

Overt Functional *De* Heads Facilitate the Acquisition of Chinese *DeP* Recursion:

The Role of Neurobiological Properties and Computational Efficiency

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1. Introduction. Existing research does not seem to provide convincing evidence for whether overt and covert functional heads play the same role in children's acquiring recursion. For example, five-year-old English-speaking children, facilitated by the overt functional heads *that*, were found to perform significantly better on recursive RCs than on recursive PPs (Sevcenco et al., 2017). The assertion has not yet ruled out the possible role of domain difference between recursive RCs and recursive PPs (clausal domain vs. phrasal domain) in the acquisition. Further, proper linguistic materials that symmetrically consist of both overt and covert functional heads are scarce in languages such as Romanian and Japanese (e.g., Sevcenco & Avram, 2018; Nakato et al., 2018), which has resulted in a lack of in-depth investigation. **2. A proposal for Chinese *DeP* recursion.** Chinese *DeP* recursion that expresses locative relationship allows *De* to be overt or covert (e.g., *zhuōzi shàng (De) píngzi lǐ *(De) huā* 'the flower in the bottle on the table'). Moreover, the functional *De* heads decide that *DeP* serves as a noun modifier with [Adnominal], so *De* is not a complementizer that introduces a clause. Based on these facts, we tackle the conundrum facing the existing studies, i.e., non-coexistence of overt and covert functional heads; and domain differences. **3. Aim.** This paper examines whether the acquisition of recursive structures such as *DeP* recursion could be affected by (c)overt functional heads, especially in certain period. **4. Methods.** We first recruited 84 monolingual Mandarin-speaking children (20 three-year olds; 20 four-year olds; 23 five-year olds; 21 six-year olds) from preschools in Jiangsu Province. For analyzing at which specific age the acquisition of *DeP* recursive structures with overt functional *De* heads had a head start over its counterpart, another 49 4-year-old children were recruited. All of them participated in a question-answering task, in which we added the compulsory *De* in the prompts, as in *Nǐ zhīdào zhuōzi shàng píngzi lǐ huā De yánsè shì shénme ma?* 'Do you know what the color of 'the flower in the bottle on the table' is?', to optimize the experiment. **5. Results.** Kruskal-Wallis Test showed that children acquired *DeP* recursion with overt *De* at the age of 4 (3-year olds vs. adults $p=0.003$; 4-year olds vs. adults, $p>0.05$) and *DeP* recursion with covert *De* at certain later stages of age 4 (4-year olds vs. adults, $p=0.016$; 5-year olds vs. adults $p>0.05$), considering the threshold to be adult-like for 5-year olds was 100% success rate in responses. In general, our results suggest that the overt functional heads promote children's recognition of recursive structures. Further, the paired sample T test indicated no significant difference in the numbers of successful comprehension between the two types of recursive structures in children aged 4;0-4;01 ($ps>0.05$), but significant in those aged 4;02-4;03 ($p=0.037$ in children aged 4;02, $p=0.0201$ in children aged 4;03). No such statistical difference was found in children aged 4;04 ($p=0.5845$). As such, 4;02-4;03 may be the neurobiologically critical periods for the acquisition of *DeP* recursion. **6. Discussions.** The immature computational mechanism and the inefficient computations within I-language cause children's unsuccessful comprehension of *DeP* recursion with covert *De* compared with the one with overt *De* before the particular time point (i.e., prior to 4;04). Relying on the computational efficiency among the interactions of linguistic submodules in the language faculty, the (un)successful acquisition of *DeP* recursion with (c)overt *De* is also clarified.

References:

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