The role of parallel function in the acquisition of relative clauses in English

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Children were tested for their comprehension of four types of sentences with relative clauses, in order to determine the role of the following factors in comprehension: (a) position of the embedded clause, (b) word order in the embedded clause, (c) grammatical functions of the identical noun phrases. The results indicate that if the identical noun phrases have the same function in their respective clauses the sentence is significantly easier to understand. The nonsignificant effects of the position of the embedded clause and of the word order in the relative clause disconfirm a putative universal of language acquisition, which has recently been proposed by Sobin. The Parallel Function Hypothesis is proposed to account for our findings, and the implications that it has for the grammar of adult English are considered.

Although subordination is a basic, universal linguistic process, very little is known about the acquisition of relative clauses, or about the acquisition of complex sentences in general. One aspect of sentences with relative clauses is that the relative clause can interrupt the main clause. In discussions of how adult speakers process relative clauses (for example, Chomsky, 1965; Miller, 1962; Bar-Hillel, Kasher, & Shamir, 1967), it has frequently been said that sentences with self-embedded relative clauses are harder to process than sentences with right branching relative clauses, presumably because they contain an interruption of the main clause. The difficulty in processing self-embedded sentences has been attributed to short term memory limitations. As Bar-Hillel et al. (1967) have pointed out, an internal clause “creates a dependence to the left and to the right of the nested element. It is natural to assume that this dependence creates a load on memory and concentration” (p. 39). Likewise, Miller (1962) has claimed: “Self-embedding by its very nature places heavier demands on the temporary storage capacity of any device that attempts to cope with it—far heavier than do either left recursive or right recursive constructions” (p. 755).

If self-embedding is difficult for adults, then it would be natural to expect that this property of linguistic structure would be difficult for the language learner, since children’s linguistic abilities depend greatly on their short term memory, which is more limited than the adult’s.

Slobin (1971) has cited evidence from studies of the child’s performance on subject and object relative clauses in support of the claim that self-embedding is harder than right branching for children. He has proposed the following universal constraint against interruptions, which operates in the processing of language and the construction of grammars: (a) “Avoid interruption or re-arrangement of linguistic

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units (p. 352)." Related principles of language acquisition which he proposes are: (b) "Structures requiring permutation of elements will first appear in non-permutated form" (p. 352) (c) "There is a tendency to preserve the structure of the sentence as a closed entity, reflected in a development from sentence-external placement of various linguistic forms to their movement within the sentence" (p. 353; emphasis added) (d) "The greater the separation between related parts of a sentence, the greater the tendency that the sentence will not be adequately processed (in imitation, comprehension, or production)" (p. 354; emphasis added). Slobin presents the relative clause data along with data about other types of constructions as evidence for his principle. He interprets self-embedded sentences as a special case of interruption by a relative clause.

Notice that the assumption that sentences with subject relatives contain an interruption rests on a particular interpretation of such sentence types in which the head of the relative clause is a constituent of the main clause. Actually, the whole complex noun phrase (NP) is the subject of the sentence. If we take this view there is no interruption of the subject and predicate of the sentence. Under this interpretation, facts about the structure of subject relatives are irrelevant to Slobin's principle. However, we will not pursue this issue further here.

Although Slobin's constraint against interruptions is presented as a universal principle of acquisition, it is also intended to have implications for adult behavior. Presumably, the assertion that self-embedding is harder for adults is what Slobin has in mind when he says: "... both adults and children have difficulty in dealing with material interposed between related parts of a sentence ... the only important age difference is in terms of how much material can be interposed without losing track of one's place in a sentence" (p. 344). Thus, putative difficulties with interruptions reflect a limitation on any human sentence processing device.

It is not obvious though that adult data do support an anti-interruption principle. Clearly not all sentences with interruptions are equally difficult for the adult. In regard to relative clauses, it has been demonstrated by Fodor and Garrett (1967) and subsequently by Hakes and Cairns (1970) and Hakes and Foss (1970) that the comprehension of sentences with multiply self-embedded relative clauses is facilitated by the presence of relative pronouns. Notice, that relative pronouns increase the length of the interruption. Thus, some longer interruptions are significantly easier to understand than some shorter ones.

