Acquisition of Recursion in Child Mandarin

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Introduction

- **Recursion**
– Core of the language faculty (Hauser, Chomsky, & Fitch, 2002).
– Cross-linguistic differences in form (Snyder & Roeper, 2004).

- **Acquisition of recursion in English, Dutch & Japanese**
– Children successfully interpret recursion involving possessives, PPs, and RCs around age 6 (e.g., Limbach & Adone, 2010; Pérez-Leroux et al., 2012; Sevcenco et al., 2015).
– 3-to-4-year-old children tend to interpret recursion as conjunction and to drop embedded DPs (e.g., Limbach & Adone, 2010; Roeper, 2011).

- **Recursive possessives in Mandarin and English**
– Multi-level recursion; left branching; explicit marker *–de* and *'s*
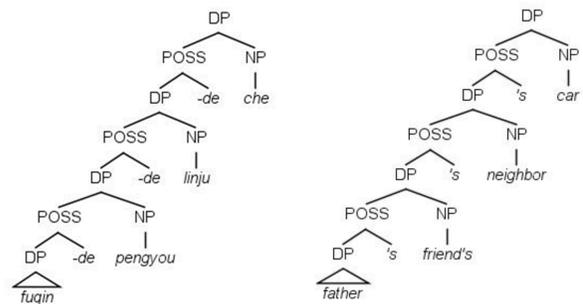
- **Acquisition studies in Mandarin**
– Four-year-olds can understand and produce two-level recursive possessives in a Truth Value Judgment task (Giblin, Shi, Zhou, Bill, & Crain, 2018).

- **Corpus data: Why 2-level may not be enough**
– But three-level is critical to show recursion:
 e.g. Bloomingdale's men's clothing = men's clothing available at Bloomingdale OR clothing belonging to Bloomingdale's man
 (a) non-recursive: DP – NP   (b) recursive: DP (DP)
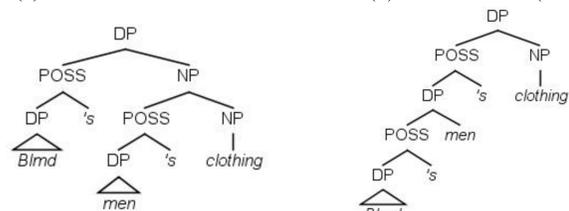
– And 2-year-olds produce both kinds of structures:

Corpus	Child age	Utterance
Shem	2;8.03	"I'm gonna have a little kid's spoon" (a)
Manchester	2;8.06	"I go on big girl's swings" (a)
Manchester	2;0.15	"Anne's Mum's dolly" (b)
Manchester	2;3.28	"Ellie's Daddy's" (b)

- **Present study**
– How do Mandarin-speaking children interpret one- to three-level possessives?

Methods

- **Participants**
– Thirty Mandarin-speaking children from two age groups (4-year-olds: $N = 10$, $M = 4;0$, range = 3;4 – 4;3; 6-year-olds: $N = 20$, $M = 5;11$, range = 5;4 – 6;4).

- **Familiarization phase**
– Children were shown pictures depicting possessive relations on iPad (Figure 1).
– Experimenter described the relations with recursive possessives; children repeated.

Figure 1. Sample picture for familiarization phase

– Experimenter's description of Figure 1: "Look! There is a robot. The robot has a snake. So this is the robot's snake. The snake has a lion. So this is the robot's snake's lion. The lion has a cookie. So this is the robot's snake's lion's cookie."

- **Test Phase: Act-out task**
– Children were shown with pictures of possessive relations similar to those in familiarization phase on iPad (Figure 2), and were instructed to give an object to one character according to the recursive possessive they heard.
– 12 test items in total: 2 one-level, 5 two-level, 5 three-level.
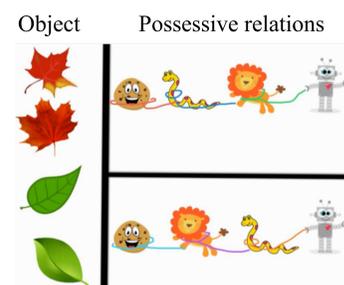

Figure 2. Sample picture for test phase

– Test items for Figure 2:
a. one-level possessive:
 she-de   shizi
 snake-GEN lion
 snake's lion
b. two-level possessive:
 jiqiren-de shizi-de she
 robot-GEN lion-GEN snake
 robot's lion's snake
c. three-level possessive:
 jiqiren-de she-de shizi-de binggan
 robot-GEN snake-GEN lion-GEN cookie
 robot's snake's lion's cookie

