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Late Intervention Effects in the Acquisition of Mandarin Sluice-like Constructions

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1. Introduction

Ellipsis – unpronounced yet deducible elements in a sentence – is a common mechanism used across languages. One such elliptical structure is 'sluicing' (first named by Ross 1969), in which only a *wh*-phrase is pronounced, as in the embedded clause in (1a). The sluiced structure in (1a) is semantically equivalent to its unelided counterpart containing the embedded *wh*-question *who you called* in (1b). The missing information in the sluice is recovered under semantic/syntactic conditions connecting it to the antecedent in the main clause.

(1) a. You called someone, but I don't know *who*.
b. You called someone, but I don't know *who you called*.

Merchant (2001), following Ross (1969), proposed a movement-ellipsis derivation for sluices: in this account, the *wh*-phrase moves to Spec CP, as in other *wh*-constructions, and the remnant TP is deleted at PF, as illustrated in (2a). Alternatively, a pseudo-sluicing approach (e.g., Erteschik-Shir 1977 and Pollmann 1975) suggests that the elliptical structure in (1a) is derived from a copula structure in which the subject and the copula are deleted, as shown in (2b).

(2) a. Sluice: You called someone, but I don't know [$_{CP}$ who$_i$ ~~[$_{TP}$ you called t$_i$]~~].
b. Pseudo-sluice: You called someone, but I don't know who ~~it was.~~

Both the movement-ellipsis and the pseudo-sluicing approaches can potentially derive the surface structure in (1a). Nevertheless, in languages with *wh*-movement, syntactic evidence from case-marking, preposition stranding, and binding

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phenomena mainly supports the movement-ellipsis derivation (Merchant 2001), while the island insensitivity of sluices argues in favor of a non-movement pseudo-sluice analysis (e.g., Adams & Tomioka 2012, cf. Merchant 2001)

In *wh*-in-situ languages, a sluice-like string ('S-string' henceforth) differs from sluices in languages with *wh*-movement. In Mandarin S-strings, an element *shi* precedes the *wh*-phrase, obligatory in argument S-strings (3a) but optional in adjunct S-strings (3b).

(3) a. Lisi jiao-le yi-ge ren,
Lisi call-PERF one-CL person
wo bu zhidao *(shi) shei
I not know SHI who
'Lisi called someone. I don't know who.'

b. Lisi jiao-le yi-ge ren,
Lisi call-PERF one-CL person
wo bu zhidao (shi) weishenme
I not know SHI why
'Lisi called someone. I don't know why.'

Importantly, *shi* is ambiguous between a copula, as shown in (4a), and a focus marker (henceforth FM) that often appears in clefts, as in (4b).

(4) a. na shi shei?
that be who
'Who is that?'

b. shi Lisi jiao-le Mali
FM Lisi call-PERF Mali
'It is Lisi who called Mali.'

The ambiguity of *shi* 'be/FM' has led to a debate over whether Mandarin S-strings involve sluicing, as in (2a), or rather are pseudo-sluices, as in (2b). The pseudo-sluicing approach (as in (5)) posits a silent *pro* as the subject of the copula *shi* and involves neither movement nor ellipsis (Adams 2004; Wei 2009, 2011; Adams & Tomioka 2012; Li & Wei 2014, 2017).

(5) The pseudo-sluicing analysis:
Lisi jiao-le yi-ge ren_i,
Lisi call-PERF one-CL person

wo bu zhidao [pro_i shi shei]
I not know be who
'Lisi called $someone_i$. I don't know who (pro_i is).'

On the other hand, the movement-ellipsis analysis (as in (6)) derives S-strings by focus movement, triggered by the FM *shi*, and TP ellipsis, parallel to the English sluicing analysis involving *wh*-movement followed by TP ellipsis (Chen 2004; Wang & Wu 2006; Chiu 2007; Song & Yoshida 2017).

(6) The movement-ellipsis analysis:

Lisi	jiao-le		yi-ge	ren,		
Lisi	call-PERF		one-CL	person		
wo	bu	zhidao	[$_{CP}$[$_{C}$ shi	[$_{FP}$ shei$_i$	[$_{F[+Foc]}$	~~[$_{TP}$ Lisi jiao-le t$_i$~~]]]]
I	not	know	FM	who		<Lisi call-PERF>

'Lisi called someone, I don't know who (it is that Lisi called).'

