepositions *in*, *on*, *at*, *to*, *for*, *from*, *with*, *by*, and *of* was targeted and was done so for a variety of reasons. These nine prepositions are of relatively different frequency in the adult language; they differ also in their retainment

of a basic spatial sense (although synchronically they can all still be used spatially, even *of* in limited cases), in the degree of abstraction they have attained when considering their entire usage potential, and in the degree of grammaticalization they have undergone (e.g., *on* is a verb particle as well as a preposition, *to* and *for* have become complementizers, *by* is used to mark agents in passive clauses, *of* marks partitive relations among others). Yet they are all monosyllabic, typically unstressed, and they tend to appear within the first two and a half years of an English-speaking child's life.

The data were taken from transcript files found in the CHILDES Archive (MacWhinney & Snow 1990).<sup>6</sup> The two children whose prepositional usages were examined for this study are Naomi (Sachs 1983) and Abe (Kuczaj 1976). These children were selected because their spontaneous utterances were regularly sampled in a home setting over the course of several years. Thus, we have both naturalistic and extensive production data on them.<sup>7</sup> (Most of the other longitudinal studies of non-impaired English-speaking children in the corpus do not cover such a wide period, or the sampling period begins well after the prepositions were first being used.) As shown in the first row of Table 2, the sampling window covers a period of well over two and a half years for both children. A cursory examination of Table 2 reveals that the age of onset for each preposition as well as the actual order of onset differs considerably for the two children. The operational criteria used for establishing age of onset (or first emergence) was either (i) the age at which two spontaneous usages occurred in a single sampling episode or (ii) the age at which at least one spontaneous usage was produced in an episode subsequent to a usage in a previous episode.

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6. Roughly, the sampling intervals were monthly for most of the sampling period. In the case of Naomi, however, the available CHILDES files during her third year of life reflect approximately a bimonthly sampling interval and there is a gap of over a year between the penultimate and last transcript files for Naomi.

7. Only data from files sampled at (roughly) biweekly intervals were used in this study.

*Table 2.* The approximate age of onset for the nine prepositions by Naomi and Abe.

Age (yr; mo)	Naomi (1;3–4;8)	Abe (2;5–5;0)
1;7		
1;9		
1;11	on, in, at	
2;1	to	
2;3		
2;5	of, for	to, in, for
2;7	by	with, on, at, of
2;9	from	by
2;11		
3;1		from
3;3		
3;5	with	

Only prepositions used in combination with other words were coded and tabulated. Single-word or holophrastic utterances containing prepositions were extremely rare, but if present were coded as indeterminate and not further analyzed. Each contextualized usage of one of the targeted prepositions was coded for a wide variety of factors (similar to those used by Tomasello 1987 and Clark & Carpenter 1989). These factors encompassed both morphosyntactic and conceptual categories such as imitative usages, repetitions, errors, innovations, spatial usages (to mark static LOCATION as well as the SOURCE or GOAL of motion), temporal usages (to mark location in TIME, DURATION, FREQUENCY), abstract usages (to mark the SOURCE or GOAL of a transfer or communicative act, for example, or to mark relations as diverse as COMITATIVE, INSTRUMENTAL, DATIVE, BENEFACTIVE, PURPOSE, REASON, etc.), usages in fixed expressions, usages to mark ASPECT, grammatical usages (as a COMPLEMENTIZER or PARTITIVE marker), and so forth. Some of these factors are listed in Table 3 along with actual examples to illustrate.

Table 3. Factors for which prepositional usages were coded.

Coded factors	Sample utterances
SPATIAL LOCATIVE (S-LOC)	<i>Where's my other bag <b>at</b>? I want-ta do this on the table right now; No, I didn't tee-tee <b>in</b> my pants</i>
SPATIAL GOAL (S-GOAL)	<i>I need some <b>in</b> here, Mom, Throw it <b>on</b> the floor</i>
SPATIAL SOURCE (S-SOURCE)	<i>Take the toys <b>from</b> the bin; Here's a letter <b>from</b> Abe to Stan</i>
ABSTRACT LOCATIVE (A-LOC)	<i><b>on</b> TV, the girl <b>on</b> the tape-recorder</i>
ABSTRACT GOAL (A-GOAL)	<i>What is Mommy listening <b>to</b>? Pay attention <b>to</b> me</i>
ABSTRACT SOURCE (A-SRCE)	<i>Daddy, can we make something <b>with</b> this wood? I'm gonna get it <b>from</b> (by means of) this chair</i>
TEMPORAL (TEMP)	<i>She won't feel bad <b>in</b> the nighttime</i>
DURATION (DUR)	<i>He cried and cried <b>for</b> hundreds of weeks; We're going to the cabin <b>for</b> some days</i>
DATIVE (DAT)	<i>Give it <b>to</b> me</i>
BENEFACTIVE (BEN)	<i>And I got something <b>for</b> me</i>
COMITATIVE (COMIT)	<i>Sing <b>with</b> me</i>
ATTRIBUTIVE (ATTRIB)	<i>I like them <b>with</b> colors; the one <b>with</b> all the sand in it</i>
INSTRUMENTAL (INST)	<i>I'm gonna scrape the fish <b>with</b> this; We built a road <b>with</b> this truck</i>
PURPOSE	<i>What are these ones <b>for</b>? It's a cover <b>for</b> the teapot</i>
PHRASAL VERB	<i>look <b>at</b>, wait <b>for</b>, play <b>with</b></i>
FIXED EXPRESSION (FIX)	<i>Happy Birthday <b>to</b> you; Just <b>in</b> case; something is <b>on</b> fire; I don't think it's silly <b>at</b> all; Cutted a hole out <b>of</b> that thing</i>
INFINITIVE (INF)	<i>How about a fork <b>to</b> make designs</i>
COMPLEMENTIZER	<i>too frightening <b>for</b> me to tell it; She left <b>for</b> me to pick up the living room</i>
ERRORS (ERR)	<i>You can take it <b>*at (to)</b> school and show your friends, You found it for me <b>*from (in)</b> the tent</i>

