

# Lexical and Functional Prepositions in Acquisition: Evidence for a Hybrid Category

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## 1 Introduction

Statistically, in a corpus of one million English words, one in ten words is a preposition (Fang, 2000). Yet, despite their frequent occurrence, there is no generally accepted account of this category and its characteristics. At best, prepositions represent a problematic, contradictory category for theories of syntax. On the one hand, prepositions are held to be one of the four major lexical categories along with nouns, verbs and adjectives, and are contrasted with the functional categories like determiners, inflection and case. On the other hand, they are taken to be a closed class, a characteristic of functional categories and not lexical ones. Prepositions are also argued to add a highly salient semantic content to sentences, as demonstrated through their theta-role assignment, while a few exceptional prepositions are argued to be empty Case assigners which don't assign any theta-roles, the so-called Dummy Case Assigners. Yet, despite these basic, contradictory characteristics, prepositions are taken by most fields of language research (child language acquisition, speech language pathology, aphasia, literacy, and much of syntax) to be a single, homogeneous category.

In recent syntactic research, several attempts have been made to account for the inconsistencies found in the category of prepositions (Tremblay, 1996; Cadiot, 1997; Rauh, 1993; Rooryck, 1996). While these accounts differ in their details, they all point to a theoretical distinction between prepositions which are lexical in nature and those which are syntactic, or functional, in nature.

Moreover, there is some evidence that a bipartite split of prepositions is psychologically real. Evidence from Broca's aphasics (Friederici, 1982), reaction times of children (Friederici, 1983), and a pilot study of the early first language acquisition of prepositions (Littlefield, 2003) indicate a split in prepositions: semantically rich prepositions (lexical prepositions) and syntactic prepositions (functional prepositions) are acquired at different times and with different error rates.

If prepositions are taken to be a hybrid category, then the seemingly conflicting characteristics fall into place; it is not the diverse contradictory qualities of prepositions that are problematic, but the treatment of prepositions as a single, monolithic category. If strong evidence from the domain of early child language acquisition supports the existence of a lexical-functional divide in the category of prepositions, then the notion that prepositions are a complex, hybrid category would need to be adopted in other linguistic areas.

The next section of the prospectus (Section 2) will provide a brief review of the relevant literature regarding the category of prepositions, the acquisition of lexical and functional categories, and the predictions that can be made for prepositions in acquisition. Sections 3 and 4 will focus on the study: the methodology and the findings. Lastly, Section 5 will discuss the conclusions and the significance of the study.

## 2 Prepositions: Lexical or Functional?

### 2.1 Lexical and Functional Categories in Theories of Syntax

The distinction between lexical and functional categories has played an important role in generative theories of syntax (Principles and Parameters, Government and Binding, and most recently Minimalism). The idea that the functional element Infl(ection) heads the sentence (Huang, 1982; Stowell, 1981; Pesetsky, 1982; Chomsky, 1986) eventually led to a parallel re-analysis of Noun Phrases (NPs) as Determiner Phrases (DPs) (Abney, 1987). Since Pollock's (1989) Split-Infl hypothesis, the questions about functional categories have focused on the nature of the structure of functional projections, rather than the fact of their existence (cf. Belletti (1994) for a good description of the development of agreement projections in Generative Grammar).

### 2.2 Prepositions are Problematic

Prepositions have generally been treated as a single category in linguistic theories (cf. Rauh (1993) for a review), and since Jackendoff (1973), it has been generally accepted that they belong to one of the four major lexical categories, along with nouns, verbs, and adjectives. However, there are problems with a unified approach to prepositions.

First, their characterization as a lexical category is problematic. All of the other three major lexical categories (N, V, Adj) are open-class categories, and thus are characterized by a high rate of membership and are readily able to add new members. Prepositions, however, are taken to be a closed class, with a limited and small membership.

But even the categorization of prepositions as a closed class is awkward. Their membership is taken to range from 50 – 60 members, as found in traditional grammars of English (Warriner & Griffith, 1977; Pollock, Sheridan, *et.al.*, 1961), to 248, as found in a corpus study of prepositions (Fang, 2000). Moreover, it is widely accepted that new prepositions can be added to the class (Kortmann & Konig, 1992; Vincent, 1999), albeit at a very slow rate.

