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The acquisition of Hungarian recursive PPs

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Abstract

In this study an experiment is presented on how Hungarian children interpret two word orders of recursive PPs (subject-PP-verb and PP-subject-verb order). According to the research of Roeper (2011) and Hollebrandse and Roeper (2014), children tend to give conjunctive interpretation to multiple embedded sentences at the beginning of language acquisition. This interpretation later turns into an adult-like, recursive interpretation. Our aim is to discover (i) whether Hungarian children start with conjunction as well, and whether (ii) the apparently more salient functional head *lévő* appearing in Hungarian recursive PPs can help them to acquire the correct, recursive interpretation early. We also want to find out whether (iii) the word orders in recursive PPs have an influence on the acquisition of children. In this paper two experiments are presented conducted with 6 and 8-year-olds and adults, in which the participants were asked to choose between two pictures. One of the pictures depicted recursive and the other one depicted conjunctive interpretation of the given sentence. In the first experiment subject-PP-verb order was tested, but in the second one sentences were tested with PP-subject-verb order. We will claim that *lévő*, which is (arguably) a more salient Hungarian functional element than *-i*, does not help children to acquire the embedded reading of recursive sentences, because both of them are overt functional heads. However, the two types of word orders affect the acquisition of recursive PPs. PP-subject-verb order is easier to compute because the order of the elements in the sentences and the order of the elements in the pictures matches.

Keywords: language acquisition; recursion; PP; functional heads; conjunction.

0. Introduction

There are three main questions that we aim to answer with this study. Firstly, (i) whether Hungarian children interpret recursive PPs conjunctively at the beginning of language acquisition, as was shown in the case of Japanese,

English and Romanian children (Roeper 2011; Hollebrandse and Roeper 2014). Our second research question is whether (ii) *lévő*, which is a more salient functional head in Hungarian compared with *-i*, may help Hungarian children to acquire the correct interpretation of recursive sentences (a previous experiment testing that question was carried out by Tóth, É.Kiss and Roeper 2016). Thirdly, (iii) it is important to find out whether the two tested orders of recursive PPs affect the interpretation of test sentences in the case of children.

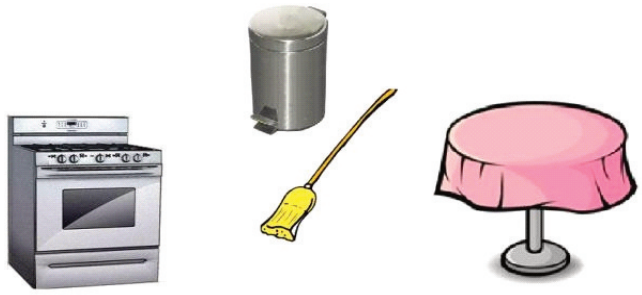
In this paper I start with the presentation of the background of the study explaining the notion of recursion and the main theories about how children acquire recursive sentences. Later we present the syntax of Hungarian recursive PPs, then we introduce previous experiments and show the current ones in detail. Finally, we aim to answer the three main research questions.

1. Recursion

According to Hauser, Chomsky and Fitch (2002), recursion is the core property of human language. It is the key element that differentiates human speech from the communicational methods of animals. Chomsky (1995) claims that there is a recursive procedure, and it is the merge of syntactical elements. During this procedure two syntactic elements are put together to form a third element. The input of this procedure can be a new element or an element that had been created by merge before. The narrower notion of recursion means the merge of elements when the output category is the same as the category of one of the input elements. This is how we can talk about recursive PPs and recursive possessives.

The main theory about how children acquire recursive structures is related to the study of Roeper (2011) and Hollebrandse and Roeper (2014). Their main claim is that children tend to interpret multiple embedded structures conjunctively at the beginning of language acquisition. Later this interpretation changes and children acquire the correct interpretation of these forms. According to Roeper et. al., conjunction is direct recursion with no intervening functional category, while multiple embedding means indirect recursion. Young children thus tend to give the first interpretation to (1) shown by Picture 1, while later they tend to interpret the same sentence according to the interpretation shown by Picture 2. In the first case the broom has to be next to the oven and the dustbin and the table at the same time, while in the second case the broom is next to the oven that is next to the dustbin that is next to the table.

