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## THE ACQUISITION OF VERB-PARTICLE AND DATIVE CONSTRUCTIONS

by

Susan D. Fischer

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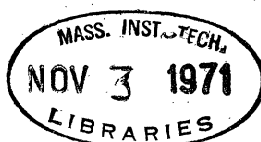
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Signature of Author.....*Susan D. Fischer*.....  
Department of Foreign Literatures and Linguistics

October 4, 1971

Certified by ...*Kenneth Hale*.....  
Thesis Supervisor

Accepted by.....*Ann Hum*.....  
Chairman, Departmental Committee  
on Graduate Students



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of the requirements for the degree of Doctor of Philosophy.

## ABSTRACT

This thesis is presented to show some of the possible interactions between the fields of generative grammar and cognitive psychology. These two fields must of necessity merge in the study of primary language acquisition.

After an investigation of the grammar of the adult for verb-particle and dative constructions, a number of psychological theories about the acquisition of grammar are examined, in particular with respect to the predictions that these theories make about the particular constructions under consideration.

Experiments are presented which are designed to test these predictions, and in addition to show the development over time of these constructions in children from three to four. The results show that, over time, the child pays more attention to semantic plausibility, pays somewhat less attention to order, and learns to use surface structure cues to deep structure grammatical relations. In addition they show that the child's use of pronominalization, at least in the structures considered, is different from the adult's in two ways: namely, the child ignores a pronoun in determining grammatical relations, and also has a different output condition on pronouns from the adult's.

Finally, an attempt is made to apply the results from these experiments to broader issues of grammatical and cognitive theories.

Thesis Supervisor, Kenneth Hale,  
Title: Professor of Linguistics

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## Chapter I -- Language Acquisition as Viewed by a linguist.

There are a number of reasons for the interest among linguists in language acquisition and psycholinguistics; some of these reasons have become more compelling in recent years. In this chapter, I shall discuss the kinds of justification that exist for this kind of study within the realm of linguistics, and my own reasons for the particular investigation reported in this thesis.

### 1.1. Linguistics and psychology

It is significant that linguistics is recognized as a "branch of human psychology," (Chomsky, 1969), in that language is but one function of the human mind. Despite this general sort of recognition, however, until quite recently linguists have considered the purview of psychologists concerned with language to be rather divorced from what linguists are interested in, in action if not in thought. Linguists have left to the psychologists aspects of language behavior considered irrelevant to competence models, specifically in the area of performance. They have taken slightly more interest in attempts by psychologists to prove the 'psychological reality' of various levels of grammatical descriptions.

The situation has changed somewhat as linguists have realized more and more how much the limitations of human thought influence the structure of language. Perceptual strategies have been invoked (Klima, to appear, Jackendoff and Culicover, 1970) to explain certain constraints on wh-fronting, and memory limitations have infiltrated into grammatical descriptions (Ross, 1967).

But there is still a long way to go. Consider, for example, the role of language acquisition. The standard account of a linguist is an idealization of the child as a little black box out of which suddenly springs a grammar of the language. Linguists are by and large concerned only with the results of this black box, not the processes that go on inside it, which they leave to the psychologists.

I think that the psychologists have been given the interesting problems. They get to find out why grammar isn't learned all at once, what kinds of things are easier and harder for a child to learn. Furthermore, they can use their knowledge of other cognitive processes to integrate language acquisition into the broader area of cognitive development. In other words, while the idealization of the little black box may be useful for the purposes of some linguists, it masks some very crucial processes, the explanation of which may have some important consequences for linguistic theory. In particular, viewing the language learner as a whole person instead of as an isolated mechanism can give us valuable insights into why language is the way it is, and perhaps why language development goes the way it goes.