Clearly, some usages of a preposition could be assigned multiple codes. Each code assignment is as subjective as its assessor, and no coding decision or coding scheme is uncontroversial or without limitations. The problem of sense determination plagues lexicographers and lexical semanticists as well and is an issue I have addressed elsewhere in print (cf. Rice 1996). For the purpose of this rather modest study, codes were chosen which were generally recognizable, had been used in other child language studies, or were applicable across multiple prepositions. Also for present purposes, usages which seemed to pertain to specific lexical collocations were treated and tabulated separately; for example, *at* in the expression *look at*. Each coded usage type was tallied as a percentage of overall uses of a particular preposition by a child. This allowed a number of specific comparisons to be made, for example, the usage context or sense type of the first appearance of a preposition, the overall range of sense types achieved by the end of the sampling period for a given preposition, the relative frequency of individual sense types, the percentage of spontaneous to non-spontaneous usages of a preposition or prepositional sense type, etc. It was hoped that these cross-child and cross-lexical comparisons would reveal something about conceptual versus linguistic transparency and complexity or, at the very least, some sort of developmental pattern.

Patterns observed for these two children and for these prepositions suggest that onset and, presumably, mastery of a particular sense type of a given item of this alleged lexical class is partly regular and partly idiosyncratic; is motivated by conceptual, linguistic, and pragmatic factors (such as communicative or interactional usefulness to the child or frequency in the adult input); can be rapid or slow; and that the successful acquisition of other parts of a child's lexicon plays a big role in the acquisition of individual prepositions. In short, not a lot of pattern was noted. Both children displayed rather distinctive styles and sequences of prepositional acquisition. For example, Abe is appreciably more verbose and linguistically innovative compared to Naomi. However, we have an incomplete picture of Abe's prepositional development since he already had started to use *to*, *in*, and *for* by the time spontaneous speech data were first collected on him.

By contrast, we do have a record of Naomi's language prior to and during her first uses of all nine prepositions under study. The actual preposition and sense type acquisition sequences for the two children are detailed in the next section.

#### 4. Points of correspondence and contrast between Naomi and Abe

In this section, I will focus on several findings in particular: (i) the order of emergence of sense types for the nine prepositions by each child, (ii) the comparative frequency of the nine prepositions for each child, (iii) any trends observed in the data, and (iv) idiosyncratic features of each child's use of a specific preposition.

Figure 1 below compares the overall prepositional tokens produced by the two children.

Because Abe had over twice as many prepositions in his sampled utterances as did Naomi and because his ratio of spontaneous to non-spontaneous usages was consistently high, the prepositions are ordered horizontally in descending order based on Abe's usage. I have differentiated between spontaneous and non-spontaneous usages, the latter being comprised of self-repetitions or immediate imitations of the adult input (determined on the basis of having occurred within the last two conversational turns or the child's last three utterances). Neither errors nor non-spontaneous usages entered into the order-of-emergence compilation of sense type described below because the former were rare and because one cannot have much confidence that the latter are representative of the child's native linguistic ability at a given point in time.

Below, I describe for each preposition the first and subsequent sense types or usage contexts as they emerged for the two children during the sampling time-frame. The prepositions are presented in a somewhat random order based loosely on the fact that in their purported "basic" spatial senses, *on*, *in*, and *at* typically predicate static relationships such as contact between an entity and some landmark location (not to mention that *in* and *on* are widely believed to be the

first prepositions to emerge in young children's speech); *to*, *for*, and *from* typically predicate dynamic relationships such as an entity's destination or origin of motion (Choi and Bowerman (1991) suggest that motion is conceptually more salient to a child than is static location so one might expect relationships involving motion to be coded before those involving stasis); while *with*, *by*, and *of* largely predicate abstract or grammaticalized relationships in Modern English such as instrumental, manner, agency, possession, association, comitative and only retain vestiges of their original spatial senses.

