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Editors

Introduction

This third volume of the Kansas Working Papers in Linguistics covers a diversity of topics which range from general linguistic theory to child language. To provide coherency, we have, therefore, grouped the papers into a number of major sections as reflected in the Table of Contents. What follows is our attempt to capture the major point of each paper, organized according to those sections.

The first paper is Ken Miner's "On the Notion 'Restricted Linguistic Theory': Toward Error Free Data in Linguistics." Miner maintains that linguistic theories must be more firmly grounded on secure data bases. He contends that the attempt to construct theories based on limited data from a few languages leads to serious errors. Rather than seeking to construct general theories, Miner advocates that we should limit ourselves to "restricted theories" which may be confined to one language family.

The Phonetics-Phonology section contains four very different papers. Geoff Gathercole's research demonstrates that instrumental evidence can play a crucial role in phonological analysis. His instrumental research on strong and weak stops in Kansas Potawatomi clearly indicates that the underlying contrast between these series is preserved even in final positions, not neutralized as heretofore supposed. In addition, the paper provides evidence for the interaction between stress and the syntactic structure of Potawatomi.

Mehmet Yavas' paper on the implications of borrowing for Turkish phonology provides a modus operandi for the analysis of languages which have lexicons replete with loan words. In the case of Turkish, previous analyses, though recognizing the importance of loan words, have neglected to incorporate them into their descriptions. Drawing evidence from borrowing, Yavas proposes that current treatments of vowel and consonant harmony should be drastically revised: consonant harmony plays the pivotal role in determining the vowel choice, not conversely. By so analyzing Turkish, he is able to account for a wide range of data unaccounted for by treatments which assume the primacy of vowel harmony.

Robert Rankin's study of Quapaw as a dying language supports the evidence from child language acquisition, aphasia, and comparative linguistics that there exists a universal hierarchy of sound-type complexity. As Quapaw functioned less and less as a native language, principled changes occurred in its phonology: the types of series lost and the order in which they were lost were determined by their relative complexity, with the most marked being lost first.

Code-mixing is the topic of Maria Dobozy's paper. Taking a letter written by a bilingual American-Hungarian as her data, Dobozy describes the phonological rules that are operating in such a code-mixing, with special emphasis on vowel harmony. She demonstrates that vowel harmony is an important process in the system and plays a central role in the rendition of English words by such speakers.

The first paper in the Syntax-Semantics section is Gerald Denning's, "Meaning and Placement of Spanish Adjectives." Denning attempts to clarify the problems of the differences in the meaning and treatment

of restrictive adjectives in three dialects of Spanish. He argues that a strict generative semantic approach will not handle the data and suggests an analysis within the framework of pragmatics.

Virginia Gathercole provides a cross-linguistic study of the use of the deictic verbs "come" and "go." She formulates the uses of "come" and "go" in eleven languages by extending Talmy's (1975) model for verbs of motion to include a presuppositional component. Gathercole divides the contexts in which "come" and "go" are used into (a) immediate deixis and (b) extended deixis. Her goal is to characterize the use of deictic verbs of motion in the eleven languages studied by a limited number of assertional and presuppositional components and thus suggest a possible universal framework for such verbs.

Whereas Denning and Gathercole focus on language related issues, Juan Abugattas takes a more general, philosophical approach in his discussion of speech acts. He claims that previous speech act analyses used the sentence as the basic unit. Abugattas believes, however, that we must go beyond the sentence: "social reality" dictates that we categorize sets of sentences into speech acts, which he calls "complex acts."

Kurt Godden's paper, "Problems in Machine Translation Between Thai and English Using Montague Grammar," brings us to a specific language oriented concern: how to mechanically translate sentences, in particular those containing restrictive relative clauses, from one language to the other. He enumerates the problems related to such a task and proposes a solution involving meaning postulates and context within a Montague framework.

Historical and Comparative Linguistics is represented by Karen Booker's "On the Origin of Number Marking in Muskogean." Booker reconstructs two proto-Muskogean number markers, one dualizer and one pluralizer which were first used with intransitive verbs of location and then generalized to locative transitives. Later these markers spread to intransitive non-locatives. Booker maintains that the highly complex suppletive verb system of Muskogean arose when these markers lost their original meaning.

Three papers, Esther (Etti) Dromi's analysis of the acquisition of locative prepositions by Hebrew children, Gregory Simpson's study of children's categorization processes, and John More's review of relative clause research, constitute the Child Language Acquisition section of the working papers. Dromi's study, which is one of the few published works in the acquisition of Hebrew, compares the order of acquisition of Hebrew locatives with Brown's (1973) order for English and also with Slobin's (1973) universals. Among her findings, Hebrew al ("on") is acquired later than English on. Her findings for Hebrew locatives are particularly interesting in that they allow a comparison of the acquisition of prefixes with that of full prepositions. Her conclusions point to the pivotal role that morphological complexity plays in the order of acquisition of locatives in Hebrew.

Gregory Simpson's major concern has to do with the process by which children form conceptual categories. He argues, on the basis of experimental data, that overextensions should not be taken as evidence

for category formation. His data suggest a distinction between concept formation and object naming, a distinction not made in previous studies. "Function," what objects can do or what can be done to them, determines how that object is conceptualized, but an object's perceptual properties may determine the name given to it. Therefore, "the child may know that two objects don't really belong together, but gives them the same name until he has more evidence."