(1) The broom is next to the oven next to the dustbin next to the table.



Picture 1.

Picture 2.

It is also asserted by Roeper (2011) and Hollebrandse-Roeper (2014) that it can differ across languages when children acquire the recursive interpretation (Picture 2). One of the possible reasons why children acquire embedded interpretation at a later age can be that in the case of indirect recursion, functional elements can be either overt or covert between recurring phrases. Di Sciullo (2015) says that in the case of indirect recursion the elements of the recurring phrases cannot be simply juxtaposed, so they cannot merge directly. There has to be a functional element between the two phrases. This element can be overt as the Brazilian Portuguese (2) example show, but can also be covert as in the Italian (3) example.

(2)	punto	**de**	controle	**de**	pasaporte
	point	DAT	control	DAT	passport
	‘passport checkpoint’				

(3) punto **0** controllo **0** passaporti
point DAT control DAT passport
'passport checkpoint'

The overtness and covertness of the functional elements can be explained by two Principles deriving from Chomsky's work (Di Sciullo 2015). One of the principles is the *Minimize Symmetrical Relations Principle*, according to which the functional elements have to appear between recurring phrases in the case of indirect recursion. If they had not appeared there that would have meant a symmetrical relation which should be minimized. However, the *Minimize Externalization Principle* licenses the virtual absence of functional heads. As follows, the overtness of the functional elements may help children acquire multiple embedding correctly at an early age. In Hungarian there are two kinds of overt functional elements, *-i* and *lévő*. We hypothesized that the latter one, which can be interpreted as a more salient head than *-i*, can presumably help Hungarian children acquire the embedded interpretation of recursive PPs early.

2. Hungarian Recursive PPs

Hungarian PP recursion means the recursion of postpositional phrases. As mentioned above, two overt functional heads (*-i* and *lévő*) can be used to build recursive PP structures.

(4) A krokodil $[_{PP}$ $[_{DP}$ $[_{AM}$ $[_{PP}$ a zsiráf
the crocodile the giraffe

előtt] **-i**] oroszlán] előtt] áll.
in front of-**AM** lion in front of stands

'The crocodile stands in front of the lion in front of the giraffe.'

(5) A krokodil $[_{PP}$ $[_{DP}$ $[_{PartP}$ $[_{PP}$ a zsiráf
the crocodile the giraffe
előtt] **lévő**] oroszlán] előtt] áll.
in front of **being** lion in front of stands

'The crocodile stands in front of the lion (being) in front of the giraffe.'

In the case of (4) the embedded PP is modified with *-i* which can be treated as an attributive modifier (Kenesei 2014). We put forward that in (5) there is an embedded PP in a *lévő* participle phrase. It can also be hypothesize that *lévő* is a more salient functional head than *-i*. There are some simple reasons to assume this. Firstly, *lévő* consists of four phonemes while there is only a single morpheme in *-i*. Secondly, the suffix *-i* is a bound morpheme, while *lévő* is half-bound, as it appears as a single word connected to the noun standing before it. Evidently these are formal observations (there is no difference in their meanings), but these formal distinctions made us to treat *lévő* as a little more salient functional head than *-i*. This is how it was hypothesized that sentences with *lévő* would be easier for children to interpret compared with sentences with *-i*. Otherwise, there is no semantic difference between *lévő* and *-i,* but it can depend on the personal intuition of language users. Some Hungarian speakers said that there is no difference between the two elements in meaning, others say that *lévő* can be especially used in spatial meaning.

Recursive PP can either precede the subject as in sentence (7), or it can follow the subject as in (6).

(6)

A	krokodil	a	zsiráf	előtt	**-i/lévő**
the	crocodile	the	giraffe	in front	of-AM/being

oroszlán	előtt	áll.
lion	in front of	stands

'The crocodile stands in front of the lion in front of the giraffe.'

