Locative Case Marking and Abstraction in Child Hungarian

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Abstract

This study asked whether contextual abstractness would affect productive locative case marking in 3- to 6- year-old Hungarian-speaking children. A narrative elicitation task examined locative case production in both concrete (e.g., IN the garden) and abstract (e.g., IN trouble) contexts. We found that 3-year-olds were less accurate in the abstract condition than controls. By contrast, there was no effect of age in the concrete condition. These results suggest that at 3 years of age children do not yet have a fully generalized rule or schema for locative case marking in Hungarian.

Keywords: Hungarian; child language acquisition; case marking; abstraction

Introduction

It has long been clear that children begin talking about abstract concepts, such as *think* and *remember,* late in linguistic development, sometime between 3 and 4 years of age (Bartsch & Wellman, 1995; Bloom, Lightbrown & Hood, 1975). In contrast, productive case marking[1] emerges comparatively early in morphologically rich languages, around the second birthday in Hungarian speaking children (MacWhinney, 1974). Given that many morphologically rich languages, like Hungarian, require that nouns be case marked in both abstract and concrete contexts, it is interesting to ask whether context has any effect on the child's correct suppliance of case markers. While very little previous research has investigated the effects of combining these early- and late- acquired aspects of linguistic competence (e.g., Lukács, Pléh & Rácsmány, 2007), two existing models of morphosyntactic development appear to make differing predictions in this respect.

First, an approach to regular inflectional morphology which uses symbolic rules (e.g., Marcus et al., 1995; Pinker, 1999; Pinker & Ullman, 2002) predicts that context, whether concrete or abstract, should not affect case marking accuracy when the child's vocabulary knowledge and understanding of the context are controlled for. This is because regular inflected forms are created using symbolic rules, which target lexical classes (e.g., nouns) as opposed to specific lexical items (e.g., bird). To take the well-studied English past tense as an example, the symbolic rules approach argues that there are two routes to creating inflected forms. Irregular forms (e.g., went) are retrieved from memory as lexical chunks, while regular forms (e.g., played) are typically created on-line using a morphosyntactic rule. In the case of the English past tense, this rule combines any member of the category VERB with the regular past-tense marker -ed; the specific verb being inflected is irrelevant to this process. For inflectional case marking, we should expect the same process to be at work. Nouns should be case-marked through a symbolic rule (in this instance, one that attaches a given case marker to a noun phrase bearing appropriate features), and it should not matter whether the noun being inflected is abstract or concrete. All nouns should receive the appropriate case by virtue of belonging to the NOUN class and having the appropriate case features.

Different predictions would be made, on the other hand, by a constructivist model (e.g., Bybee, 1995; Tomasello, 2003). Following this approach, morphosyntactic schemas are thought to emerge gradually as the child abstracts[2] away from the lexical expressions s/he has learned. In the example of the English past tense, then, the child does not start out with a notion of 'regular' as opposed to 'irregular' early in development, as s/he would under a symbolic rules account. This distinction emerges gradually as the child learns a variety of verbs with different past-tense marking patterns. Regular verbs occur frequently and so will lead to the development of a generally applicable schema, akin to a VERB + -ed rule. Similarly, less frequent patterns (e.g., sing-sang-sung) will result in less productive schemas. Over time, a set of past-tense schemas of varying productivity develop that allow the child to mark any verb for past tense.

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[1] Case marking, broadly defined, refers to the linguistic means of indicating which role each noun plays in a sentence. For example, in the sentence *John gave a flower to Mary*, the preposition *to* indicates that *Mary* is the recipient of the gift. Some languages, like Hungarian, require such markers for all nouns.

[2] Note that two distinct meanings of the term 'abstract' are used in this paper. 'Abstract' refers (1) to the non-concrete lexical contexts (e.g., time, belief) which are used in the experiment, and (2) to the generalization of productive rules away from the specific examples that gave rise to them.

A mature schema for an aspect of morphosyntax, then, may operate similarly to a symbolic rule, but its developmental trajectory is crucially different. Under this account, we should expect children to go through a period when no fully general schema is operational. Applied to locative case marking, we should be able to observe a period in development when the child's ability to supply the correct inflection is contextually- and lexically- dependent. During this period we might expect the addition of an abstract context to disrupt their normally productive ability to supply case markers correctly.

