Resultatives Result from the Compounding Parameter: On the Acquisitional Correlation between Resultatives and N-N Compounds in Japanese

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1. Introduction

This paper is an attempt to investigate experimentally the nature of the acquisition of the resultative construction in Japanese, and to provide support for the theory of Compounding Parameter proposed by Snyder (1995b), and more generally, for the parameter-setting model of grammar acquisition.

Since the introduction of the so-called Principles and Parameters approach to Universal Grammar (e.g. Chomsky 1981, Chomsky and Lasnik 1993), there have been two major research trends in the field of grammar acquisition studies. One line of research, which has been pursued by Stephen Crain, Yukio Otsu and many others, is to motivate the 'principles of UG' by showing that the principles of UG constrain the course of grammar acquisition from virtually the very beginning of life (see Crain 1991, Otsu 1981, among others). For example, in Otsu (1981), the innateness of the Subjacency constraint and Binding conditions was supported by showing that children obey those constraints as soon as they acquire relevant lexical items and structures. The other line of research, which was initiated by Nina Hyams (Hyams 1986), is to motivate the existence of 'parameters' by making use of children’s production of non-adult forms. In Hyams (1986), the so-called null subject phenomenon in the early speech of English-speaking children was analyzed, and it was claimed

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that there is a parameter that divides languages into null subject languages like Italian and non-null-subject languages like English, and that the grammar of the English-speaking children who produce null-subject sentences is just like that of Italian-speaking children with respect to the relevant parameter-setting. While this theory of Hyams had to undergo many revisions, the importance of the research style that she has developed still remains unchanged.

One recent work that falls in this second line of research, namely research that motivates parameters with children’s data, is a series of studies by William Snyder (Snyder 1995a, b, 1996, 1999, Snyder and Chen 1997, Snyder and Stromswold 1997). In the next section, we will summarize the empirical basis for his theory of the Compounding Parameter, and clarify the question that we address experimentally in the following sections.

2. The Compounding Parameter

2.1. Establishing the Compounding Parameter

English allows several constructions in which the main verb combines with a secondary predicate and forms a “complex predicate” that semantically resembles a simple verb. The following list of examples is from Snyder (1999: 2):

(1) a. John painted the house red. (Resultative)
   b. Mary picked the book up / picked up the book. (Verb-Particle)
   c. Fred made Jeff leave. (Make-causative)
   d. Fred saw Jeff leave. (Perceptual report)
   e. Bob put the book on the table. (Put-locative)
   f. Alice sent the letter to Sue. (To-Dative)
   g. Alice sent Sue the letter. (Double Object Dative)

The typical examples are the resultative as in (1a), in which the main verb combines with an adjective phrase (paint red), and the verb-particle construction as in (1b), in which the main verb combines with the particle (pick up).

The first step to the discovery of the Compounding Parameter was made in Stromswold and Snyder (1995) and Snyder and Stromswold (1997). In these studies, Snyder and Stromswold have examined in detail the spontaneous speech data of 12 English-speaking children available in CHILDES (MacWhinney and Snow 1985, 1990). The major result obtained through this investigation, supported by a variety of statistical analyses, was that every child acquired the sentence-types in (1b-g) as a group. Based on this result from child language acquisition, Snyder and Stromswold have
claimed that the constructions in (1b-g) stem from a common cause, namely from a single, parametric property of a grammar.

As a second step, Snyder (1995b, 1999) has examined whether the availability of the constructions in (1) is connected to some morphological property of a language, in order to test the claim made in several places of syntactic literature that parametric properties can be reduced to the properties of functional heads (e.g. Borer 1984, Fukui 1986, Chomsky 1993). A detailed cross-linguistic survey has led to a surprising finding: The availability of complex predicates (as diagnosed by resultatives of the English type) has shown a strong correlation with the availability of productive root compounding (as diagnosed by the grammaticality of novel N-N compounds, like *banana box*, *worm can*). The following table from Snyder (1999:5-6) presents the results of the cross-linguistic survey:

(2) Results of Cross-linguistic Survey:

<table>
<thead>
<tr>
<th>Language</th>
<th>Resultatives</th>
<th>Productive N-N Compounding</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASL</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>English</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>German</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Hungarian</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Japanese</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Khmer</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Korean</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Mandarin</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Thai</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Basque</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Arabic (Egyptian)</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>French</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Hebrew (Modern)</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Javanese</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Russian</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Serbo-Croatian</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Spanish</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Given this strong cross-linguistic correlation, the next step that Snyder has taken is to investigate the acquisitional correlation between productive N-N compounding and the various complex predicate constructions in (1). The results obtained through the examination of spontaneous speech data of 10 English-speaking children available in CHILDES were as follows: Ages of first clear use of a novel N-N compound have shown an exceptionally strong correlation with the ages of acquisition for verb-particle constructions (1b), and were also robustly correlated with the ages of
acquisition for causative-perceptual constructions (1c,d), put-locatives (1e), to-datives (1f), and double object datives (1g). Thus, the acquisition data have also provided evidence for the strong association between complex predicates and morphological compounds.