(7)

A	zsiráf	előtt	**-i/lévő**
the	giraffe	in front	of-AM/being

oroszlán	előtt	krokodil	áll.
lion	in front of	crocodile	stands

'There is a crocodile in front of the lion in front of the giraffe.'

In the case of (6) the subject of the sentence fills Spec TopP in the structure, while in the other case (7) it is the PP which moves to this position. We did not have any preliminary supposition about which order would be easier for children to interpret.

3. Previous experiments in recursive PPs

The first experiment was conducted by Perez (in Hollebrandse-Roeper 2014), who tested recursive PPs and recursive possessives on 46 children. 25 of the participants belonged to the group of 3 to 5-year-olds, and 21 of the participants were older than 5 years. It was found that the younger group could understand recursive PPs with the help of pictures, but they failed to produce them. The older age group could interpret recursive sentences well. But besides recursive structures, other types of sentences appeared in their production. The latter type of sentences consisted of structures that could be interpreted neither recursively nor conjunctively. Perez claims that children tend to avoid recursive answers in production, this is why they tend to give other types of answers. It seems to be important to separate perception and production in the field of recursion as well.

Sevcenco, Roeper and Pearson (2015) tested recursive PPs. In their research they made an experiment to find out how children acquire recursive interpretation. They were interested especially in how children interpreted recursive PPs. They tested 22 English speaking children, who were older than 3 years and younger than 9 years. They found that children between 3 and 6 years preferred conjunctive interpretation and 86% of them did not even produce embedded PPs during the tests. The other group of the participants consisted of children who were older than 6 but younger than 9. It turned out that they understand multiple embedding and the hierarchic nature of recursion. The authors of this study claimed that the hierarchic interpretation of multiple embedding is not one of the characteristics of the beginning of language acquisition, it rather evolves step by step. The data of these experiments prove that young children tend to interpret multiple embedding conjunctively while older children can interpret it correctly.

The third experiment, conducted by Tóth, É. Kiss and Roeper (2016), can be interpreted as a preliminary experiment of the current one. In this experiment we tested the two Hungarian functional elements in recursive PPs, and we aimed to show whether the interpretation of sentences with *-i* and *lévő* differed. There were two examined age groups; one of them consisted of 6-year-olds, while the other one consisted of 8 to 11-year-old students. Adults did not participate. We hypothesized that *lévő*, which is a more salient functional head in Hungarian recursive PPs than *-i,* would help children to understand PP recursion correctly. In the case of 6-year-olds there were significant differences found concerning the two functional heads ($p > 0.05$). The exper-

iment involved an act-out task, which was easy for both of the age groups as 70% of the younger and 80% of the older participants could interpret recursive PPs correctly. The second task of the participants was to repeat the test sentences. In this case, only 40% of 6-year-olds succeeded, while the older group could cope with this task with 85% success.

To sum up the results of the previous experiments, the experiment of Perez shows that younger children can understand recursive PPs, but they cannot produce them yet. The experiment of Sevcenco, Roeper and Pearson (2015) demonstrates that younger children interpret recursive PPs conjunctively, but at a later age this interpretation changes and turns into recursive reading. The third experiment, which was done by Tóth, É. Kiss and Roeper (2016), shows that also young children can interpret recursive PPs correctly with 70% success rate. They also state that a more salient functional head, *lévő*, appearing in PP recursion can help 6-year-olds interpret sentences recursively more than *-i*. This difference was slightly significant and we cannot talk about significant differences in the case of the older group. This was one of our reasons to test this condition again on three age groups including adults.

4. Experiments

In this section two experiments will be discussed. We tested two factors; one of them was how children interpret recursive PPs containing *-i* and *lévő,* and the other one was how children interpreted recursive PPs with two word orders (subject-PP-verb and PP-subject-verb order). Two experiments were needed because in the first one we tested subject-PP-verb order, while in the second one we tested PP-subject-verb order. There was an adult control group in both cases.

