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EARLY MORPHOLOGY OF SPATIAL EXPRESSIONS IN HUNGARIAN CHILDREN: A  
CHILDES STUDY<sup>1</sup>

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## Background

The study of early use of spatial expressions has been quite central in studying the language and cognition issues crosslinguistically. Both experimental studies (Johnston and Slobin, 1978) and analysis of longitudinal data (Choi and Bowerman, 1991, Sinha, Thorseng, Hayashi, and Plunkett, 1994) have recently been used to analyze issues like what is the role of universal cognitive

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development and language specific formal factors in the unfolding of the system.

Our study is a pilot research using available recorded observational data on Hungarian children. MacWhinney (1976) summarizing earlier diary data and some of his observational files presented a detailed picture of the emergence of locative expressions. His most interesting observation relates to the fact that in early usage there is a dominance of container relations, and ‘from’ type expressions are rather rare. He also made an interesting general observation: “Hungarian inflections differ little in terms of formal complexity. Thus, differences in their emergence can be attributed to semantic-pragmatic factors.” (MacWhinney, 1976, p. 409). This observation was the starting point for our analysis.

## Methods

This study reports analyses on five children code named in CHILDES as AND, GYU, ZOLI, MON, EVA which are the only Hungarian observational data available in CHILDES up to now (MacWhinney, 1995). Table 1 shows the age ranges of the samples we have used and the number of child utterances in each sample. The first two children are boys while the three others girls.

<b>Child</b>	<b>Samples</b> number of utterances, (age)	<b>All</b>
ZOLI	15 (1;5), 1916 (1;8), 993 (1;10), 652 (2;0), 1417 (2;2)	4993
GYURI	1397 (2;3)	1397
ANDI	944 (2;1), 32 (2;8)	976

EVA	956 (2;7), 2;9 (1482), 2;9 (2078)	4516
MONI	85 (1;11), 119 (2;2), 101 (2;4), 422 (2;5)	727

Table 1: Some descriptive characteristics of the samples used

Altogether 15 samples of spontaneous speech between 1;5 and 2;9 will representing 12.609 utterances will be analysed with an emphasis on locative expressions both on verbs and in NPs. All the samples come from child-adult interaction in a nursery setting where sometimes other children than the target child also participated in the conversation. It is worth to emphasize that the child-adult interactions were mainly recorded between Brian MacWhinney and the target child. MacWhinney was a visiting ‘stanger’ and at the same time a non-native speaker of the language. These two factors might have had a role in the relatively sophisticated language used by the children: talking to such a ‘strange fellow’ they had to give their best, using a more explicit language than usual.

Due to the limited age range only a few simple questions could be raised and actual developmental trends could hardly be raised regarding the development of spatial expressions.. We will concentrate more on the relative distribution of the different spatial expressions rather than on the acquisition patterns.

Our analysis concentrates on some basic issues:

(i) What is the relationship in the acquisition of Hungarian between the directionally dimensional system and the CONTAINER-SURFACE differences? Are there any preferred spatial relationships that seem to appear earlier? Is there a relation between object prototypicality and use of cases ?

(ii) How does acquisition of spatial case-marking relate to the unfolding of the entire nominal paradigm i.e. how productive are early uses?

(iii) What is the relationship between the different systems used to code spatial reference in Hungarian including the verbal prefix system, the case markers in the nominal paradigm, the postpositional system, and the adverbials.

### **The language of space in Hungarian**

Two marking systems are used with noun phrases. Simple type of relations are expressed by agglutinated case suffixes (IN, ON, AT) while postpositions are used to code cognitively more complex relations (UNDER, AMONG, BEHIND etc). This system is multiplied by three for each relationship by taking into consideration the dynamic aspects of coding of the location and the path. There is a static LOCATIVE for each relationship, and two DYNAMIC forms: one where the coded location, i.e. the reference object (Jackendoff, 1987), is the GOAL (the end of the path), and one where it is the SOURCE (the starting point of the path). This crossing of relation with directionality Multiplied with the container, surface and

neighborhood relationships this results in a completely symmetrical two dimensional system for spatial case markers as presented in Table 2. The table gives the allomorphs that are related to vowel harmony. For the postpositions there is a similar system but we don't present the details here.