Liu et al. (to appear) (see also Liu 2019) provide a detailed discussion of the arguments for and against the two approaches, including novel syntactic and prosodic evidence from Mandarin. They conclude that both operations – sluicing and pseudo-sluicing – are part of the adult grammar of Mandarin. Either derivation is possible except in cases where one or the other is blocked by independent principles (see Liu 2019; Liu et al. to appear for discussion.) This raises the question: how do Mandarin-speaking children acquire S-strings, and more specifically, what analysis do they assign to these sentences – sluice or pseudo-sluice? An experimental study was designed to investigate this question. As we outline in the following section, the two analyses make different predictions for acquisition.

2. Sluicing vs. Pseudo-sluicing: Acquisition of Mandarin S-strings

Mateu, Hyams, and Winans (2017) and Mateu and Hyams (2018) found that English-speaking children comprehend subject sluices significantly better than object sluices until they are approximately 5 years-old. We henceforth refer to this asymmetry as the "subject advantage". Their findings are consistent with the predictions of the Intervention Hypothesis (Friedmann, Belletti, & Rizzi, 2009; see also Hyams & Snyder 2005; Snyder & Hyams 2015), viz., that A'-dependencies that cross another potential A'-moving element are harder for children.[1] According to this hypothesis, the subject advantage results from the movement-ellipsis derivation of English sluices. As shown in (7a), there is no intervener in the movement of who in the subject sluice, while the embedded subject *John* intervenes in the movement of *who* in the object sluice (7b).

[1] The effects of intervention are also observed in other constructions that derive from A'-movement of an object. For example, children up to the age of six experience difficulties with object relative clauses (Friedmann, Belletti, & Rizzi, 2009; Friedmann & Novogrodsky, 2004; McKee, McDaniel, & Snedeker 1998), object *wh*-questions (de Vincenzi et al. 1999; Friedmann et al. 2009), object topicalization (Friedman & Lavi, 2006), as well as A-dependencies such as passives and raising (Snyder & Hyams 2015, a.o.).

(7) a. Someone pushed John, but I don't know [$_{CP}$ who$_i$ [$_{IP}$ ~~t$_i$ pushed John~~]]
b. John pushed someone, but I don't know [$_{CP}$ who$_i$ [$_{IP}$ ~~John pushed t$_i$~~]]

Since the movement-ellipsis analysis of Mandarin S-strings postulates (focus) movement of the *wh*-remnant, it also predicts that Mandarin-speaking children will show the same subject advantage. On the other hand, the pseudo-sluicing analysis, which proposes no movement in the derivation of Mandarin S-strings, makes no such prediction. All else being equal, on the pseudo-sluice analysis children should show no subject (or object) advantage in their comprehension of S-strings.

In what follows we discuss an experiment designed to investigate whether the subject advantage exists for 3- to 6-year-old Mandarin-speaking children. Our results should provide us with a better understanding of the acquisition of the Mandarin S-strings construction as well as its syntax.

2.1. Methods

2.1.1. Subjects

A total of 59 native Mandarin-speaking children aged 3;0-6;8 (M = 4;10) were tested, 15 in each year interval except for the 3-year-old group which had 14 subjects. Forty-seven of the children were recruited in Changsha, Hunan, China and the remaining twelve in Los Angeles, California, all of whom had at least 80% exposure to Mandarin. Fourteen additional subjects were tested but excluded because they failed five or more out of the twelve control trials which consisted of full *wh*-questions.

2.1.2. Design and Materials

The experiment had 24 trials with a 2 × 2 × 2 design crossing three factors: S(entence)Type (S-strings vs. full (unsluiced) *wh*-questions), Position (subject extraction vs. object extraction), and Animacy (animate vs. inanimate arguments). Three out of the four transitive verbs were used in each condition: *zhui* 'to chase', *tui* 'to push', *ya* 'to be on the top of', and *kao* 'to lean on'. The sentences in (8) and (9) demonstrate the four conditions (2 Positions × 2 Types) with animate arguments. Under the animate condition, the *wh*-phrase used was *shei* 'who'.