The acquisition of relative clauses has been a topic of great interest among psycholinguists. John More presents a valuable critical review of the recent literature with special emphasis on the debate between Dan Slobin (1971), Amy Sheldon (1974), Michael Smith (1975), Tavakolian (1977), and deVilliers et al. (1976). The Minimal Distance Principle, the Noun-Verb-Noun Strategy, the Parallel Function Hypothesis, and Slobin's operating principles are compared, along with the formulations of deVilliers and Tavakolian.

Five major topic areas are represented in this third volume of the Kansas Working Papers in Linguistics. Each paper in its own way is a contribution to linguistic scholarship: some provide evidence in new areas of inquiry, others bring new evidence to bear on old questions, while still others suggest future courses of research.

Anthony Staiano and Feryal Yavas

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Language Acquisition

THE USE OF LOCATIVE PREPOSITIONS
BY HEBREW SPEAKING CHILDREN
2:0 - 3:0 YEARS OLD*

Esther (Etti) Dromi

Introduction

Cross-linguistic data suggest that children begin to express loca-
tive notions at the beginning of the multi-word level with no overt
linguistic markers. Only later when they reach Stage II as described
by Brown (1973) or at the age of 2:0 - 3:0 do they begin to use explicit
marker systems for mapping the underlying notions of location onto
surface utterances (Brown, 1973; Slobin, 1973; Clark and Clark, 1977).

Languages differ in the grammatical means of mapping underlying
notions. For this reason researchers expect to find differences in the
order and rate of acquisition of terms that are used to express a speci-
fic content domain (Slobin, 1973; Johnston and Slobin, 1977).

The goal of the present inquiry is to look at the use of locative
adpositions among 30 Hebrew speaking children aged 2:0-3:0. An attempt is
made to determine the order of acquisition of these terms and to draw
tentative conclusions as to the role of cognitive complexity and lin-
guistic complexity in determining this order.

Theoretical Background

In the last few years several studies consider the question of the
acquisition or use of locative expressions by young children. In most
of these studies the way children treat locative terms provide the re-
searchers with clues as to the processes involved in the acquisition of
natural languages. These studies can be classified according to dif-
ferent general concerns or hypotheses about the predominant variables
which determine the language development course.

The relation between the cognitive complexity of locative terms
and the order of acquisition has been studied by Antinucci and Parisi
(1970), H. Clark (1973), and H. Grimm (1975). The main claim of these
researchers is that the child acquires linguistic devices by learning
how to apply them to the a priori knowledge he has previously learned
about the world. Parisi and Antinucci (1970) showed that the accuracy of
children's motor responses to instructions containing locatives depends
on the complexity of the spatial relations that these terms represent.
Thus the children deal much more accurately with topological terms such
as 'in' and 'on' than with locatives of dimensional space such as 'in
front of,' 'below,' and 'beside,' or of complex spatial relations, such
as 'through' or 'along.' In his paper, "Space, Time, Semantics, and the
Child," H. Clark (1973) specified the cognitive complexity of locative
expressions according to properties such as position in space (positive

direction unmarked, negative direction marked) directionality (location
is unmarked, direction is marked) and the number of dimensions of the
reference points (one-dimensional prepositions are unmarked, two- and
three-dimensional ones marked). (See H. Clark, 1973, Table 2, page 4)
Although it is difficult to examine empirically the application of the
complexity hypothesis to child language, Clark argues that the order of
acquisition should be determined by the cognitive complexity. Grimm
(1975) studied the spontaneously produced prepositional phrases of 137
German children aged 2:7-7:0. On the basis of her data on frequency of
use, order of emergence, and types of substitutions, she concluded that
"The development of spatial prepositions concurs with the development of
spatio-geometric properties shown by Piaget" (Grimm, 1975:97). Grimm sug-
gested that spatial prepositions are the first to emerge in child lan-
guage and that these prepositions are followed by temporal and purely
syntactic prepositions.

The nature of non-linguistic strategies that are involved in the
acquisitions of word meaning has been studied by using stimuli with
spatial prepositions such as 'in,' 'on,' and 'under' (E. Clark, 1973;
Grieve, Hoogenraad and Murry, 1977:271). In these studies the way children
respond to the investigator's instructions provided clues as to the
processes of acquisition of these terms as well as to the general role
of non-linguistic strategies which the children use before manifesting
full linguistic competence. The order of acquisition of spatial terms
by English-speaking children suggested by these studies is 'in,' 'on,'
and 'under,' respectively. Grieve says that "normally there is a period
when the child understands 'in,' 'on' but not yet 'under'" (Grieve, et
al.).

A third group of studies provides data on the emergence of specific
adpositions in child language. Brown (1973) discusses the acquisition
curve of the prepositions 'in' and 'on' of his three subjects and noted
an abrupt rise to criterion at the beginning of Stage II when almost
all uses of 'in' and 'on' were correct. He observed that these preposi-
tions seemed at this stage to be used for spatial and concrete purposes.
Brown found that in the acquisition of the 14 grammatical morphemes by
his English-speaking subjects the prepositions 'in' and 'on' both fell
second in the ranked order.

de Villiers and de Villiers (1973) confirmed Brown's findings. In
a cross-sectional study, they examined the order of acquisition of the
same 14 grammatical morphemes that were discussed by Brown (1973), with
a group of 21 English-speaking children age 1:4-3:4. They found a high
correlation between their results and Brown's. In their rank order, the
prepositions 'in' and 'on' are acquired early and following each other
(de Villiers and de Villiers, 1973).

