

Theses of doctoral (PhD) dissertation

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THE ACQUISITION OF HUNGARIAN RECURSIVE STRUCTURES

Doctoral thesis (PhD)

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1. AIMS

The main aim of the thesis is to provide insights into the acquisition patterns of recursive structures. One of my research questions is at what age the production and comprehension of the whole structures begin, and what patterns of comprehension and production are obtained before this age. Exploring the differences between the acquisition patterns of the three structures studied was also a question. The experiments investigated the comprehension and production of two recursive (relative clauses and recursive possessives) and one complex structure (complex PPs) in children aged four to eight years. The data were collected using act-out tasks. The complex PPs were used as control compared to the other two constructions, as PPs are structures of the same complexity but are not recursive. Research on recursion in linguistics raises the issue that the acquisition of recursive structures is not immediate, and therefore occurs later in language acquisition depending on comprehension and production as well as languages. Therefore, a non-recursive structure is assumed to appear earlier in children's speech rather than a recursive version of the same complexity. Contrary to expectations, the production data show that it is the recursive structure that appears earlier (at age six) rather than the non-recursive structure (at age seven). This is apparent in comprehension tasks involving all three structures, even in the youngest age group: four-year-old children show adult-like performance. After carrying out the three main experiments, it became important to compare the children's working memory development and their acquisition of the three structures. I used syllable span and sentence repetition tasks to carry out the former one. Although a connection between working memory development and the rate of acquisition of the recursive structures was found, it was the type of structure (recursive possessives, relative clauses, complex PPs) that proved to be the more important factor.

2. THE STRUCTURE OF THE DISSERTATION

The dissertation consists of seven main chapters. Its structure reflects the presentation flow of the three main experiments and the working memory test.

In the first chapter, the theoretical background is presented, moving towards a broad and then narrower notion of recursion. The categorically-independent notion of *merge* recursion introduced by Chomsky (2007) is distinguished from the specific, category-dependent notion of recursion. The latter is what I mean by recursion from this point on, since the experimental material corresponds to it. I also refer to the article and its critique of Hauser, Chomsky and Fitch (2002), since it was this paper that brought the issue of recursion to the centre of linguistics, but in this paper recursion is understood as *merge*, and thus not what I am investigating, in any case it is a landmark in the literature. It is also important to note what Roeper and Oseki (2018) think about the different types of recursion. I don't share their theory either, but it is indispensable to mention it, as it is the best-known theory on children's acquisition of recursion so far.

The second chapter is started with the literature on the structural features of pronouns and the acquisition of spatial expressions, which are essential when it comes to (complex) PPs. Then I turn to the experiments with complex PPs in different languages, followed by my own pilot studies, which are either differed in terms of sentence word order or could be interpreted as a kind of trial of the main experiment. The methodology and results of the main experiment are discussed, followed by the data discussion in the order of the task measuring comprehension and later production. Finally, the data of the two orders are compared.

The third chapter deals with relative clauses. I begin with their syntax, followed by a discussion of Hungarian and foreign cross-linguistic studies. Then the methodology, results and finally the discourse of the comprehension and then the production task are presented, and this chapter concludes with a comparison of the two types of tasks.

The fourth chapter is about recursive possessives. I first write about the syntactic features of the possessive structure and the relevant parts of morphological acquisition. Then I turn to the syntactic properties of the recursive possessive structure, to foreign research on these constructions, and to two pilot tests, one of which is a picture-sentence matching task, the other a colouring task. The main experimental data are discussed in the order of the task measuring comprehension and then production, either in terms of methodology, results, or discourse. Then the data from the two task types are compared.

In chapter five, the data from the three structures' comprehension and then production task are discussed. The main conclusions from them are drawn.

Chapter six deals with the links between working memory and the acquisition of recursive structures. I briefly describe the connection between working memory and language, the differences between declarative and procedural memory systems, and the results of the main working memory tests that relate to language acquisition. Finally, I turn to the methodology and results of my own syllable span and sentence repetition tasks.

In chapter seven, the data from the main experiments and the working memory tests are summarised, the main questions addressed at the beginning of the thesis are answered, and the next possible steps for further research are outlined.