(8) Subject extraction with animate arguments
Antecedent clause:
wo neng kanjian
I can see
yi-ge ren zai zhui hongse yifu-de nansheng…
one-CL person PROG chase red clothes-DE boy
'I can see that someone is chasing the boy in red…'
a. …ni neng kanjian shi shei ma?

you can see be/FM who Q
'…can you see who?'

b. … ni neng kanjian
you can see
shei zai zhui hongse yifu-de nansheng ma?
who PROG chase red clothes-DE boy Q
'…can you see who is chasing the boy in red?'

(9) Object extraction with animate arguments
Antecedent clause:
wo neng kanjian
I can see
Hongse yifu-de nansheng zai zhui yi-ge ren…
red clothes-DE boy PROG chase one-CL person
'I can see that the boy in red is chasing someone…'

a. …ni neng kanjian shi shei ma?
you can see be/FM who Q
'…can you see who?'

b. … ni neng kanjian
you can see
hongse yifu-de nansheng zai zhui shei ma?
red clothes-DE boy PROG chase who Q
'…can you see who the boy in red is chasing?'

Our experiment also had trials with inanimate arguments to cancel a potential effect observed in previous studies, viz. that children generally prefer animate DPs to be subjects and inanimate DPs to be objects (e.g., Dahl 2000 for Swedish, Øvrelid 2004 for Norwegian, Scott & Fischer 2009 for English). More specifically, in the S-string trials such as (8a) and (9a), if children are affected by the tendency in natural language for *shei* 'who' questions to be subject *wh*-questions and the more general trend of animate DPs to be subjects, that would bias them towards a subject answer in the S-string trials, yielding a subject advantage for reasons having nothing to do with intervention. To avoid this confound, we manipulated Animacy, balancing trials with animate and inanimate arguments.[2]

As discussed earlier, S-strings with argument *wh*-phrases such as *shei* 'who' and *shenme* 'what' require the presence of *shi*, regardless of the syntactic position. However, in full *wh*-questions in Mandarin, *shi* is optional in subject(-cleft) *wh*-questions (as in 10a) but unacceptable in object(-cleft) *wh*-questions (as in 10b).

[2] In our experiment, there were no animacy mismatch trials – either subject and object were both animate or both inanimate. Some previous studies have shown that intervention effects are stronger when the moved element shares features with the intervening element (see Friedmann et al. 2009, Gutierrez-Mangado 2011, Belletti et al. 2012, a.o. for the effects of mismatched features in A'-movement constructions, and especially Mateu & Hyams 2018 for animacy mismatch effects in English sluice acquisition).

(10) a. (shi) shei zai zhui wo?
FM who PROG chase I
'Who is chasing me?'/ 'Who is it that is chasing me?'
b. wo zai zhui (*shi) shei?
I PROG chase FM who
'Who am I chasing?' / '*Who is it that I am chasing?'

To avoid introducing another variable into the experiment (i.e. the presence of *shi* in subject but not object full *wh*-questions), we did not include *shi* in either the subject or object *wh*-question controls.

2.1.3. Procedure

The children were shown images on a screen and were then asked pre-recorded questions by a cartoon character, Miss Donkey. Figures 1 and 2 are examples of the images, in which three characters/items perform the same actions (e.g., chase, push, etc.) on one other. The children were required to answer questions such as (8-9) by answering 'yes/no' and by pointing to one character/item in the image.

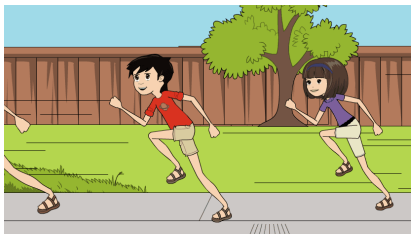

Figure 1. Chasing event – animate

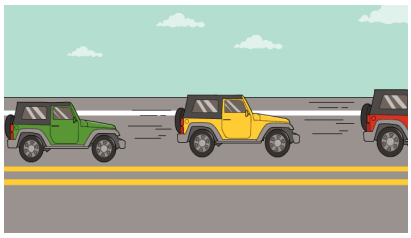

Figure 2. Chasing event - inanimate

For instance, in Figure 1, the girl in purple is chasing the boy in red, who is in turn chasing the girl in yellow. Miss Donkey would ask, for example (8a), 'I can see that someone is chasing the boy in red, can you see who?' A correct response to this question would be either to point to the girl in purple or to verbally answer 'yes (the girl in purple)'. Other responses (e.g., pointing to another character or saying 'no') were counted as incorrect.[3]

The test started with a brief color-naming test. One subject failed this pretest and was eliminated. Next was the training session that contained 9 items designed to familiarize the children with the task. All the children understood the task and no one was eliminated during the training. There were in total 24 test sentences in

[3] Most children tended to point to the characters/items as opposed to verbally responding to the questions. When a child responded 'yes', s/he was then asked to point out which and when a child responded 'no', s/he was asked to explain why.

the 2 × 2 × 2 design, as described previously. Any child who became tired or lost interest was given a short break.