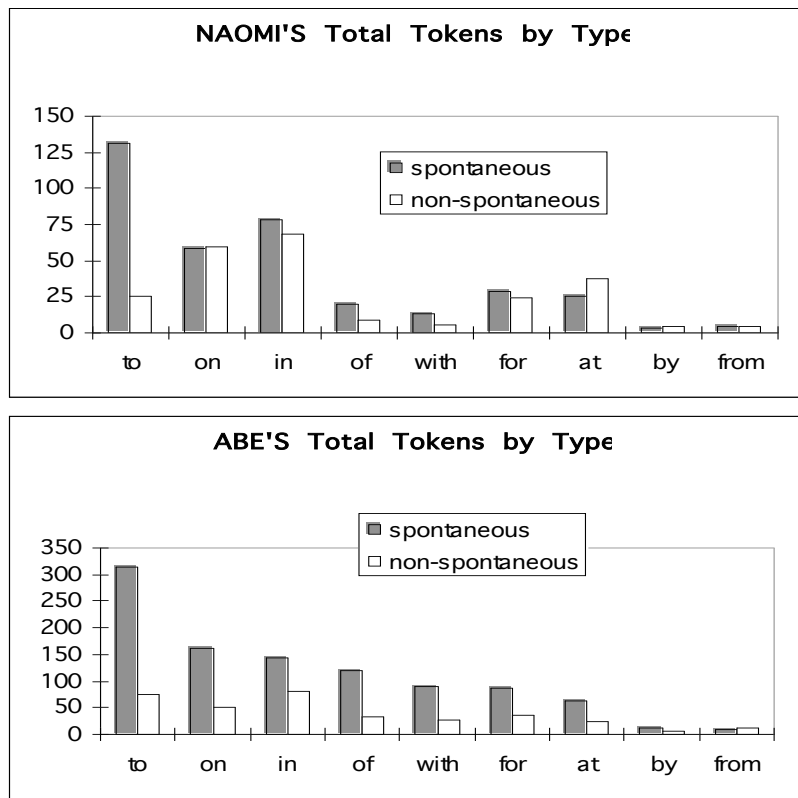


Figure 1. The overall prepositional tokens produced by Naomi and Abe.



For each preposition, I give two tables. The first table indicates the order of emergence and approximate age of the *first* recorded usage of each major sense type for the two children as reflected in their spontaneous speech. Note that this criterion is much less stringent than the one used for tabulating order of emergence by preposition in Table 2. The second table summarizes each child's overall usage frequency for a given preposition, including a breakdown of the non-spontaneous utterances and all the spontaneous ones subcategorized by sense type. In some cases, a preposition is only used in a specific, fixed expression such as *by* in *by myself*. In those cases or when the usage is limited to a particular domain such as *on* in *put CLOTHES on*, the actual usage context is spelled out rather than assigning it an abstract sense type such as SPATIAL LOCATION, whose code nomenclature is meant to reflect that the child has partially generalized the preposition in this subcategory.

*ON*. As shown in Figure 1, Abe had nearly twice as many usages of *on* in the sampled CHILDES files as did Naomi. Moreover, more than half of Naomi's uses of this item consisted of repetitions or imitations. Their respective emerging sense sequences are given in Table 4.

Table 4. Order of first emergence of major sense types of *on* by Naomi (N) and Abe (A).

N	<i>has</i> <i>CLOTHES on</i> (1;10)	<i>put CLOTHES on</i> (2;0)	S-GOAL (2;0)	S-LOC (2;3)	<i>turn</i> <i>MACHINE on</i> (2;6)	ASPECT (4;8)
	>	>	>	>	>	
A	S-GOAL (2;6)	S-LOC & <i>put CLOTHES on</i> (2;7)	<i>turn MACHINE</i> <i>on</i> (2;10)	<i>on TV</i> (2;11)	<i>has</i> <i>CLOTHES on</i> (3;2)	TEMP (4;11)

Table 5 shows the frequency of individual senses or usage types of *on* by each child.