3. RESEARCH METHODS

3.1. Methods of the pilot tests

The thesis contributes to answering the main experimental questions and objectives by analysing the results of five pilot tests, three main experiments and two additional exercises. In total, there are data from 657 participants. The experimental subjects were typically divided into five age groups; children from four to eight years of age were included, and adults were also included in the pilot tests.

I will first present the pilot-test experimental material, as this shows the greatest variation. I mainly used a task requiring the matching of pictures with sentences, in which the participants had to choose between two or more pictures the one that best matched the test sentence. I also used Pinto – Zuckerman's (2019) colouring task in one of the pilot tests. In this task, participants had to colour in a certain part of a picture according to the test sentence – on paper for children and on a computer for adults.

3.2. Methods of the three main experiments

In the three main experiments, an act-out task was used to collect data. For the complex PPs and relative clauses, the comprehension task involved placing carton animals in a wooden bus based on the test sentences. Other animals were already sitting on the bus, and they and the structure of the bus itself were used as reference points when placing the animals. For the production task, I used a variety of food items as reference points in addition to the animals. These items were associated with a particular animal depending on what the animal tended to eat (e.g. cat eats milk, dog eats bone, etc.). After the experimenter pretended that the animal had eaten the food and sat down, the participant had to indicate as clearly as possible where the animal had sat down. This was helped by the location of the other animals and the direction of the bus itself. The experimental design was determined by whether we started recording data with a task measuring comprehension or production, with half of the participants seeing the comprehension task first and the other half seeing the production task first. And the same was true for the recursive possessive test, for which I used a wooden house rather than a bus. The house contained various fairy-tale characters, their animals, and their corresponding ingredients. For the task measuring comprehension, the experimenter indicated which character's animal's ingredient should be put in the basket, as one of the puppets had a birthday

that day and we wanted to bake a cake for him. We had to get the ingredients from the people in the house. In the task measuring the production, the experimenter put the ingredients in the basket and the respondent had to tell which food from which animal of which fairy tale character was taken for the cake. For all three experiments, there were 8 test sentences and 4 warm-up tasks for the comprehension and production tasks each. The latter were simple PPs, or simple possessives, and were used to help the children understand what they were going to be asked to do next, and to check that they understood the simple versions at all, before moving on to the much more complex structures.

3.3. Methods of the working memory tasks

To explore the relationship between working memory and the acquisition of recursive structures, I used a syllable span test and a sentence repetition task. First, I looked at the average number of syllables in the given grammatical structure. This gave me 13 syllables for complex PPs, 17 for the relative clauses and 10 for recursive possessives. For the syllable length test, I generated number sequences corresponding to the given structure (i.e. there were 13, 17 and 10 syllable number sequences), which the participants had to repeat. And for the sentence repetition task, I also created test sentences corresponding to the syllable length described above. Half of the items in the list were recursive or complex in the case of PPs, while the other half had no embedding. These were simple grammatical structures.

4. THE MAIN THESES OF THE DISSERTATION

4.1. The initial age of the adult-like comprehension and production of recursive structures

My first question was at what age children start to understand the three structures adult-like and to produce them as a whole. The cross-linguistic literature (Roeper and Oseki 2018, Hollebrandse and Roeper 2014) argues that although the onset of comprehension and production of recursive structures may vary from structure to structure and from language to language, comprehension usually starts at age 5–6 and production at age 7–9 (i.e. relatively late). When examining the relationship between comprehension and production, a similar pattern emerges across the experiments, i.e., for all three structures, children start producing the target structure 2–3 years later than their comprehension. However, for the comprehension task, I found that the majority of Hungarian children as young as 4 years old were already comprehending the test sentences in an adult-like manner, and even the production of the target structures occurs much earlier than international data suggest, at the age of 6–7 years. This difference may be due to the methodology of the experiment, as in this case we did not give the children any misleading stimuli (e.g., a picture reflecting a subjunctive interpretation), and they had to develop the meaning and the produced structure entirely on their own.