Lastly, there are contradictions within the category of prepositions itself. Most prepositions express semantic relations, as realized in their assignment of theta roles. But a few, like *of* and (arguably) the dative *to* seem to be purely syntactic; they are required for Case assignment, but do not add any thematic properties to the structure. In a parallel observation, the majority of prepositions assign Case structurally (as do verbs), while the purely syntactic ones assign Case inherently (cf. Ura (2001) for a concise review of Case assignment in Generative Grammar).

### 2.3 Recent theoretical work suggests a split

While much attention and research have been focused on lexical and functional projections relating to nouns and verbs, prepositions have been examined less. Recently, however, several proposals have been advanced to resolve the difficulties with this category by positing the existence of two (or more) types of prepositions.

In order to explore the inherent properties of prepositions in UG, Tremblay (1996) draws on a variety of characteristics of the French preposition *avec* ‘with’ to claim that this preposition is semantically vacuous. Most pertinent to the topic at hand, though, is that she assumes a division between lexical prepositions and semantically vacuous prepositions, and further calls for the latter group to be divided into two classes: the Dummy Case assigners and ‘true empty’ prepositions.

Similarly, Cadiot (1997) draws on the idea of ‘colorless’ prepositions (Spang-Hanssen, 1963, as cited in Cadiot) to propose two main categories of French prepositions, colorless and colorful, which can be seen as the two ends of a continuum, with some prepositions falling in between the two extremes. Of interest here is that the distinction between colorless and colorful is primarily based on the preposition’s contribution to semantics and syntax: colorless prepositions don’t contribute to the meaning of the phrase, but are inserted due to syntactic requirements, and colorful ones add a salient meaning to the phrase.

Rauh (1993) argues that prepositions are a heterogeneous category, and uses syntactic and semantic properties to argue for a distinction between lexical and non-lexical prepositions. Those with characteristics analogous to the other lexical categories are called ‘lexical’ and are argued to have their own entries in the lexicon. Non-lexical prepositions, however, are those which have undergone some form of grammaticalization, and therefore have no autonomous lexical entry, but are listed under the entry of their governor. There are two types of non-lexical preposition in her view: Case prepositions and those found in fixed phrases (prepositions which arguably form a single syntactic unit with their noun).

Lastly, a line of argument suggesting a split in prepositions has been advanced within the framework of generative grammar. Van Riemsdijk (1990, 1998) makes a strong argument for functional heads in prepositions within this framework. While his aim is to design a more restricted, cogent theory of endocentricity, he uses the category of prepositions to illustrate his framework. Drawing on data from German and Dutch prepositions, postpositions and circumpositions, he argues that the best account of the data requires an analysis of these prepositional elements where some are purely functional heads and others are lexical.

Using van Riemsdijk’s (1990) work as a spring-board, Rooryck (1996) elaborates a Minimalist account of prepositions, and uses data from English, German, Dutch, and French to show that the structural Case of PPs is assigned within a functional projection via Spec-Head agreement.

While these four models differ in their details, they are similar in suggesting an overall theme: as a category, prepositions are not homogeneous, but should be considered multi-layered.

### 2.4 Empirical evidence for the lexical/functional split

There is some empirical evidence that prepositions are treated differently in aphasia and in child language.

While “the inclusion of prepositions in the class of ‘functional categories’ employed by many researchers in aphasiology usually goes unquestioned” (Froud, 2001: 5-6), it has been observed that not all prepositions are affected in agrammatic subjects.

Friederici (1982) tested prepositions in German with 12 Broca’s and 12 Wernicke’s subjects using a Cloze test to examine production and grammaticality judgment tasks to test comprehension. Careful to omit verb particles from her test sentences, she looked at prepositions in two categories: those with a high semantic content and those that were required for purely syntactic reasons. While there was little change found in the perceptive abilities of the Broca’s patients between the two types, their productive abilities showed a significant difference. They correctly produced lexical prepositions 69.6% of the time and syntactic ones 36.3%. The opposite production pattern was found with the Wernicke’s patients: they correctly used lexical prepositions less (51.79%) than syntactic

prepositions (63.1%).