The use of locative expressions in several languages was studied by
Slobin (1973) and Johnston and Slobin (1977), who tested the role of the
'formal linguistic complexity' of these terms in the process of their
acquisition. Slobin (1973) suggested that analyses of cross-linguistic
discrepancies in the development of terms used to express identical under-
lying notions would provide evidence for specific operating principles

that children use in the process of acquiring their first language. Such studies would enable one to examine the extent to which various phonetic, morphological and semantic properties facilitates or impedes the acquisition process.

Johnston and Slobin (1977) used a wide range of tests in order to study the comprehension and production of locative expression in four different languages: English, Turkish, Serbo Croation and Italian. The investigators found that in all four languages, children at the early age of 2:0-2:8 use no more than two or three different prepositions and that children in each successively older age group produced more locatives than those in the previous group. It was only subsequently, between the ages of 2:8-4:0, that a significant difference emerged in the number of locative expressions produced by children learning Turkish or Italian and those learning English or Serbo Croation. In all four languages the first four locative expressions to be produced were 'in,' 'on,' 'under,' and 'beside.' English, Turkish and Italian children acquired the locatives in the predictable order (in, on, under, beside) while Yugoslav children's performance was marginally predictable (on, in, beside, under). By applying six criteria to specify the formal linguistic complexity of locative expressions in the four languages, the investigators showed that wherever cognitive complexity fails to predict the order of acquisition, linguistic processing determines that order.

As different languages make different combinations of the possible determinants of order of acquisition, it was suggested by Brown (1973) and by Slobin (1973) that in order to work out the determinants of acquisition order, it is useful to look at comparative data. Since Brown (1973:294) wrote "not much information is now available on order in other languages and what there is seldom utilizes an explicit criterion of acquisition...," several studies on languages other than English have been published. For example, Macwhinney (1976) studied the acquisition of morphology and syntax in Hungarian. Lipp (1977) discussed the acquisition of Estonian inflections. In both studies Cazden's (1968) criterion for determining the acquisition of new forms, i.e. 90% correct use in obligatory context was applied, and it proved to be generally applicable to other languages than English.

In the present study I will examine the use of locative prepositions in the spontaneous speech of Hebrew speaking children. The rank order of locative prepositions will be determined according to the correct use in obligatory contexts. Tentative conclusions will be drawn concerning the order of acquisition of these terms in Hebrew.

An attempt will be made to examine the role of cognitive complexity and formal linguistic complexity, in determining that order. Special reference will be made to the form of this expression in Hebrew, and I will propose the following hypotheses: (i) prefixed locatives are more salient for children than whole word prepositional locatives, (ii) morphological complexity is a determinant factor in the acquisition of new forms.

Locative Prepositions in Hebrew

The means for mapping underlying notions that specify a relation between an object and its location is the concern of this study. In Hebrew such relations are expressed with prepositions. Prepositions constitute a restricted set of items which perform a variety of functions. I shall not discuss prepositions that serve as purely syntactic markers or prepositions that serve only as markers for grammatical case relations. Rather, I shall discuss the use of prepositions that contain independent semantic content. All locative relations are marked in spoken Hebrew by prepositions. They always precede the reference point, but they differ in form. We can classify the prepositions into 3 groups according to form.

A.   Enclitic Prefixes – bound morphemes attached directly to the noun.

    (1) be^2 -   'in'
            oto   -   'car, automobile'
            beoto -   'in a car'

These prefixes are attached enclitically to the following noun with which they form a single phonolgoical unit (in terms of stress, vowel alter- nations on the prefix etc.). As bound morphemes they never occur in isolation. These prefixes incorporate the definite marker ha- as follows:

    (2) beoto   'in (a) car'; be-+ha-oto =baoto   'in the car'
         leyeled 'to (a) boy'; le-+ha-yeled=la yeled 'to the boy.'

B.   Separate Word Prepositions – Morphemes that are represented in the orthography as separate words, and which are not affected by the initial element or elements of the word which they precede.

    (3) al 'on' al gag   'on (a) roof'; al hagag   'on the roof'
         im 'with' im yeled 'with a boy'; im hayeled''with the boy'

The contrast between (A) and (B) is manifested clearly in two preposi- tionals which under certain syntactic and semantic constraints, can take either an enclitic or separate word form, thus:

    (4) le- (Prefix) alternates with el (Free Morpheme) in the sense of 'to'

        leyeled ~ el yeled   'to a boy'
        layeled ~ el hayeled 'to the boy'

C.   Fused forms – These occur whenever a preposition is followed by a pronoun rather than by a full noun or noun phrase. In such cases the combination of preposition + pronoun is fused into a single form. Thus:

(5) le-   +hu   'to' + 'he' = lo   'to him/it (masc)'
     le-   +hi   'to' + 'she' = la   'to her/it (fem)'
     be-   +ani   'in' + 'I'   = bi   'in me'
     be-   +hi   'in' + 'she' = ba   'in her/it (fem)'
     al-   +hu   'on' + 'he' = alav   'on him/it (masc)'
     al   +hem   'on' + 'they'= alehem 'on them'

The precise form taken by these fusings differs from one preposition to
another. It is assumed that these forms have to be learned as idio-
syncratic properties of a particular preposition. Thus, for instance,
the object marker et changes to ot before pronominal suffixes and the
preposition im 'with' changes to it before pronominal suffixes.