4.2. Comprehension and production of recursive structures before the age of adult-like performance

I also include among the main research goals the question of what other interpretations children attribute to the structures under investigation if they fail to interpret the target structure in an adult-like manner. And in terms of production, if children are unable to produce the given structure as whole, what other structures do they produce instead. Concerning the comprehension task, the cross-linguistic literature (Roeper 2011, Hollebrandse and Roeper 2014, and Roeper and Oseki 2018) on the interpretation of recursive structures argues that the primary interpretation for children younger than 5–6 years is a kind of conjunctive interpretation. A different pattern is found in the experiments conducted. In the production task, it can be argued that for PPs, acquisition is abrupt, while for relative clauses and recursive possessives, there is a gradual progress. Younger children (4–5 years old) typically produce partial structures, and only later develop full target structure production. It is not typical that children younger than 5–6 years replace recursive structures with conjunctive structures. If they

do produce conjunctive structures, it is more in the older age group (mainly 7 years). Exploring this could be a focus for future research.

4.3. Comparison of data for the three structures

I compared the results on the comprehension and production of the three structures. The initial hypothesis was that complex PPs would prove to be the easiest structures for children, since a general feature of recursive structures is that they present difficulties for the language acquisition system. That is, based on this assumption, we hypothesized the ease of a syntactically non-recursive structure, thus, complex PPs. Yet, this was exactly the structure that was shown to be the most difficult to use, and the easiest being the recursive possessives. This can be explained by the fact that complex PPs are less frequent than the other two structures. The PPs and RCs are made more difficult by the prepositions they contain, which children acquire later than, for example, morphemes that build recursive possessives, such as the -NAK suffix (Lukács, Szamarasz 2014). The ease of recursive possessives is also explained by the results of the memory test. That is, children who had to repeat number sequences or sentences corresponding to recursive possessives performed much better in the test, compared to the repetition scores of the other two structures. The difference found between complex PPs and relative clauses, i.e., the ease of the latter, may be explained by the syntax itself, in addition to the frequency factor. In the latter, the main clause gives the exact location of where the animal sat down in the task (in front of the pig (sat down)), and the subordinate clause specifies, in the case of two pigs, exactly where it was (which is under the elephant). In complex PPs, this kind of separation is not possible in Hungarian, where the participant has to remember the whole structure at once (in front of the pig under the elephant), which puts a much greater strain on the memory system. This is why dialogue-sensitive responses are considered correct in the case of RCs, as opposed to PPs.

4.4. The relationship between working memory and the acquisition of recursive structures

In an experiment to investigate the relationship between working memory and the acquisition of recursive structures, I wanted to find out what correlations exist between the acquisition patterns of recursive structures and the memory capacity of children. For the complex PPs and their relative clauses, there is a larger jump in memory development at roughly the same ages as seen for the act-out tasks. For the recursive possessives, the jumps in memory development

occur one year earlier than observed in the act-out task. This could be one reason for the ease of recursive possessives, where memory development is the basis for production. The fact that we find a jump in development for PPs and RCs at the same time could be explained by the acquisition path of prepositions (Lukács and Szamarasz, 2014, suggest that around the age of five is the age when Hungarian children acquire them, although the acquisition path depends on the spatial expressions). Just as with the fact that for complex PPs, production starts at age seven, while for RCs, they produce whole RCs instead of dialogue-sensitive responses at this age (if we prime them with the target structure, i.e., at order D1).

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4. RELEVANT PUBLICATIONS

4. 1. Publications:

- 2018 A magyar rekurzív birtokos szerkezet elsajátítása a nemzetközi kutatások tükrében. In: Scheibl György (szerk.) *LingDok 17. Nyelvészdoktoranduszok Dolgozatai*. Szeged. 211-231.
- 2018 Eve V. Clark: *Language in Children* (Routledge Guides to Linguistics) review. In: *Alkalmazott Nyelvtudomány*, XVIII. Volume 2018/1. Issue.
- 2018 The acquisition of Hungarian recursive PPs. In: *Yearbook of the Poznan Linguistic Meeting 2449-7525*. De Gruyter Onlie. 105-123.
- 2019 A magyar PP rekurzió elsajátítása. In: Scheibl György (szerk.) *LingDok 18. Nyelvészdoktoranduszok Dolgozatai*. Szeged. 61-79.
- 2019 A rekurzió vizsgálata a gyermeknyelvben. In: *Élet és Tudomány*, LXXIV. Volume 15. Issue. 454-456.
- 2019 A magyar rekurzív birtokos szerkezet elsajátítása. In: Bóna Judit – Horváth Viktória (szerk.) *Az anyanyelv elsajátítás folyamata hároméves kor után*. ELTE Eötvös kiadó. Budapest. 129-145.
- 2020 A rekurzív magyar birtokos szerkezet elsajátításának vizsgálata 4-től 8 éves korig. In: Bóna Judit – Krepsz Valéria (szerk.) *Nyelvfejlődés csecsemőkortól kamaszkorig*. ELTE Eötvös kiadó. Budapest. 121-137.
- 2021 *A magyar rekurzív szerkezetek elsajátítása* In: *Édes Anyanyelvünk* 43. Volume. 2. Issue. 16-17.