Insofar as linguistics is a branch of human psychology, it is impossible to divorce psychological studies of language from psychological studies in other areas, particularly in the area of development. This is the impetus, I believe, behind much of Bever's work in particular. He seeks to demonstrate that the way in which a child treats his language at a particular stage in his development, is closely related to the way in which he interacts with the rest of the world. For example, there is a stage in the child's cognitive development where the

child will judge relative numerosity by length or height instead of, e.g., counting. This sort of strategy is a fairly reasonable one, since the two are often correlated. However, when they are not, the child will make mistakes at this stage that he would not have made at an earlier stage before he had this strategy. Bever (1970a, b) has found that at this same stage, the child has a similar way of handling sentences. The child develops, or extensively utilizes, a strategy that says that the first noun in a sentence is the logical subject and the second is a logical object. This strategy serves him in good stead until he happens to come across a passive sentence, which the child at this stage comprehends less accurately than a child at an earlier stage. It is also just at this stage that the child starts to develop brain dominance, and Bever feels that there is a connection somewhere.

Psychologists, then, have very good reasons for studying language. Linguists have the same reasons for studying psycholinguistics, but they also have reasons uniquely their own. This is where the two camps part company and what we shall discuss next.

#### 1.2. The notion 'possible natural language'

The interdependence between language and other cognitive capacities which we emphasized in the preceding section is relevant when we discuss the notion of what is possible as a natural language. It is not necessary that all the languages of the world exhaust the possibilities of natural languages, but it is certainly necessary to limit what can be a natural language, and it is most likely the limitations of cognitive abilities that ultimately determine whether or not a particular language

is, in some sense, 'natural.' An operational definition of a natural language is a language that is so easy that even a child can learn it. Certainly the child's cognitive capacities at any particular stage will determine what he is capable and not capable of learning. To put it another way, what the child does is at least partly determined by what he can do. The kinds of generalizations that a child makes about the language, the kinds of structures which he imposes upon it, are certainly dependent upon the kinds of generalizations he is capable of noticing. As a result, there are rather strict limitations on what can be a generalization in a natural language. To give a rather far-fetched example, let us imagine a language in which to negate a sentence involves saying it backwards word by word (whatever a word is), while to make a yes-no question from that sentence involves saying it backwards phoneme by phoneme (whatever a phoneme is). This is an extremely difficult grammar to conceptualize, and I think the difficulty lies in the notion that the mind just is not built for that sort of language.

### 1.3. Language learning and linguistic universals

It is possible that what is universal about language, i.e., what all languages have in common, may in fact be that which is not precluded as a possible natural language, and if the innate structure of the mind is what precludes some mechanisms from operating in the grammar, then one concludes that what is innate is what is universal, and vice versa. Now, this means that there are two tacks which one may pursue to find out what the universals of language are. One is to look at all the languages of the world and see what they have in common, perhaps a

la Greenberg (1962), or perhaps in a more sophisticated way, since Greenberg concentrates mainly on surface phenomena.

The other way is to look at language acquisition. It is a not unreasonable starting hypothesis that the earlier a child displays a particular concept, construction, kind of grammatical rule, etc., the more universal that concept, etc., is likely to be. If the child is born with a certain competence, regardless of how we characterize that competence -- base rules, inference strategies, or whatever -- then the earliest structures that the child assigns to speech will be those which are already built in. Hence, by looking at the order of acquisition we may discover those aspects of language which are truly universal.

#### 1.4. Linguistic change

Even though the innately determined structures limit the possible grammar for the child, they by no means determine the exact nature of the language he will speak. That is to say that while languages have perhaps a common central core, they can differ quite widely, and in fact, one language will change its grammar over the years. Since at least the time of Meillet, it has been accepted that the primary reason for linguistic change is the fact of 'discontinuous transmission'; that is, the child, while he may be predisposed to language, is not born with a complete grammar of the language he is to learn, and the input from which he draws his grammar may be different from that of his parents' generation. Kiparsky (1965, 1968) has hypothesized a number of laws governing linguistic change. For our discussion the most relevant points which he considers are the concepts of bleeding and feeding

orders of rules in a grammar. Kiparsky claims that the natural trend of language change is for rules to have the order of maximal application. Two rules are in 'feeding' order if the output of the first provides an additional input to the second. They are in 'bleeding' order if the first changes its output in such a way that it no longer provides an input to the second. For example, let us say we have a language with the following three rules, applying in the order given:

- (a)  $C \rightarrow E / F \text{ --- } G$
- (b)  $A \rightarrow B / C \text{ --- } D$
- (c)  $B \rightarrow H / I \text{ --- } J.$

Rules (a) and (b) are in bleeding order, while rules (b) and (c) are in feeding order. According to Kiparsky, maximal order of application means that a language will change to maximize feeding orders among rules and to minimize bleeding orders.

In terms of what we have been discussing in previous sections of this chapter, this is no accident. Language change results from children's internalizing grammars different from those of their parents. Given the kinds of strategies that children utilize in at least some aspects of language learning, it is natural for them to learn generalizations first, perhaps spurious ones in terms of their parents' grammar, and exceptions later. For example, Ervin (1964) has found that in learning past tenses, the child first learns the regular -ed form<sup>1</sup>, and then only later acquires the exceptions. If an exception is not learned by a generation, perhaps because it is not heard often enough to register as an exception, then the bleeding order of rules is lessened. Thus the laws of linguistic change can be seen as a natural consequence

of the laws of cognitive development.

One example of this sort that has most likely occurred in English is the regularization of the past tenses or participles of such verbs as, for example, cleave, swell, etc. Cloven and swollen exist as adjectives, but are not necessarily related to the verbs with which they were originally associated. For example, in my dialect, cloven is only used to describe the hooves of kosher animals. Generations of grade- and high-school teachers have despaired of ever teaching their students the lie-lay-lain paradigm -- children have either regularized it or abandoned it entirely for the phonologically regular lay-laid-laid.

There is another aspect of theories of linguistic change which is relevant in a very practical sense to the study of language development. Kiparsky (1965, op. cit) and other recent generative grammarians have, as implicit above, formulated linguistic change in terms of changes in grammars, rather than changes in the output of these grammars. A grammar can be changed in one or more of the following ways:

1. Addition of a rule -- a rule can be inserted anywhere in the grammar, rather than just at the end, hence having potentially far-reaching consequences in terms of an output radically different from previously.
2. Deletion of a rule.
3. Reversing the order of two rules (for examples, see Chomsky and Halle, 1968, pp. 420-430).
4. Reanalysis -- Reanalysis comes about when a grammar has changed so as to be non-optimal and a new generation analyzes

the output of that grammar more simply than the previous one.

Kimball (1967) has suggested such a reanalysis for the auxiliary system of English, and Naro (1968) has proposed reanalysis as operative in the development of Portuguese passives.

The relevance of the above discussion to the study of acquisition is that these techniques can be used to describe language development in both an intuitively satisfying and perspicuous way. The process of reanalysis is of particular importance to the study of language acquisition, and we shall return to this in our discussion in the final two chapters.

#### 1.5. Why I chose verb-particles and datives.

There are a number of reasons why I have chosen in particular to investigate the acquisition of verb-particle and dative constructions in English. The first is that the grammar of both these kinds of constructions is fairly simple; that is to say, they do not consist, at least on the surface, of complex sentences or even reduced complex sentences.

At the same time, however, as we shall show, these constructions crucially involve facets from all components of the grammar -- deep structure, semantic interpretation, transformations, phonology, and output conditions.

Thirdly, the dative seems to be a fairly basic grammatical relation which has not been investigated before in its developmental aspects. The verb-particle construction, on the other hand, is quite 'language-particular.' If studying their acquisition is a valid means of determining their degree of universality, it would seem a good idea



to compare these two.

Furthermore, there is something that ties these two constructions together, namely how they behave with respect to pronominalization of objects (see next chapter) -- do children nonetheless treat them perhaps differently? If so, why?