Arguing that Friederici's contrast between lexical and functional prepositions "does not seem to be well supported from a grammatical point of view" because "members of the category preposition are always closed-class items", Grodzinsky (1998: 119) offers a competing account: ungoverned prepositions are intact and governed ones are omitted in agrammatic speech. There are several problems with this account. First, it would only apply to prepositions (which require "a special statement" (122)), and not other grammatical categories. Second, Tesak and Hummer (1994) present counter-evidence from the spontaneous speech of agrammatic patients, and found no evidence supporting Grodzinsky's claim. Lastly, Grodzinsky's results only support his claim in the ungrammatical contexts, and don't seem to be borne out in the grammatical contexts.

In a study examining five- to eight-year-old children's reaction times to open versus closed class items, Friederici (1983) again investigated the divided nature of prepositions. Using a word-monitoring task, she found that children reacted significantly more slowly when presented with syntactic prepositions than lexical ones. This was more pronounced in the youngest children, but was still apparent in the oldest group. Additionally, the younger children had more difficulty responding to the functional prepositions, and didn't respond to the syntactic ones as often as the lexical ones.

Lastly, there is some cross-linguistic evidence that prepositions have a dual nature. While prepositions are not the main focus of Rouveret's (1991) study of functional categories and (Agr)reement in Welsh, he does show that some Welsh prepositions are inflected while others are not. He argues that the inflected ones, which agree with their pronominal complement in person, number and (in third person singular) gender, have a parallel structure with inflected verbs, and thus they have the same lexical-functional structure that IP and DP have. While he doesn't discuss the uninflected prepositions in any detail, it does seem that he is positing an implicit juxtaposition between the two types: the inflected prepositions, which transparently fill a functional head on the one hand, and the uninflected prepositions which don't.

The fact that there are several theoretical proposals which suggest that prepositions are not a single, homogeneous category shows a growing awareness of the problematic nature of prepositions. These theoretical proposals, however, have not gained wide-spread acceptance in the field, while the parallel structures argued for DP/NP and IP/VP have. While there are several pieces of empirical evidence that point to the cognitive reality of this lexical/functional distinction in prepositions, additional evidence needs to be produced which strengthens this view of prepositions.

One area which can offer significant insight about the nature of prepositions is that of early child language acquisition. By examining the developmental patterns found in young children's speech, it may be possible to add to the growing body of evidence firmly supporting a lexical/functional analysis of prepositions.

## **2.5 Language Acquisition: development of lexical and functional categories**

The fact that children acquire linguistic elements in similar, developmental stages was established by Brown's (1973) landmark study of Adam, Eve and Sarah, and confirmed by de Villiers & de Villiers (1973). One of the most general observations of children's developmental stages is that there is a difference in the production of lexical and functional categories.

Since researchers first began observing that children's earliest utterances are 'telegraphic' (Brown & Fraser, 1963; Brown, 1973; Bowerman 1973), it has come to be generally accepted that at the early stages of linguistic development, children's linguistic production is characterized by a heavy use of lexical items and a general lack of functional ones (Lebeaux, 1988; Radford, 1990; Platzack, 1992). Functional elements that are missing from early child production include auxiliaries, possessive *s*, verb inflection, determiners, expletive subjects, complementizers (cf. Radford (1995) for a synthesis of this literature). It should be noted that while this characterization has been accepted for many languages, it is not certain that it is generalizable to morphologically rich languages, which show some functional morphology produced in the early stages; cf. Caselli, Casadio & Bates (1999) for Italian; Aksu-Koc (1988) for Turkish; and Levy (1988) for Hebrew.

From this research the generalization can be made that children begin using lexical items early on (typically around one year of age), and functional items later (typically around two).

## **2.6 Predictions for the acquisition of PPs**

These observations about the development of lexical and functional categories lead to two general predictions for longitudinal language patterns. First, the appearance of lexical items should precede the appearance of functional items. Second, more overall errors (especially errors of omission) should occur with functional elements than with lexical ones. In short, if prepositions are a hybrid category, the lexical prepositions should enter the children's spontaneous production before the functional ones, and the lexical prepositions should also have a lower rate of

omission in obligatory contexts than the functional ones.

## 2.7 Distinguishing lexical and functional prepositions

If prepositions are taken as a hybrid category consisting of both lexical and functional elements, then which are lexical and which are functional? In this paper, *of* will be taken as a functional preposition, and all other prepositions will be taken as lexical. There are several pieces of evidence that lead to this bifurcation of the category. Throughout this discussion, I will adopt a generative view of syntax.

