

EVALUATING SYNTACTIC ANALYSES WITH CHILDREN

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Abstract

Recent, vast progress both in syntactic theory and in the study of child language further tightened the connection between these two fields, and enables us to make the contribution from the latter to the former. This paper summarizes two case studies to illustrate how evidence from acquisition can be used to evaluate competing syntactic analyses. These case studies, which are drawn from the author's own research, focus on (i) the acquisition of the ditransitive construction in Japanese and (ii) the acquisition of swiping in English. The case studies presented here demonstrate that the study of child language has the potential to make significant contributions to the theoretical studies of syntax.*

Keywords: *ditransitives, scrambling, swiping, language acquisition*

1. Introduction

An impressive number of language acquisition studies conducted within the Principles and Parameters approach to UG have made at least two major findings. One group of studies revealed that various principles of UG constrain the course of acquisition from virtually the very beginning of life (e.g. Otsu (1981) and Crain and Thornton (1998)), and a different group of studies demonstrated that even children's "errors" fall under the range of possible human languages determined by parameters (e.g. Hyams (1986), McDaniel, Chiu and Maxfield (1995), Thornton (2004)). In making these findings, the contribution was mainly from theoretical studies to the study of child language, in that the role of the latter was

limited to providing supportive evidence to the former. Yet, recent vast progress in both of these fields further tightened the connection between theoretical analyses and acquisition research, and enables us to make the opposite contribution. For example, as Snyder and Isobe (this volume) convincingly demonstrate, the time course of child language acquisition constitutes a very important ground to evaluate parametric proposals, which suggests that the study of child language has the potential to identify the parameters of variation permitted by human language.

In this study, I will illustrate another way to make the opposite contribution. More specifically, this study summarizes two case studies to illustrate how the investigation of child language can contribute to differentiate among competing syntactic analyses of a certain phenomenon. These case studies, which are drawn from the author's own research, deal with (i) the acquisition of the ditransitive construction in Japanese (Sugisaki and Isobe (2001)) and (ii) the acquisition of swiping in English (Sugisaki (2008)). The case studies presented here, if successful, will demonstrate that evidence from acquisition can be used to determine which of the proposed syntactic analyses is on the right track, and hence that the study of child language can make significant contributions to the theoretical studies of syntax.

2. Case-study 1: The Syntax of Ditransitives in Japanese

Our first case-study, taken from Sugisaki and Isobe (2001), concerns the acquisition of ditransitive construction in Japanese. As is widely known, the word order in Japanese is relatively free: The verb must come at the end of the sentence, but the order of other phrases can be changed freely. Thus, for a ditransitive sentence, which contains three arguments, the following six word orders are available:

- | | | | | | |
|-----|----|----------|----------|---------------|--------|
| (1) | a. | John-ga | Mary-ni | sono hon-o | ageta. |
| | | John-Nom | Mary-Dat | that book-Acc | gave. |

‘John gave that book to Mary.’

- | | | | | |
|----|---------------|---------------|---------------|--------|
| b. | John-ga | sono hon-o | Mary-ni | ageta. |
| | John-Nom | that book-Acc | Mary-Dat | gave |
| c. | Mary-ni | John-ga | sono hon-o | ageta. |
| | Mary-Dat | John-Nom | that book-Acc | gave |
| d. | Sono hon-o | John-ga | Mary-ni | ageta. |
| | that book-Acc | John-Nom | Mary-Dat | gave |
| e. | Mary-ni | sono hon-o | John-ga | ageta. |
| | Mary-Dat | that book-Acc | John-Nom | gave |
| f. | Sono hon-o | Mary-ni | John-ga | ageta. |
| | that book-Acc | Mary-Dat | John-Nom | gave |

It is widely assumed that the syntactically unmarked position for the subject is located before all objects and verbs (see Hoji (1985) and Saito (1985), among many others). In contrast, the unmarked word order among the VP-internal arguments of the ditransitive construction is still controversial. Whether (1a) or (1b) constitutes the basic word order remains one of the central issues in the study of Japanese syntax. In the next subsection, we review two major proposals concerning the basic word order of Japanese ditransitives

2.1. Two Approaches to the Ditransitive Construction in Japanese

In his seminal work, Hoji (1985) argues that the dative argument is projected in a higher position than the accusative argument, yielding the basic order of NOM-DAT-ACC-V as in (1a) (see also Nemoto (1993), Tada (1993), Takano (1998), and Yatsushiro (2003)). The ACC-DAT order as in (1b) is derived from the DAT-ACC order by scrambling the accusative object to a position structurally higher than the dative object. This is schematically shown in (2).