4.1. The first experiment

In this experiment the subject-PP-verb order of the recursive PPs containing both *-i* and *lévő* functional heads was tested. We introduce the first experiment in detail starting with the presentation of the participants, methods, results and the discussion of the data at last.

4.1.1. Participants

There were 61 participants in the first experiment, 19 pre-schoolers, 22 second graders and 20 adults. In the group of pre-schoolers there were 9 boys and 10 girls, their mean age was 6 years and 7 months. The group of second graders consisted of 9 girls and 13 boys and the mean age of this group was 8 years and 5 months. In the group of adults there were 13 women and 7 men, their mean age was 48 years.

4.1.2. Methods

Firstly, there were some test sentences created with the combination of 4 postpositions, which were *alatt* 'under', *fölött* 'above', *előtt* 'in front of', and *mögött* 'behind'. We wanted to make plausible sentences so there were no sentences containing both *under* and *above*, or *in front of* and *behind*. We used 12 sentences, each combined with a pair of pictures. The sentences contained three occurrences of the postposition *alatt*, three occurrences of *fölött*, three occurrences of *előtt* and three occurrences of *mögött*.

(8)

A	medve	a	majom	mögött	-i
the	bear	the	monkey	behind	-AM

krokodil	fölött	ül
crocodile	above	sits

'The bear sits above the crocodile behind the monkey.'

Picture 3.

The picture on the left depicts the recursive interpretation, because the bear is above the crocodile that is behind the monkey, whereas the picture on the right shows the conjunctive reading, i. e. the bear is above the crocodile and behind the monkey. There were six picture- pairs in the case of which the recursive picture was on the left hand side, and there were another six which showed the recursive reading on the right hand side. It is also important to mention that there were 6 test sentences in which *-i* was the functional head, and there were other 6 in which *lévő* appeared. Every participant saw a pseudo-randomized order of the same sentences. Fillers were introduced after every sentence, which consisted of very simple sentences with a pair of simple pictures. One picture depicted the sentence correctly, while there were some elements on the other picture that did not match the sentence.

4.1.3. Results

R statistic software was used to evaluate the results and Chi-square statistic was done to show the significant differences among the data. Firstly, we summed up all the recursive and conjunctive answers concerning all the three age groups and it was found that there are significant differences between the two types of answers in the case of all the three groups. Adults gave significantly more recursive answers than conjunctive ones (χ^2 (1) = 36, $p < 0.001$***), although their success rate did not achieve 100 per-cent. Both pre-schoolers (χ^2 (1) = 21.16, $p < 0.001$***) and second graders (χ^2 (1) = 5.76, $p < 0.05$*) chose conjunctive pictures more times than recursive ones. The results are shown in Table 1.

Table 1.

Age-groups	Recursive answers	Conjunctive answers
Pre-schoolers	27%	73%
Second graders	38%	62%
Adults	80%	20%

Secondly, we compared all the recursive choices of sentences with *-i* and sentences with *lévő*. No significant differences were found between the in-

terpretations of sentences containing the two different functional heads in any of the three age groups i.e. in the case of pre-schoolers (χ^2 (1) = 0.16, p = 0.6892), second graders (χ^2 (1) = 0.64, p = 0.4237) and adults (χ^2 (1) = 0.04, p = 0.8415). This is shown by Table 2.

Table 2.

Age-groups	Recursive answers by *-i*	Recursive answers by *lévő*
Pre-schoolers	52%	48%
Second graders	46%	54%
Adults	49%	51%

Finally, we compared all the recursive answers in the three groups, in the case of which we have found significant differences (χ^2 (2) = 21.879, p < 0.001***). It means that adults chose the picture with recursive reading more times than the conjunctive one, while both groups of children preferred the conjunctive interpretation shown by the pictures. The data show that pre-schoolers chose recursive pictures fewer times than second graders, and second graders chose recursive pictures less often than adults.