2.2. Results

Table 1 (plotted in Figures 3 and 4) lays out the mean percentages of correct responses under the four conditions ({subject extraction, object extraction} × {full *wh*-questions, S-strings}) and the number of children who performed significantly above chance in each age group.[4]

Because responses were categorical (either correct or incorrect), a mixed-effect logistic regression (using the lme4 package, Bates et al. 2014) modeled the dependency of correct responses to Age (3, 4, 5, 6), SType (Full *wh*-questions, Sluices), Position (Subject, Object) and the SType-Position interaction as fixed effects and Verb and Participant as random intercepts, we found significant effects of Age ($p < 0.001$) and SType ($p < 0.001$).[5] The conclusions drawn from these results are that (i) older children performed better than younger children, and that (ii) children performed better with full *wh*-questions than S-strings.

As can be seen in Figures 3 and 4 below, the performance of children differed across age. To better explore this age effect, the data were divided into 2 groups, younger (3- and 4-year-old) and older (5- and 6-year-old) children. The prominent difference between these two groups is the interaction between SType and Position, which is not significant in the younger group ($p = 0.673$) but significant in the older group ($p = 0.026$). The interaction in each group is shown in Figures 5 and 6.

We see in Figures 5 and 6 that the younger children showed no difference in performance between subject/object trials in either the S-strings or the full *wh*-question controls ($p = 0.489$ and 0.301 for full *wh*-questions and S-strings, respectively), whereas the older children showed no difference in performance on subject/object *wh*-questions ($p = 0.841$), but performed significantly better on subject S-strings than on object S-strings ($p = 0.004$). In other words, the younger children (3- and 4-year-olds) did not exhibit a subject/object asymmetry in either

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[4] Since there were three characters/items in each image for a child to choose from, chance performance would be 33% correct and a response of more than 50% correct would be considered significant above chance according to a binomial distribution parameter hypothesis test ($p = 0.045$).

[5] We also ran a full model with Age, SType, Position, Animacy (Animate arguments, Inanimate arguments), the SType-Position interaction, as well as the Animacy-Position interaction (with Verb and Participant as random intercepts). The results show that Age ($\chi^2(1) = 20.484$, $p < 0.001$) and SType ($\chi^2(2) = 25.495$, $p < 0.001$) both contributed significantly to the model fit according to a likelihood-ratio test, while Animacy ($\chi^2(2) = 5.595$, $p = 0.061$) and Position ($\chi^2(3) = 1.057$, $p = 0.787$) did not, and neither did the Animacy-Position interaction ($\chi^2(1) = 0.700$, $p = 0.403$) nor the SType-Position interaction ($\chi^2(1) = 0.353$, $p = 0.553$). Insofar as Animacy and its interaction with Position did not contribute significantly to the model, we therefore exclude these factors from the model.

sentence type, while the older children (5- and 6-year-olds) showed a significant subject advantage in their comprehension of S-strings.

Table 1 Percentage of correct responses (standard errors in parentheses) and numbers of above-chance participants in each age group

	Full *wh*-question controls			**S-strings**		
	Subject *wh*-Q	**Object *wh*-Q**	**N above-chance**	**Subject S-string**	**Object S-string**	**N above-chance**
Age 3	73.81% (6.2)	69.05% (3.7)	13/14	63.10% (6.8)	59.52% (6.1)	10/14
Age 4	85.56% (6.0)	90.00% (4.4)	15/15	75.56% (8.4)	84.44% (6.7)	13/15
Age 5	93.33% (5.6)	94.44% (2.8)	15/15	92.22% (3.2)	81.11% (4.6)	15/15
Age 6	92.22% (5.6)	97.78% (2.6)	15/15	93.33% (3.2)	81.11% (5.8)	15/15
Average	**86.23% (3.6)**	**87.82% (2.5)**	**-**	**81.05% (3.8)**	**76.55% (3.6)**	**-**
	87.02%		**-**	**78.80%**		**-**

