

Ellipsis meets *wh*-movement: sluicing in early grammar*

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1 Introduction

Ellipsis (meaning without sound) poses an extreme ‘poverty of the stimulus’ problem for language acquisition. Children must recognize that part of a sentence is missing, and they must assign a meaning to the elided material by associating the ellipsis site to its antecedent. It is not immediately obvious how they do this. Although ellipsis has not been very widely studied in acquisition overall, some forms of ellipsis have received more attention than others. The development of VP ellipsis (VPE) has been looked at in a number of languages, most prominently English (Thornton & Wexler 1999, Matsuo & Duffield 2001, Foley et al. 2003, Thornton 2010), but also in Japanese (Matsuo 2007), European Portuguese (Santos 2009), and Mandarin (Fangfang et al. 1996). Argument ellipsis (AE) has also been studied in several “object drop” languages, including Mandarin (Su 2013, Zhou 2014), Cantonese (Cheung 2008), Japanese (Matsuo 2007), and European Portuguese (Santos 2009).

There has been far less investigation of the acquisition of sluicing, which involves the ellipsis of TP in a *wh*-question that leaves a “remnant” *wh*-phrase overt, as in (1).

- (1) Someone is drawing a flower, but I can’t see who ___.

Sluicing appears to be more widely distributed across languages than some other kinds of ellipsis such as VPE (Merchant 2001). Also, broadly speaking, *wh*-questions are acquired quite early as compared to the auxiliaries (e.g., *do* support) which act as the licensors to VPE. For these reasons sluicing seems like a good vehicle for exploring the acquisition of ellipsis.

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1.1 Theoretical background

There are various theoretical proposals concerning the status of the elided material in sluicing, and ellipsis more generally. Analyses differ primarily with respect to the issue of how much structure is posited in the ellipsis site. One prominent analysis is that of Merchant 2001, who proposes that the *wh*-phrase is in SpecCP of a fully generated embedded clause. This would make the structure of clauses containing sluices analogous to those of standard *wh*-questions, except that a sluicing rule deletes the remainder of the embedded clause, i.e., the embedded TP, and any structure below it, as in (2a). The second group of analyses does not implicate movement. Under such approaches, the full *wh*-question is not present in the syntactic derivation. Instead, operations are postulated at the level of interpretation, LF. Within this group, some analyses posit some minimal structure in the ellipsis site, such as a null pronoun, as in (2b) (e.g., Hardt 1993, Chung et al. 1995), and some none at all, as in (2c) (e.g., Culicover & Jackendoff 2005).

- (2) a. Someone is drawing a flower, but I can't see who $\langle t_i \text{ is drawing a flower} \rangle$.
 b. Someone is drawing a flower, but I can't see who *pro*.
 c. Someone is drawing a flower, but I can't see who.

The competing analyses of sluicing make different predictions about children's acquisition of these structures, as we will discuss. Additionally children must also identify the antecedent of the ellipsis site. Although the precise formulation of the identity condition is still under debate (Barker 2013, Chung 2013, Merchant 2013), *who* in (2) must be interpreted as 'someone', the individual drawing the flower.

1.2 Previous studies of acquisition of sluicing

Previous studies include Wood (2009) and Lindenbergh et al. (2015).¹ Wood tested English-speaking children ages 4;5-5;5 and 6;8-7;8 in a grammaticality judgment task and found very poor performance (under 60% correct) in his younger age group. However, children also performed poorly on the controls (65% correct), which consisted of full structures, and relatively well in the ungrammatical sluices, which had no antecedent (70% correct), casting some doubt on the methodology he used. Lindenbergh et al. (2015) tested Dutch-speaking children ages 4;9 to 6;1 in a picture-matching task. Each picture array contained 4 pictures and was coupled with a sentence as in (1); one picture matched the sentence, one controlled for the reading

¹ Sugisaki (2016) also looked at Japanese children's comprehension of a construction which is similar, though not identical to English sluicing, in which the sluice is derived from a cleft construction in which the CP subject of the cleft has been elided (e.g., Saito 2004).

in which the child only paid attention to the first part of the sentence (someone is drawing a flower). In the other two “distractor” pictures either a different object (e.g., a woman drawing a guitar) or a different action (e.g., a woman holding a flower) was depicted. Lindenbergh et al. obtained much better results than Wood with a mean percentage correct of 94%.