First, there is a difference in the semantic salience of the prepositions. As Hoekstra (1995) observes, functional items lack heavy semantic content, while lexical items do have a salient semantic meaning. *Of* is different from other prepositions because it has little or no semantic content when compared to other prepositions like *in*, *on*, and *to*; it is often described as "semantically null" (Chomsky & Lasnik, 1995: 113), "semantically empty" (Lyons, 1986: 141), or "(genuinely) semantically vacuous" (Ouhalla, 1999: 161). This is especially clear in phrases like 'the destruction of the city' or 'the picture of Bob', but even in partitive constructions like 'all of the bears', the meaning of *of* as a partitive marker is unclear: compare with the parallel 'all the bears' or 'all bears' (cf. McCawley (1998) for a detailed outline of different possible types of partitive structures). One common-sense way of showing the semantic differences between *of* and other prepositions is to ask a layperson to describe the meaning of several different prepositions. Generally they are able to express or gesturally illustrate the meaning of the lexical prepositions, while they are completely stumped by *of*. This shows that *of* lacks a clear descriptive content; as Haegeman & Guéron state: "Functional heads lack descriptive content" (1999: 407).

Additionally, there is a different relationship between *of* and other prepositions with regard to theta-role assignment. As Rooryck (1996) states: "The property which sets prepositions apart from Case markers such as *of*... is the fact that they are associated with specific thematic roles (Comitative/Instrument for *with*, Theme for *about*)" (226), but *of* plays no role in determining the thematic role of its complement. *Of* is present to assign Case, not to assign a theta-role.

Lastly, the Case assignment of *of* has traditionally differed from that of other prepositions. Prepositions are generally taken to be structural Case-assigners which assign oblique Case to their objects (just as transitive verbs assign accusative Case structurally to their complement NPs). *Of*, however, is largely taken to be an inserted element which prevents a structure from violating the Case Filter, thus *of* is a realization of inherent case assignment in structures where nouns or adjectives assign a theta role to a complement, but are unable to assign Case. The most often cited examples of inherent Case assignment involve genitive constructions (perhaps more aptly described as 'relational nouns' in Haegeman & Guéron (1999); e.g.. 'the mother of the groom'), deverbal nouns (e.g.. 'Sue's painting of the house') and structures with adjectival heads (e.g. 'She is proud of her class'). Not only is case assigned differently, but a different Case is assigned. While prepositions as a class assign oblique Case, *of*-insertion results in genitive Case. (Cf. Haegeman (1994); Chomsky & Lasnik (1995); Ouhalla (1999); and Ura (2001), for discussions of inherent Case assignment.)

Rooryck (1996) maintains a distinction between functional *of* and other prepositions in outlining a Minimalist program for case assignment of prepositions (again, drawing on distinctions made in van Riemsdijk (1990)). While all structural Case assignment is taken to occur under Spec-Head relations, he argues that *of* is a functional head, while other prepositions are lexical heads that incorporate into the empty functional node.

It is sometimes argued that the dative *to* (e.g. 'She gave the cat to me') is similar to *of*, and that it should also be considered as a functional element (Rooryck, 1996). However, these dative constructions have been notably difficult to deal with in syntactic theory, and it is unclear what the exact status of the dative *to* really is. When compared with the paraphrases where the preposition is not required (e.g. 'She gave me the cat'), it seems that the preposition *to* adds no meaning to the phrase, and is semantically vacuous like *of*. On the other hand, the meaning of *to* in these dative structures seems to be that of a goal, which is the same meaning that the preposition has when used in more general, non-dative structures (e.g. 'I went to Florida'). Lastly, on a pragmatic level, the use of the dative *to* phrase seems to be less related to the core meaning of the verb. Comparing structures where an object has been omitted, '\*She gave me' is significantly worse than '?She gave a cat'. For these reasons, the dative *to* will not be taken to be a functional preposition in this study.

## 3 Method

### 3.1 Subjects

The study focused on two children in the CHILDES database (MacWhinney and Snow, 1985, 1990) who were selected for their large number of transcribed recordings occurring at frequent intervals, the long period of time covered by these recordings, and the early age at which the recordings began. The CLAN data processing program

(MacWhinney, 1993) was used to calculate MLUs and to tabulate the data after the coding was complete.