In addition to encompassing many linguistic questions, these constructions, particularly datives, also relate to the question of strategies for comprehension (these will be discussed in chapters 3 and 4), and also to the relation between syntax and semantics. Chomsky (1957) has suggested that in language acquisition, syntax and semantics are to be separated. We shall show that, at least with respect to the dative construction, they are not.

Footnotes to Chapter I

1 Actually, she finds that they first know the irregular past tenses, but these gradually disappear in favor of the regularized ones, and she offers no evidence that the child at the very earliest stage associates the present and past forms of irregular verbs.

## Chapter II -- The Linguistic Analysis of Verb-Particle and Indirect Object Structures

### 2.0. Introduction

If one is interested in studying the acquisition of verb-particle constructions and structures containing indirect objects, it is necessary to consider the treatment of these structures in the adult's grammar, since this is presumably the 'target' at which the child is aiming, the terminal point in the development of these constructions. In this chapter, we shall examine these constructions, discuss the analyses which have been presented to account for them, and suggest what seem at this time to be the most plausible solutions. We shall attempt to be as neutral as possible among those linguistic theories now vying for predominance in the field.

For the purposes of this chapter, we shall base the linguistic discussion essentially on the 'extended standard theory' of Chomsky, as exemplified in Chomsky (1970a, b), but reference will be made to other works which bear on our discussion. Grammatical judgments will be mine unless otherwise indicated.

### 2.1. Verb-particle constructions

In considering verb-particle constructions, we are concerned with sentences such as the following:

- (1) John freaked out.
- (2) The quenelles fell apart.
- (3) John freaked out Mary.
- (4) John freaked Mary out.
- (5) John let in the girl.
- (6) John let the girl in.

Two conflicting analyses have been offered for these kinds of sentences, namely Fraser (1965) and Emonds (1970). There are two issues differentiating these analyses. The first is the location of the particle in deep structure. Simplistically speaking, Fraser says the particle should be before the direct object (if there is one), and Emonds contends that it should occur after the direct object in deep structure. The second issue, which is intimately related to the first, is the labelling of the node dominating the particle; Fraser says it should be particle, while Emonds says it should be preposition. Let us examine these analyses more closely.

#### 2.1.1. Fraser's analysis

Fraser suggests that the deep source for sentences like (3)-(6) is a structure with the particle to the left of the object. Structures containing an external particle (i.e., to the right of the object) are to be derived transformationally. Fraser does not really have any cogent arguments for this source, outside of his linguist's intuitions, which inform him that discontinuous constituents should not be allowed in deep structure. On phonological grounds, Fraser argues for the following rule to introduce particles into the base:

$$(7) \quad V \rightarrow [+V] \text{ Prt.}$$

He reasons that if a sequence like call up is dominated by a single lexical node, then that sequence will be treated as a compound by the stress rules, and the stress of call up in a sentence like (8)

(8) John called up Mary.

will come out right.

Verbs, according to Fraser, must be subcategorized, not only as to whether or not they may take particles, but also as to which particles, if any, they may take. Thus call, for example, would be represented as [+ \_\_ Prt.] , [ \_\_ <sup>up</sup>{out, 3} etc. ].

To transform structures with internal particles to structures with external particles, Fraser suggests the following rule:

(9) V Prt. NP X

1 2 3 4  $\Rightarrow$  1 3 2 4

Condition: Obligatory if 3 is PRO

The above condition is necessary to prevent sentences like (10) from being derived:

(10) \*John called up her.

Fraser points out a number of distinctions between particles and prepositions. For example, sentence (11) is ambiguous, depending on whether over is construed as a particle or as a preposition:

(11) John looked over the fence.

He also notes that some particles are really directional adverbials, and that constructions containing these particles are literal rather than idiomatic. Consider sentences like these:

(12) John is putting that girl on.

(13) John is putting that coat on.

(14) John put the cat out for the night.

(15) John put the girl out for a ride.