- (2) a. [NP-Nom [[NP-Dat [NP-Acc V]]]]
 b. [NP-Nom [NP-Acc₁ [NP-Dat [t₁ V]]]]

One piece of evidence for this proposal comes from the scope interpretation: While the dative argument unambiguously takes scope over the accusative argument in the DAT-ACC order, the relative scope is ambiguous with the ACC-DAT order, as illustrated in (3). This contrast is explained in a straightforward way if we assume that the ACC-DAT order is derived from the DAT-ACC order by scrambling the accusative NP and that the trace of movement contributes to the scope interpretation.

- (3) a. John-ga daremo-ni [Bill ka Mary]-o syookaisita.
 John-Nom everyone-Dat Bill or Mary-Acc introduced
 ‘John introduced Bill or Mary to everyone.’

everyone > Bill or Mary **Bill or Mary > everyone*

- b. John-ga [Bill ka Mary]-o daremo-ni syookaisita.
 John-Nom Bill or Mary-Acc everyone-Dat introduced
 ‘John introduced Bill or Mary to everyone.’

everyone > Bill or Mary *Bill or Mary > everyone*

(Hoji (1985: 257-8))

Miyagawa (1997) advances an alternative hypothesis, according to which both the DAT-ACC and ACC-DAT orders can be base-generated without syntactic movement, as shown in (4) (see also Kitagawa (1994) and Koizumi (1995)).

- (4) a. [NP-Nom [NP-Dat [NP-Acc V]]]
 b. [NP-Nom [NP-Acc [NP-Dat V]]]

A major argument for Miyagawa’s analysis is the absence of the Chain Condition effect in the ditransitive construction. The crucial result of Rizzi’s (1986) Chain Condition is that no structure like (5) can exist:

(5) $X_1 \quad Y_1 \quad t_I$

(where X c-commands Y and Y c-commands t and there is movement from t to X.)

In simple transitives, the ACC-NOM order, which is derived from the NOM-ACC order via scrambling, shows the Chain Condition effect, as exemplified in (6). In contrast, the ACC-DAT order in ditransitives does not exhibit such a violation, as shown in (7). According to Miyagawa, the grammatical status of (7) suggests that no movement is involved in generating the ACC-DAT order. Thus, both DAT-ACC and ACC-DAT orders are best viewed as being base-generated.

(6)?? [John-to Mary]- o_1 otagai $_1$ -ga t_I mita.
 [John-and Mary]-Acc $_1$ each other $_1$ -Nom saw
 ‘John and Mary, each other saw.’

(7) John-ga [Hanako-to Mary]- o_1 (paatii-de) otagai $_1$ -ni (t_I)
 John-Nom [Hanako and Mary]-Acc $_1$ (party-at) each other $_1$ -Dat
 syookaisita.
 introduced
 ‘John introduced Hanako and Mary to each other at the party.’

(Miyagawa (1997: 4-5))

2.2. Predictions and Experiment

In the acquisition of Japanese, it has been observed at least since Hayashibe (1975) that there seems to be a period in development, sometimes up to five years old, where children exhibit difficulty in interpreting scrambled word orders and tend to interpret scrambled sentences like (8a) as if they have a non-scrambled word order as in (8a).¹

(8) a. Kamesan-ga ahirusan-o osimashita.
 turtle-Nom duck-Acc pushed

‘A turtle pushed a duck.’

- b. Kamesan-o ahirusan-ga osimashita.
turtle-Acc duck-Nom pushed

‘A duck pushed a turtle.’

If it is generally the case that scrambled orders pose a difficulty to Japanese-speaking children, the two syntactic analyses reviewed in the previous subsection make different predictions. Since the analysis by Hoji (1985) postulates scrambling in deriving the NOM-ACC-DAT-V order from the NOM-DAT-ACC-V order, this analysis predicts that Japanese-speaking children have more difficulty in comprehending sentences with NOM-ACC-DAT-V order than those with NOM-DAT-ACC-V order. In contrast, since Miyagawa’s (1997) analysis allows the base-generation of both orders, this analysis predicts that the difficulty Japanese-speaking children have in comprehending sentences with NOM-ACC-DAT-V order should be the same as for those with NOM-DAT-ACC-V order.