Table 5. Child usage frequency of *on* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	20%	2%
repetitions	14%	19%
indeterminate usages	15%	3%
errors	2%	0%
S-LOC	14%	29%
S-GOAL	11%	19%
<i>put CLOTHES on</i>	7%	6%
<i>have CLOTHES on</i>	3%	0%
<i>on TV</i>	3%	7%
fixed expressions	9%	11%
Other	2%	4%
Total of all uses	100% (N = 119)	100% (N = 211)

Both Naomi and Abe have developed a healthy repertoire of *on* uses by the end of the sampling period, although they are not quite the same uses. Clearly, the experientially basic (and highly frequent!) act of putting clothes on or the simple state of wearing clothes (e.g., *having a hat on*) provides a powerful bootstrap into this lexical category. Moreover, the preposition is phonologically salient in these contexts by virtue of it functioning primarily as a verb particle in *have X on* or *put X on* constructions. In these contexts, it is uttered in phrase-final position and receives primary stress. However, whether this bootstrap is conceptual, phonological, linguistic, or merely pragmatic remains to be seen. Not surprisingly, SPATIAL GOAL and SPATIAL LOCATIVE usages are prevalent and regularly generalizable. Moreover, SPATIAL usages precede TEMPORAL ones and other ABSTRACT usages. All in all, Naomi and Abe's developmental patterns for *on* seem quite consonant with the historical pattern evidenced by *on* and predictions emanating from the grammaticalization literature.

IN. Table 6 presents the developmental sequence for the emergence of different sense types of the preposition *in* by Naomi and Abe.

Table 6. Order of first emergence of major sense types of *in* by Naomi (N) and Abe (A).

N	S-GOAL (1;9)	S-LOC (2;0)	TEMP (3;2)	
	>	>	>	
A	S-LOC (2;5)	S-GOAL (2;7)	A-LOC & TEMP (3;0)	DURATION (3;2)

Table 7. Child usage frequency of *in* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	4%	3%
repetitions	33%	32%
indeterminate usages	9%	2%
errors	0%	0%
S-LOC	27%	23%
S-GOAL	24%	24%
A-LOC	0%	6%
TEMP	1%	3%
DURATION	0%	2%
fixed expressions	2%	5%
Other	0%	0%
Total of all uses	100% (N = 146)	100% (N = 226)

As shown in Figure 1 and Table 7, nearly half of Naomi's uses of *in* were in non-spontaneous utterances. GOAL-directed usages preceded static LOCATIVE ones and there were very few TEMPORAL usages at all. By contrast, Abe used *in* for marking location before destination (GOAL). He also produced more ABSTRACT usages such as the following: *I'm in another quiet mood* (3;10.18) (ABSTRACT LOCATION); *because I didn't know anything to dream in the daytime, to sing in the nighttime* (3;7.21), *Daddy do you remember where I putted that surprise you gotted me in the morning* (4;1.15) (TEMPORAL); *We haven't color that in a long, long time* (3;1.22) (DURATION). Both children

seemed to generalize SPATIAL GOAL usages with *in*, that is, they did not persist in using them exclusively with verbs such as *put*. A more complete picture of Naomi and Abe's respective proportion of different *in* usages is given in Table 7 above.

*AT*. For both children, *at* is a relatively low frequency item despite its early emergence, as shown in Table 2 and Figure 1 respectively. The majority of Naomi's usages of *at* were non-spontaneous (in fact, they were self-repetitions of utterances containing the expression *look at*, which turned out to be her dominant spontaneous usage of *at* as well). Table 8 summarizes Naomi and Abe's development sequence for this preposition and Table 9 gives the relative proportion of usages of *at* by Naomi and Abe.

Although the first usages of *in* and *on* for both children were SPATIAL, the first usages to emerge for *at* did not seem to be spatial at all and were only marginally prepositional (synchronically speaking). The developmental pattern for *at* is remarkable in the fact that both children began by using this preposition in the collocation *look at* and this usage either dominated or persisted as the major usage throughout the sampling period. Indeed, all of Naomi's repetitions involved *look at*. The phrasal verb *look at* has a great deal of pragmatic utility for any young child trying to draw the attention of caregivers. It is therefore not surprising that *at* should emerge first in this context. The near exclusivity of *at* in a *look at* collocation is consistent with Tomasello's Verb Island hypothesis whereby a morphosyntactic marker or associated lexical item first occurs exclusively with or in the context of a particular verb (Tomasello 1992). This hypothesis suggests that underextensions are the norm in child language acquisition, at least with respect to inflectional and relational items (cf. Bloom, Lifter & Hafitz 1980; Bybee 1985: 50–51, *passim*). CL theory would probably add that the first-to-emerge underextended form should be experientially grounded (which *look at* certainly is). Of course, one could argue that the child has not acquired *at* at all, merely the expression *look at*, in which the second morpheme is phonologically reduced compared to its pronunciation as head of an independent prepositional phrase such as *I found it at*

Table 8. Order of first emergence of major sense types of *at* by Naomi (N) and Abe (A).