(6) et dan 'OM Dan'   *et hu 'OM he'   -   oto
     im dan 'with Dan' *im hu 'with he' -   ito

     In regard to the development of locative prepositions in Hebrew, I
am especially interested in looking at the contrast between prefixes and
separate word prepositions. The fact that children can use two forms
with the same meaning interchangeably seems to facilitate the analysis
of the data and to justify some arguments. The acquisition of the fused
forms will also be discussed. It is necessary to find out whether the
structural complexity of these forms has a crucial effect on the order
of acquisition.

The Study

     Speech samples from thirty Hebrew speaking children aged 2:0-3:0 were
elicited, transcribed, and analyzed. These samples were obtained in
the course of a larger study of Israeli children's speech production at
this age (Dromi, 1977). The subjects had all been born on "kibbutz"
(collective villages) and used Hebrew as their first and only language.
These children have spent their lives mainly in a peer-group situation
of the so called "children's home," spending two to three hours each day
with their parents. After an initial pilot-study to test the effective-
ness of various techniques of elicitation, a set of pictures and small
plastic toys were used to elicit spontaneous utterances from the children
The researcher tried to avoid engaging in conversations with the subjects
and talked mainly when she introduced a new set of stimuli, then she
would say, "Oh! what a nice picture I have!..."   Each stimulus was
presented to the child for 30 seconds; if the child did not respond the
stimulus was changed. Whenever the child produced an oral response, the
experimenter would repeat it using an "echolalic" type of imitation.
This imitation included intonation, misarticulated sounds, and morpho-
syntactic errors. This procedure was followed in order to help the
experimenter to interpret and then transcribe the utterances. It proved
to be effective, especially with the younger subjects. The sessions, each
of which lasted 30-50 minutes, were recorded by a portable cassette
recorder, Sony T.C. 95. During the sessions, contextual information was

noted down as part of the written record. All utterances were trans-
cribed following each session. Speech samples varied in size from 50
to 220 utterances for each child with a mean of 113 utterances and a
total of 4,294 utterances. MLU values were calculated on the basis of
an original model for calculating MLU in Hebrew,[3] they ranged from
1.5 to 5.8.

For the purpose of the present study, I considered for analysis
only the spontaneous utterances of each child. Neither imitative utter-
ances (when a child reproduced the experimenter's repetition) nor re-
sponses to question (those usually were rare and did not refer to the
stimuli) were analyzed. The spontaneous utterances of each child were
scored for the frequency with which the child supplied obligatory con-
texts for locative prepositions, and for the proportion of the contexts
in which the prepositions were present where required.

Obligatory contexts for each prepositions were defined according
to Brown's (1973) suggestions. Because I was dealing with a restricted
set of items, and as the procedure of elicitation did not allow linguistic
prior contexts, I determined the obligatory contexts on the basis of two
criteria:

a. Linguistic Contexts - The child's own utterance. Whenever the
child omitted a preposition and it was clear that a specific preposition
was needed, i.e.:

(7) *hayeled   yošev   hasir   šelo
      the child   sit(s)   the toilet   his
      'The child is sitting his toilet'
instead of:
      hayeled   yošev   al   hasir   šelo
      the child   sit(s)   on   the toilet   his
      'The child is sitting on his toilet' --

(8) *dubi   nofel   maim
   (a) teddy   fall(s) (a) water
      'A teddy is falling a water'
instead of:
      dubi   nofel   lamain
   (a) teddy   fall(s)   to the water
      'A teddy is falling into the water'

Whenever the child substituted an appropriate preposition with a dif-
ferent one which did not fit the meaning of the sentence.

(9) *hu   medaber   al   hatelephon
      he   talk(s)   on   the   phone
      'He is talking on the phone.'
instead of:
      hu   medaber   ba telephon
      he   talk(s)   in the phone
      'He is talking in the phone.'

(10)   *hu   mashke   lapraxim
       he   gives water   to the flowers
       'He is giving water to the flowers'
instead of:
       hu   mashke   et hapraxim
       he   give(s) water   the flowers
       'he is giving water on the flowers'

b.   Non-linguistic Contexts of the Speech Situation - Here I
made the decision mainly on the basis of the stimuli that were presented
to the child and the motor manipulations of the child concurrently with
the utterance, i.e.,

When the child was talking about a specific picture that described
a child approaching a dog, and he said:

(11)   *hine   yeled   holex   hakeley
       here   (a) child   go(es)   the dog
       'Here is a child going the dog'
instead of:
       hine   yeled   holex   lakelev
       here   (a) child   go(es)   to the dog
       'Here is a child going towards the dog'

Or when the child put a doll in a crib and said:

(12)   *po   buba   mita
       here   (a) doll   (a) bed
       'Here is a doll a bed'
instead of:
       po   buba   bamita
       here   (a) doll   in the bed
       'Here is a doll in the bed:

It should be noted here that the 'rich interpretation' procedure was
applied only for those utterances that included clear locative intention.
Utterances such as buba agala 'baby crib' or cova yeled 'hat boy' which
could be interpreted in several ways were not identified as utterances
which supplied obligatory contexts for prepositions.

Results

Out of a total of 4,294 spontaneous utterances studied (Dromi, 1977),
only 439 utterances contained obligatory contexts for locative preposi-
tions. The children supplied the expected prepositions in all but 49 of
these.