4.1.4. Discussion

We have learned from the data of the first experiment that both groups of children preferred conjunctive interpretation of recursive sentences, although 80 per-cent of adults tend to choose pictures depicting the embedded interpretation of recursive sentences. Furthermore, there was no significant difference between the interpretation of recursive PPs with *-i* and *lévő*. This means that neither of the functional elements could help children to interpret recursive PPs. The data confirm the data of Roeper et. al. (2014), as we can see a so called acquisition path of recursive sentences. We have learnt from the first experiment that children prefer to interpret recursive PPs conjunctively, pre-schoolers thus have acquired recursive PPs with 27% success while second graders can interpret recursive PPs with 38% success, but at a later age adults can interpret them with 80% success. The question remains why chil-

dren tend to give more conjunctive interpretations at age 6 and 8 than recursive ones, although we have learnt from this study that it has nothing to do with the two overt functional elements. The low success rate can be the consequence of two factors: (i) contra di Sciullo's statement, conjunctive structures are simpler – they contain no covert functional elements, hence they are easy to learn. The second factor can be that (ii) these sentences were hard to interpret because the order of the elements in the test sentences did not correspond to the order of the elements on the stimuli. This is why it became important to test another word order in the second experiment.

4.2. The second experiment

In this section we present the experiment testing the PP-subject-verb order. We learned from the first experiment that the subject-PP-verb order was difficult to interpret for children. This is why in the second experiment we wanted to test an order which followed the orders of elements depicted in the pictures. We hypothesized that the PP-subject-verb order would be easier for children to interpret correctly compared with the order tested in the first experiment.

4.2.1. Participants

We returned to the same kindergarten and school, where we had recorded the data of the first experiment before, although because of the absence of some participants and the different mean ages of the group of adults there are some differences among the data of participants of the first and second experiment. In the second experiment there were 67 participants; 17 pre-schoolers, 23 second graders and 27 adults. The mean age in the group of pre-schoolers was 6 years and 6 months, 10 girls and 7 boys participated in the experiment from this group. In the group of second graders the mean age remained 8 years and 5 months, and there were 10 girls and 13 boys participating in the experiment. 44 years was the mean age of adults and there were 22 women and 5 men who took part in the second experiment.

4.2.2. Methods

There were no serious changes in the methods of the second experiment compared with the methods of the first one. The task of participants was the

same; they had to choose from two pictures (one depicting recursive, the other one depicting a conjunctive reading) after hearing the test sentences. We used the same pictures in this experiment which had been used before, but the sentences showed PP-subject-verb order compared with the word order of the first experiment (subject-PP-verb order).

(9) A majom mögött-i krokodil fölött medve ül
the monkey behind-AM crocodile above bear sits
'There is a bear above the crocodile behind the monkey.'

Picture 4.

The order of the test sentences was changed, thus the first sentence in the first experiment became the last one in the second experiment, and the second sentence of the first experiment became the last but one in the second experiment etc. In the case of sentence (9) and the pair of pictures belonging to it, the order of the two pictures remained the same as in the first experiment. Accordingly, the picture on the left depicts recursive interpretation, while the picture on the right depicts conjunctive interpretation of sentence (9). In the case of sentence (8) it is the subject which occupies the position of Spec TopP, while in sentence (9) it is the PP which moves to this position. Sentence (8) might have been hard to interpret because the order of the elements in the pictures does not depict the order of the elements in the test sentences (we have

to look at the bear first then jump to the monkey and finally we have to look at the last element while processing the sentence), but in the case of sentence (9), the order of the mentioned elements in the pictures shows the order of the test sentence (we have to find the monkey, then the crocodile and the bear at last). The fillers in the second experiment were not changed significantly. It did not take more time than a day to record the data, but we had to wait a month to return to the same school and kindergarten after the first experiment.

4.2.3. Results

In the second experiment we also used R statistic software and Chi-square test on the data. Firstly, we compared recursive and conjunctive answers of all the three age groups, which can be seen in Table 3.

Table 3.