Given such converging evidence from cross-linguistic variation and child language acquisition, Snyder (1999:4) has proposed that UG is equipped with what he calls the *Compounding Parameter*:

(3) Compounding Parameter:
The grammar \{disallows*, allows\} formation of endocentric compounds during the syntactic derivation. [*unmarked value]

The idea behind the Compounding Parameter is that in complex predicate constructions, the main verb and the secondary predicate constitute a single word (namely, an endocentric compound) at the point of semantic interpretation, and the operation necessary to form this is the same as the one required to produce N-N compounds.¹ This way, the parameter determines both the availability of productive, endocentric compounding and the availability of syntactic complex predicate constructions. Snyder (1995b, 1999) further argues that this parameter cannot be reduced to the properties of functional heads or closed class lexical items, given that no such closed-class item has been independently motivated in root compounds. Thus, this parameter constitutes one of the few pieces of evidence for a substantive parameter in the sense of Chomsky (1981: 6).

2.2. A Remaining Issue: Acquisition of Resultatives

We have seen that English-speaking children acquire the complex predicate constructions (1b-g) as a group. We have also seen that the acquisition of this group of constructions correlates with the acquisition of novel N-N compounds. Furthermore, we have observed cross-linguistically that the availability of resultatives shows a strong correlation with the availability of productive N-N compounds. However, we can easily see that there is a mysterious gap: Even though resultatives are claimed to be part of the Compounding Parameter, neither English-speaking children nor the Japanese-speaking child available in CHILDES (Miyoshi 1999) ever reliably use this construction in their speech. If resultatives stem from the Compounding Parameter, why are resultatives lacking in children’s speech while other complex predicates are frequently observed?

There are at least three possible explanations for the lack of resultatives in children’s spontaneous speech. The first possibility is that resultatives,

¹ For a more detailed discussion of this point, see Snyder (1995a, b).
even though they have shown strong cross-linguistic correlation with N-N compounding, do not stem from the Compounding Parameter: The cross-linguistic correlation is merely accidental. The second possibility is that even though resultatives stem from the Compounding Parameter, there is some grammatical reason that specifically delays the acquisition of that construction. The third possibility is that even though resultatives are available to children as well as other complex predicates, there is some extra-grammatical factor that prevents children from producing that construction. This third possibility would be the one Snyder has in mind: he notes that “The resultative construction (1a) unfortunately had to be excluded from the spontaneous-speech analysis, because of its extremely low frequency in the speech of both children and adults” (Snyder 1999: fn.4). However, given the limitation of the corpus study, we still do not know which of the three possibilities noted above is the correct explanation.

The present study is an attempt to overcome the limitation of the corpus study by conducting an experiment, and to investigate further the nature of the Compounding Parameter. Specifically, we will try to tease apart the possible explanations noted above by testing the following prediction from the Compounding Parameter:

(4) The possibility of resultatives emerges in the child’s grammar as soon as s/he acquires the knowledge of productive N-N compounding.

If the results of the experiment have shown that this prediction is borne out, then we can say that the third possibility is the correct one; namely, we will obtain direct evidence for the view that resultatives are really part of the Compounding Parameter. Thus, the experiment that we will report shortly is an attempt to show acquisitionally that resultatives stem from the Compounding Parameter by verifying the validity of the prediction given in (4).

3. Logic of the Experiment

If we assume that Snyder’s theory, summarized in (5), is on the right track, then we will have the acquisitional predictions given in (6) and (7):

(5) Productive N-N compounding and the complex predicate constructions (including resultatives) stem from the Compounding Parameter.
(6) Those children who are capable of producing novel N-N compounds are also capable of interpreting resultative constructions correctly.
(7) Those children who are not capable of producing novel N-N compounds are also not capable of interpreting resultative constructions correctly.
The experiment that we will report in the next section is based on (5) - (7).

One way of investigating whether children can correctly comprehend resultatives would be to check whether they can distinguish resultatives as in (8) from the corresponding sentences with the attributive adjectives as in (9):  

(8)  

a. John is painting the house red.  
b. Mary is cutting the paper square.  