4. 2. Conference presentations:

- 2016 The 7th Generative Approaches to Language Acquisition North America Conference (GALANA7)
(University of Illinois at Urbana-Champaign, 8–10 September 2016)
Co-authored by Katalin É. Kiss and Thomas Roeper (presentation by Thomas Roeper)
Presentation: *The role of the visible functional head in the interpretation of recursion*
- 2016 4th Bucharest Colloquium on Language Acquisition (BUCLA4)
(University of Bucharest, 19 November 2016)
Presentation: *The acquisition of recursive possessive structures in Hungarian*
- 2016 Nyelvészdoktoranduszok 20. Országos Konferenciája (LingDok)
(Szegei Tudományegyetem, 30 November – 1 December 2016)
Presentation: *A magyar rekurzív birtokos szerkezet elsajátítása*
- 2017 2nd Budapest Linguistics Conference (BLINC2)
(Eötvös Loránd Tudományegyetem, 1–3 June 2017)
Presentation: *The role of the functional heads in Hungarian PP recursion*
- 2017 13th International Conference on the Structure of Hungarian (ICSH 2017)
(Research Institute for Linguistics of the Hungarian Academy of Sciences, 29–30 June 2017)
Poster: *The role of the functional heads in Hungarian PP recursion*
- 2017 47th Poznan Linguistic Meeting (PLM)
(Faculty of English, Adam Mickiewicz University, Poznań, 18–20 September 2017)
Presentation: *The role of the functional heads in Hungarian PP recursion*
- 2017 Nyelvészdoktoranduszok 21. Országos Konferenciája (LingDok)
(Szegei Tudományegyetem, 23–24 November 2017)
Presentation: *A magyar PP rekurzió elsajátítása*

- 2018 Az anyanyelv-elsajátítás folyamata hároméves kor után
(Eötvös Loránd Tudományegyetem, 24 May 2018)
Presentation: *A magyar rekurzív birtokos szerkezet elsajátítása*
- 2018 20. Pszicholingvisztikai Nyári Egyetem
(Balatonalmádi, 10–14 June 2017)
Presentation: *A magyar rekurzív birtokos szerkezet elsajátítása*
- 2019 8th Novi Sad Worskhop on Psycholinguistic, Neurolinguistic and Clinical Linguistic
Research (PNCLR8)
(Faculty of Philosophy, University of Novi Sad, Serbia, 20 April 2019)
Presentation: *The acquisition of Hungarian recursive PPs*
- 2019 21. Pszicholingvisztikai Nyári Egyetem
(Balatonalmádi, 26–30 May 2019)
Presentation: *The acquisition of Hungarian recursive PPs*
- 2019 3rd Budapest Linguistics Conference (BLINC2)
(Eötvös Loránd Tudományegyetem, 6–8 June 2019)
Presentation: *The Acquisition of Hungarian Recursive PPs*
- 2019 14th International Conference on the Structure of Hunarian (ICSH 2019)
(Linguistics Department of Universität Potsdam, Germany, 11–12 June 2019)
Presentation: *The acquisition of Hungarian recursive PPs*
- 2019 Generative Approaches to Language Acquisition (GALA14)
(University of Milano Bicoccia, Italy, 12–14 September 2019).
Presentation: *The acquisition of Hungarian recursive PPs*
- 2020 Nyelvfejlődés csecsemőkortól kamaszkorig
(Eötvös Loránd Tudományegyetem, 13 February 2020)
Presentation: *A magyar rekurzív birtokos szerkezet elsajátításának vizsgálata 4-től 8 éves korig*

2021 Workshop Recursion Across Languages. The Intricacies of Babel

(Online Workshop at University of Bucharest and University of Massachusetts
Amherst, 1–2 June 2021)

Presentation: *Recursion in Children's Hungarian – Complex PPs vs. Recursive Possessives*