More in keeping with the latter hypothesis, we will provide evidence that the accuracy of case marking in 3-year-old children is dependent on whether or not the context is abstract. First, however, the Hungarian locative case system, its acquisition, and the nature of the abstract contexts under consideration will be briefly described.

The Hungarian Locative Case System

The Hungarian locative case system distinguishes between three path types, STATIVE, GOAL, and SOURCE, within each of three relation types, CONTAINER, SUPPORT, and PROXIMITY. This results in the nine locative cases in Table 1 below. The equivalent English prepositions are given for comparison:

Table 1: Locative cases of Hungarian

	CONTAINER	SUPPORT	PROXIMITY
STATIVE	*-ban/ben* in	*-on/en/ön* on	*-nál/nél* at
GOAL	*-ba/be* into	*-ra/re* onto	*-hoz/hez* to
SOURCE	*-ból/ből* out of	*-ról/ről* off of	*-tól/től* from

According to Pléh (1995), there is a tendency in the adult language for *-ban/ ben* (in) to reduce to *-ba/be* (into); for this reason, these cases were collapsed in our analyses of the child language. For all other cases, path distinctions are required in both the locative and non-locative uses of the case markers. Additionally, Hungarian is an agglutinating language (meaning that all the components of complex words are easily distinguishable from one another), in which case forms do not exhibit any person, number, or gender marking. Thus, the formal complexity of all case marked nouns is argued to be equivalent (MacWhinney, 1976), making Hungarian a good testing ground for hypotheses as to the effects of cognitive and semantic/lexical factors.

Hungarian Locatives in Acquisition

Previous research into child Hungarian has revealed a relatively stable pattern of acquisition for the locative case system. In corpus studies of children from 1;8 to 2;9, MacWhinney (1974, 1976) and Pléh, Vinkler & Kálmán (1997) found that CONTAINMENT cases are produced earlier and more frequently than SUPPORT and PROXIMITY cases. Similarly, GOAL paths are favored over STATIVE and SOURCE paths at this age. The resulting acquisition pattern for the individual locative cases generally proceeds in three phases, illustrated in Table 2 below, and is typically complete by 3 years of age (MacWhinney, 1976: 404):

Table 2: Order of Acquisition for the Locative Cases

Period 1	*Period 2*	*Period 3*
INTO	ONTO	OUT OF
IN	ON	AT
TOWARD		AWAY FROM
		OFF OF

As children get older, the advantage for GOAL paths seems to decrease. Pléh, Palotás & Lőrik (2002) found that 5- to 8- year-olds produced an equal proportion of STATIVE and GOAL expressions in an elicitation task, and were marginally more accurate in STATIVE contexts. SOURCE cases, on the other hand, continue to be produced less frequently and less accurately than other path types. In the adult language, as well, SOURCE paths are the least frequent (Lukács et al., 2007). This asymmetry is found cross-linguistically (e.g., Johnston, 1988) may be attributable to a general cross-linguistics preference to encode GOAL over SOURCE paths (Bowerman, 1996; Lakusta & Landau, 2005).

In terms of the role abstraction plays in productive locative case marking, Lukács and colleagues (2007) investigated the use locative cases and postpositions by children with Williams Syndrome and by vocabulary-matched controls between 4 and 10 (mean 7;10). The control data for their Experiment 2 is informative here, in that it included an abstract ('non-spatial') condition. In this sentence completion task children were required to supply one of the 9 locative case markers to the last noun in a sentence that was read aloud to them. Ninety sentences (5 with each relation type) were tested in all. The typically developing controls were nearly at ceiling in their production of case markers in spatial (concrete) contexts. However, in the non-spatial (conceptually abstract) context, the controls were significantly less accurate in producing the SOURCE-path case markers. Also, production was significantly less accurate in the non-spatial condition overall. Thus, there is some evidence that conceptual abstraction leads to less accurate production, even in a low-demand task with older children.