Relationship	Static	Goal	Source
Container IN	-ban/- ben	-ba/-be	-ból/-ból
Surface ON	-n	-ra/-re	-ról/-ról
Neighbourhood AT	-nál/-nél	-hoz/- hez/- höz, -ig	-tól/-tól

Table 2. The two dimensional system of Hungarian locative case markers

There is also an elaborate dimensional verb prefix system that supplements use of nominal spatial expressions. Thus, as we shall see in connection with the results

in Hungarian, a coordination has to be learned between the directionality of the prefix and the case-marker. Directional prefixes cannot be combined with static case-markers. Things like *\*bemegy a házban* ‘in-goes the house-Inessive’ are excluded. There are also some preferential issues in the combination of prefixes with case markers: directional expressions where the prefix and the case marker code the same moment of the path seem to be simpler. Thus *Bemegy a házba* ‘in-goes the house-IN’ feels to be simpler than *Bemegy a házból* ‘in-goes the house-From’ where in the latter case two points are coded along the path.

### Overall distribution of usage

Table 3 shows the overall distribution usage of all spatial case markers used by the children, both in absolute numbers and in row percentages (in brackets).

Relationship	Static	Goal	Source	All
IN	29 (9)	355 (86)	19 (5)	413 (68)
ON	27 (23)	86 (72)	6 (5)	119 (19)
AT	11 (14)	48 (60)	21 (26)	80 (13)
TOTAL	77 (13)	489 (80)	46 (7)	612

Table 3 Overall distribution of all the spatial case markers used by the children. The numbers in parenthesis are row percents, and in the last column total percentages

It is certainly of relevance concerning the relative cognitive and linguistic difficulty of case markers and postpositions in Hungarian that in the entire material only 8 occurrences of postpositions were found compared to 612 case-markers. In the following discussion we will only deal with the case markers. It is interesting to note that in cross-linguistic study of Johnston and Slobin in English and Italian children UNDER belonged to the same cluster (which was the first to be acquired) as IN and ON. It seems to be that in spontaneous usage for Hungarian children the case-marking is easier to handle than postpositions. In an elicited production task however UNDER seems to be the easiest postposition that is handled by Hungarian children already at 3 (Pléh, 1994).

Spatial case-marking occurred 612 times out of 12.609 utterances which means that about 5% of all utterances had locative noun phrases. A two-way analysis of variance used the repeated measures of the type of relationship and directionality. Both factors proved to be significant even with this small number of subjects. The locative relation type produced an  $F(2,8)$  value of 5.02 ( $p < 0.05$ ) while directionality had an  $F$  value of 4.94 ( $p < 0.05$ ). The interaction  $F(4,16)$  value was 5.03 ( $p < 0.0081$ ). The effects indicate that on the level of performance children even at an early age have clear preferences which relationships to code in a language where a quite sophisticated system is at their disposal. This is relevant to the language and cognition issue because in Hungarian the linguistic complexity of the 9 spatial case markers is the same. While in English, for example, the dynamic relations require elaborated constructions, like *out of*, *from over* etc.

Of all the spatial case markings, two thirds were CONTAINER relationships. That is the basic meaning of the main effect. At the same time ON relations were more frequent than AT relations, the first being 19 the second 13 % of the time. If we compare in Table 3 the different columns, 80 % of all markings were GOAL, 13

% being STATIC and 7 percent only SOURCE. Thus, the directionality main effect basically shows an overwhelming preference for coding the GOALS of intentional action.

Similar data on Danish and English children as reported by Sinha, Thorseng, Hayashi, and Plunkett, (1994) indicated that AT relations were relatively late to show up among the particles. However, in their study there was no clear preference for container over support and surface type of relations. Of course their study did not look for performance statistics. They were looking for reliable usage as a sign of acquisition and the temporal priority relations. As the authors also noted, an important factor might be here the multiplicity of meanings. In the spatial domain IN type suffixes in Hungarian seem to have a more straightforward CONTAINER meaning while ON suffixes have many more meaning including in the directional goal version horizontal movement as well as the vertical one. This ambiguity might also be a reason for the relatively less SURFACE markings. It is interesting to note that static ON relations are basically as frequent as static IN. That is related to the meaning ambiguity static on is clearly surface while the GOAL ON has the multiplicity problem. When you go "back, force, here, there, left, right" the locative constructions in Hungarian all carry the superessive *-ra* suffix.