Secondly, the factor of interruption has not been demonstrated to be necessary to the explanation of the adult's difficulty in processing self-embedding. This is because the observations about the difficulty of interruptions are based on studies which only looked at multiply embedded relative clauses (Blumenthal, 1966; Fodor & Garrett, 1967; Foss & Lynch, 1969; and Stolz, 1967.) Using such sentences it is not possible to control for other factors that might affect the ease of processing, such as word order in the relative clause, or the function of the shared nominals. In these studies, self-embedded sentences have the object NP relativized, and right branching sentences have the subject NP relativized.

Furthermore, it is possible that the strategies for processing sentences with multiple embeddings are quite different than those for processing sentences with only one embedding.

Although there is some doubt that an anti-interruption principle is crucial for adults, this does not imply that it would not be correct for children. It is quite possible that children, whose short term memory is more limited, would have this principle.

If we ask what predictions Slobin's universal (a) makes about the acquisition of relative clauses we find that it is quite vague. If interruption and rearrangement are merely to be "avoided", then it is not clear what predictions one can make about the child's difficulty in processing sentences with them, or about the
order in which children learn them. One can avoid driving a car, but this does not necessarily mean that driving a car is difficult. It may be easy, but unpleasant or unnecessary. To say that speakers avoid interruption can just mean that they do not use sentences with interruptions frequently. Unless we know under what conditions speakers will avoid interruptions we cannot test this statement. In Slobin's principles (c) and (d), the word "tendency" is also too loose. There is no way to falsify a statement about a tendency.

Slobin's principle (a) can be made into an empirical claim if we formulate it in the following way: (a') A sentence with an interruption or rearrangement will be more difficult to process than a sentence that does not contain an interruption or rearrangement.

Slobin cites evidence that appears to support such a claim from studies that investigated the use of relative clauses by children between the ages of 2-5 (Brogan, 1968; Menyuk, 1969; Slobin & Welsh, 1969; Smith, 1970a). In these studies, subject relatives were more difficult to repeat than object relatives. It is important to point out that the positive evidence that he presents for such a universal, in regard to relative clauses, consists solely of production data, which is either elicited or spontaneous. The limitation of such data is clear, however. Correct imitation is not a reliable indication of how a sentence is understood, or whether it is understood at all. Spontaneous production data is also of limited use in providing insight into underlying linguistic competence. The crucial evidence for any claim about children's competence must come from a different type of data, that is, from facts about how children understand relative clauses.

The study that I will report involves a toy-manipulation comprehension task that attempts to find out what these facts are, and to test the claims made by the following three hypotheses about the role of grammatical variables in the acquisition of relative clauses. 

**Interrupt C Hypothesis:** Self-embedding contributes to psychological complexity. 

**Order Hypothesis:** A surface structure in which the underlying word order is preserved is easier to process than one in which the underlying word order is not preserved. 

**Parallel Function Hypothesis:** In a complex sentence, if coreferential NPs have the same grammatical function in their respective clauses, then that sentence will be easier to process than one in which the coreferential NPs have different grammatical functions. The grammatical function of the relative pronoun will be interpreted to be the same as its antecedent.

The Interruption Hypothesis predicts that subject relatives in English (for example, *The boy who hit the girl saw the man*) will be harder to process than object relatives (for example, *The man saw the boy who hit the girl*), because the former contains an interruption of the main clause by the embedded clause. The Word Order Hypothesis predicts that relative clauses in which the subject NP is relativized (for example, *.... the boy who hit the girl .....*) will be easier to process than relative clauses in which the object NP is relativized (for example, *.... the boy who the girl hit .....*). This is because, according to the standard treatment of relativization, the underlying word order is preserved in the surface structure of the relative clauses in which the subject NP is relativized. Both of these predictions follow from the reformulated principle, (a'), on page 274, which incorporates these two hypotheses.