(9)  

a. John is painting the red house.  
b. Mary is cutting the square paper.  

An advantage of testing Japanese-speaking children is that while in English, the order between the noun and the adjective has to be reversed to create resultatives from sentences with attributive adjectives, in Japanese, we can make minimal pairs as in (8) and (9) without any word order differences. Let us consider the following Japanese examples:  

(10)  

John-ga  ie-o  aka-ku  nutteiru.  

John-NOM  house-ACC  red  painting  

'John is painting the house red.'  

(11)  

John-ga  aka-i  ie-o  nutteiru.  

John-NOM  red  house-ACC  painting  

'John is painting the red house.'  

As in English, the unmarked word order of resultatives in Japanese is different from the word order of sentences with attributive adjectives. However, Japanese has the operation of scrambling (e.g. Saito 1985), which induces the property of relatively free word order. If we apply scrambling to the adjectival phrase in the resultative (10) and move the AP to the prenominal position, we can create resultatives which have the same word order as the sentence in (11):  

(12)  

Resultatives with short AP scrambling:  


John-NOM  red  house-ACC  painting  

'John is painting the house red.'  

As we can see, there is no word order difference between the resultative in (12) and the sentence with a prenominal adjective in (11): Both examples contain the order NP-AP-NP-V. The only difference between them is the inflectional ending of the adjectives: -ku in the case of resultatives, and -i in

2. We thank Yukio Otsu for the relevant suggestion.
the case of attributive adjectives. If it is found that children can correctly distinguish between resultatives and sentences with prenominal adjectives by making use of the subtle distinction provided by the inflectional endings (and without the help of the word order difference illustrated in (10) and (11)), then this would be a strong indication that young children have the ability to comprehend resultative constructions. Thus, the availability of scrambling in Japanese, we believe, is of great help to investigate children’s abilities to interpret resultatives.

In our experiment on resultatives, we will crucially make use of the pair (11) and (12). However, in order to do so, we should have some evidence for the early acquisition of scrambling in Japanese. The experimental study by Otsu (1994) provides the relevant data. He has convincingly shown that even three-year-olds acquiring Japanese can correctly comprehend scrambled sentences, if the appropriate discourse situation is given. Thus, we assume that the use of sentences with scrambling would pose no extra difficulty for children’s comprehension.

4. The Experiment

4.1. Subjects

The subjects were 20 monolingual Japanese-speaking children ranging in age from 3;4 (three years, four months) to 4;11 (mean age 4;2). There were 7 three-year-olds and 13 four year-olds.

4.2. Method

The experiment consists of two tests: The N-N Compounding Test (N-test) and the Resultative Test (R-test). All the subjects received the N-test first. In both tests, the relevant material was presented on a laptop computer. The reason for giving the N-test first was to familiarize children

3. The assumption that children would heavily rely on the word order when they have difficulty in comprehending a sentence is supported by the following observation made in the acquisition of scrambling: Japanese-speaking three-year-olds tend to interpret the scrambled sentences as if they were in the canonical order (ignoring the case particles) when no discourse is given. See Otsu (1994).

4. An experiment with English-speaking children is in preparation, in which sentences of the following type are used:
(i) Pat is painting something red.
This sentence is ambiguous between the resultative interpretation and the interpretation in which the adjective modifies the noun. Thus, we predict the responses of the children who have not acquired resultatives to be as follows: They will interpret the adjective as attributive and will not be able to assign a resultative interpretation.
with this mode of presentation by assigning them (what we think is) the simpler task first.

4.2.1. The N-N Compounding Test

The N-test is intended to test whether children have the ability to create novel N-N compounds. The task is elicited production. In this task, the child was asked to name the object in the picture presented on a laptop computer. The task proceeded as follows:

(13) Sample procedure (translated from Japanese to English):

Experimenter: (Showing a picture of a bear) Do you know what this is?
Child: A bear!
Experimenter: (Showing a picture of a clock) Do you also know what this is?
Child: A clock!
Experimenter: (Showing a picture of a bear-shaped clock) Now, what do you call the clock that is in the shape of a bear?

We expected that if children have the ability to create N-N compounds, they could name the unfamiliar object in the third picture using a novel N-N compound.

There was one practice item and four test items, which are shown in (14). As a practice item, we have chosen a compound which seems to be relatively lexicalized. Among the four test items, two were shape compounds and the other two were material compounds. The order of presentation of test items was counter-balanced.