Concerning the trajectorial preference (the overwhelming dominance of GOAL coding) it is remarkable to note that while the trajectorial problem has a central role in semantic discussions concerning spatial expressions (see Jackendoff, 1987, 1992, 1994, Landau, 1994, Landau and Jackendoff, 1993) the available data tell us not too much even about children's differential usage of GOAL and STATIC relations. Sinha et al. remark, that in their English observational data, they were unable to code for goal-static differences say in the use of IN. And the GOAL over SOURCE difference in most of the languages studied could be due to the more complex expressions. In Hungarian all these markers are of similar linguistic complexity and are already in the active repertoire of the children. However the

postulated universal GOAL directedness of human thought comes across very clearly. Thus we think that the distribution of GOAL and SOURCE reflects a cognitive preference towards coding GOALS rather than the SOURCE of intentional action. But the nature of these languages allows us to see more clearly what is less transparent in the acquisition of other languages because their SOURCE codings are more periphrastic and complicated in their form as well. Here the forms are simple but they still hardly appear. This is true not only in child language performance but also in aspects of structure as well. In Hungarian (Kálmán, 1996) goals are more available for incorporation and goal adverbials are the predominant sources of locative prefixes.

Though goal was the most frequently used perspective with all relationships its proportion was not the same all over.. The dominance of the GOAL form was most expressed with IN relations. This might be related to the fact that in spoken Hungarian there is strong tendency to reduce *-ban* to *-ba* and *-ben* to *-be*. This is not only a phonetic issue, however. E.g. *-on* does not undergo this fate. Probably there is a strong tendency to neutralize GOAL-STATIC distinction in the case of containers (see about this Pléh, 1995). This implies that several of the uses of *-ba* might be in normative grammar *-ban* forms with inessive meaning. In the case of at relations, the relative frequency of SOURCES slightly increased. This might be related to the fact that this suffix rather frequently appeared as a verb argument in constructions like "afraid of". That is to say that the most frequent tokens of this particle were not spatial but rather mental.

In general children made few mistakes and those were mainly with the most complex coordinated constructions where the prefix-verb-suffix combination is used.

### **How productively fits the usage into the nominal paradigm?**

A rather reasonable question is whether these forms were unanalyzed rote

units or were productively computed. One indicator for this might be how frequently they show up following other morphemes. The general structure of Hungarian nouns in this respect is Stem-Derivational Suffix-Personal-Plural Marker - Person Marker - Possession marker. Of course we do not expect the entire paradigm to show up. We made a search for all the forms where the spatial case marker was preceded by a suffix. 65 occurrences were found out of the 612 relevant cases. There were two occasions of simple plurals, but the rest were possessively marked forms as Table 4 shows.

Person	Singular	Plural
1st	39	2
2nd	10	0
3rd	12	0

Table 4. Distribution of possessively marked forms preceding the spatial case markers

It seems to be that possessive marking that is pragmatically very clearly motivated (in my pocket, in your mouth, in my hand etc.) provides an inroad for the child to the agglutinative paradigm. Most of the suffixed forms refer to body parts and pieces of clothing that might have been acquired as units. There is a strong preference for ego-involved constructions second and third persons being much more rare. Most probably, the agglutinative system is not an all or non question for the Hungarian child but develops gradually. Possession marking seems to be motivated by clear psychological factors might be a starting point in this process. It is noteworthy that simple plurals and plural possessions never appeared in

combination with spatial case-markers. It is also important that no ordering mistakes were observed.

The issue of **vowel harmony** is worth mentioning in relation to this productivity question. With the IN relations no vowel harmony mistake appeared. With the ON relations there is a four way alternation but still no mistakes were observed here either. With the most difficult AT relations there were two mistakes.

*Bélusnél*. The child seems to harmonize with the first syllable. Another mistake *Moncsitól*.

But there was a correct form, *Moncsitól* as well from the same child. Here again what we have is a mixed form and the child makes the suffix harmonize either with the first or with the second syllable,

### **Some possible prototype effects**

There are several mentioned and data in the literature to the effect that the types of objects could be somehow connected to the acquisition of spatial expressions. Starting with the work of Eve Clark (1973) several studies have been concerned with the issue whether understanding of spatial expressions starts from a pair of non-linguistic hypotheses, the first one somehow having precedence over the other.

Rule 1: If the object is a container place the object inside it.

Rule 2: If the object has a horizontal surface place the object on it.