The third hypothesis, which I call the Parallel Function Hypothesis, has not been suggested in any previous research into the nature of language processing. This hypothesis claims that children will be following a strategy of interpreting the grammatical function of the relative pronoun as being the same as its antecedent. It follows from this hypothesis that those sentences in which the shared nominals have the same grammatical function as their relative clauses (for example, *The man saw the boy who the girl hit*) will be easier to process than sentences in which the co-referential NPs have different grammatical functions, (for example, *who hit the girl*).

**Relative Sentence**

In order to test these hypotheses with relative clauses control for each, an example of each label on the right OO, are abbreviated functions that the respective clauses self-embedded, or Half are: see br (OS, OO). The subject of the clause of the clause (SO, sentences are par is, the shared nor or both objects are nonparallel if.

**Control Test: COC**

In order to test performance on the be affected by fi length, having to the preferred toy for the strategy of MC children were given.
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its preserved
the under-
ne phrase, sentence,
grammatical
es, then that
mone different
grammatical
son will be
es ante-
 predicts that
for example, the
relatives (for
example, hit the girl)
introduction
added clause.
 predicts that
subject NP is
boy who hit the
than relative
relativized (for
hit ....). This
word order is
are of the rela-
tion NP is rela-
tions follow from
page 274,
theses. All the Parallel
been suggested
the nature of the
thesis claims
strategy of
function of the
same as its
his hypothesis
the shared
practical function
example, The
will be easier
which the co-
nt grammatical
functions, (for example, The man saw the boy
who hit the girl).

**METHOD**

**Relative Sentence Test**

In order to test the different predictions that these hypotheses make, four types of sentences with relative clauses were chosen which would control for each of these factors. Table 1 gives an example of each of these types. The sentence labels on the right in Table 1, SS, SO, OS, and OO, are abbreviations of the grammatical functions that the identical NPs have in their respective clauses. Half of the sentences are self-embedded, or subject relatives (SS, SO). Half are right branching, or object relatives (OS, OO). The relativized NP is either the subject of the clause (SS, OS), or it is the object of the clause (SO, OO). Finally, one half of the sentences are parallel function relatives, that is, the shared nominals are both subjects (SS) or both objects (OO). Half of the sentences are nonparallel function sentences (SO, OS).

**Control Test: Coordinate Structure Sentences**

In order to rule out the possibility that performance on the relative clause task would be affected by factors of meaning, sentence length, having to act out two propositions, or preferred toy moving strategies (in particular, the strategy of moving the same toy twice), the children were given a control test, after the relative sentence test. This test contained the coordinate structure counterparts to the relative sentences. They were presented in the same fashion as the relative sentences, and the children had to act them out in the same manner. Examples of these sentences are shown in Table 2.

**Subjects**

The subjects were 33 monolingual children, 17 boys and 16 girls, who attended the University of Texas Nursery School. There were three age groups with 11 children in each: Group I: 3.8–4.3; Group II: 4.6–4.11; Group III: 5.0–5.5.

**Materials and Procedure**

In order to test the children's comprehension, they were required to act out the sentences with toy animals. Each child received three examples of each of the four types of relatives, for a total of 12 sentences. The sentences were presented in three blocks, each of which contained four sentences. The sentences within each block were randomized, and the order of presenting each block was randomized. Halfway through each block the child received a filler sentence. After every block the child had a short break. The test sentences were acted out with familiar plastic toy animals (a dog, a horse, a giraffe, a pig, a lion, a bird) that had weighted bases. The

**Table 1**

<table>
<thead>
<tr>
<th>Four Types of Relative Sentences That Were Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Matrix NP (head)</strong></td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Subject Relatives</td>
</tr>
<tr>
<td>Ex: The dog that jumps over the pig bumps into the lion</td>
</tr>
<tr>
<td>subject</td>
</tr>
<tr>
<td>Ex: The lion that the horse bumps into jumps over the giraffe</td>
</tr>
<tr>
<td>Objective relatives</td>
</tr>
<tr>
<td>Ex: The pig bumps into the horse that jumps over the giraffe</td>
</tr>
<tr>
<td>object</td>
</tr>
<tr>
<td>Ex: The dog stands on the horse that the giraffe jumps over</td>
</tr>
</tbody>
</table>
TABLE 2