Abstraction

Previous research into lexical development has found that the acquisition of abstract vocabulary (e.g., think, believe) begins later than concrete vocabulary (e.g., bird, cup) (e.g., Maguire, Hirsch-Pasek & Golinkoff, 2006). This is likely to be due both to the conceptual difficulty children have with these abstract notions until 3 to 4 years of age (e.g., Gopnik & Meltzoff, 1997), as well as to the mapping problem inherent in attaching labels to non-objects (e.g., Gentner & Boroditsky, 2001). As the abstract lexicon develops later than the concrete one, these lexical items provide an interesting place to test grammatical productivity. From the perspective of the symbolic rules approach discussed above, as long as the child knows the vocabulary item in question and knows which case marker to apply, the productive rule should ensure correct inflection. On the other hand, if the child's schema for locative marking is still weak and lexically dependent, as would be predicted under a constructivist account, the fact that young children have less experience with abstract lexical items should certainly affect their ability to correctly supply case markers for these items.

Thus, the present study distinguished between concrete and abstract contexts, as illustrated in (1-2) below:

(1)   A fiú lemászik a fáról
        The boy down-climb-3sg the tree-OFF
        The boy is climbing down from the tree

(2)   A fiú gondolkodik a madárokról
        The boy think-3sg the bird-PL-OFF
        The boy is thinking about the birds

Sentence (1) illustrates a typical concrete spatial use of the delative case marker (= off of), while sentence (2) provides an example of an abstract context where this case marker would commonly be applied.

In order to ensure that there were no conceptual misunderstandings on the part of the child and that the child knew which case marker was required by each noun, we provided case-questions in the abstract condition and only included the child's response when it was semantically appropriate (see below).

For each condition there were mutually exclusive criteria for the selection of test items. In the concrete condition we chose nouns labeling tangible objects where the prototypical spatial marker was required (e.g., to the birdhouse, in the garden). In the abstract condition, only non-spatial contexts were chosen. These were predominantly belief (e.g., think, remember, believe) and temporal contexts, as these have been considered by previous research to be late-acquired and abstract.

The Present Study

The present study, then, asked whether contextual abstractness would affect productive case marking in 3 to 6

year olds. This age range was chosen because (1) case marking is generally productive by this age in Hungarian and (2) the abstract lexicon emerges during the fourth year and should be rather well developed by age 7 (e.g., Gopnik & Meltzoff, 1997). Thus, we hoped to capture the period between when vocabulary for basic abstract concepts (e.g., emotions, beliefs) emerges and when it becomes adult-like.

Our predictions were based on the theories of morphosyntactic acquisition outlined above. We expected that if children were using a symbolic rule in their case marking (e.g., Pinker & Ullman, 2002) there would be no difference across contexts or ages, given that we provided the children with the target nouns and only counted their semantically relevant responses. The child's ability to apply a productive rule should not be influenced by whether or not the noun being marked is abstract[3]. If, on the other hand, a fully generalized case-marking schema had not yet developed in the younger children, we would expect an age effect as a result of abstraction even with when controlling for vocabulary and conceptual comprehension. Without a fully general schema for locative case marking, context and the familiarity of the vocabulary should have an effect.

To test these predictions we used a picture story to elicit locative-case-marked noun phrases from children from 3 to 6 years of age. In this study, age and context (concrete or abstract) were the independent variables, while percent correct case marking was the dependent variable.

Method

Participants

Participants were 50 children and adult controls, 24 males and 26 females. All of the children were monolingual native speakers of Hungarian attending two nursery schools in Budapest. They ranged in age from 3;4 to 7;2. The adults were native speakers of Hungarian who worked at the Budapest University of Technology and Economics. They were all at least 20 years of age, and none of them were familiar with the experiment prior to their participation. Table 3 shows the five groups of participants that resulted:

Table 3: Participant Demographics

Group	N	Male	Mean Age	Age Range
3yr	10	6	3;7	3;4 – 3;11
4 yr	10	4	4;5	4;0 – 4;10
5 yr	10	4	5;5	5;0 – 5;11
6 yr	10	4	6;5	6;0 – 6;8
control	10	6		7;2 – 55

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[3] This assumes, of course, that the child realizes that the vocabulary item in question is a noun (Bloom, 2000). In our study, most errors were case substitutions as opposed to omissions, so, it does seem that the children were aware of the relevant lexical class.