Fraser notices somewhat different syntactic behavior between these directional adverbials and 'real' particles. Ross (1967, pp. 108-110) reviews them concisely:

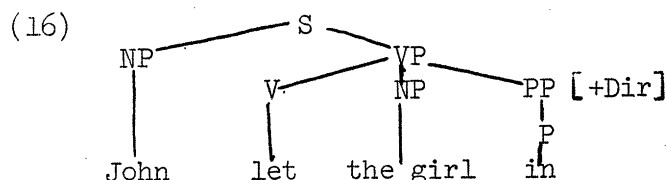
- 1) The prepositions of these i.e., directional, as opposed to particle verbs verbs will conjoin (he took boxes in and

- out), particles will not (\*I showed her up and off.)
- 2) These verbs do occur in action nominalizations, while verb-particles do not (his bringing of the trays in, but not \*his eking of a bare existence out).
  - 3) Some directional phrases, like into the house or out of the window, may always occur with these verbs (he let her out into the garden, they were loading them on from the warehouse, he elbowed it off into the well, they took it in up the stairway), but there are verb-particle constructions which exclude them (\*I burned it up from Boston, \*I showed her up out of the window, \*Sheila whiled the morning away into the well.)
  - 4) If a verb stem occurs with one of these prepositions from reduced directional phrases, it will occur with many more. Thus, since throw out is one of these verbs, it is to be expected that other directional prepositions will also occur with throw (e.g., over, under, down, up, off, across, on, in, away, around). The same is true of verbs like bring, take, send, shoot, hand, etc., but no such prediction is possible with true verb particles. Thus, although figure out exists, there is no figure off, figure in, etc.

After the unspecified NP and second preposition have been deleted from a VP like let the cat out (of something), the remaining preposition, out, is optionally moved to the left, around the object NP, and adjoined to the verb.

#### 2.1.2. Emonds' Analysis

Emonds' analysis for all verb-particle constructions is essentially the same as that described by Ross above for directionals. He suggests that particles be considered (and labelled) as intransitive prepositions, on the analogy of intransitive verbs, and that as such they should occur in deep structure after the object of the verb they go with. Hence, the deep structure of sentences such as (5) and (6) would be this:



In this way, he can capture a number of generalizations that relate directional adverbials to directional particles. Hence, he posits rule (17 = Emonds' 6) to account for a sentence like (5):

(17) X -V -NP - P PP -Y  
           [-Pro]

1 2 3            4        5  $\Rightarrow$  1 2 4 3 5, where 1-2-3-4- is a VP.

Emonds reasons (p.4): "...there does not seem to be any convincing argument that in fact lexical entries must be sequences of contiguous elements. It may be that lexical entries (insertion transformations) may consist of verbs and other sister constituents which are not necessarily contiguous."

Furthermore, with this statement of the rule, the interaction between particle placement and indirect object movement can be represented quite elegantly. We shall defer discussion of this latter observation to a later section.

2.1.3. Why Fraser is more right than Emonds, and what's wrong with both of them.

What Emonds' analysis requires is that lexical insertion be allowed to take place on discontinuous elements in the phrase marker. While Emonds claims that "there does not seem to be any convincing argument that in fact lexical entries must be sequences of contiguous elements," this is not allowed in the Aspects theory, and as I

understand it, there is no way in his analysis in which the verb-particle pair can ever be a constituent, in particular a compound, which Fraser argues, is the only way to get the proper stress pattern. One can grant that Emonds is correct about the placement in deep structure of the non-idiomatic, directional particles, but this does not mean that his arguments are true for all particles. The arguments cited above (pp. 13 and 14) show clear syntactic differences between directional particles and idiomatic ones. In particular, argument (2) shows that, while the directional particles may occur after the direct object in deep structure, the idiomatic particles must occur before it. Chomsky (lectures, 1969) suggests that nominalizations reflect deep structure rather than derived-structure grammatical relations. He bases this suggestion on sentences such as those in (18):

- (18) a. John's eagerness to please bothers me.
- b. \*John's easiness to please bothers me.