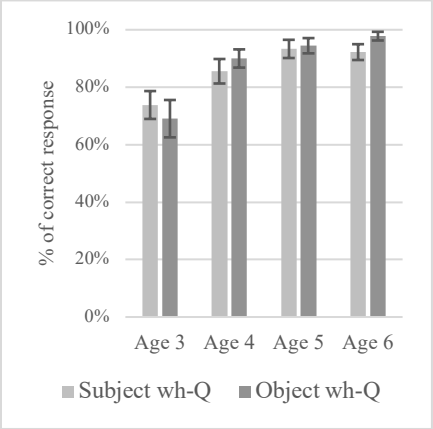

Figure 3. Mean percentages of correct responses for full *wh*-questions by age

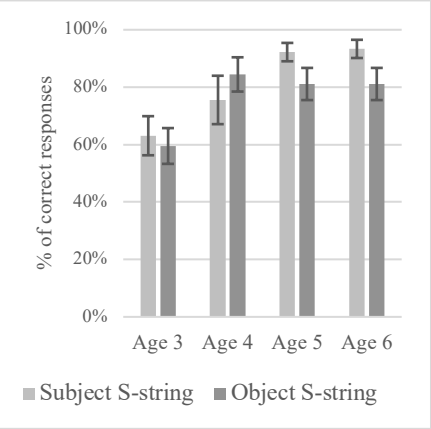

Figure 4. Mean percentages of correct responses for S-strings by age

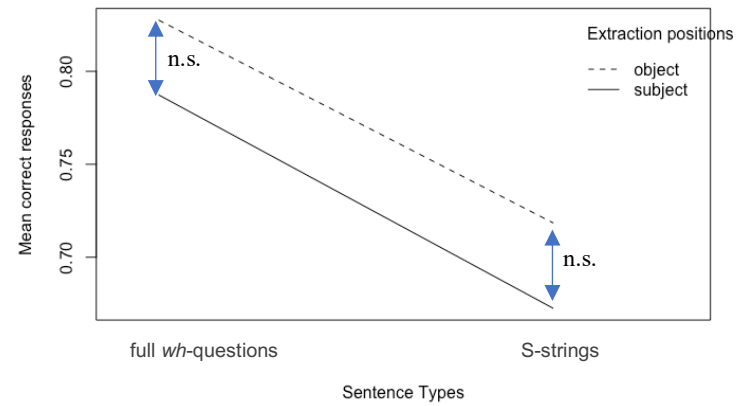

Figure 5. The SType-Position interaction in the younger group

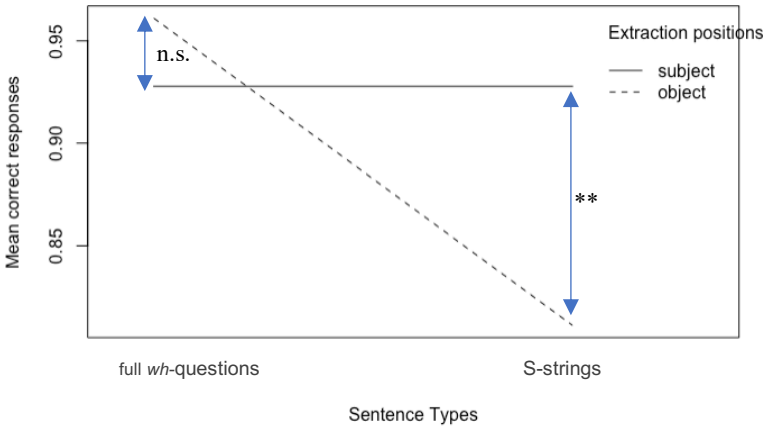

Figure 6. The SType-Position interaction in the older group

2.3. Discussion

The primary goal of our experiment was to determine whether there is a subject advantage in Mandarin-speaking children's comprehension of S-strings. Recall the different predictions of the two analyses of S-strings: if only a pseudo-sluicing analysis is available to these children, they should not show a subject/object asymmetry in their interpretation of S-strings. Conversely, given the intervention effect observed in English sluices (and other A'-movement structures, see fn. 1), we expect that if a movement-ellipsis derivation is part of their grammar, children will perform better on subject S-strings than on object S-strings (the subject advantage).