The two children selected were Naomi (Sachs, 1983; MacWhinney & Snow, 1985), who has a total of 16,634 utterances spanning a period of 3 1/2 years (1;2,29 to 4;9,3), and Sarah (Brown, 1973) who has a total of 36,711 utterances spanning nearly three years (2;3,5 to 5;1,6). The data for each child are reported in MLU groups, which were established in order to enable comparison between the children, and to allow comparison with other child language research. The placement of transcript files into MLU groups was established on the basis of two criteria: (1) the child had a consistent MLU for a minimum of two consecutive files, and (2) the mean MLU for the group fell within the target. If the mean MLU for a group was lower than the target MLU (for example, if the mean MLU was 1.30, but the target group was 1.50-1.99), then the next two consecutive files within the range were considered the beginning of the MLU group. The MLU groups, total morphemes per group, total number of files, and the age range of the children in each group are shown below in Table 1.

		MLU Groups							
Group	MLU	1	2	3	4	5	6	7	Totals
		1.0-1.49	1.5-1.99	2.0-2.49	2.5-2.99	3.0-3.49	3.5-3.99	4.0+	
Naomi	Mean MLU	1.40	1.65	2.26	2.43	3.15	3.56	4.83	2.75
	Total Morphemes	1,363	1,687	5,096	10,816	10,990	11,363	5,944	47,259
	Total Utterances	1,026	1,023	2,266	4,453	3,412	3,208	1,251	16,639
	Total Files	7	6	14	24	23	16	3	93
	Age	1;2,29- 1;9,10	1;9,26- 1;10,14	1;10,17- 1;11,17	1;11,16- 2;2,25	2;3,0- 2;11,10	2;11,11- 3;8,19	4;7,28- 4;9,3	1;2,29- 4;9,3
Sarah	Mean MLU	n/a	1.74	2.28	2.76	3.29	3.65	n/a	2.74
	Total Morphemes	n/a	12,033	14,246	14,608	27,933	36,790	n/a	105,610
	Total Utterances	n/a	6,909	6,233	5,265	8,470	10,072	n/a	36,949
	Total Files	n/a	24	21	19	35	40	n/a	139
	Age	n/a	2;3,5- 2;8,2	2;8,25- 3;1,17	3;1,24- 3;6,6	3;6,16- 4;3,7	4;3,13- 5;1,6	n/a	1;2,29- 4;9,3

Table 1: MLU Groups

### 3.2 Procedure

All obligatory contexts where prepositions occurred or should have occurred were identified by reading through each file and tagging each utterance. Because contexts with errors of omission were also included, it was not possible to conduct this search with the CLAN program. The following list of prepositions, compiled from Warriner & Griffith (1977), Pollock, Sheridan, *et.al.* (1961), and Hill (1968), was used as a starting point to identify possible contexts:

aboard, about, above, across, after, against, ahead, along, alongside, amid, among, around, as, at, away, back, before, behind, below, beneath, beside, besides, between, beyond, but, by, concerning, down, during, except, for, forwards, from, in, inside, into, like, near, of, off, on, onto, opposite, out, outside, over, past, since, through, throughout, to, toward, under, underneath, until, up, upon, with, within, without

Files were read in a random order, to prevent a chronological bias on the part of the coder.

Following the conventional guidelines for utterance inclusion and exclusion (Brown, 1973; Miller, 1981), several types of structures and utterances were eliminated from the coding process. First, all utterances which may not reflect a child's own usage and analysis were excluded; this included all perfect full or partial imitations of an immediately preceding speaker's utterance, and all utterances containing recitations of songs, poems or quotes (except if the child manipulated the chunk, showing mastery of the elements of the recited material). In order to avoid token inflation in instances where the child repeated one phrase over and over, all immediately adjacent, complete repetitions of the child's own utterances were also eliminated. The initial errors of speaker-initiated repairs were eliminated, because the initial error is corrected by the child, and shouldn't be counted as an error in their linguistic analysis, but rather a speech disfluency.

Three types of contexts were excluded because the preposition-like words in them seemed to be used as parts of learned chunks, rather than individually analyzed segments. These included memorized formulas such as *once upon a time*, idiomatic expressions such as *come on* and *lookit* and *how about*, and compound words such as *upside down*, *giddy-up*, and *downstairs*.