In order to evaluate these predictions, Sugisaki and Isobe (2001) conducted an experiment with 20 Japanese-speaking children, ranging in age from 3;11 (three years, eleven months) to 5;00 (mean age 4;06). The task was truth-value judgment (Crain and Thornton (1998)). In this task, the children were told stories accompanied by an animation presented on a computer screen. At the end of each story, the character Meowce appeared on the screen and described what he thought had happened in the story. The task for the children was to judge whether Meowce’s description was correct or not, by pointing at one of the two cards Meowce had in his hands, ○ (correct) or × (wrong). A sample story and examples of Meowce’s utterances are given in (10) and (10), respectively.

- (9) Sample story (which is accompanied by (10b)):

Satoshi came back home with his Pokémon Pikachu during his long journey, in order to introduce Pikachu to his mother. Opening the door, Satoshi said,

“Mom, I’m back home!” However, there was no response. On the table he found a memo that said, “I am out shopping.” Looking at the memo, he said, “Oh no, Mom cannot meet Pikachu right now.” However, he got a good idea. He took Pikachu to his room, and showed him a picture. In that picture, Satoshi and his mother were smiling. He said, “Hey look, Pikachu. This is my mom!” Pikachu looked very happy to see Satoshi’s mother.

- (10) a. Satoshi-ga akachan-ni Pokémon-o misetayo.
 Satoshi-Nom baby-Dat Pikachu-Acc showed
 ‘Satoshi showed his Pokémon to the baby.’
- b. Satoshi-ga Pikachu-o okaasan-ni misetayo.
 Satoshi-Nom Pikachu-Acc mother-Dat showed
 ‘Satoshi showed Pikachu to his mother.’

The results revealed that, while children correctly responded to the sentences with the DAT-ACC order 90% of the time, they provided corrected responses to sentences with the ACC-DAT order only 60% of the time.² These results suggest that Japanese-speaking children have more difficulty in comprehending the NOM-ACC-DAT-V order than the NOM-DAT-ACC-V order, and hence favor the scrambling analysis by Hoji (1985) over the base-generation analysis by Miyagawa (1997).^{3,4}

3. Case-study 2: The Syntax of Swiping

For our second case-study, we turn to the acquisition of an exotic property of English. It has been observed at least since Ross (1969) and Rosen (1976) that English allows a peculiar type of elliptical *wh*-questions that can be found only under sluicing, in which the *wh*-object of the preposition appears not after the preposition but before it, as illustrated in (11). Merchant (2002) calls this construction *Swiping* (sluiced *wh*-word inversion with

prepositions in Northern Germanic).

- (11) a. John fixed it, but I don't remember what with.
b. John was talking, but I don't remember who to.

Since the recent minimalist analysis by Merchant (2002), this phenomenon has gained much attention, and two major types of analysis have been proposed in the syntactic literature. One approach (Merchant (2002); see also van Craenenbroeck (2004)) argues that swiping crucially involves pied-piping of prepositions in its derivation, while the other approach (e.g. Kim (1997), Hasegawa (2006), Nakao and Yoshida (to appear)) claims that swiping is derived through preposition-stranding (P-stranding). Let us now briefly review these two approaches.

3.1. Two Approaches to Swiping

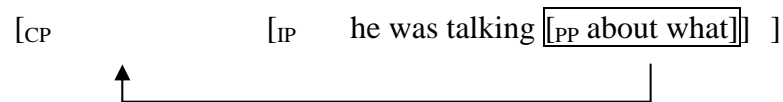
One of the fundamental characteristics of swiping is that, at least in English, only a limited variety of *wh*-expressions can occur in this construction. Based on his classification of *wh*-elements in swiping sentences given in (12), Merchant (2002) postulates the condition in (14) that the *wh*-element must be a head, not a phrase.⁵

- (12) Possible and impossible *wh*-elements in swiping:
- a. Swiping possible: who, what, when, where
- b. Swiping impossible: which, which one, whose, how rich,
 what kind, what time, what town, etc.
- (13) a. * She bought a robe for one of her nephews, but God knows which
 (one) for.
- b. * They were riding in somebody's car, but I don' know whose in.
- (14) The Minimality Condition:
 Only 'minimal' (i.e. X⁰) *wh*-operators occur in swiping.