Our results show a clear subject advantage in older Mandarin-speaking children (ages 5-6). This finding supports the hypothesis that these children, and (a fortiori) Mandarin-speaking adults, have focus movement-ellipsis as part of

their grammar. In this respect our results parallel those found for English. However, the subject advantage is not observed in the younger Mandarin-speaking children (ages 3-4). Thus, another important finding of our study concerns the delayed appearance of a subject advantage in Mandarin as compared to English. Recall that English-speaking children show a subject advantage in their comprehension of sluices by age 3 and become adultlike (i.e. lose the subject > object asymmetry) at around age 5 (Mateu et al. 2017, Mateu & Hyams 2018), while in Mandarin the subject advantage emerges at age 5-6.

This cross-linguistic difference raises the question of why Mandarin-speaking children show a subject advantage later than English-speaking children? Our hypothesis is that the presence of *shi* with its copula/FM ambiguity introduces a structurally simpler, non-movement derivation for Mandarin S-strings that does not exist for English sluices. We propose that Mandarin-speaking children first analyze *shi* uniquely as a copula, thereby deriving only the pseudo-sluice. Later, they learn that *shi* also functions as a FM, at which point a movement-ellipsis derivation of the S-string also becomes available. Because children initially have only a copula analysis of *shi* (Stage 1), there is no movement at this stage, hence no intervention and no subject advantage. Once they acquire the focus property of *shi*, the movement-ellipsis derivation enters their grammar and the subject advantage emerges as an effect of intervention (Stage 2).

In addition to the age effect just described, our experiment also shows that children performed better on *wh*-questions than on S-strings. This asymmetry is unsurprising: in the S-string children must recover unspoken information (be it the elided structure in sluices or the reference of the null subject *pro* in pseudo-sluices) in order to assign an interpretation, which may add computational cost to the derivation, while this issue does not arise in the full *wh*-questions.

Moreover, in contrast to what we observed in the S-string results, we found no subject/object asymmetry in full *wh*-questions at any age. A possible explanation is that the intervention effect is not triggered in full *wh*-questions because Mandarin is a *wh*-in-situ language, viz., there is no overt *wh*-movement. However, this explanation would fail to explain why in a *wh*-movement language like English there is also no Subject > Object asymmetry in full *wh*-questions among 3- to 6-year-olds (Mateu et al. 2017). Therefore, a more plausible account is that by age 3 children are fully adultlike with respect to *wh*-questions, and hence show no intervention effect, i.e. no subject/object asymmetry. The subject advantage only surfaces when there are additional costly factors, such as having the recover elided material.

2.4. A Follow-up Corpus Study

To further test our two-stage hypothesis for the acquisition of Mandarin S-strings, we followed up with a corpus study which included 457 children (age 0;08-6;11) from the CHILDES data-base (MacWhinney 2000). We conducted a search of all instances of *shi*. The expectation, given our two-stage model, is that

children will not produce sentences with FM *shi* until a later age, while copula *shi* should be present quite early.

As predicted, our results show that Mandarin-speaking children produce copula *shi* from an early age.[6] For illustrative purposes, we provide several early examples in (11).

(11) a. Xueer shi nvsheng (1;03)
Xueer be girl
'Xueer is a girl.'

b. zhe shi da qiqiu (1;05)
this be big balloon
'This is a big balloon.'

On the other hand, FM *shi* appears later and is far less frequent, also as predicted. Of 6235 tokens of *shi* only 13 are FMs (0.21%). Table 2 provides the total number of FMs produced by the children in our corpus study at one-year age intervals.

Table 2 The number of FM *shi* produced in two structures in Mandarin

	Age 3	Age 4	Age 5	Age 6
# of sentence-initial FM *shi* in clefts	1	5	5	2
# of FM *shi* in S-strings	0	0	0	0

Note that all instances of FM *shi* that we found appeared in clefts, for example (12). There were no occurrences of argument S-strings in Mandarin-speaking children's spontaneous productions through the age of 6;11.