(14) Practice item

a. A plane made of paper \textit{kami-hikouki} (paper plane)

Test items

b. Bread in the shape of a turtle \textit{kame-pan} (turtle bread)
c. A clock in the shape of a bear \textit{kuma-tokei} (bear clock)
\textit{kuma-dokei} [a Rendaku form] \textsuperscript{5}
d. An elephant made of balloons \textit{fuusen-zousan} (balloon elephant)
e. A panda made of ice \textit{koori-panda} (ice panda)

\textsuperscript{5} Rendaku (sequential voicing) is a phonological phenomenon observed in Japanese in which the word-initial consonant of the second word of a compound is changed from [-voiced] to [+voiced] under certain conditions. See Vance (1987) and references cited there.
The prerequisite for passing the N-test is to produce at least three N-N compounds out of the four test items.

### 4.2.2. The Resultative Test

The R-test is intended to test whether children can correctly comprehend resultatives as in (15) and hence can distinguish them from the corresponding sentences with an attributive adjective like (16):

\begin{align*}
(15) & \quad \text{John-} \text{ga \ aka-ku \ ie-o \ nutteiru.} \\
    & \quad \text{John-NOM \ red \ house-ACC \ painting} \\
    & \quad \text{‘John is painting the house red.’} \\
(16) & \quad \text{John-} \text{ga \ aka-i \ ie-o \ nutteiru.} \\
    & \quad \text{John-NOM \ red \ house-ACC \ painting} \\
    & \quad \text{‘John is painting the red house.’}
\end{align*}

The task is truth-value verification, developed by Stephen Crain (Crain and Thornton 1998). The child was told a story, which was accompanied by an animation presented on a laptop computer, and at the end of each story, the character Meowce appeared on the screen and described verbally what he thought had happened in the story\(^6\). The task for the subject was to judge whether Meowce’s description was correct or wrong, by pointing to one of the cards Meowce has in his hands: O (circle, which means ‘correct’) or X (cross, which means ‘wrong’). A sample story is presented below:

\begin{align*}
(17) & \quad \text{Sample story (translated from Japanese to English):} \\
    & \quad \text{Today, Pikachu is playing in Ash’s room. In the room, there are two} \\
    & \quad \text{chairs. One chair, which is blue, belongs to his good friend Ash, and} \\
    & \quad \text{the other chair, which is red and small, belongs to Pikachu. Pikachu} \\
    & \quad \text{wants these chairs to be the same color. He walked to Ash’s chair, and} \\
    & \quad \text{started thinking about painting that chair with red paint. However,} \\
    & \quad \text{Pikachu realized that he would be scolded very much if he painted that} \\
    & \quad \text{chair without Ash’s permission. Then, what can he do? He got a good} \\
    & \quad \text{idea. He can paint his own chair. He got blue paint, and started painting} \\
    & \quad \text{his chair with that paint.} \\
    & \quad \text{\textit{Meowce: Pikachu-wa aka-ku isu-o nutte-imasu.}} \\
    & \quad \text{Pikachu-TOP red chair-ACC paint-ing} \\
    & \quad \text{‘Pikachu is painting the chair red.’}
\end{align*}

\(^6\) The advantages of the use of animation in the experiment are discussed in Isobe and Sugisaki (to appear).
In the above story, if the child has the ability to interpret resultatives correctly, then s/he would judge that the description is false, because even though Pikachu once thought about painting a chair red, he gave up that idea and started painting his own chair with blue paint. On the other hand, if the child does not have the knowledge of resultatives and has wrongly assigned the interpretation of ‘Pikachu is painting the red chair,’ then s/he would judge Meowce’s description to be true.

The task contained two practice items and six test items, which are presented in (18). The order of presentation of test items was counter-balanced.

(18) Practice items: Expected Answer:
   a. Pikachu- ga chairo-i isu-ni suwatta-yo. True
      Pikachu-NOM brown chair-on sat
      ‘Pikachu sat on a brown chair.’
   b. Pikachu- ga shikaku-i pan-o totta-yo. False
      Pikachu-NOM square bread-ACC took
      ‘Pikachu took a square bread.’

Test Items:
   c. Pikachu- wa kiiro-ku fune-o nutte-imasu. True
      Pikachu-TOP yellow ship-ACC painting
      ‘Pikachu is painting a boat yellow.’
   d. Pikachu- wa aka-ku isu-o nutte-imasu. False
      Pikachu-TOP red chair-ACC painting
      ‘Pikachu is painting a chair red.’
   e. Pikachu- wa shiro-i jitensya-o nutte-imasu. True
      Pikachu-TOP white bicycle-ACC painting
      ‘Pikachu is painting a white bicycle.’
   f. Pikachu- wa maru-ku kami-o kitte-imasu. True
      Pikachu-TOP round paper-ACC cutting
      ‘Pikachu is cutting a sheet of paper round.’
   g. Pikachu- wa maru-ku hamu-o kitte-imasu. False
      Pikachu-TOP round ham-ACC cutting
      ‘Pikachu is cutting a slice of ham round.’
   h. Pikachu- wa hoso-i ninzin-o kitte-imasu. False
      Pikachu-TOP thin carrot-ACC cutting
      ‘Pikachu is cutting a thin carrot.’