N	<i>look at</i> (1;11)	S-LOC (2;5)	<i>at mealtime</i> (3;0)			
	>	>	>	>	>	
A	<i>look at</i> (2;6)	S-LOC (2;7)	TEMP (3;1)	<i>at the same time</i> (3;2)	<i>throw at</i> (3;5)	<i>at all</i> (3;11)

Table 9. Child usage frequency of *at* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi		Abe	
imitations	0%		2%	
repetitions	60%		10%	
indeterminate usages	0%		1%	
errors	0%		14%	
S-LOC	5%		40%	
TEMP	6%		6%	
<i>look at</i>	29%		20%	
fixed expressions	0%		7%	
Other	0%		0%	
Total of all uses	100%	(N = 63)	100%	(N = 87)

*school*. Spatial usages quickly emerged for both children as did TEMPORAL ones, thereby suggesting that conceptual basicness correlates with developmental priority. On the other hand, extremely ABSTRACT, semantically opaque usages such as *at the same time* or *at all* were soon produced by Abe as well, suggesting either that a lot of language production is the consequence of rote learning or that parental input and background frequency are important factors in shaping a lexical category along with conceptual basicness.<sup>8</sup>

8. A finding thoroughly supported by additional research of mine comparing the acquisition and usage frequency of different senses of *to* and *for* by thirty Brit-

*TO*. Figure 1 reveals *to* as the most frequently used of the nine prepositions by both Naomi and Abe. It was nearly twice as common as the next most frequent item. However, it is arguable as to whether or not two separate lexical items, a preposition and an infinitive marker, were being coded and counted as different instantiations of the same morpheme. Nevertheless, *to* is the only case in which Naomi and Abe's patterns were identical in terms of sense types achieved, order of emergence, and relative proportion of sense type use vis-à-vis all the senses in the lexical category. This parallelism can be seen in both Tables 10 and 11.

Table 11 indicates just how prevalent the heavily grammaticalized and purportedly semantically opaque INFINITIVAL sense of *to* is for both children. Taken at face value, this finding flies in the face of what grammaticalization theory would predict since lexical senses of an item predate grammatical ones historically. On the other hand, SPATIAL GOAL-of-motion usages do precede more ABSTRACT usages in transfer predications such as DATIVE uses as in *give to*. Nevertheless, we might want to question seriously whether or not INFINITIVAL *to* should even be considered an extended sense of the preposition *to*. This seems to be carrying polysemy too far for some. Cross-linguistically, however, complementizers routinely grammaticalize from locatives, especially from GOAL-markers (cf. Carlson 1991; Craig 1991; and Genetti 1991), so a connection is not unexpected. Moreover, there is precedence in the child language literature for assuming that English-speaking children might treat INFINITIVAL *to* as a special case of the preposition. Bloom, Tackeff and Lahey (1984) found that in four children's spontaneous speech, INFINITIVAL *to* emerged only in the context of a small number of verbs (reminiscent of Tomasello's Verb Island hypothesis discussed earlier) and did not behave as a meaningless syntactic marker. They reasoned, "Inasmuch as the preposition *to* in noun contexts in the children's speech always meant 'direction towards', the fact that they learned *to* in verb contexts at essentially the same time that they learned *to* in

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ish children with the usage frequency in their respective households (cf. Rice 1999).

noun

con

Table 10. Order of first emergence of major sense types of *to* by Naomi (N) and Abe (A).

N	INFINITIVE (2;1)	S-GOAL (2;2)	misc. PHRASAL VERBS (2;5)	DATIVE (4;8)
	>	>	>	
A	INFINITIVE (2;5)	S-GOAL (2;6)	misc. PHRASAL VERBS (2;7)	DATIVE (3;0)

Table 11. Child usage frequency of *to* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	4%	4%
repetitions	14%	14%
indeterminate usages	3%	1%
errors	0%	1%
S-GOAL	9%	14%
phrasal verbs	2%	5%
DATIVE	2%	2%
fixed expressions	7%	3%
infinitive marker	59%	56%
Total of all uses	100% (N = 149)	100% (N = 385)

texts added support to the conclusion that they learned *to* in verb contexts with that meaning” (1984: 403). There are certainly instances of INFINITIVAL *to* produced by Naomi and Abe that suggest it is an isolable, salient lexical item with GOAL- or PURPOSE-marking properties: *I wanna have something to eat* (3;2.21); Mother: *Why did you have your jacket on?* Abe: *Because why. To go outside* (3;5.17); or *I want something to get, to bring, to put in the truck* (4;8.14). I report similar acquisition results for *to* by thirty British-speaking children in Rice (1999).

*FOR.* *For* was one of Abe's first acquired prepositions, but except for an isolated use at 2;1, Naomi did not really start using it until she was almost two and a half. Neither child used it with much frequency except in collocations with *look for*. Nevertheless, as shown in Tables 12 and 13, each child achieved quite a range of different usages, most of which are highly abstract.

Table 12. Order of first emergence of major sense types of *for* by Naomi (N) and Abe (A).