The control group for this study was composed of 7 year olds (n = 4) and adults (n = 6). The 7-year-olds performed identically to the adult controls, with nearly 100% accuracy, so these groups were collapsed.

Materials

The stimulus for this experiment was a picture story consisting of eleven color cartoon pictures drawn for this purpose. The story was about a little boy who wanted, and eventually received, a birdhouse for his birthday. Some of the pictures included representations of the little boy's thought states and memories to serve as some of the conceptually abstract contexts. Figure 1 provides an example:

Figure 1: Sample Narrative Picture

A basic script of prompts was used by the experimenters to elicit relevant case marked expressions. Although the course of the interview varied slightly from child to child, there were approximately 12 prompts given in each condition. Examples of these prompts and their typical responses are given in Table 4:

Table 4: Sample Prompts and Responses

Concrete	Abstract
Hol ül a János?	*Mire vár a János?*
A faágon.	*A bulira.*
Where is János sitting?	What is he waiting for?
On the tree branch.	For his party.
Hol van a tojások?	*Mire gondol?*
A fészekben.	*Az ajándékéra*
Where are the eggs?	What's he thinking about?
In the nest.	About the present.
Hol van a János?	*Mire emlékezik is János?*
A létrán.	*A nyárra*
Where is János?	What does János remember?
On the ladder.	The summer.
Honnan mászik le?	*Melyik napon lesz buli?*
A fáról.	*Szombaton*
From where is he climbing?	On what day will his party be?
From the tree.	On Saturday.

Design and Procedure

Testing took place at two nursery schools in Budapest, Hungary, and all children were tested in a quiet room at the nursery school they attended. The child was seated next to Experimenter 1, who conducted the experiment, in front of a Dell Latitude D600 laptop with a 14 inch screen. Experimenter 2 sat on the other side of the table and took notes. Sessions were video- and audio- recorded. The camera was positioned behind the child so that it recorded the screen and the child's gestures, and the microphone was attached to a stuffed owl toy which sat on the table next to the child.

The task overall took between 10 and 20 minutes, and included a brief warm-up introducing the topic, followed by the presentation of the story. During the trial, children were shown the pictures one at a time using a PowerPoint presentation and asked a series of basically scripted questions associated with each picture, as described above. Since the children were allowed to freely respond to each question and make additional contributions to the story telling as they wished, the course of the interview differed slightly across trials. The children received stickers for their participation.

In order to control for the child's lexical knowledge, labels were typically provided before the question was asked (e.g., "This is a birdhouse. Can you tell me what John is thinking about?" The correct response would be "About the birdhouse"). If the question needed to be repeated, relevant vocabulary labels were always provided in both the abstract and concrete contexts. Thus, there were very few instances where children failed to respond to a question.

An additional control for the child's lexical knowledge resulted from the question forms that were used in each condition. In the concrete contexts, basic locative question words were used which specified the path but not the required case type, i.e., *hova* (= to where) *hol* (= where) and *honnan* (= from where). In the abstract condition, on the other hand, the nature of the concepts under discussion made the use of locative question words pragmatically inappropriate. Thus, abstract questions were asked using case-specific forms of the question words, which meant that the correct case marker was supplied as part of the question, e.g., *mi__ről__ gondolkodik*? (= what is he thinking about?), *a házikó__ról__* (= about the little house). As it is obligatory in Hungarian to answer a case-specific question with a response marked by the same case, the child's task in the abstract condition was essentially to concatenate the target noun with the case marker, both of which were provided by the experimenter.

Coding

The audio tapes of all sessions were coded by a native speaker of Hungarian, who was not familiar with the research project, and checked by the primary investigator, an advanced, but non-native, Hungarian speaker. The

native-speaking coder was provided with a sheet containing all the questions and whether the responses should be counted as concrete or abstract.

The number of correct responses was recorded for each condition, case, and path type. Only responses containing case marked NPs or pronouns were counted. Clausal responses (e.g., Q: *miről gondolkodik?* (= what is he thinking about?) A: *Hogy madárház* (= that (there's a) birdhouse)) were excluded. Any case marking errors were transcribed along with the question that elicited the error and what the correct response should have been.