Words that were on the prepositions list but were used as other lexical categories were also excluded. These lexical categories were defined in terms of their structural position with regard to other sentential elements. They included verbs (11a), nouns (11b), adjectives (11c), conjunctions (11d), the complementizer *for* (11e), and infinitival *to* (11f).

- (11) a Sarah: I don('t) like grapes. (file 57)
- b Sarah: he lay on the front.  
      Mother: who's on the front of what?  
      Sarah: the back +... (file 59)
- c Sarah: next birthday have a cake. (file 57)
- d Sarah: um # turn the light on # (be)fore I go. (file 69)
- e Gail: what d(o) ya use that for # Sarah?  
      Sarah: for goin(g) out and see somebody's out there. (file 99)
- f Sarah: I wan(t) (t)a eat cereal. (file 34)

For all contexts that were retained, each was tested to eliminate adverbs and particles. Then each preposition was identified as either lexical or functional, and all errors were coded as omissions, substitutions or other. Because the error rates overall were so low, these three types of errors will be considered together in the following discussion. [Please refer to the Appendix for the syntactic tests utilized to separate out adverbs and particles.]

### 3.3 Results

A total of 1292 prepositional contexts were found for Naomi, and a total of 3518 were found for Sarah, as seen below in Table 2.

			Total Prepositions Used							
Group			1	2	3	4	5	6	7	Totals
MLU			1.0-1.49	1.5-1.99	2.0-2.49	2.5-2.99	3.0-3.49	3.5-3.99	4.0-	
Naomi	Lexical	Correct	0	11	76	198	330	318	204	1137
		Error	0	7	18	19	13	5	0	62
	Functional	Correct	0	0	0	1	20	39	20	80
		Error	0	0	4	4	2	0	3	13
	Total		0	18	98	222	365	362	227	1292
Sarah	Lexical	Correct	--	79	267	443	869	1328	--	2986
		Error	--	38	51	18	28	28	--	163
	Functional	Correct	--	0	7	85	74	148	--	314
		Error	--	5	6	5	22	17	--	55
	Total		0	122	331	551	993	1521	0	3518

Table 2: Raw Scores, Naomi and Sarah

Because Sarah has a larger set of data than Naomi, the raw totals were normalized by dividing them by the total number of utterances for each MLU group. Thus each score in Naomi's Group 2 was divided by 1023, the total number of utterances in that group. (Please refer back to Tables 1 and 2 for the total number of utterances in each group.) The normalized scores are shown below in Table 3, and are expressed as percentages; these scores will be the basis of the graphs and discussion in the following section.

			Normalized Scores						
Group			1	2	3	4	5	6	7
MLU			1.0-1.49	1.5-1.99	2.0-2.49	2.5-2.99	3.0-3.49	3.5-3.99	4.0-
Naomi	Lexical	Correct	0.00%	1.08%	3.35%	4.45%	9.67%	9.91%	16.31%
		Error	0.00%	0.78%	0.79%	0.45%	0.38%	0.16%	0.00%
	Functional	Correct	0.00%	0.00%	0.00%	0.02%	0.59%	1.22%	1.60%
		Error	0.00%	0.00%	0.18%	0.09%	0.06%	0.00%	0.24%
Sarah	Lexical	Correct	n/a	1.14%	4.28%	8.41%	10.26%	13.19%	n/a
		Error	n/a	0.59%	0.80%	0.36%	0.33%	0.28%	n/a
	Functional	Correct	n/a	0.00%	0.11%	1.61%	0.87%	1.47%	n/a
		Error	n/a	0.07%	0.10%	0.09%	0.26%	0.17%	n/a

Table 3: Normalized Scores, Naomi and Sarah

## 4 Discussion

There are two key observations to be drawn from this data. First, both children show a steady, relatively rapid increase of their use of lexical prepositions over time, while functional prepositions do not even enter their spontaneous speech patterns until MLU Group 3 (2.0-2.49). Even when the functional prepositions do enter into the children's production, there is a very low rate of occurrence. This pattern can be seen very clearly in the graph given in Figure 1.