N	BEN (2;1)	misc. FIXED & PURPOSE (2;5)	<i>look for</i> (2;8)	<i>for meal &amp;</i> COMIT (3;2)	DURATION (4;8)		
	>	>	>	>	>	>	
A	BEN (2;6)	COMIT (2;7)	<i>for meal/</i> <i>day</i> (2;11)	REASON (3;1)	DURATION (3;2)	<i>look/wait</i> <i>for</i> (3;3)	COMP (3;8)

Table 13. Child usage frequency of *for* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	4%	6%
repetitions	38%	20%
indeterminate usages	2%	4%
errors	0%	0%
BENEFACTIVE	22%	26%
PURPOSE	4%	13%
COMITATIVE	7%	5%
DURATION	5%	7%
REASON	0%	2%
<i>look/wait for</i> (phrasal verb)	5%	5%
<i>for MEAL/HOLIDAY</i>	2%	4%
fixed expressions	9%	5%
complementizer	2%	3%
Total of all uses	100% (N = 54)	100% (N = 119)



While a considerable range of usages emerged for *for*, only BENEFACTIVE senses were used with much frequency. Curiously, BENEFACTIVE usages of *for* emerged much earlier for both children than did somewhat comparable DATIVE usages of *to*, suggesting that linguistic factors, rather than purely conceptual ones, are partly responsible for extension within a lexical category. Furthermore, unlike the child reported on in Tomasello (1987), neither Naomi nor Abe used *for* erroneously (e.g., substituting *for* for *to* in a *give* construction).

*FROM*. From the information given in Table 2, Figure 1, and Tables 14 and 15, one sees that *from* was both a late acquired preposition for

Table 14. Order of first emergence of major sense types of *from* by Naomi (N) and Abe (A).

N	S-SOURCE (2;8)			
	>	>	>	
A	S-SOURCE (3;0)	<i>from Abe</i> (3;0)	A-SOURCE (by means of) (3;5)	<i>a day off from school</i> (4;5)

Table 15. Child usage frequency of *from* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi		Abe	
imitations	13%		14%	
repetitions	25%		18%	
indeterminate usages	13%		10%	
errors	0%		10%	
S-SOURCE	49%		28%	
A-SOURCE	0%		15%	
fixed expressions	0%		5%	
Total of all uses	100%	(N = 8)	100%	(N = 21)

both children and it manifested just about the overall lowest frequency despite the fact that it retains a strong SPATIAL sense in English. Moreover, the total number of spontaneous usages was just about equivalent to the non-spontaneous ones. Table 14 reveals that Naomi never produced any usages beyond a handful of SPATIAL ones, while Abe seems to have acquired a few more ABSTRACT usages. Table 15 gives the proportion of use by usage type of *from*.

*BY*. The preposition *by* was the least used of all nine items in this study. The order of emergence patterns are given in Table 16 and the proportion of usage types is presented in Table 17.

Table 16. Order of first emergence of major sense types of *by* by Naomi (N) and Abe (A).

N	<i>by myself</i> (2;3)			
	>	>	>	
A	S-LOC (2;5)	<i>by-self</i> (3;5)	PASSIVE AGENT (3;8)	TEMP (4;10)

Table 17. Child usage frequency of *by* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	14%	6%
repetitions	29%	16%
indeterminate usages	14%	6%
errors	0%	0%
S-LOC	0%	17%
<i>by-self</i>	43%	16%
<i>by mistake</i>	0%	17%
passive agent	0%	16%
TEMP	0%	6%
Total of all uses	100% (N = 7)	100% (N = 18)

For the preposition *by*, its use by Naomi was confined throughout the sampled files to the expression, *by myself*, whereas Abe first used it as a SPATIAL LOCATIVE, then in productive *by -self* constructions, and then rather unexpectedly but completely spontaneously as a marker of a passive agent, *A baby butterfly was killed by a bird* (3;7.21). Finally, Abe had one instance of a TEMPORAL usage: *You were there by then when I was carving the top [of the pumpkin] off* (4;10.15). Because Abe is so expressive and precocious linguistically, it is difficult not to conclude that many of these abstract sense types are probably being used idiomatically.

*WITH*. With *with*, we have more evidence to support Tomasello's Verb Island Hypothesis. Dynamic uses of *with* with verbs of coming and going were the initial sense types for both children. Moreover, the experientially basicness and pragmatic utility of *playing with someone* or doing things with things (INSTRUMENTAL) or with other people (COMITATIVE) clearly motivated the majority of the instances of *with*. These uses emerged in the order given in Table 18. Their overall frequency is indicated in Table 19.

Table 18. Order of first emergence of major sense types of *with* by Naomi (N) and Abe (A).

N	<i>go with</i> (2;5)	<i>play with</i> (3;4)	INST (3;4)	ATTRIB (3;4)	<i>come with</i> (3;6)	
	>	>	>	>	>	
A	<i>come/go with</i> (2;7)	<i>play with</i> (2;8)	COMIT (2;8)	INST (2;11)	ATTRIB (3;1)	<i>make/build with</i> (3;7)

In addition, both Naomi and Abe used *with* to mark ATTRIBUTIVE relations such as *because you can shoot with your eyes closed* (3;9.19) or *[I want] toast with honey* (3;9.19). However, these uses are considerably more abstract and did emerge later, in keeping with what the grammaticalization evidence might predict.