If this diagnostic is applied to verb-particle constructions, it gives a natural explanation for the difference in grammaticality between (19b) and (20b). According to this diagnostic, the idiomatic particles come before the verb, while the non-idiomatic ones may come afterwards, as these sentences show:

- (19) a. John's calling up of the girl surprised me.
- b. \*John's calling of the girl up surprised me.<sup>1</sup>
- (20) a. John's letting out of the cat surprised me.
- b. John's letting of the cat out surprised me.<sup>2</sup>

In nominalizations, idiomatic particles must come before the object, while directionals may, like other adverbials, move around fairly freely.



Another argument for differentiating idiomatic and directional particles has to do with the heavy noun phrase constraint. In his dissertation, Ross proposes a set of output conditions which may determine the acceptability of sentences. One such condition is discussed below (see p. 20), but the one which concerns us here is the constraint on surface-structure order of particles and so-called 'heavy' noun phrases, e.g., relative clauses. A particle cannot be separated from its verb by a heavy noun phrase, for example,

- (21) a. Quentin called up the boy he had gone to Harvard with.
- b. \*Quentin called the boy he had gone to Harvard with  
          up.

I know of no dialects of English which allow (21b). But there are dialects which allow the (b) sentence of (22):

- (22) a. Quentin let in the dog that was barking.
- b. Quentin let the dog that was barking in.

Once again, there is a syntactic differentiation between 'true' particles and directional adverbs.

It seems to me that the reason for the ungrammaticality of (21b), and one reason for the necessity of Ross' output condition is that separating two members of a constituent by, say, something on the order of a sentoid, puts too much of a cognitive load on the short-term storage capacity of the memory. One is forced in a sentence like (21b) to hold (either in production or in comprehension) one member of the constituent in abeyance, as it were, until the intervening material can be processed. If this is indeed the case, one would expect this condition to hold for other V+X idioms as well, and in fact it does. The following pairs of sentences are parallel to those in (21):

- (23) a. John took to task the woman who had flunked the driving test.
- b. \*John took the woman who had flunked the driving test to task.
- (24) a. Hiram called into question the facts that Edward had been talking about all day.
- b. \*Hiram called the facts that Edward had been talking about all day into question.
- (25) a. The workers sent to Coventry the man who had broken the strike.
- b. \*The workers sent the man who had broken the strike to Coventry.<sup>3</sup>

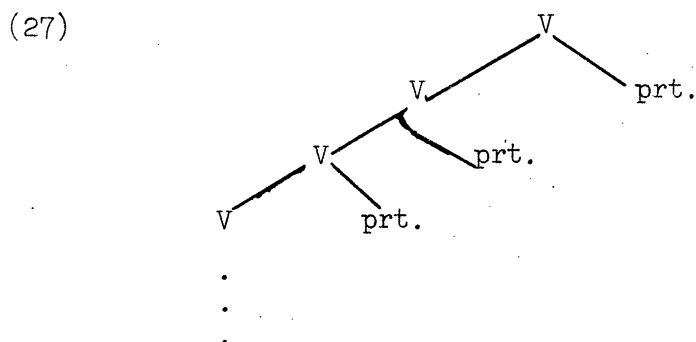
If directional adverbials are not constituents of the verb, no cognitive limits will be violated, and hence (22b) will be acceptable. For those dialects in which (22b) is unacceptable, the inward movement of directional particles may be obligatory, or let in may be reanalyzed into a verb-particle construction. If the reason for the difficulty of the starred (b) sentences is the separating of a constituent, then the crucial question is whether or not a discontinuous constituent should be allowed in deep structure. This may still be an open question, but allowing discontinuous constituents would greatly increase the power of a grammar, and is hence suspect.

If Fraser is right about particles coming before the object in deep structure, is he also right about the phrase structure rules that introduce them and about the transformation that moves them? This is the question that we shall investigate next.