To explore this, we performed a pilot study on object types, orientation and production. Anna Borgos (1994) a student of ours investigated in nursery children the use of case markers and paraphrases for static relations. Prototypical surface

and container reference objects (table, cup) as well as non-prototypical ones (closet, book) were used. She found that more simple case markers without object part reference were used with prototypical reference objects. Thus constructions like *On the table* and *On the top of the cup* were characteristic solutions to describe two arrays. There was a difference favoring containers over surfaces here as well. The largest difference (between 33 and 60 % of simple case markers) was between non-prototypical surfaces and prototypical containers.

Tilting and other non-usual perspectives - similarly interventions as in the understanding studies by Sinha (1983) - resulted in more paraphrases for surfaces but had no impact on container expressions. Thus children never had trouble to describe the content of a tilted mug as being IN, but they would say things for a tilted surface like *The cube is on the bottom of the table*. All of this is trivial enough. It only shows how early on can children sensitively use the rich system provided by their language.

We tried to look for similar preference relations in our CHILDES material. For the IN and ON type of suffixes we tried to make a content analysis about the nouns deciding in the first case whether they were prototypical containers and in the second case whether they were prototypical surfaces. As CONTAINERS the following types of things were counted: mouth, hand, pocket, room, bed. As SURFACES things like earth, floor, table were counted. As Table 5 shows there was a much stronger alliance between CONTAINERS and IN suffixes than between SURFACES and ON suffixes. Of course this differences in usage are not child specific factors they would most probably show up in adult performance, too. Containers are the best candidates for a container relation.

<b>Relationship</b>	<b>Static</b>	<b>Goal</b>	<b>Source</b>
IN	41	45	21

ON	41	10	0
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Table 5. Percentage of prototypical containers (with IN relations) and surfaces (with ON relations) compared to the overall number in the given cell

In IN types of suffixes there is quite an elevated percentage of container specific usage. In the case of ON types of suffixes this is rather different. One should not have expected too much here, however, since the dynamic ON goes as an argument with movement verbs of all direction (UP,DOWN, ACROSS etc.) that certainly do not imply SURFACE. In the case of STATIC ON relations 41 % was with a typical surface that shows that there is some extent of pragmatic motivation here but to a much lesser extent than with the container relations.

### **Relationships between predicates and case markers**

There are several aspects involved in the relationship between predication and case marking. One is the general elaboration of the space coding on the verb, by the prefix and on the noun phrase. Stated roughly:

- a directional movement verb requires a GOAL or a SOURCE case and excludes a STATIC;
- a directional prefix usually agrees in direction with the case marker;
- a path can be coded both by the prefix and by the nominal case.

This is made more complicated by the use of some of the prefixes as adverb like free forms and also by the fact that adverbs appear together with prefixes or even case markers. An extreme case would be *Bemegy oda a házba* 'INGoes there the

houseIN' "She goes in the house".

Table 6 shows the general distribution of the different combinations with the 9 cells for the IN relations.

Spatial Structures	Static	Goal	Source
Case	6	145	10
Case + Verb	14	119	3
Case + Pref + Verb	2	81	6
ADV + V + Case	7	10	0

Table 6 Different combined spatial constructions with IN relations

The most frequent type is Case + Verb but the prefixed version approaches it.

Spatial Structures	Static	Goal	Source
Case	2	42	0
Case + Verb	15	23	4
Case + Pref + Verb	4	19	3

ADV + V + Case	6	2	0
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Table 7 Different combined spatial constructions with ON relations

Spatial Structures	Static	Goal	Source
Case	7	31	19
Case + Verb	2	13	0
Case + Pref + Verb	0	3	2
ADV + V + Case	2	1	0

Table 8 Different combined spatial constructions with AT relations

### **Some speculations on possible developmental patterns**

Our children were well beyond the first stages of using spatial expressions. We still would like to suggest as a conclusion some speculations about possible developmental sequences in Hungarian spatial language.

Our suggestion is that the sequence of acquisition is:

- 1) general adverbial usage of Particles (that later become prefixes and case-markers) like *be*, *fel*

2) use of case markers on nouns

Our subjects are well over these stages. Though the isolated case-marked noun is still very frequent.

3) the verb + case and prefix (or adverb) + case combinations as basic ones used for coding spatial relations

4) prefix + verb + case combinations

Our subjects are around the third stage and in a transition into this later phase. It seems to be that they also indicate two rather interesting aspects of the acquisition of spatial terminology. First they clearly show a strong preference for coding goals and containers even when it seems to be that the child already masters the other spatial markers. Second, they also indicate that the well motivated possessive marking in Hungarian might be a clue for the child to discover the productive rules of agglutination.

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