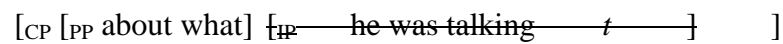
In order to account for this fundamental property of swiping, Merchant (2002) proposed an analysis in which swiping sentences are derived through *wh*-movement involving pied-piping of a preposition, followed by head movement of the *wh*-word to the selecting preposition. Merchant argues that this head movement of the *wh*-element occurs at PF, after Spell-Out and after the application of the deletion operation. A sample derivation under this analysis is shown in (15).

(15) (John was talking, but I don't remember ...)

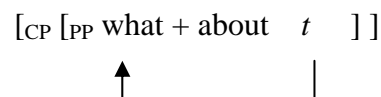
a. *wh*-movement + pied-piping:



b. sluicing (IP-deletion) in PF:



c. head movement in PF:



This “pied-piping + PF head-movement” analysis provides a straightforward account for the Minimality Condition: In order to adjoin to the preposition, which is a head, the *wh*-element must also be a head, due to Structure Preservation. In other words, by using head movement to derive the observed inversion, this analysis correctly rules out the possibility that phrasal *wh*-operators participate in swiping.

Even though the analysis by Merchant (2002) captures the Minimality Condition (14) in a straightforward way, it offers no account of the cross-linguistic distribution of swiping that Merchant himself notes: The languages that allow swiping are limited to those that permit P-stranding. English, Danish, and some varieties of Norwegian allow swiping (Merchant (2002: 309)), and these languages also permit P-stranding (Merchant (2002: 291)), as

illustrated in (16) and (17). This observation suggests that the availability of P-stranding constitutes a necessary condition for the possibility of swiping.⁶ Yet, as we have seen above, what is crucially involved in Merchant's analysis is pied-piping, not P-stranding. Then, under this approach, it remains mysterious why P-stranding seems relevant in determining the distribution of swiping across languages.

(16) Danish:

- a. Per er gået i biografen, men jeg ved ikke
 Per is gone to cinema but I know not
 hvem med.
 who with
 'Per went to the movies but I don't know who with.'
- b. Hvem har Peter snakket med?
 who has Peter talked with
 'Who was Peter talking with?'

(17) Norwegian:

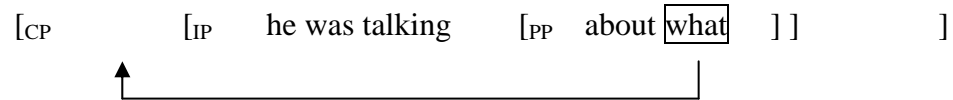
- a. % Per gikk på kino, men jeg veit ikke
 Per went to cinema but I know not
 hvem med.
 who with
 'Per went to the movies but I don't know who with.'
- b. Hvem har Per snakket med?
 who has Per talked with
 'Who was Per talking with?'

An alternative approach proposed by Hasegawa (2006), Kim (1997), and Nakao and Yoshida (to appear) is better suited to explain this cross-linguistic generalization. These

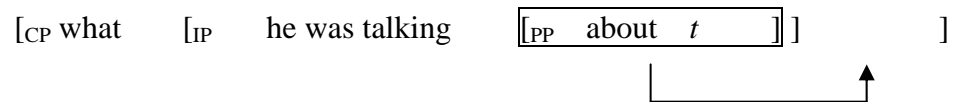
studies argue that the swiping construction is derived through the combination of P-stranding and a rightward movement of PP. A sample derivation under Hasegawa's (2006) analysis is shown in (18).⁷

(18) (John was talking, but I don't remember ...)

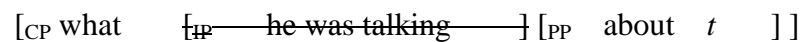
a. *wh*-movement + P-stranding:



b. rightward movement of PP:



c. sluicing (IP-deletion) in PF:



Such “P-stranding + PP movement” analysis is quite appealing in that it opens up a way to capture the cross-linguistic generalization that swiping is restricted to P-stranding languages. On the other hand, this approach has difficulty in offering a satisfactory account of the Minimality Condition: There is no reason not to expect both phrasal and minimal *wh*-expressions to appear in the swiping construction, given that both of them can undergo P-stranding.