Table I represents the Hebrew locative prepositions which were mani-
fested in 439 spontaneous utterances of 3C 2:0-3:0 year old Israelis,
along with a simplified description of their means and examples for
different correct uses.

Preposition	Differential Semantic Features	Examples

1. be- 'in, at'
   ba- 'in, at + Def. Marker'
   [+ internal
    − directional]

   a. position within
      hakadur bakufsa 'the ball is in the box'
   b. end result of an action
      sim bakufsa   'put[4] it in the box'
   c. presence with closeness to
      hu babank   'he is at the bank'
      lehitraot barxox 'see you in the street'

2. betox 'in, inside' literally 'in the inside of'
   [+ internal
    − directional
    + surrounded]

   a. position within
      hakadur betox hakufsa 'the ball is in the box'
   b. end result of an action
      sim betox hakufsa 'put it in the box'
   c. position within and surrounded by
      hu betox habait 'he is inside the house'
      hu betox hayaar 'he is inside the forest'

3. el 'to'
   [+ directional
    + goal]

   a. movement towards
      hayeled ratz el habait 'the boy runs towards the house'
      hayeled rotze el ima 'the child wants to go to his mother'
      hu yotze el hakvish 'he goes to the street'

4. le- 'to, into, for'
   la- 'to, into + Def. Marker'
   [+ directional
    + goal
    (+ dative)[5]]

   a. movement towards
      hayeled ratz labait 'the boy runs toward the house'
   b. transfer to animate recipient
      hu zorek kadur layalda 'he throws a ball to the girl'
   c. marks the beneficiary
      hu kona ledan sefer 'he buys a book for Dan'

5. li 'to + pronominal suffixes'
   lo
   lahem
   [+ directional
    + goal
    (+ dative)]

   a. the same as (4)b and c fused with pronominal suffixes
      hu zorek la kadur 'he throws to her the ball'
      hu kone lahem sefer 'he buys for them a book'

6. al 'on'
   [− internal
    − directional
    + contiguous
    + high]

   a. on top and in touch with
      hu yosev al hagag 'he sits on the roof'
      hu yosev al aba šelo 'he sits on his father's lap'
   b. end result of an action
      sim al hašulxan 'put it on the table'

7. mi- 'from, off'
   me-
   [+ directional
    − goal]

   a. movement away from
      ze nafal mehagag 'it fell off the roof'
   b. transfer away from
      hu lakax midani 'he took from dani'
      hu lakax mehasifria 'he took from the library'

8. al yad 'near, beside, next to'
   [− internal
    − directional
    − contiguous]

   a. position close to
      al yad dani 'beside dani'
      al yad habank 'next to the bank'
      al yad habait 'near the house'
   b. end result of an action
      sim al yad habait 'put it near the house'

9. meaxorey 'behind, in the back of'
   [− internal
    − directional
    − front]

   a. position to the rear of
      hu omed meaxorey habank 'he stands behind the bank'
   b. end result on action
      sim meaxorey hakufsa 'put it behind the box'

10. mitaxat le 'under, below, beneath' literally 'from the bottom of'
    [− internal
     − directional
     − high]

    a. position lower to
       haet mitaxat lasefer 'the pen is under the book'
       hu mitaxat lagag 'he is under the roof'
    b. end result of an action
       sim mitaxat lasulxan 'put it under the table'

Table I: Hebrew locative prepositions in our sample.

I described the semantic properties of the prepositions in terms of the following binary markers [± internal] [± directional] [± goal] [± contiguous] [± high] [± front]. (In this binary system [- directional] means [+ stationary], [- high] means [+ low], etc.

The system is not adopted from any other study and it includes only those features that would help the reader to grasp the meaning differences expressed by the prepositions.

Table 2 shows the number of obligatory contexts for each preposition supplied by each child. All values are presented in absolute numbers. Figures given without parentheses indicate the number of correct uses in obligatory contexts. Numbers in parentheses indicate the incorrect use of a preposition; that is to say, all instances in which the child omitted this preposition or substituted another preposition for it.

Table 2 reveals the following trends:

1. The number of different locative prepositionals seems related to the level of MLU. In the same stimuli conditions a greater variety of prepositions is used by children with higher MLUs. This correlation is independent of the sample size, as the overall correlation between the number of utterances for each child and his MLU is not significant ($r = 0.297$ $p > 0.05$).

Note that in general, children with low MLU's produced only a limited number of utterances with locative intentions. In view of the fact that such children in general failed to make overt reference to spatial relations, it was impossible to determine obligatory contexts for prepositions with these subjects. For example, when a low MLU child was presented with a picture of a baby in a crib, the child might say "A baby and a crib" or simply "A baby" and hence no obligatory context could be counted in such instances.

2. On the assumption that cross-sectional studies can predict the sequence of acquisition (de Villiers and de Villiers, 1973), I suggest that Table 2 represents the sequence of acquisition of locative prepositions in Hebrew. We can see that each preposition shows limited use in the early stages (i.e., when the child has a low MLU), and that only later - as MLU increases - is there a rise in the frequency of use of each preposition. This trend is best shown by the increase in frequency of the prepositions al 'on' and le- 'direction to,' reading from left to right on the table.

In Table 3 prepositions are ranked according to the overall frequency of obligatory contexts for the group as a whole. The first column shows obligatory contexts, the second shows number of correct uses, the third column shows the proportion of correct uses for each preposition, the fourth column shows the relative frequency within the locative prepositions.