Table 19. Child usage frequency of *with* [shaded lines indicate non-spontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	0%	9%
repetitions	17%	14%
indeterminate usages	11%	0%
errors	6%	0%
INSTRUMENT	17%	20%
ATTRIBUTIVE	6%	14%
<i>go/come with</i>	11%	8%
<i>play with</i>	21%	25%
other COMITATIVE	11%	6%
SOURCE	0%	4%
Total of all uses	100% (N = 18)	100% (N = 115)

*OF*. Finally, *of*, arguably the most abstract and grammaticalized of all the prepositions under consideration here, was neither very late to emerge nor of particularly low frequency. The emergence pattern for *of* is shown in Table 20 and the overall proportion of usage types is shown in Table 21. Of course, *of* never really heads its own preposition phrase so much as it exists in an array of highly frequent collocations, to mark quantities (both quantals as in *half of the cookie* and sortals as in *a glass of milk*) and partitive relations (*the top of the refrigerator*). Both of these usages generalized early for both children.

Table 20. Order of first emergence of major sense types of *with* by Naomi (N) and Abe (A).

N	misc. FIXED (2;5)	QUANTIFIER (3;2)	
	>	>	
A	QUANTIFIER	SORTAL	misc. FIXED

	(2;6)	(2;8)	(3;0)
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Table 21. Child usage frequency of *of* [shaded lines indicate nonspontaneous or uncodable uses].

Sense type	Naomi	Abe
imitations	3%	6%
repetitions	28%	14%
indeterminate usages	0%	2%
errors	0%	0%
quantifier	41%	44%
sortal/partonymic	0%	13%
fixed expression	28%	21%
Total of all uses	100% (N = 29)	100% (N = 152)

This is by no means a definitive study. It lacks the thoroughness, for example, of a case study like that reported in Tomasello (1987, 1992), or Moerk (1992). Not only were the sampling intervals fairly wide, but data from only two children were examined and not at a very finely-grained lexical or contextual level of detail, only at a broad semantic one. The pattern of prepositional errors and innovations, which have not yet been analyzed, should eventually yield some interesting data that may help indicate the role of conceptualization in the acquisition process. Although these findings remain largely anecdotal, they accord with conclusions drawn by other researchers tracking lexical development, viz., that inter-child and inter-item variability is great and so it is unlikely that conceptual predispositions drive the acquisition process as much as other factors (Van Geert 1985/6). The patterns of lexical growth for these nine items evidenced by Naomi and Abe differ from each other as well as from Tomasello's daughter (1987). Thus, they certainly underscore one aspect of the Langacker quote given in section 2: There may be considerable individual variation with respect to the specific structures (schemas or extensions) that speakers ultimately arrive at.

### **5. Summary of factors affecting the acquisition of prepositions**

Despite the narrowness of the present case study, some preliminary conclusions can be drawn. There are significant speaker differences in the emergence and usage patterns for the majority of the nine prepositions studied. More often than not, each child manifests a different point of entry into one of the nine lexical categories. In addition, underextensions involving specific verbs or objects seem to be the norm. There are also significant differences among the nine prepositions in terms of whether a basic spatial sense or some more abstract or grammaticalized sense emerges first. The relative role that adult frequency and other input factors play is as yet unknown, so we should not put too much stock into wholly conceptually-driven acquisition mechanisms unless we are prepared to expand our characterization of and/or operationalize such mechanisms. Perceptual salience, experiential basicness, and conceptual complexity are hard concepts to qualify, let alone quantify. While a cursory examination of the error pattern reveals some early conceptual influence on the use of a particular preposition in a particular context, there also seems to be a large linguistic component to the acquisition process (i.e., items may emerge in idiomatic or fixed expressions without regard to their meaning or function, or because the child has developed an affinity for a particular verb or expression, or because of contrastive pressures exerted by another lexical item in the same category), as well as an even larger experiential component (i.e., a child may use a form purely on the basis of frequency of exposure to the adult target or because it is associated with an activity or social interaction that is highly routine or of great importance psychologically to him or her).

These findings, although not very robust, do suggest that semantic extension within a lexical category by a young child proceeds outwardly only partially (if at all) from some basic, concrete sense by the application of a series of metaphorical image-schematic transformations or other construal processes. This is the dynamic claimed to underlie historical patterns of development. As shown in Table 22, the child language evidence presented here are, at the very least, in-

conclusive about any parallelisms which might obtain between developmental and diachronic extension. They tend, however, to point in the direction that ontogeny does not recapitulate phylogeny when it comes to the development of polysemous senses of a preposition.

Table 22. Presence (√), absence (\*), or indeterminacy (?) of correspondence between historically attested order-of-emergence patterns (from Table 1) and Abe and Naomi's developmental orders.