I presume that the reason that Fraser chooses (7), above, as the rule of introduction of the particle into the phrase structure, rather than (26),

$$(26) \quad V \rightarrow V \text{ Prt.}$$

is that he wishes to avoid recursive structures such as (27):



which (26) would allow if the grammar is not restricted in some fashion. However, (27) is an artifact, unfairly taking advantage of a possibility not clearly allowed in the theory of grammar, namely of making a lexical category [i.e., N, V, A] infinitely recursive.

Now for the transformation: we repeat here for convenience Fraser's verb-particle transformation.

(9) V prt. NP X  
 1 2 3 4  $\Rightarrow$  1 3 2 4

Condition: Obligatory if 3 is PRO.

Both Fraser and Emonds have conditions on their transformations having to do with pronoun objects. However, this condition is patently false: if the pronoun direct object is stressed at all, i.e., if it is [+ Stress] by rules of normal sentential stress or by rules of contrastive and emphatic stress, not necessarily 1 stress, then a sentence containing an unmoved particle is acceptable:

(28) I picked up {  
           her  
           him  
           that  
           this  
           them  
           you }

(29) I picked up { that  
one  
some } <sup>4</sup>

The stress on the pronouns in (28) is emphatic, while that in (29) is not.

Although it can be argued (see Fischer, 1968) that emphatic stress can somehow be represented at the deep structure level, hence enabling us to add a condition on the stress of the pronoun in the statement of the rule of particle movement, this option is not open to us for treating the cases of normal sentential stress in (29). At the point in the derivation at which the rule of particle movement applies, there is no stress, one way or the other, marked for the pronouns in (29), and hence no way of accounting for the grammaticality of the sentences in (29) by means of a condition on that rule. This is part of a wider problem which has been treated briefly by Ross (1967) and more extensively by Perlmutter in his dissertation (1968). Perlmutter suggests the device of surface structure constraints, or output conditions, as a way of handling facts such as those we have presented, though he argues for these constraints on the basis of problems of clitic placement in Spanish. What an output condition does is to state a 'template,' an allowable sequence of formants, variation from which sequence produces an unacceptable utterance in the language, even if the sequence can be generated by the syntax in a completely motivated fashion. Output conditions are among the most arbitrary rules in a grammar. As their name implies, they operate very late in the grammar, even after the phonological component, if necessary, as in our case.

We propose, then, an output condition, stated in something like

the following terms:

- (30)  $W V X [ \neq \emptyset ] \begin{matrix} \text{PRO} \\ [-\text{Str.}] \end{matrix} Y \rightarrow *$   
 Where X contains no internal S boundary

(to be read, star a derivation, in which the output contains a verb followed by, but not immediately followed by an unstressed pronoun.)

This condition will be modified in a later section of this chapter, in which further evidence will be adduced to support this conclusion.

## 2.2. Indirect object placement

We shall be concerned in this section with sentences of the form of (31) and (32):

- (31) a. The boy gave the book to the girl.  
 b. The boy gave the girl the book.
- (32) a. The boy bought the book for the girl.  
 b. The boy bought the girl the book.

The sentences in (31) we shall call to-datives; those in (32) we shall call for-datives. We shall be concerned with the syntactic and semantic relationships between the (a) and (b) sentences, the particular inter-relationships among verb, direct object, and indirect object, and the differences between indirect object phrases and other prepositional phrases.

### 2.2.1. The dative

There is a very special relation between indirect objects and direct objects, a relation that does not hold for other prepositional phrases and direct objects. This is that in a sentence containing an indirect object, the indirect object is the direct recipient of or benefits from the possession of the direct object -- the indirect

object 'gets to keep' the direct object, at least for the period of time under consideration in the sentence. If we compare sentences such as (33) and (34),

(33) I gave the book to Jane.

(34) I moved the book to Jane.

we can see this difference quite clearly; to Jane in sentence (33) is an indirect object -- Jane is the recipient of the book. No such inference can be drawn from (34) -- here, to Jane is purely a directional adverbial, and no claim is made as to whether Jane will keep the book or not.