2 The current study

The main aim of this study was to enrich the sparse literature in this area and help resolve the conflicting findings of the two previous studies. We addressed two questions: i) Are children able to recover the elided material and respect the identity condition? ii) Do children show an asymmetry between subject- and object-*wh*-sluices? The answer to the latter question could provide insight into the underlying structure of the ellipsis site. A number of studies have found that children perform more poorly on object as opposed to subject *wh*-questions, possibly an ‘intervention effect’, i.e., the subject intervening in the A-bar-dependency (see [Friedmann et al. 2009](#) for an overview). If we posit a structured ellipsis site involving *wh*-extraction, as in (2a) ([Merchant 2001](#)), children should show this same asymmetry, performing worse on object-extracted sluices, (3a) than on subject-extracted sluices, (3b). On the contrary, if no movement (or structure) is involved (e.g., [Culicover & Jackendoff 2005](#), [Chung et al. 1995](#)), children should perform similarly on both.

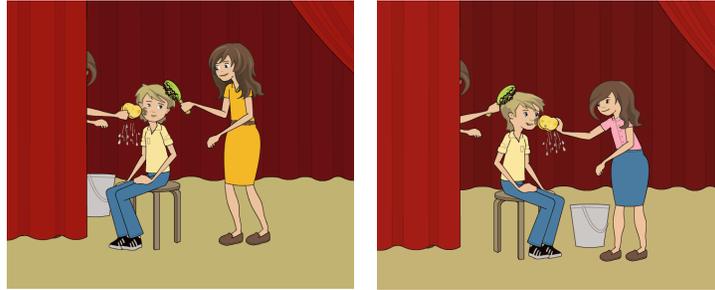
- (3) a. Ben is brushing someone, can you see [_{CP} who_i [_{TP} <Ben is brushing *t_i*>]]?
 b. Someone is brushing Ben, can you see [_{CP} who_i [_{TP} <*t_i* is brushing Ben>]]?

To date we have tested 30 English-speaking children aged four- to six-years old (M = 5.7), 10 in each age group. In a ‘*wh*-question task’, modeled after a Truth-Value Judgment task ([Crain & McKee 1985](#)), children were shown an image on a screen. A computer-simulated puppet commented on what she could see and asked a question about what the child could see. An example trial from the experiment is given in (4). Figure 1(a) was used to elicit a ‘yes’ answer; figure 1(b), was used to elicit a ‘no’ answer.² Our study included 29 trials consisting of 15 sluiced sentences, as in (4), and 14 unsluiced control sentences, as in (5).

- (4) I can see that someone is brushing Ben, can you see who?

² Children often chose to resolve the sluice by pointing to the relevant hidden or visible person, rather than responding with ‘yes’ or ‘no’. We counted their responses as correct if they pointed to the appropriate character in the picture.

- (5) I can see that someone is brushing Ben, can you see who is brushing/washing Ben?
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(a) 'Yes' scenario for (4)

(b) 'No' scenario for (4)

Figure 1 Sample images from Condition 2

There were three different conditions. Condition 1 corrected for a potential confound in Lindenbergh et al.'s study, which may have allowed children to arrive at the correct meaning of the sluice by interpreting the two clauses independently ("two-clause strategy" as in (6))³. In this condition, we used intransitive verbs, and images contained two characters, one performing the action described in the sentence, and one standing or sitting. In 'yes' trials, the agent of the action of the sentence was in plain sight, while the second character was hidden behind an object. In 'no' trials the situation was reversed.

- (6) I can see that someone is jumping. Can you see someone?

Condition 2 tested verb identity. Figures 1 and 2 provide example scenarios: one character was performing the action described by the transitive verb, and the other one was performing a different transitive action. Items were split between subject and object *wh*-questions. An example of an object *wh*-question is given in (7).

- (7) I can see that Ben is brushing someone, can you see who?

Condition 3 tested argument identity. In this case children were shown a picture with multiple characters all performing the same action on one another, for example, brushing hair. This tested whether children allowed a sentence like (7) to have the non-adult-like interpretation in (8).

³ In Lindenbergh et al.'s experiment the target image was the only one out of the four options in which someone was drawing a flower *and* someone was hidden.

- (8) I can see that Ben is brushing someone, can you see who_i <the girl in pink is brushing t_i>?