IDENTICAL STRUCTURE PARTS TO THE RELATIVE SENTENCES

| Identical subjects (SS) (parallel function) | Ex: The dog bumps into the lion and the dog jumps over the pig |
| Identical subject of first clause and object of second clause (SO) | Ex: The lion jumps over the giraffe and the horse bumps into the lion |
| Identical object of first clause and subject of second clause (OS) | Ex: The pig bumps into the horse and the horse jumps over the giraffe |
| Identical objects (OO) (parallel function) | Ex: The dog stands on the horse and the giraffe jumps over the horse |

Action sequences were maximally distinct when performed with the toys. The verbs that were used were bump into, jump over, and stand on.

The children were told that they were going to play a game in which they were a zookeeper. They had to make the animals do what the experimenter said, making sure to perform the action in both clauses. The experimenter first demonstrated the three types of actions that the child would have to perform in the experiment. Then the child was asked to perform four demonstration sentences to verify that they understood the procedure and could act out the sequence of two actions. The animals were placed in “cages” in a row in front of the child. Before each sentence was acted out the experimenter instructed the child to take out the three animals which would be used to act out the sentence. The test sentence was then read to the child twice. The experimenter sat to the left of the child and recorded the toy moving responses.

Scoring

The child had to perform both actions and could do so in either order. If only one clause was acted out that response was marked as incorrect. Such responses constituted 4–5% of the total responses for each of the four sentence types. Those responses in which the

2 At this time, the children were also instructed that when an animal stood on another animal it must be taken right off. This was to prevent them from standing the dog, for example, on the horse while the lion jumped over both animals.

The only mistake was that the verb was incorrectly acted out were counted correct. Such mistakes were not statistically significant. In addition, they had no bearing on the question of whether the child could correctly interpret the reference and function of the relativized NP.

RESULTS

The results of the relative sentence test are shown in Table 3. They do not support Slobin’s proposed acquisition universal. A 2 × 2 × 3 analysis of variance (embedding × function × age) where the first two factors were repeated measures, indicates that performance increased as a factor of age, F(2, 30) = 3.93, p < .05. There was no reliable main effect of embedding, F < 1; that is, as may be seen in Table 3, the level of performance on the self-embedded sentences (SS and SO combined) was not significantly different from the right branch (OO combined). In a reliable interaction of with the effect of embedding, analysis of variance wa word order in the re either the subject NP is the object NP is rela main effect of word or reliable, F(1, 30) = 3.06, the Interruption Hyp Order Hypothesis at findings.

Other results of this explained by either of Performance on par sentences (SS, OO) NPs have the same gr better than perform function sentences (SO) the .001 level of signifi And parallel function ficantly easier at each the absence of an i function, F < 1. The I thesis, therefore, is ess results.

The results of the are shown in Table 4 on both the coord tasks (Tables 3 and relative sentences an the coordinate sentence significant difference among the four relational sentence differences sentences. Therefore, coordinate structure indicate that it is the sentences that differ in difficulty. These find confirmed when the repl third with a diff Eleven children between 5 and participated in Austin Montessori Sc.

TABLE 3

MEAN NUMBER OF CORRECT ANSWERS BY AGE GROUP: RELATIVE SENTENCES (3.0 possible)

<table>
<thead>
<tr>
<th>Age group</th>
<th>SS</th>
<th>SO</th>
<th>OS</th>
<th>OO</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (3.8–4.3)</td>
<td>1.0</td>
<td>.18</td>
<td>.54</td>
<td>1.36</td>
</tr>
<tr>
<td>N = 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II (4.6–5.11)</td>
<td>1.45</td>
<td>.73</td>
<td>.91</td>
<td>1.64</td>
</tr>
<tr>
<td>N = 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III (5.0–5.5)</td>
<td>2.27</td>
<td>.64</td>
<td>1.17</td>
<td>1.55</td>
</tr>
<tr>
<td>N = 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg. Mean Score</td>
<td>1.58</td>
<td>.52</td>
<td>.88</td>
<td>1.52</td>
</tr>
<tr>
<td>N = 33</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
combined) was not significantly different from that on the right branching sentences (OS and OO combined). In addition, there was no reliable interaction of either age or function with the effect of embedding, \( F < 1 \). A separate analysis of variance was performed contrasting word order in the relative clause in which either the subject NP is relativized (SS, OS) or the object NP is relativized (SO, OO). The main effect of word order was not statistically reliable, \( F(1, 30) = 3.06, p > .05 \). Thus, neither the Interruption Hypothesis nor the Word Order Hypothesis are supported by these findings.