Age-groups	Conjunctive answers	Recursive answers
Pre-schoolers	39%	61%
Second graders	24%	76%
Adults	10%	90%

The data show that there are significantly more recursive answers in the case of all the three age-groups than conjunctive ones. In the case of pre-schoolers (χ^2 (1) = 4.84, $p < 0.05$*) the difference between conjunctive and recursive answers is significant, just as well as in the group of second graders (χ^2 (1) = 27.04, $p < 0.001$***). The data of adults did not change much compared with the first experiment; they gave significantly more recursive answers than conjunctive ones (χ^2 (1) = 51.84, $p < 0.001$***).

Secondly, we compared -i with lévő and it was found that in the second experiment there were no significant differences between the recursive interpretation of sentences with *-i* and recursive interpretation of sentences with *lévő* in the case of any of the age groups. Table 4 shows the percentages of pre-schoolers (χ^2 (1) = 0.16, p = 0.6892), second graders (χ^2 (1) = 0.16, p = 0.6892) and adults (χ^2 (1) = 0.16, p = 0.6892).

Table 4.

Age-groups	Recursive answers by *-i*	Recursive answers by *lévő*
Pre-schoolers	52%	48%
Second graders	48%	52%
Adults	48%	52%

Thirdly, among all the recursive answers concerning the three age groups we have not found significant differences (χ^2 (2) =8.06, p = 0.01777).

Just as well as we have seen in the case of the first experiment adults could interpret recursive PPs with a high success rate, second graders gave less recursive answers than adults, while pre-schoolers chose the picture depicting the recursive reading less often than second graders. So an acquisition path outlines from the data, just as well as at the first experiment.

4.2.4. Discussion

It was found in the second experiment that all the age groups tend to interpret PP-subject-verb order recursively, as they chose the picture depicting the embedded interpretation significantly more often than the conjunctive one. It is also found that pre-schoolers gave significantly fewer recursive answers than second graders and second graders elected recursive pictures significantly fewer than the group of adults. This case (just as well as in the case of the first experiment) the data showed the acquisition path of recursive PPs. In neither of the experiments did we find any effect of the two functional elements *(-i/lévő).* It means that the presumably more salient one (*lévő*) did not help children to interpret recursive PPs. In the next section we compare the data gained from both of the experiments.

4.3. A comparison of the data of the first and second experiment

We used the same statistic methods to compare the data of the two experiments that we had used before to compare the data of the first experiment and the data of the second one. Table 5 shows all the recursive answers of the two experiments.

Table 5.

Age-groups	Recursive answers in the first experiment (S-PP-V)	Recursive answers in the second experiment (PP-S-V)
Pre-schoolers	27%	61%
Second graders	38%	76%
Adults	80%	90%

We cannot see any significant differences in how adults interpreted the two word-orders (χ^2 (1) = 0.58824, p = 0.4431). However, there are significant differences in the case of pre-schoolers (χ^2 (1) = 13.136, p < 0.001***) and second graders (χ^2 (1) = 12.667, p < 0.001***). Considering the data, we suggest that PP-subject-verb order is easier than subject-PP-verb order for children.

5. General discussion

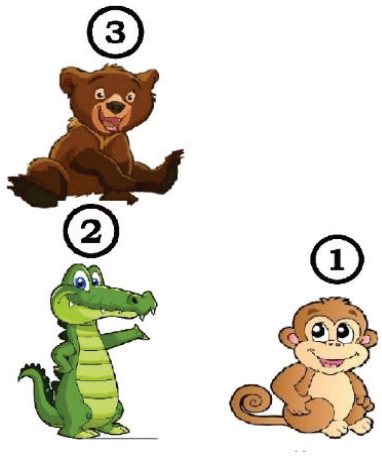
It is stated that the two different word orders appearing in both of the experiments cause the different interpretation of recursive PPs in the case of children. Namely, they tend to interpret PP-subject-verb order according to the recursive interpretation compared with subject-PP-verb order, which was interpreted mostly conjunctively. We do not think that the first experiment affected the better results of the second experiment, in other words we do not think that participants practiced PP recursion during the first experiment and their better results in the second one came from this practice. There is some evidence for claiming this. Firstly, both of them were short experiments, so we suppose that they did not have enough time to learn it. Secondly, we used fillers which did not contain recursive PPs to make them concentrate on something else. Lastly, more than a month passed between the two experiments. The salience of the recursive interpretation of the PP-subject-verb order rather came from the accordance of the stimuli and the test sentences and the discrepancy between them in the case of subject-PP-verb order. Before we would start the explanation of it in detail, we would like to sum up shortly why there was no difference between the interpretation of PPs with *-i* and *lévő*. Neither of the functional elements helped children more to interpret multiple embedded PPs recursively, as both of the functional elements are overt. In