Subject No.	38	30	19	9	28	14	5	25	4	7	16	21	11	37	15	20	2	17	23	13	26	32	35	27	34	3	36	33	18	12
Age	2:7	2:1	2:11	2:3	2:0	2:9	2:7	2:8	2:8	2:3	2:2	3:0	2:9	2:5	2:2	3:0	2:6	2:11	2:10	2:10	2:7	2:6	2:7	2:6	2:9	2:5	2:3	2:8	2:10	2:
MLU	1.6	1.9	2.0	2.3	2.4	2.5	2.7	2.7	3.0	3.0	3.1	3.1	3.2	3.2	3.5	3.5	3.6	3.7	3.7	3.8	3.8	3.8	3.9	4.0	4.1	4.1	4.2	4.7	5.2	5.
be-/ba- 'in, at'	2(2)	4	1	2	4(3)	2(1)	2	3	9(2)	3	3	4	2	9(1)	3(1)	2	3	6(3)	4(3)	6	8	1	9	3	3(1)	3(3)	5(1)	3	9(3)	
al/'on'			2		2				1		1(2)(1)	1(1)			1(3)(1)	2(1)		3(2)	4(2)		7(1)		3							
el/'to'		1										1						1		2	2									
il lo lahem 'to' + pronominal suffixes		3	1	2	1	5	3	1	10	6	2	5	4	3	7	1	4	5	2	5	3	3	5	2	12	5	2	5	3	5
mi-/me- 'from, off'				2		2	1	1	2(1)	1(1)		1	4	1(1)		1			2		4(2)	4(2)			1(1)		2		2	
la-/la- 'to' ('transfer to animate & dative')		1	2	3(1)		1	3	3(1)	1	1	1(1)	1	5	2	1	1	1	3	1	1	3	2	6	1	2	1	3	2		
le-/la- 'to' ('movement towards')							1	3		1(1)	1		1	1		1		3		2	1	3(1)	5	3	1	3				
meaxorey 'behind, in back of'										1					2(2)												1			
al-yad 'beside along'																														
betox 'inside, in'																					1				1		1	1		
mitaxat 'under'																														1

Table 2. Frequency of occurrence of each preposition for each child. The table is ranked according to MLU values (N + 30)

Preposition	Obligatory Contexts	Correct Uses	Correct Uses/ Oblig. Contexts	Relative Frequency of Oblig. Contexts (Percentage)
1. be- ba- 'im, at'	139	118	0.85	31.7
2. li lo la 'to + pronominal suffixes'	111	111	1.00	25.3
3. le- la- 'to' (transfer to animate & dative)	60	49	0.82	13.7
4. al 'on'	54	50	0.93	12.3
5. le- la- 'to' (movement towards)	34	30	0.88	7.7
6. me- mi- 'from, off'	25	18	0.72	5.7
7. el 'to'	5	5	1.00	1.1
8. al yad 'beside, near'	5	3	0.60	1.1
9. betox 'inside'	4	4	1.00	0.9
10. meaxorey 'behind, in back of'	1	1	1.00	0.2
11. mitaxat 'under, below, beneath'	1	1	1.00	0.2
	439	390		100.0

Table 3:   Use of locatives by the group as a whole (N = 30)

Tables 2 and 3 show that:

1. The prepositional be- ba- 'in, at the' was used by all subjects, including those with the lowest MLU (1.6).

2. The fused forms with the dative marker le- were used by all children but one (subject no. 37) with an MLU of 2.0 or more. Almost all children used this form only with singular pronominal suffixes (e.g., li 'to me' lo 'to him' la 'to her'). Only subject No. 27 (MLU 4.0) who used this form more frequently than other subjects in our study, used it 3 times with plural pronominal suffixes (e.g., lahem 'to them', lanu 'to us').

3. The use of the preposition le- 'to' combined with an animate noun is the third more frequent preposition. Most of the children used this preposition more than once in different contexts. 10 subjects in our sample (Subjects no. 9, 28, 14, 4, 16, 37, 15, 23, 3) used it only in that sense (e.g., leima 'to mommy' layeled 'to the boy' ledany 'to Danny') and never used it to express movement towards location (e.g. lebait 'to a house' lasade 'to the field' lavoda 'to the work').

4. If we disregard the formal differences between the use of the preposition le- prefixed to a regular (animate) noun and "fused" with a pronominal suffix (i.e., ledani 'to Danny' and lo 'to him respectively), then the preposition le- 'to' in its dative use is shown to have the highest frequency of occurrence.

5. The locative preposition al 'on' ranked the fourth in the order of acquisition. In our sample only when MLU values exceeded 3.0 (subject No. 7), or even 3.5 (subject No. 15) did the children begin to use this preposition more frequently. This suggests that in Hebrew the two prepositions be- 'in, at' and al 'on' do not appear at the same time and that al is acquired relatively late.

6. The locative preposition le- in the sense of direction toward a place is far more common than its synonymous full word form el. The full word preposition was used only by 4 of our subjects and 3 of those used it only in one instance. Table 2 does not represent a specific trend in the development of this preposition. The prefix le- (direction) is acquired relatively late. Children with MLU values of under 3.5 used it only rarely. Subject No. 23 (MLU 3.7) used the full word el when he referred to direction and the prefix le- only in the restricted sense with relation to an animate goal. This clear distinction between form and function is of interest and will be considered in the next section.