(19) a. What was John talking about?

b. Which (book) was John talking about?

In sum, both “pied-piping + PF head-movement” analysis and “P-stranding + PP movement” analysis have their own strengths and weaknesses, and the evaluation of these two approaches awaits evidence from a different source. In light of this situation, we now turn to a different source of evidence: the time course of child language acquisition.

3.2. Predictions and Transcript Analysis

The “pied-piping + PF head-movement” approach and the “P-stranding + PP movement” make different predictions for the acquisition of English. The former approach gives *wh*-movement involving pied-piping a central role in the derivation of swiping. Under this analysis, the syntactic knowledge required for pied-piping constitutes a proper subset of the syntactic knowledge required for swiping. Then, we expect that English-learning children should never acquire swiping significantly earlier than pied-piping with *wh*-movement. In other words, the pied-piping approach predicts that (20) should hold in the acquisition of English. In contrast, under the P-stranding approach, *wh*-movement involving P-stranding constitutes a crucial step in deriving swiping sentences, and the syntactic knowledge required for P-stranding constitutes a proper subset of the syntactic knowledge required for swiping. Then, we predict that English-learning children should never acquire swiping significantly earlier than P-stranding with *wh*-movement, as stated in (21).

(20) *Prediction for Acquisition from the Pied-piping Approach:*

English-learning children should acquire pied-piping with *wh*-movement significantly earlier than or at around the same time as swiping.

(21) *Prediction for Acquisition from the P-stranding Approach:*

English-learning children should acquire P-stranding with *wh*-movement significantly earlier than or at around the same time as swiping.

In order to determine which of the two acquisitional predictions is correct, Sugisaki (2008) analyzed 20 longitudinal corpora for English from the CHILDES database (MacWhinney (2000)), which provide a total sample of more than 434,000 lines of child speech. For each child, we located the first clear uses of (i) swiping, (ii) *wh*-movement involving pied-piping, and (iii) *wh*-movement involving P-stranding. The corpora analyzed

in that study are summarized in Table 1. The CLAN program Combo was used, together with complete files of prepositions and *wh*-words in English, to identify potentially relevant child utterances. These were then searched by hand and checked against the original transcripts to exclude imitations, repetitions, and formulaic routines. The age of acquisition was taken as the first clear use, followed soon after by repeated use (Stromswold (1996), Snyder (2007)).

<u>Child</u>	<u>Collected by</u>	<u>Age Span</u>	<u># Child Utterances</u>
Abe	Kuczaj (1976)	2;04 – 5;00	22,633
Adam	Brown (1973)	2;03 – 4;10	45,555
Anne	Theakston et al. (2001)	1;10 – 2;09	19,902
Aran	Theakston et al. (2001)	1;11 – 2;10	17,193
Becky	Theakston et al. (2001)	2;00 – 2;11	23,339
Carl	Theakston et al. (2001)	1;08 – 2;08	25,084
Dominic	Theakston et al. (2001)	1;10 – 2;10	21,180
Eve	Brown (1973)	1;06 – 2;03	11,563
Gail	Theakston et al. (2001)	1;11 – 2;11	16,973
Joel	Theakston et al. (2001)	1;11 – 2;10	17,916
John	Theakston et al. (2001)	1;11 – 2;10	13,390
Liz	Theakston et al. (2001)	1;11 – 2;10	16,569
Naomi	Sachs (1973)	1;02 – 4;09	15,960
Nicole	Theakston et al. (2001)	2;00 – 3;00	16,950
Nina	Suppes (1973)	1;11 – 3;03	31,505
Peter	Bloom (1970)	1;09 – 3;01	26,891
Ruth	Theakston et al. (2001)	1;11 – 2;11	20,419
Sarah	Brown (1973)	2;03 – 5;01	37,012

Shem	Clark (1978)	2;02 – 3;02	17,507
Warren	Theakston et al. (2001)	1;10 – 2;09	16,651

Table 1: Corpora Analyzed

The results were as follows. Two children (Abe and Aran) showed frequent use of swiping, while other children did not produce any swiping sentences. One of these two children (Abe), however, uttered only a single type of swiping: *What for?* This limitation leaves the possibility that this expression is a formulaic routine for this child. Hence, we should focus on the analysis of the remaining single child, Aran.