Results

Table 1. Percentage of types of answers

Participant group	Possessive level	Correct	Error: Conjunctive	Error: Reductive	Other errors
4-yrs	1	75%	5%	10%	10%
	2	54%	12%	26%	9%
	3	46%	14%	30%	10%
	All	64.17%	11.67%	25%	9.17%
6-yrs	1	80%	0	17.5%	2.5%
	2	76%	9%	11%	4%
	3	72%	16%	4%	6%
	All	75%	10.42%	9.17%	5.42%

– Coding:
Test item – robot's lion's snake
Conjunction – robot, lion, snake;
Reduction – robot's snake

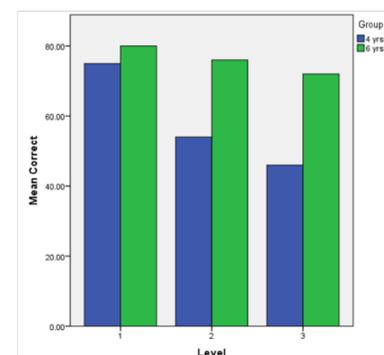- **Interpretation of recursive possessives**

Figure 3. Percentage of correct answers of 4- and 6-year olds per level

– Between-subjects effect (Age): $p = .125$
– Within-subjects effect (Embedding level): $*p = .023$
– 6-yrs: either good at both 2- and 3-level or bad at both levels
– 30% 4-yrs: good at 2-level but bad at 3-level

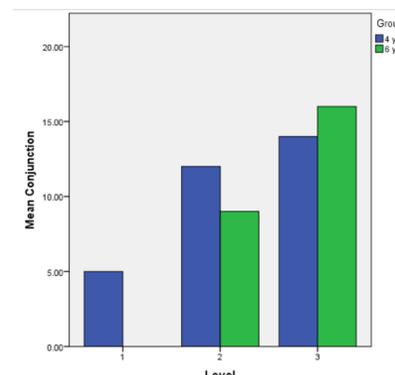- **Conjunctive and reductive answers**

Figure 4. Percentage of conjunctive answers of 4- and 6-year-olds per level
– Within-subjects effect (Recursion level): $*p = .013$
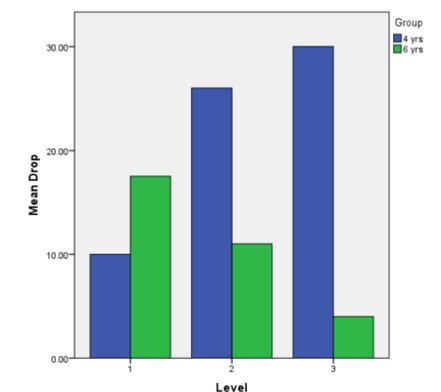
Results cont.

Figure 5. Percentage of reductive answers of 4- and 6-year-olds per level

– Effect of recursion level * age: $*p = .011$

- **Earlier acquisition in Mandarin than in English**
– Gentile (2003): 4-year-olds' 2-level conjunctive rate: 30% (vs. 12%)
– Limbach & Adone (2010): 6-year-olds' 2-level recursive, conjunctive, and reductive rate: 59%, 15%, 22% (vs. 76%, 9%, 11%)

Discussion & Conclusion

– The higher the recursion level, the greater difficulty children had with interpretation.
– Children avoided recursion by interpreting it as conjunction or by dropping one or more embedded DPs. Younger children gave more reductive answers and fewer conjunctive answers than older children.
– Evidence shows a sharp shift between 2- and 3-level, which we believe to be a shift from non-recursive to recursive structures. Given that 2yr-olds already show very suggestive evidence of spontaneous NP-generic possessives and recursive DP possessives, 3-level possessives are important in that they provide sharp evidence of recursion.
– The fact that English-speaking children need to learn both NP and DP recursion, and that possessives can be either left- or right-branching could delay their acquisition compared with Mandarin-speaking children.

Selected References

- Limbach, M., & Adone, D. (2010). Language acquisition of recursive possessives in English. *Proceedings of the 34th annual Boston University Conference on Language Development, 34,* 281-290.
- Pérez-Leroux, A. T., Castilla-Earls, A. P., Bejar, S., & Massam, D. (2012). Elmo's sister's ball: The problem of acquiring nominal recursion. *Language Acquisition, 19*(4), 301-311.
- Roeper, T. (2011). The acquisition of recursion: How formalism articulates the child's path. *Biolinguistics, 5*(1-2), 57-86.