Among the six test items, three contained the verb *nuru* ‘paint’, and the other three contained the verb *kiru* ‘cut’. Each of these three items consisted of two resultative sentences and one sentence with an attributive adjective. The criterion for passing the R-test is to give correct answers for all of the three items with ‘paint’, or for all of the three items with ‘cut’.
4.3. Results

The results are summarized in the following contingency table:

<table>
<thead>
<tr>
<th></th>
<th>Pass</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pass</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Fail</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 1 Contingency table for N-Test / R-Test

As is clear, there is a strong contingency between the pass / fail in the N-test and the pass / fail in the R-test \( p = .0194 \), two-tailed Fisher Exact Probability Test). This result shows that the predictions (6) and (7) have been borne out, which in turn lends a strong support to the hypothesis (5) above.

Let us discuss some details. The ages of subjects for each cell are presented in Table 2:

<table>
<thead>
<tr>
<th>N-Test</th>
<th>R-Test</th>
<th>Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass</td>
<td>Pass:</td>
<td>3;7, 3;10, 4;0, 4;1, 4;4, 4;4, 4;5, 4;7, 4;8</td>
</tr>
<tr>
<td>Pass</td>
<td>Fail:</td>
<td>4;6, 4;8</td>
</tr>
<tr>
<td>Fail</td>
<td>Pass:</td>
<td>4;8, 4;11</td>
</tr>
<tr>
<td>Fail</td>
<td>Fail:</td>
<td>3;4, 3;4, 3;7, 3;10, 3;11, 4;0</td>
</tr>
</tbody>
</table>

Table 2 Ages of subjects

As we can see, older children tended to fall in the pass / pass cell, and younger children tended to fall in the fail / fail cell.7

Among the 12 children who passed the N-test, nine children produced the appropriate N-N compounds for all of the four test items. Of the remaining three, two children failed in producing one of the shape compounds, and one child failed in producing one of the material compounds. Interestingly, there was no child who produced just one or two compounds; all the children who passed the N-test successfully produced at least three compounds out of the four test items.

Incidentally, three children (4;1, 4;4, 4;7) produced the Rendaku form *kuma-dokei* for the test item ‘bear clock’.

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7. We should say something about the four children that fell into the unexpected pass / fail cell and fail / pass cell. Those four subjects were the oldest children among the subjects; their attention tended to be directed to the computer itself, not to the animations. We need some modification to prevent this kind of situation.
Among the 12 children who passed the R-test, three children gave correct answers to all of the test items. Five children passed the ‘paint’ items only, and four children passed the ‘cut’ items only. Among these nine children who passed either ‘paint’ items or ‘cut’ items, six children made only one error out of the six test items.

We must hasten to add that we also tested two adult native speakers of Japanese, and they had no difficulty with any of the test items in either test.

4.4. Discussion

The results of the experiment just reported have revealed that there is a strong contingency between the pass / fail in the resultative test and the pass / fail in the N-N compounding test. This result strongly supports Snyder’s theory (5) that resultatives and productive N-N compounding stem from the same parameter. Furthermore, the results have shown that the knowledge of resultatives is acquired relatively early, even though young Japanese-speaking children may not produce that construction in their spontaneous speech.8

5. Conclusion

The results of our experiment with Japanese-speaking children indicate that even three-year-olds have knowledge of resultatives, and also reveal that the emergence of this knowledge strongly correlates with the emergence of the knowledge of N-N compounding. These results provide the first piece of acquisitional evidence for Snyder’s claim that resultatives and productive N-N compounding are governed by the same parameter, namely by the Compounding Parameter. More importantly, these results provide a new piece of experimental evidence for the parameter-setting model of language acquisition, which predicts that superficially unrelated properties governed abstractly by the same parameter appear simultaneously during the course of grammatical development.

8. A consequence of our experimental results is the fact that, while English-speaking children seem to set the value of the Compounding Parameter before the middle of their second year (see e.g. Snyder 1995b), Japanese-speaking children set the value around the middle of their third year (or later). Our explanation for this point is provided in Isobe and Sugisaki (to appear).
References


