The Role of Processing Capacity in Scope Assignment by Mandarin-acquiring Children

**Introduction:** Children’s command of scope knowledge is influenced by many factors, including syntax, pragmatics, and processing capacity (Lidz, 2016). However, few studies have looked into the role of processing capacity. This paper uses a covered-box task to investigate Mandarin-acquiring children’s interpretation of sentences with a universal quantifier and a numeralized NP (as in (1)), and a digit-span test to uncover the relation between children’s processing capacity and scope assignments.

1. a. you yi-qi ma zai zhui mei-zhi tuzi (OE)
   have one-CL horse Prog chase every-CL rabbit
   ‘One horse is chasing every rabbit.’
   b. mei-tiao gou dou zai zhui yi-zhi mao (EO)
   every-CL dog DOU Prog chase one-CL cat
   ‘Every dog is chasing one cat.’

**Covered-box task:** Children were asked to choose one from three pictures according to a sentence. One picture was hidden in an opaque box. Children can choose the hidden picture, if they think the other two are incorrect. Four readings are targeted: surface-scope and inverse-scope readings of both OE sentences and EO sentences. A list consists of 12 test items, 6 control items, and 6 fillers. The control items aim to test the knowledge of *mei* (every) and to remind them that the correct choice can be covered.

**Digit-span task** was used to study working memory. Participants heard a sequence of numerical digits and were asked to recall the sequence correctly, with increasingly longer sequences (from 2 to 8 or 9 digits). Here the digit-span task was given both forwards and backwards.

**Subjects & Procedures:** Eighteen children were tested. They were divided into three age groups (4-4;06, 4;06-5;07, and 6-6;10). Another seven adults were recruited as the control group. All subjects are monolingual. Each participant first took the digit-span test and then one list of the covered-box task.

**Results:** 1) Children younger than 4;06 failed the control items, indicating immature knowledge of *mei* (every), so their data is excluded. 2) The younger group (4;06-5;07, n=7) allow a higher acceptance rate of the inverse-scope reading of OE sentences (76.19%) than those older children (6-6;10, n=7) and adults (28.57% and 5.50% respectively). 3) All age groups allow the inverse-scope reading of EO. 4) There is a significant inverse correlation between children’s backward-recalling digit span and their acceptance rate of the inverse-scope reading of OE sentences (r= –0.738, r²= 0.545, p< 0.05).

**Discussion & Theoretical Implications:** 1) Mandarin-acquiring children are more permissive towards the inverse-scope reading of OE, indicating there is no “Universal Chinese grammar” stage even for Chinese-acquiring children. 2) Following the QR-parameter analysis (Aoun& Li, 1993), these results pose a learnability problem for children. Without negative evidence, it is a puzzle how children can ‘unlearn’ the inverse-scope reading. 3) Bobaljik and Wurmbrand (2012) propose a soft constraint favoring transparent reflection of LF scope in PF precedence relationships, which can be overridden by other economy conditions (as in English). Following this analysis, I propose that in Mandarin, given a specific LF representation (the inverse-scope reading), the topicalization of the object (the universal quantifier) which respects the scope transparency constraint will block QR. In Mandarin, a topic-prominent language, the object-topicalized structure shares the same numeration as the subject-topicalized structure, but it is not the case in English, a subject-prominent language (due to different information structures). 4) Children with limited processing capacity cannot undergo the comparison between QR and topic structures. Thus they may allow the inverse-scope reading of OE sentences. The significant reverse correlation between the backward-recalling digit span and the acceptance rate of the inverse-scope reading of OE seems to support this proposal.