Other results of this study also cannot be explained by either of these two hypotheses. Performance on parallel function relative sentences (SS, OO)—in which the identical NPs have the same grammatical function—is better than performance on nonparallel function sentences (SO, OS), at greater than the .001 level of significance, \( F(1, 30) = 26.58 \). And parallel function sentences were significantly easier at each age level as indicated by the absence of an interaction of age and function, \( F < 1 \). The Parallel Function Hypothesis, therefore, is essential for explaining our results.

The results of the coordinate sentence test are shown in Table 4. If we compare the results on both the coordination and relative clause tasks (Tables 3 and 4), it is clear that the relative sentences are harder, overall, than the coordinate sentences. Also, there is a significant difference in the order of difficulty among the four relative sentences, but there is no such difference among the coordinate sentences. Therefore, the high scores on the coordinate structure experiment clearly indicate that it is the structure of the relative sentences that is the most important source of difficulty. These findings were subsequently confirmed when the results of both tests were replicated with a different group of children. Eleven children between the ages of 2.10 and 5.8 participated in a second study at the Austin Montessori School. The only difference in the procedure was that the Montessori group received the task with the coordinate structures first, and the task with the relative sentences second.

### Table 4

<table>
<thead>
<tr>
<th>Sentence Type</th>
<th>SS</th>
<th>SO</th>
<th>OS</th>
<th>OO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group 1 (3.8–4.3)</td>
<td>1.75</td>
<td>1.75</td>
<td>1.63</td>
<td>2.13</td>
</tr>
<tr>
<td>( N = 8^* )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group II (4.6–4.11)</td>
<td>1.82</td>
<td>2.0</td>
<td>1.82</td>
<td>2.0</td>
</tr>
<tr>
<td>( N = 11 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group III (5.0–5.5)</td>
<td>2.64</td>
<td>2.0</td>
<td>2.27</td>
<td>2.55</td>
</tr>
<tr>
<td>( N = 11 )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg. Mean Score</td>
<td>2.1</td>
<td>1.93</td>
<td>1.93</td>
<td>2.23</td>
</tr>
<tr>
<td>( N = 30 )</td>
<td></td>
<td></td>
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</tbody>
</table>

* Scores for the three youngest children in Group I are not included because they did not complete the task.

Another outcome of the relative clause test is quite intriguing. Looking at Table 3, one is struck by the fact that there is much less improvement with age on object relatives than there is on subject relatives. In fact, a post hoc simple effects analysis indicated that performance on the parallel function subject relative (SS) improves significantly with age, the significant contrast being between the youngest and oldest age groups, \( F(2, 30) = 7.64, p < .01 \). However, performance on the parallel function object relative (OO) shows no significant differences across age levels. In order to explain this, the errors that were made by each child were tabulated to determine if the children were responding in a consistent fashion. Table 5 presents an analysis of their responses.

Given that there are three NPs in a relative sentence, there are six possible subject–object pairings per clause, and each sentence has two clauses. Therefore, there are 36 possible pairs of subject–object pairings. However, only a few of these possible responses actually
showed up. The fact that the children could have but did not move toys in these many ways is additional support for the claim that they are relying on certain general principles to interpret sentences. The explanatory power of the Parallel Function Hypothesis is substantial in accounting for mistakes on object relatives. Approximately two-thirds (80/119) of the mistakes were due to parallel function; about two-thirds (83/129) of the mistakes on the subject relatives, also, were due to parallel function. However, parallel function is not sufficient to explain all of the incorrect object relative toy moving responses.