Hungarian there are only overt functional heads appearing in recursive PPs, this is why we hypothesized that *lévő*, which is a more salient functional head than *-i*, could help Hungarian children acquire PP recursion early. But the data of the experiments show that the presumably more salient functional head, *lévő* does not have an important role in the early acquisition of recursive PPs. The fact that there are no significant differences between the two elements show that the salience of *lévő* does not matter. The thing that matters this time is that both of them are overt functional elements. The main difference in the interpretation of children is attested between the two word-orders (PP-subject-verb, and subject-PP-verb). If we look at the next examples we can note that in the case of sentence (10) at first we have to find the bear, then we jump at the monkey and finally we have to look at the crocodile. This explains why the computation of this sentence is much harder than sentence (11), in the case of which the order of elements in the pictures is continuous, i. e. we look at the bear first then the crocodile and finally we find the monkey.

(10) A medve a majom mögött-i krokodil fölött ül
the bear the monkey behind-AM crocodile above sits.
'Above the crocodile behind the monkey there is a bear.'

Picture 5.

(11) A majom mögött -i krokodil fölött medve ül
the monkey behind -AM crocodile above bear sits
'There is a bear above the crocodile behind the monkey.'



Picture 6.

This shows that the order of the elements in the pictures can affect the interpretation of recursive sentences. In other words, if the expected visual order of the elements corresponds to the word order of the sentences, children can interpret recursive PPs more easily compared with the case when the expected visual order of the elements does not correspond to the word order. This can explain why PP-subject-verb order was easier for children to interpret than subject-PP-verb order.

6. Conclusion

In this study two experiments were presented which aimed to show how 6 and 8-year-old children tend to interpret recursive PPs.

There were three main questions we wanted to answer. Firstly, whether (i) Hungarian children interpret recursive PPs conjunctively just as well as young English, Japanese and Romanian children do, as was claimed by Roeper

(2011) and Hollebrandse and Roeper (2014). Both of the experiments show that Hungarian children tend to give conjunctive answers after hearing recursive sentences as well, but there are some factors which can have an influence on their interpretation. One of these factors could have been the salience of functional heads, while the other can be the connection between the order of the elements in the pictures and the order of these elements in test sentences.

Our second question was (ii) whether the supposedly more salient functional head (*lévő*) helps Hungarian children to interpret recursive PPs correctly, compared with the other functional element (*-i*). It was found that there is no significant difference between the interpretation of recursive sentences with *-i* and *lévő* in the case of any of the age groups. One of the possible explanations can be that both of the functional elements are overt.

The third research question was (iii) whether the two word orders (PP-subject-verb and subject-PP-verb) can have an influence on the acquisition of recursive PPs. We found that when PP was in topic position, it was easier for children to interpret the sentence, compared with the case when the subject was topicalized. This can be explained with the computational difficulty of the latter one. In this case the order of the mentioned elements and the pictures depicting them did not match. However, when PP was in topic position, the stimuli matched the word order of the sentences.

In sum, we stated that the observation of Roeper (2011) and Hollebrandse and Roeper (2014), correctly captures how Hungarian children interpret recursive sentences, viz. they tend to give conjunctive interpretations at an early age, then this interpretation changes in the course of time. However, there is an important factor that can influence how children interpret multiple embedding presented by the two experiments. The interpretation of linguistic recursion is easier for children if the order of elements in the visual stimulus matches the order of elements in the linguistic representation.

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