(12) a. shi shenme zai xiang a
FM what PROG make.sound SFP
'What is it that is making a sound?' (age 3 (month unknown))

b. Child 1: dao-le
fall-PERF
'(It) fell down.'
Child 2: zenme nong de?
how do DE
'What happened?'
Child 1: *shi* ni nong de a
FM you do DE SFP
'It was you (who did it).' (age 4;03)

As Table 2 shows, we found only one occurrence of FM *shi* among the 3-year-olds, given in (12a), and the exact age of this child is unknown. The next

[6] The earliest production of the copula *shi* we found in the CHILDES corpora is the following:
(i) *Xueer shi laoshu* 'Xueer is a mouse' (0;08)
However, without any audio or video support, we suspect a transcription error. It seems unlikely that an 8-month old could produce a sentence of this complexity, even as an imitation.

example appears at age 4;03, shown in the exchange in (12b). Thus, it is only after 4-years old that the FM *shi* becomes somewhat productive, with 5 examples, the same number as produced at age 5.

Thus, consistent with our hypothesis, Mandarin-speaking children produce FM *shi* much later and far less frequently than copula *shi*, supporting the claim that the focus property of *shi* is acquired relatively late. Moreover, the fact that there were no S-strings at all in the corpus data, even at age 6, highlights the difficulty of this structure for Mandarin-speaking children. This is in line with our experimental results: when presented with an S-string in the experiment the younger children assign the only interpretation (pseudo-sluicing) available in their grammar – with *shi* as a copula. Sometime between 4 and 5 years old, the focus property of *shi* is acquired (as evidenced by the production of clefts) and the movement-ellipsis derivation also becomes available. At that point, the subject advantage emerges as a result of the intervention effects triggered by focus movement. In the comprehension experiment, we see this effect in 5- and 6-year-olds.

It is reasonable to ask at this point why the Mandarin-speaking child who already has the structurally simpler pseudo-sluicing analysis (with copula *shi* 'be') would add the more complex movement-ellipsis derivation. A possible explanation is that children acquire the focus movement associated with *shi* on the basis of clefts and then extend the movement analysis to S-strings which also contain *shi*. In an S-string, the focus movement of the *shei* 'who' when *shi* is analyzed as a FM, requires an extraction site, which entails a hidden TP structure. Thus, in this way children would need to add a movement-ellipsis (sluicing) derivation to the pseudo-sluicing derivation already established in their grammar. Moreover, without disconfirming evidence there would be no reason to abandon the pseudo-sluicing analysis and therefore both derivations persist through to adulthood.

Thus, at Stage 2 both derivations are possible. When the child commits to a movement-ellipsis analysis this gives rise to the intervention difficulties associated with long-distance dependencies. When a pseudo-sluicing analysis is generated no asymmetry arises. There does not seem to be any obvious way to predict for any individual S-string what analysis the child (or adult) will choose.[7]

3. Conclusion and Summary

[7] There are cases in the adult grammar (and presumably in the Stage 2 child grammar) where either a sluice or pseudo-sluice analysis would be forced. For example, an accented or negated *shi* in the S-string forces the pseudo-sluice structure, while an S-string with idioms forces the sluice structure (see Liu 2019 and Liu et al. to appear for more detailed discussion). Outside these cases the choice may be random or determined by a variety of discourse or other factors.

The primary finding of our experiment is that older Mandarin-speaking children show a subject advantage (subject > object) in the interpretation of S-strings. The implications of this finding are two-fold: first, the subject advantage observed in the older groups supports a movement-ellipsis analysis of Mandarin S-strings in their grammar. Second, the delay of such a subject advantage suggests a two-stage development in Mandarin: children initially analyze *shi* as a copula, hence apply a simpler pseudo-sluicing derivation, and only later acquire the focus properties of *shi*. At that point, the movement-ellipsis derivation enters their grammar and the subject advantage emerges as an effect of intervention. A follow-up corpus study shows that the development of FM *shi* is later than that of a copula *shi*, consistent with the hypothesis of a two-stage development of *shi* and (pseudo-)sluicing in Mandarin.

Our results also have clear implications for the adult grammar of Mandarin – they entail that adults (like older children) also have a dual analysis of S-strings. This is consistent with the syntactic and prosodic evidence discussed in Liu (2019) and Liu et al. (to appear) and reconciles a number of conflicting arguments in the literature.

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