	S <sub>1</sub> /F <sub>1</sub>	>	S <sub>2</sub> /F <sub>2</sub>
?	concrete	>	abstract
*	transparent	>	opaque
*	spatial	>	non-spatial
√	spatial	>	temporal
?	adposition	>	particle
*	lexical usage	>	grammatical usage
√	specific meaning	>	generalized meaning

Returning to the Langacker quote given in section 2 above, the data presented here certainly reinforce his central message that “speakers learn and manipulate specific expressions”. In this regard, Cognitive Grammar, with its basic tenet of being usage-based, may be far from having an underspecified theory of language acquisition. Rather, it may have already axiomized what looks to be true: Usage patterns may differ appreciably from speaker to speaker so the model must remain bottom-up in its approach rather than seek the highest level of generalization possible (e.g., generalizations such as “SPATIAL usages emerge before NON-SPATIAL ones”, “PREPOSITIONAL usages emerge before PARTICLES”, or “the central/basic meaning of the preposition *to* is to mark SPATIAL GOALS”). The kind of methodology relied upon in this study is not without precedent (cf. Bloom et al. (1994), who argued for evidence of young children's knowledge of and adherence to certain pronominal binding principles on the basis of spontaneous speech data from the CHILDES corpus for 3 children, or Tomasello's (1987) study of prepositional use by a single child). However, any conclusions about the mechanisms underlying lexical

acquisition drawable from spontaneous speech data can and should be strengthened by:

- analyzing longitudinal data from additional children;
- looking in more detail at specific contexts surrounding a particular usage type;
- normalizing the results for each child on the basis of MLU or tokens per 100 words (percent scores);
- looking for correlations in onset and sequence of individual prepositions and usages;
- examining the adult input;
- examining acquisition of similar locative items cross-linguistically.

These additional investigations form the basis of ongoing and future work as part of my long-term research into prepositional semantics and the representation of meaning in the mental lexicon.

## **6. Ramifications for lexical network analyses of prepositions**

This paper took as its point of departure the idea that the center of a multi-faceted, polysemous lexical category such as an English preposition is often assumed to be a semantically basic (and generally historically prior) sense and that additional senses probably arise on the basis of conceptual pressures of some sort. This is what is assumed throughout the CL literature and detailed in a host of well documented grammaticalization studies. If true, I questioned whether or not acquisition patterns might reflect the diachronic pattern. If not true, then one is left wondering what influences the growth of a lexical category developmentally.

On the whole, these findings suggest that semantic extension within a developing lexical category appears to be only partially conceptually driven for the young child. The emergence of a lexical item's initial and subsequent sense types seems to be motivated as much if not more by frequency of exposure, favorite expressions, or



contrastive pressures exerted by other lexical items than by purely semantic factors. As Carpenter states in her diachronic vs. developmental comparison of evolving classifier systems, "Learning a language is not simply a process of mapping linguistic forms onto salient cognitive categories. Many conceptually salient categories are not grammaticalized in all languages, or even in all systems of a single language, and the child must learn which ones are linguistically significant and which ones are not" (1992: 146). The child's task is to learn a "conventional, pre-existing system, with a targeted end-state" (1992: 145), so it is of no great surprise that the forces shaping a lexical system diachronically should not be the same as those that a child uses to fill in or acquire some approximation of that system developmentally. Bowerman (1989) has reached a similar conclusion on the basis of cross-linguistic developmental research: The conceptual categories that are considered basic for a child, that seem to motivate acquisition in the first place, including error patterns and innovations, are those that the *target language* distinguishes; i.e., they are language-specific, not universal.

Cognitive Linguistics needs to pay more attention to acquisition, which for psychologists and both generative and functionalist linguists alike has long been a testing ground for hypotheses about the role that cognition (as opposed to purely linguistic factors such as morphosyntactic regularity, high frequency, etc.) plays in language development. After all, the CL movement places a great deal of theoretical weight on the idea that conceptualization shapes grammar and that most linguistic categories are complex, internally structured, and generally display prototype effects. The data presented here are suggestive of the notion that a lexical category for a young child does not start out as either monosemous or polysemous, but as potentially very homonymous. Additional senses do not emerge through extension. Rather, they *may* be integrated through some sort of schematization process at a much later date. Any CL-sanctioned model of a lexical network that assumes the single dimensionality of semantic extension via conceptually-motivated extensions in semantic/associative memory will probably not receive wide support by evidence from developmental studies. CL needs to integrate into the model the

idea that multiple factors constrain and license semantic extension. Some of these candidate factors are frequency, semantic contrast, pragmatic utility, ease of articulation, lexical preference, conventionalization, and so forth. We need more integration of independent empirical findings into our models of lexical semantic knowledge. There should be efforts to refine terms like “cognitive salience” and “conceptual basicness/complexity” and even “metaphorical extension”. Certainly, there should be more care in using labels like these as all-purpose explanatory mechanisms driving language growth and change.

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