The responses that can not be accounted for by parallel function indicate that at each age level, relative clauses that follow the matrix sentence are consistently interpreted as modifying the subject NP rather than the object NP. In 22% of all the responses on the parallel function object relatives (OO), the relative clause is interpreted as being a subject modifier. For instance, when given a sentence like *The dog bumps into the horse that the giraffe jumps over*, the toy moving response involved the giraffe jumping over the dog instead of over the horse. For almost one-third of the children, this was the only kind of mistake that they made on object relatives. In fact, these children had no correct responses for the OS sentences and few correct responses for the OO sentences, because they consistently interpreted the relative clause as modifying the subject. We can explain this type of response if we assume that children are over-relying on an Extrapolation rule. Thus, they interpret the relative clause at the end of the main clause as if it had been part of the subject NP in deep structure, and has been transported by the Extrapolation rule to sentence final position. Once we notice that they are associating any relative clause with the subject NP, it becomes clear why the incidence of correct performance on object relatives is low.

### DISCUSSION

The importance of this widespread and systematic behavior of avoiding continuous constituents and favoring discontinuous constituents is that it falsifies the claim that children will use strategies of speech perception and production which prohibit interruptions or rearrangement of linguistic units.

I would like to point out that the fact that four- and five-year-olds prefer a different reading for object relatives than adults do, could not have been discovered if a repetition test, rather than a comprehension test, had been used. Some children spontaneously repeated the model sentence. A comparison of their repetitions with their toy moving was very informative. One child, when given a subject relative, restructured the sentence and repeated it as an object relative. That she interprets the relative clause as a subject modifier is only clear from her toy moving:

*Given:* The giraffe that bumps into the lion stands on the horse.

*Repeated:* The giraffe bumps into the lion that stands on the horse.

3 In English there is a rule of Extrapolation from NP (Ross, 1967) which moves an embedded relative clause to the end of the main clause. Sentence (a) is related to sentence (b) by the rule of Extrapolation:

(a) A man *who was smoking a cigar* entered the room
(b) A man entered the room *who was smoking a cigar*
ACQUISITION OF RELATIVE CLAUSES

Acted: The giraffe bumps into the lion. The giraffe stands on the horse.

The fact that children are not interpreting object relatives as adults assumed they were, or should be, raises the question of why fourand five-year-olds prefer the Extraposition interpretation? Why do they favor the subject, or sentence-initial NP? Although our first reaction may be to call this a mistake, it is inappropriate to do so. There is no difference in the child and adult's rule of Extraposition from NP. Adults too can extrapose over another NP, as the following examples show:

1. Did you see a man ring the neighbor's bell who was selling Fuller brushes from door-to-door?
2. A guy was dating my sister that my mother didn't approve of at all.
3. People advocate that position who are especially militant.

Thus, both adults and children are capable of discontinuous parsing. But adults do not do it often. They prefer to associate the modifier with the adjacent head whenever possible, even in cases where it can be associated with either NP. The explanation for this is frequently given is that an antiambiguity constraint controls the production and parsing of such sentences. Consequently, most adult speakers do not find the following sentences ambiguous:

4. The driver wrecked the car that Argentina was hoping would win the race.
5. Call the telephone number to get the prize that you see on your television screen.
6. Someone was dating my cousin who lives in Ohio.

The point is that if there were an anti-interruption constraint, and if it depended on short term memory, then adults should tolerate more separation than children; but we find that the opposite is true. In fact, prohibitions on discontinuity appear to be irrelevant to both the child and the adult.

I have demonstrated that the Parallel Function Hypothesis is crucial for the explanation of certain facts about the acquisition of relative clauses in English. Further support for the role of parallel function in child language is provided by Brown (1971), Limber (1971), and Maratsos (1973). Brown (whose work came to my attention after the completion of this research) also found that the overall mean scores on self-embedded sentences were not significantly different from the mean scores on right branching sentences. However, he found that there was a significant embedding X word order interaction, which held true for each of the three age levels tested. This cannot be explained by an appeal to factors of discontinuity or word order. Although Brown does not discuss the notion of parallel function or compare the scores of the parallel function sentences with the nonparallel function sentences; and although he does not discuss the extraposition strategy, it is clear that both are necessary to explain his results. His study of relative clauses, which used a picture identification task and a different set of sentences, independently confirms our findings. For further discussion see Sheldon (1972).