Aran exhibited the first clear use of swiping at the age of 2;07. His swiping sentences exhibited two kinds of *wh*-expressions (*who* and *what*) and various different prepositions. This variety suggests that Aran has already acquired adult-like knowledge of swiping. Some actual utterances are listed in (22).

- (22) a. *CHI: what in ? (Aran26a.cha)
b. *CHI: who for ? (Aran27a.cha)
c. *CHI: who from ? (Aran28b.cha)
d. *CHI: what with ? (Aran33a.cha)

Despite such productive use of swiping, Aran showed no single use of pied-piping with *wh*-movement throughout his corpus. This complete absence of pied-piping in the spontaneous speech makes it impossible to statistically evaluate the prediction in (20), and hence we cannot determine its validity. Yet, the lack of pied-piping in child English despite the presence of swiping casts serious doubt on the analysis in which swiping is derived through *wh*-movement involving pied-piping.

In contrast, P-stranding under *wh*-movement was frequently observed in Aran's speech. The first clear use of P-stranding appeared at the age of 2;05, two months earlier than the first

clear use of swiping. In order to evaluate the statistical significance of the observed age-differences between acquisition of P-stranding and acquisition of swiping, I counted the number of clear uses of the earlier construction before the first clear use of the later construction. Next, the relative frequency of the two constructions in the child's own speech was calculated, starting with the transcript after the first use of the later construction, and continuing through the end of the corpus. A Binomial Test was then used to obtain the probability of sampling the observed number of tokens of the earlier construction simply by chance, before the first use of the later construction, under the null hypothesis that both became available concurrently and had the same relative probability of use as in later transcripts (Stromswold (1996), Snyder (2007)).

This statistical analysis revealed that Aran acquired P-stranding significantly earlier than swiping ($p < .0001$), along the line of the prediction in (21). This finding, combined with the complete lack of pied-piping, lends support to the P-stranding approach to swiping, and puts further explanatory burden on the pied-piping analysis.

5. Conclusion

The two case studies reviewed above suggest that clearly-delineated syntactic analyses make certain predictions for acquisition, and hence that evidence from child language can be brought to differentiate among competing syntactic analyses. Such contributions from the study of child language to syntactic theory are still quite small in number, in my view. I conclude this paper by hoping that a larger number of studies attempt to make this way of contribution, to further tighten the connection between acquisitional investigations and the theoretical studies of syntax.

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ENDNOTES

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¹ For an observation that manipulation on the presentation of test sentences significantly improves children's comprehension of scrambled sentences, see Murasugi and Kawamura (2005) and Otsu (1994).

² Based on their act-out experiment, Suzuki et al. (1999) argue that the DAT-ACC order is slightly more difficult than the ACC-DAT order. See Isobe et al. (2004) for a possible interpretation of this discrepancy.

³ Miyagawa's (1997) analysis is significantly revised in Miyagawa and Tsujioka (2004). An acquisitional evaluation of this revised analysis has to be left for future research.

⁴ Matsuoka (2003) argues that Japanese has (at least) two types of ditransitive verbs, and that the basic order varies depending on verb types. See Isobe et al. (2004) for an experiment evaluating this syntactic analysis.

⁵ The *wh*-expressions *which* and *whose* are monomorphemic, as well as those in (12a). Yet, Merchant (2002) argues that *which* must select a complement (which may be null due to NP-ellipsis), and *whose* can be analyzed as *who* in the specifier of DP headed by the genitive 's. These properties distinguish them from the other simple *wh*-expressions listed in (12a).

⁶ It is not a sufficient condition, though. Languages like Frisian, Icelandic, and Swedish rule out swiping, even though they permit P-stranding.

⁷ A crucial difference between Hasegawa's (2006) analysis and those of Kim (1997) and Nakao and Yoshida (to appear) is that the latter analysis places the PP movement before the P-stranding movement. Since this difference does not affect the discussion to follow, I will refrain from further discussion.