7. The preposition mi- me- 'from' does not seem to manifest a clear trend. Most of the children used it only once, so it is quite difficult to examine its productive use. It seems as though the use of this preposition has no predictive value as to the use of other prepositions by the child.

8. The remaining locative prepositions, all of which share a certain formal or morphological complexity, were produced rarely and only by few children with relatively high MLU values. We can tentatively conclude that the locative prepositions that contain three distinct morphemes such as, mitaxat le- 'under' literally, "from-bottom to", al-yad 'beside, next to' literally, 'on hand (of)'; betox 'inside', literally, 'in

center of'; are infrequently produced by Hebrew speaking children 2:0-
3:0 and are probably acquired considerably late.

Discussion

It is important to note here that this study is based on the
analysis of spontaneous speech samples and, hence, only the production,
and not the comprehension of the children is considered. As this study
is a cross-sectional study, all the assumptions regarding the order of
acquisition and possible determinants of this order are tentative and
should be re-examined in a longitudinal study as well.

The Hebrew data show that not only correct productions increase
with MLU but so does the total number of obligatory contexts for locative
prepositions. Brown (1973) noted that a short time before reaching
criterion (i.e. 90% of correct use in obligatory contexts), Adam, Eve,
and Sara omitted the prepositions 'in' and 'on' but supplied many ut-
terances in which there were obligatory contexts for these prepositions.
This suggests that the technique of determining obligatory contexts can
be taken as a predictive measurement for the acquisition of new forms.

The Hebrew data do not seem to fully conform with Brown's findings
concerning his three English speaking subjects. According to Brown
(1973:330)."'in' and 'on' are always the first prepositions learned and
always learned together." In Hebrew, the locatives be- ba- 'in/at' and
and le- la- 'to' (which preceeds an animate goal) are the two earliest
prepositions to be acquired; al 'on' is ranked fourth in the suggested
order of acquisition. It is clear that 'in' and 'on' are not acquired
concurrently in Hebrew. (see Tables 2 and 3) A very similar course of
development for locative inflections was proposed by Lipp (1977) for
Estonian. Macwhinney (1976), who studied the acquisition of cases in
Hungarian, suggested that the first locative inflections in Hungarian
that reach 90% criterion are those which express motion towards a goal.

The discrepancy between the acquisition of the earliest two pre-
positions in English and Hebrew might be explained on the basis of per-
ceptual properties. I suggest that not only post-verbal particles
facilitate acquisition as Slobin (1973) argued, but also prefixes are
more salient for the child than full word prepositions. This assumption
is supported by the data of this study in which locative directional le-
was far more common than its synonymous full word form el; be- 'in, at'
was the common manner of expressing 'location internal to,' while the
children rarely used betox, the separate word for 'inside', and while
several occurrences of the prefix mi-me 'from' are recorded not one
instance of min, the separate word of this preposition occurred.

The many factors that are involved here need to be investigated
further. We must consider acoustical and phonological differences be-
tween prefixes and full word prepositions, differences in morphological
complexity, differences in the semantic complexity (i.e., homonymity and
synonymity), differences in the frequency in parental speech, as well as
differences in the linguistic contexts in which adults use each form.

Slobin's (1973:191) principle: "Pay attention to the ends of words"

could be invoked to explain the early and frequent use of the "fused"
forms. It is possible that although these forms are relatively more com-
plex formally, they are more salient for the child, as they always appear
in a fixed position at the end of the utterance.

Our data support the assumption that children require semantic co-
herence and that they try to look for a one-to-one mapping between ideas
and linguistic units (Slobin, 1973). It is possible that in the process
of acquisition of complex forms such as the "fused" forms and double
meaning prepositions in Hebrew, children go into a stage in which the
form is produced only in restricted function. For example, children who
used fused forms of le- 'to' only combined with singular pronominal
suffixes, or other children who used le- only in its dative function.
Slobin's (1973:207) principle: "Errors in choice of functor are always
within the given functor class" was found to be accurate for our data.
For example:

(13) (i)   hi omedet   al hayalda hazot
             she stands (Fem) on the girl the this
             'she is standing on this girl'

                                The subject used al 'on' instead of
                                al yad 'beside, next to'.

      (ii)   ex hu yošev baricpa?
             how he sits in the floor
             'How is he sitting in the floor?'

                                The child used ba- 'in the' instead
                                of al ha- 'on the' in an otherwise
                                well-formed question.

      (iii) hayeled   medaber al hatelefon
             the boy   talks   on the phone
             'The boy's talking on the phone'

                                The preposition al ha- 'on the' is
                                used instead of the required ba- 'in
                                the' with the noun 'telephone' in
                                Hebrew.

      (iv)   hem nosim   balul
             they go travel   in the chicken coop
             'They're going in the chicken coop'

                                Here the stationary locative ba-
                                'in the' was misued instead of the
                                movement towards prepositional
                                la- or el ha- 'to the'.

This finding supports E. Clark's (1972) hypothesis that children are aware that words are related to each other as members of a particular semantic field.

I did not find any consistent preference for one preposition over another, that is, children did not substitute simpler terms for more complex terms as was suggested by E. Clark (1972). Only one subject (No. 15 MLU 3.5) produced the locative preposition al 'on' instead of the preposition al yad 'beside, next to,' quite consistently.