Another study of the comprehension of relative clauses, by Gaer (1969), also presents results that are consistent with our findings. However, a number of crucial factors were not controlled for in this study, such as the word order in the relative clause, and the presence or absence of the relative pronoun. This work is discussed at greater length in Sheldon (1972).

In light of our findings, the question arises as to how far reaching the Parallel Function Hypothesis is and whether it has implications for the grammar of adult English. One area where parallel function seems to play a role is pronounization. In the sentences below, parallel function appears as a constraint on the interpretation of pronouns and their antecedents in conjoined sentences. Examples
(7) through (9) indicate that the pronoun in the second conjunct is interpreted as being coreferential with the NP that has the parallel grammatical function in the first conjunct. A sentence is much less acceptable if NPs which do not have the same function are interpreted as being coreferential. (The pronouns in the second conjunct have weak stress.)

(7) Mary hugged John and Betty kissed him.
(8) *Mary hugged John and he kissed Betty.
(9) *John hit Bill, and then he, kicked him.

However, examples (10) through (13) indicate that the presence or absence of stress on the pronoun interacts with the reference of the pronoun.

(10) John hit Bill, and then Sarah kicked him.
(11) John hit Bill and then Sarah kicked him.

In (10), the absence of stress on the object pronoun indicates that it refers to the object NP of the preceding conjunct. In the unmarked case, then, the reference of the pronoun is determined by parallel function. Example (11) shows that in order to indicate a change in the usual interpretation of the sentence, contrastive stress is placed on the pronoun, signalling that it does not refer to the parallel function NP in the preceding conjunct. This holds if the pronoun in the second conjunct is a subject, as well:

(12) John hit Bill and then he, kicked Sarah.
(13) John hit Bill, and then he, kicked Sarah.

In addition to pronominalization, there is another area of syntax in which the notion of parallel function appears to be relevant. It is well known that only constituents that function in the same way can be conjoined, NPs that have different cases cannot be conjoined, as in

(14) *John and the hammer broke the window
Also, an infinitive and a gerund cannot be conjoined, as in

(15) *I like to paint and dancing

These examples of pronominalization and coordination indicate that the fact that the parallel function strategy is used by children to interpret relative clauses is not an isolated finding. It appears that parallel function plays a role in adult English, in other aspects of the grammar than relativization.

In summary, the results of this study reveal that what is hard about learning to process sentences with relative clauses is, (a) finding the NP that the clause modifies, and (b) finding the grammatical function of the relativized NP. In attempting to find the antecedent to the relative pronoun in object relatives, children over-relied on the Exposition interpretation. In attempting to assign a function to the relativized NP, they over-relied on the parallel function interpretation. Children's tendency to over-generalize when they learn language is well known. In this case, it is the over-use of these strategies that accounts for most of the mistakes that they make. Since a strategy does not work all the time, and since adults do not follow or depend on these strategies to the extent that children do, apparently, learning a language also involves learning not to rely on certain strategies, learning to restrict the use of certain strategies in those sentences where they do not apply.

In addition, our evidence indicates that the reformulated principle (a') (in italics on page 274) makes false predictions about the role of interruptions as well as the role of the correspondence between surface and deep structure word order, in the acquisition of relative clauses in English. In light of this it would be worth reconsidering claims that have been made about the role of interruptions in other areas of language behavior.

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The evidence from both child and adult English does indicate that a fruitful avenue for future research would be an investigation of the role that the Parallel Function Hypothesis has in the acquisition of other languages. Another fruitful direction would be to investigate the implications that the Parallel Function Hypothesis has for adult grammar. Clearly, acquisition research provides insights into adult language as well as child language, and can stimulate research in both directions.

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