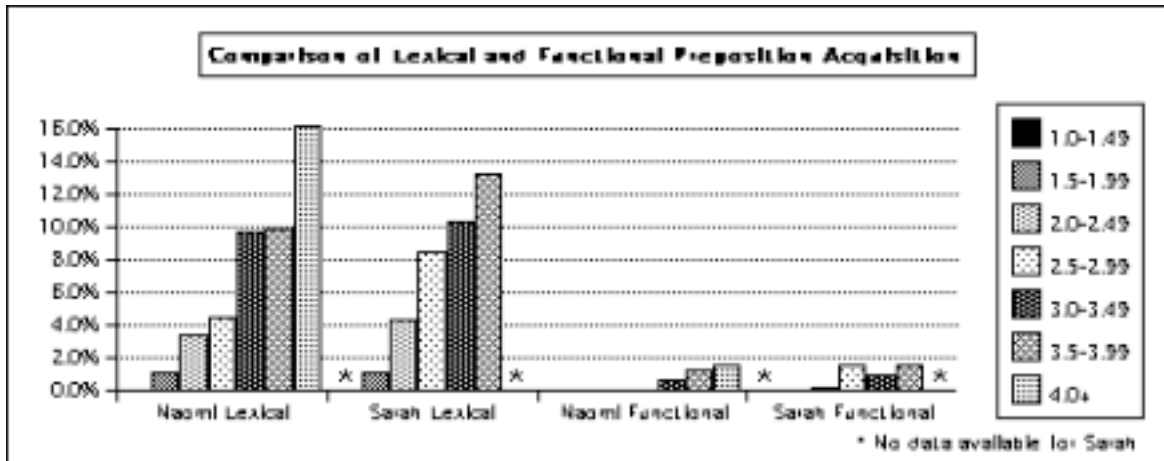


Figure 1: Comparison of Lexical and Functional Prepositions

Second, the raw scores in Table 2 show that errors with both types of prepositions are very low, and the overall number of errors made with lexical prepositions is greater than functional ones. That there are more total errors with lexical prepositions than functional ones is to be expected, since there are significantly more contexts containing lexical prepositions. When errors are considered as a percentage of the total possible contexts available for each category, it is clear that the overall error rate of functional prepositions is much higher than that of lexical prepositions. Naomi and Sarah make mistakes with functional prepositions 40% and 37% of the time, respectively, and only 12% of the time overall with lexical prepositions. Additionally, both girls go through an initial period where their error rate with functional prepositions is 100%.

	Group MLU	Errors							Mean
		1 1.0-1.49	2 1.5-1.99	3 2.0-2.49	4 2.5-2.99	5 3.0-3.49	6 3.5-3.99	7 4.0+	
Naomi	Lexical	--	38.89%	19.15%	8.76%	3.79%	1.55%	0.00%	12.0%
	Functional	--	--	100.00%	80.00%	9.09%	0.00%	13.04%	40.4%
Sarah	Lexical	n/a	34.2%	16.0%	3.9%	3.1%	2.1%	n/a	11.9%
	Functional	n/a	100.0%	46.2%	5.6%	22.9%	10.3%	n/a	37.0%

Table 4: Comparison of Lexical and Functional Errors

These two findings in the data support the hypothesis that there is a lexical and functional division in prepositions, and the predictions made earlier (Section 2.6) are borne out. As was pointed out earlier, it is well established that in first language acquisition, lexical items are the first to be acquired, and the functional items come in later. The conclusions drawn from this data suggest that there are two types of prepositions.

## 5. Significance

Despite the close similarities found in the patterns of acquisition for the two children studied here, a study with only two subjects is insufficient to prove that the patterns found are wholly reliable. Thus further children must be added to the study in order to verify the initial findings presented here.

While prepositions have long been a problematic category, the notion that they are a hybrid category comprised of both lexical and functional elements goes a long way toward putting those problems in order. Strong evidence from the domain of language acquisition would provide important empirical evidence that recent theoretical

innovations are on the right track. Moreover, clear evidence supporting such a prepositional division would be of interest to a variety of fields. For example, it would add force to Friederici's (1982) observation that Broca's aphasics differ in their use of prepositions along lexical/functional lines. While Grodzinsky dismissed Friederici's lexical-functional distinction as unsupported "from a grammatical point of view" (1998: 119), the current study would offer the type of relevance needed to allow other neurolinguists to adopt this difference. Similarly, this research may have consequences for fields like speech language pathology that use the distinction between lexical and functional elements to aid in determining the developmental stage of clients. And, as syntactic density is often used as a measure of complexity for graded reading materials, and prepositions are assumed to be functional elements in these assessment tests (Kidder & Golub, 1976), the consideration of prepositions as lexical and functional may be of interest to those trying to develop more precise instruments of measuring children's reading materials.