(14) (i)   yešena   al hadubi
            sleeps (Fem) on the teddy
            '(She) is sleeping on the teddy-bear'

      instead of:
            al yad   hadubi
            on hand   the teddy
            'beside the teddy'

      (ii) omedet   al hadelet
            stands (Fem) on the door
            '(She) is standing on the door'
      instead of:
            al yad   hadelet
            on hand the door
            'beside the door'

It could be that al yad is more complex than al not only in terms of morphological complexity but also in terms of 'transparency' as is indicated by Johnston and Slobin (1977). There the researchers judged locative expressions to be easier whenever the form of the word gives some indication of its meaning. The locative al yad is misleading for the child because its literal meaning is 'on the hand of.' In fact there was in our sample one utterance that seems to clearly show this. In response to a picture of a bear and a child walking side by side the subject used al hayad 'on the hand' instead of al yad 'beside her.'

      lama yes la dubi al hayad?
      why has she a teddy on the hand
      'Why does she have a teddy on her hand?

In their relative formal linguistic scale Johnston and Slobin (1977) considered morphological complexity as a possible determinant of order of acquisition. The Hebrew data clearly indicate that Hebrew speaking children do acquire one-morpheme locatives earlier than two- or three-morpheme locatives. It is striking that all the locative prepositions that were produced rarely and only by a few subjects with higher MLU values (see results, par. 7) have three morphemes.

As far as cognitive complexity is concerned, our data do support two of H. Clark's (1973) assumptions. (i) be- ba 'in' and al 'on' which are stationary locatives occur before el and le- of 'direction towards.'

(ii) le- 'to' and al 'on,' which refer to positive direction, are ac-
quired before mi 'from' and mitaxat le- 'under,' which refer to negative
direction.

Johnston and Slobin's (1977) proposal that linguistic processing
might explain order of acquisition whenever the cognitive complexity
fails to predict this order, seems justified. It might be that whenever
the linguistic complexity is superimposed on the cognitive complexity
level of a term, the end result is a significant delay in acquisition.
The term 'under' is considered by most investigators to be more
complex than 'in' and 'on' (Clark, 1972; Grieve et al., 1977), but still
was found among the earliest adpositions to be acquired in English,
Turkish, Serbo-Croatian and Italian (Johnston and Slobin, 1977). Al-
though some of the stimuli pictures in our study included the spatial
relation of 'under', only one child in our group produced the Hebrew term
mitaxat le- 'under.' The child (subject No. 12 MLU 5.8) who had the
highest MLU value in the group produced this preposition only once. It
seems as though this finding manifests the significant role of morpholo-
gical complexity in determining order of acquisition.

The present study suggests that the order of acquisition of loca-
tive prepositions in Hebrew is: be- ba- 'in'; le- la- and le- +
pronominal suffixes 'to' (dative); al 'on'; le- la- 'to' (direction); mi-
me- 'from'; al yad 'beside'; meaxorey 'behind'; mitaxat le- 'under.'
It seems as though enclitic prefixed prepositions are acquired before
full word prepositions that share the same locative notions. Our hypo-
thesis that morphological complexity acts as a determinant in the
acquisition of locative prepositions in Hebrew might be accepted. For
more comprehensive conclusions further investigation is needed. It is
suggested that Johnston and Slobin's structured methodology be replicated
with Israeli subjects to have comparative data from another language.
We also need an evaluation of the semantic complexity of the terms in
Hebrew (lexical diversity in that specific semantic field), and to try
to eliminate the semantic morpho-syntactic confounded variables. It is
necessary also to investigate children's comprehension of these terms
and to compare the data with the findings of this inquiry. It would be
interesting to extend the study to older children at a more advanced
level of language acquisition, when it is assumed that they have been
acquired fairly complete control of the "fused" system of inflected
preposition and pronominal suffixes.

Footnotes

1 I am extremely grateful to Dr. Melissa Bowerman, the Bureau of Child
Research, University of Kansas, and Dr. Ruth Berman, Department of
Linguistics, Tel Aviv University, Israel, for their valuable criticisms
of the earlier drafts of this paper.

2 Hebrew forms are given in broad phonemic transcription. All words
have main stress on the final syllable, unless they are specially marked
with an accent aigu on the penultimate.

3. The method for calculating MLU in Hebrew was prepared under the guidance of Dr. Ruth Berman, Tel Aviv University. Although following the general lines for calculating MLU set out by Brown (1973), considerable modifications were necessary in view of the fact that Hebrew is much more highly inflected than English, and has a rich system of bound morphology. The MLU as stipulated in my earlier study was found to be a reliable indicator of overall language development, showing a high correlation with rate and stage of acquisition of various syntactic categories and markers (e.g. question-words, quantifiers, and adjectives).

4 Some differences between the use of locative prepositions in English and in Hebrew is manifested here. In Hebrew (not as in English) usually [- directional] prepositions would follow the verb sim 'put.' I considered the emphasis here on the end result of the action sim bakufsa in the sense of 'cause it to be in the box.'

5 For the purpose of this study, I included 'dative' among the locative prepositions for the following reasons: (i) Sometimes it was too difficult to distinguish between the two functions as Hebrew uses identical surface structures (le - 'to') for both. (ii) It seemed interesting to examine whether children acquire these two 'uses' concurrently or whether they apply a certain strategy which indcates that they distinguish between those two functions. (iii) It was argued in Lyons (1967:392) that "the case of the indirect object (the dative) and the directional of 'motion towards' fall together in many language."

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