3 Results and discussion

Our results thus far are given in Table 1. We see first that even the youngest children in our study easily understand sluiced sentences, obtaining over 90% correct answers in all the sluice conditions. Given their near perfect score on the Condition 1 sentences we know that children are not relying on a “two-clause strategy”, a confound in the Lindenbergh et al. results. If children interpreted ‘I can see that someone is jumping, can you see who?’ as ‘I can see that someone is jumping. Can you see someone (else)?’ then children would have said ‘yes’, even in the ‘no’ scenario, where the character who is jumping is mostly hidden behind a curtain. Moreover, children’s high scores in Conditions 2 and 3 indicate that four- to six-year-old children respect the identity condition and do not allow for verb or argument mismatches.⁴

	Control conditions			Sluiced conditions		
	1	2	3	1	2	3
4yo	100%	95%	87.5%	96.67%	91.67%	91.67%
5yo	100%	85%	83.75%	100%	93.33%	95%
6yo	100%	97.5%	98.75%	100%	98.33%	100%
Avg.	100%	92.5%	90%	98.89%	94.44%	95.56%
Grand avg.	94.17%			96.30%		

Table 1 Results of the *wh*-question task by Condition.

Additionally, we found a small but significant difference in performance between subject and object sluices ($Z = -2.293$, $p = 0.022$). As shown in Figure 2, young children do better with subject sluices, suggesting that they have the same (possibly intervention-induced) difficulty here as they show with other instances of *wh*-movement such as relative clauses. This difference all but disappears in the 6-year olds, again parallel to what we see in other cases of *wh*-movement (Friedmann et al. 2009). This subject-object asymmetry supports the hypothesis that children

⁴ Note that overall children did slightly worse on the controls than the sluices. The difference is found only in control conditions that involve a mismatch (e.g., *I can see that Ben is washing someone, can you see who the girl in green is washing?*). We hypothesize this difference might be caused by either processing difficulties with resolving two referents (one for *someone* and one for *who*), or the pragmatic oddity of the abrupt shift in the question under discussion from one clause to another.

(like adults) derive sluices via *wh*-extraction, as proposed in various syntactic analyses (Merchant 2001). It also provides an all too rare instance in which we find acquisition evidence for a theoretical analysis, evidence not otherwise available because adults do not show such an asymmetry.

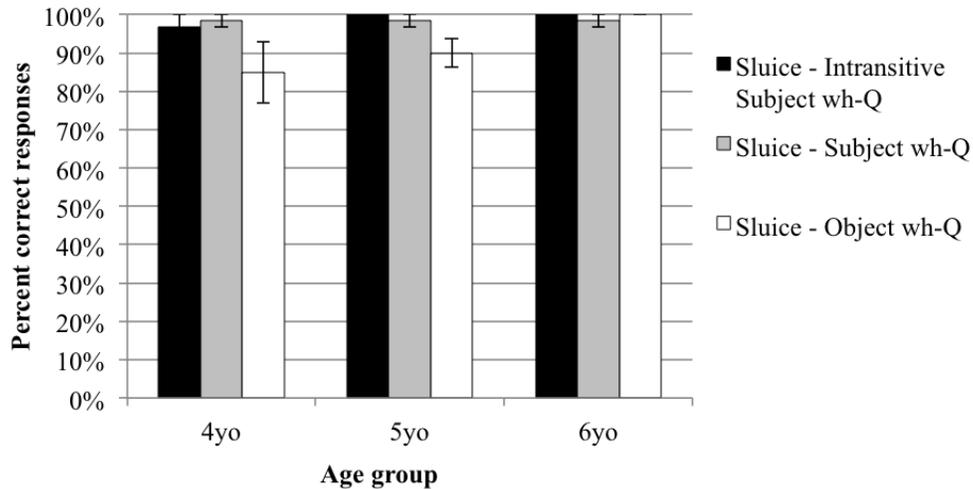


Figure 2 Children’s performance on sluiced subject *wh*-questions and sluiced object *wh*-questions.

Interestingly, we did not find a significant difference in the control *wh*-questions. Children obtained an average of 92.78% in the subject *wh*-questions (with transitive verbs) and 89.44% in the object *wh*-questions ($Z = -0.768, p = 0.441$). While children do not have much difficulty with simple object *wh*-questions by age four, it seems reasonable to conclude that A-bar movement across an intervener coupled with a sluicing operation (deleting the TP at PF) exceeds their computational resources. We are currently testing three-year-olds. We expect that younger children, with presumably even fewer resources, will show a much stronger subject-object asymmetry in both the sluiced and the control sentences.

4 Conclusions

This study investigated children’s acquisition of sluicing in English. We found that by age four, children have no difficulties comprehending sluiced *wh*-questions and generally respect the identity condition, disallowing both verb and argument mismatches. Interestingly, and despite their high scores, we did find children performed significantly better in sluiced subject *wh*-questions than sluiced object *wh*-questions.

We hypothesize this is an intervention effect similar to that found in other A-bar constructions, providing evidence for a structured TP at the ellipsis site. This study thus contributes to theories on the acquisition of ellipsis and also to the theoretical debate about the syntactic status of sluicing.

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