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## 7 Appendix: Syntactic Tests: Prepositions, Adverbs, Particles

### 7.1 Prepositions , Adverbs and Particles

There are several ways to distinguish between prepositions, adverbs and particles in English. The first two tests are based on the nature of the object's relationship with the preposition, adverb, or particle. Because prepositions require a complement noun phrase, they cannot be placed in a post-object position, while adverbs and particles can freely change positions with the object (Fraser, 1976; Baker, 1995). The sentences in (1a) and (1b)

show the ability of particles and adverbs to shift positions, while those in (1c) show the preposition's inability to shift.

- (1) a Fill up the diaper pail. / Fill the diaper pail up. (particle)  
b Pick up my box. / Pick my box up. (adverb)  
c Walk up the hill. / \*Walk the hill up. (preposition)

A second test questions whether or not an object pronoun can be separated from the verb; particles and adverbs are unable to occur between the verb and the pronoun object, while prepositions must remain in this position (Baker, 1995). Examples in (2a) and (2b) show the inability of particles and adverbs to separate the pronoun object from the verb, while (2c) shows the preposition's ability to do so.

- (2) a He ate it up. / \*He ate up it. (particle)  
b I'm peeling it off. /\*I'm peeling off it. (adverb)  
c \*I stepped it over. / I stepped over it. (preposition)

Because prepositions are more closely related to their complement noun phrase than to the verb, short adverbials may separate the verb from the PP, while the same construction with a particle or adverb will be ungrammatical (Fraser, 1976). An example of this is shown in (3), where the ungrammatical sentences contain particle and adverb constructions, and the prepositional structure in (3c) is grammatical.

- (3) a \*I'll pick quickly out the shoes. (particle)  
b \*She took quickly off her bandaid. (adverb)  
c She jumped quickly off the chair. (preposition)

Lastly, the lack of a close relation between the PP and the verb means that the PP can be fronted to sentence initial position, while a particle or adverb never can (Fraser, 1976). This is illustrated in (4).

- (4) a \*Up the diaper pail, she filled (particle)  
b \*Up my box, I picked. (adverb)  
c Up the hill, she walked. (preposition)

## 7.2 Adverbs and Particles

To distinguish particles from adverbs, there are three additional tests which can be applied, as developed by Fraser (1976) and further detailed in Sawyer (1999). First, the particle cannot be modified by degree adverbials, as in (5a), while the adverb can be modified in this way, as in (5b).

- (5) a \*She ate the apple only part of the way/all the way up. (particle)  
b She pulled her pants only part of the way/all the way on. (adverb)

Second, the adverb may function as a constituent in a gapped sentence, while the particle cannot, as shown in (6). In (6b), the adverb changes the direction of the action (up or down), but not the action itself, whereas with the particle construction, it is the combination of the verb and particle together that create a meaning: to 'do in a person' is to kill someone, and to 'do up an article of clothing' is to fasten it closed. Thus with the particle construction, the verb cannot be gapped, and the sentence fails.

- (6) a \*Smith did his enemy in, and Max his coat up. (particle)  
b Sarah pulled the pants up, and Naomi, the sweater down. (adverb)

With regard to prosody, the particle cannot take contrastive stress, while the adverb can. Because the verb and the particle essentially form a single semantic unit, the particle is dependent on the verb, and can't be contrasted with another particle. Adverbs, on the other hand, are independent of the verb, and can be contrasted with other adverbs. Example (7a) shows that the particle *off* can't be used with contrastive stress because it can't be contrasted with another particle, like *on*; the phrase 'to carry something off' means to have final success, while 'to carry on' means to keep doing something. But because the adverb is independent of the verb, it can be contrasted with other adverbs, as seen in (7b).

- (7) a \*I said to carry the deception OFF, not ON. (particle)  
b I said to carry the prop ON, not OFF. (adverb)