In order to control for the degree to which the child understood the story, especially the abstract elements, errors were only counted if the child produced a semantically appropriate noun phrase as a response with an omitted or incorrect case marker. For example, if the question was *Mikor lesz a bulija?* (= when will his party be?), the response should have been *szombaton* (= on Saturday). If the child instead responded as though s/he had misunderstood the question, for example, *a születésnapom van* (= it's my birthday), the response was ignored. Every coding sheet was also checked against the audio by the primary experimenter to confirm the accuracy of the counts for each category.

Results

The dependent variable for this experiment was the percentage correct in each condition (concrete and abstract), and the independent variable was age. The means are presented in Tables 5 and 6 below:

Table 5: Descriptive Statistics for Concrete Condition

	3 yr	*4 yr*	*5 yr*	*6 yr*	*control*
Mean	96.8	93.3	99.4	97.1	99.4
SD	4.34	10.38	1.9	5.57	1.9

Table 6: Descriptive Statistics for Abstract Condition

	3 yr	*4 yr*	*5 yr*	*6 yr*	*control*
Mean	82.4	92.3	89.3	93.0	100
SD	14.78	13.77	11.05	9.91	0

As accuracy scores in the two conditions were significantly correlated ($r = .302$, $p = .033$), the data were analyzed using a one-way multivariate analysis of variance (MANOVA). For the concrete condition, accuracy did not vary by age, $F(4, 49) = 1.9$, $p = .127$, *n. s.*. Performance for all groups neared ceiling levels. In the abstract condition, however, there was a significant effect of age on accuracy, $F(4, 49) = 3.24$, $p = .02$, partial $\eta^2 = .22$. As the equality of variance assumption was violated in this dataset, a Games-Howell post-hoc was used. This revealed that the 3-year-olds in the abstract condition were significantly less accurate in their case marking than the controls (mean difference between the 3-year-old and control groups = -0.176, $p = 0.28$) There were no other significant differences between the groups in either condition.

Discussion

In sum, this study found that 3 year old children do use locative case markers less accurately when they are inflecting abstract vocabulary items. This result obtained even when children were provided with the target nouns and when only their semantically appropriate responses were included. We also found that this difference between case marking in concrete and abstract contexts disappears by 4 years of age. Together, these results suggest that 3 year old children are still not using a fully productive schema or a symbolic rule for locative case marking. Their application of these inflectional markers is still lexically sensitive. As children get older, they develop increasingly robust locative marking schema(s), leading to near-perfect accuracy in both concrete and abstract contexts.

There are several limitations of this study which we hope to address in future research. First, the selection of lexical items for the concrete and abstract conditions was largely intuitive and not based on imagability norms, as these do not exist for Hungarian. There was also a bias towards temporal items in the abstract condition, which may have influenced the result. Finally, this study was unable to control for the frequency of these lexical items in child directed speech, in that there was no available corpus for Hungarian in which to test this. Our future research plans includes collecting such a corpus. We are also interested to see whether this difference between concrete and abstract contexts will also hold for the structural cases (accusative and dative) as these may be less influenced by semantic and lexical factors.

Finally, it is also worth considering these results from the perspective of abstract language development. Very few previous studies have investigated the process children go through as they move beyond the limits of the here-and-now in their speech. Our results indicate that this transition affects their productive use of morphosyntax, suggesting that it may be informative to look into this relationship more closely in future research. One question that arises, for example, is whether discussing abstract topics is challenging for 3-year-olds because the vocabulary and contexts are unfamiliar, or because there is something inherently difficult about abstraction. If it turns out to be the latter, then longitudinal investigations of this transition may be warranted.

In conclusion, the goal of the present investigation was to determine whether context would impact the accuracy of productive case marking in 3- to 6- year-old children. The

result of this investigation, that abstract contexts do indeed cause reduced accuracy in 3-year-olds, suggests that Hungarian-speaking children are not using a symbolic rule or a fully general schema in their productive case marking at this age. If they were, we would not expect the class of noun being inflected (i.e., abstract or concrete) to have an effect on the child's application of the case marking rule, as it does not in older children. This finding, then, provides some support for a constructivist model of syntactic development where increasingly general schemas are abstracted away from lexically learned exemplars. Moreover, the impact of abstract language on the otherwise productive morphosyntax of 3-year-old children suggests a potentially fruitful new area for research.

Acknowledgments

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