Similarly, if we compare (35) and (36), we see that the same characteristic holds for for-datives as well:

(35) I bought the book for Jane.

(36) I washed the dishes for Jane.

Sentence (36) does not entail that Jane will keep the dishes. Sentence (35) is really ambiguous among at least three readings -- the first is that I bought the book in order that Jane might have it (to keep), and the second is that Jane wanted to buy the book (perhaps to give to someone else), but for some reason could not go herself, so I did her a favor. These two readings factor out if we pronominalize Jane.

Consider the difference between (37) and (38)

- (37) I bought the book for her. (pronounced <sup>4</sup> ai <sup>2</sup> bɔt <sup>1</sup> t̚ə buk  
<sup>3</sup> fɔ̃ hɛr )
- (38) I bought the book for her. (pronounced <sup>4</sup> ai <sup>2</sup> bɔt <sup>3</sup> t̚ə buk  
<sup>1</sup> fɔ̃ <sup>4</sup> hɛr )

In sentence (37), my reading is that Jane will keep the book. For (38),

however, I have the reading that for means something like 'as a favor to.' In the third reading, very closely related to the second, for means 'in place of,' but, at least for animate objects, still maintains the nuance that one is doing a favor for the object. It is the first two readings that we are concerned with here, the dative and the benefactive.

## 2.2.2. Syntactic distinctions between datives and other phrases

We have seen, in the preceding section, that there are clear semantic distinctions to be made between dative prepositional phrases and non-dative ones. Syntactic differences also appear when we examine these constructions.

### 2.2.2.1. Permutation

The most obvious characteristic of indirect objects that distinguishes them from other phrases is their capability of permuting with direct object noun phrases, with a concomitant (usually) deletion of the preposition associated with those indirect objects. The sentences in (39), vis-à-vis those in (40), demonstrate this difference:

- (39) a. I gave the book to John.
- b. I gave John the book.
- c. I bought the book for John.
- d. I bought John the book.
  
- (40) a. I moved the knight to a black square.
- b. \*I moved a black square the knight.
- c. I washed the dishes for Mary.
- d. \*I washed Mary the dishes.

In section 2.2.1. above, we noted an ambiguity in sentence (35). In fact, there is a systematic ambiguity in all for-phrases occurring with

verbs which may take datives, and with a large number of to-phrases as well. In the for-phrases, as noted above, the ambiguity lies in the [ at least ] two possible readings of benefactive and dative. In to-phrases, the two readings are dative and directional. For verbs such as give, feed, tell, the dative reading is always present, though a directionality may be implied. But for many other verbs -- e.g., send, bring, pass, etc., there is a real ambiguity between directional and dative readings for the to- phrase.<sup>5</sup>

The important point to note here is that the directional or benefactive reading disappears, leaving only the dative reading, when we have sentences like (39) (b) or (d). Below, we shall discuss various ways of accounting for this fact.

In the case of for-datives, the definiteness of the direct object is crucial for grammaticality -- it is perfectly all right to say (41),

(41) I washed Mary { a dish  
                          { some dishes } .

but in that case Mary is going to be the recipient of the dish or dishes. This is a fairly productive construction; there are a number of verbs which allow for-dative with an indefinite direct object but not a definite one, particularly when that dative is a reflexive:

(42) Jane peeled me { a  
                          { \*the } peach.

(43) Davy Crockett killed himself { a  
  { \*the } bear when he was  
  only three.

(44) Billy caught himself { a whole bunch of } fish.  
                                  { \*that }



- (45) Caroline found Audrey { some } union grapes.  
                                      { \*those }

As has been found in other cases,<sup>6</sup> the sentence with a definite article becomes grammatical when there is a relative clause attached to the indirect object:

- (46) Jane peeled me the peach that I wanted.

With for- datives, though for some reason not with to- datives, the difference between verbs which allow dative movement and those which do not holds in cases even where one does not delete the preposition:

- (47) a. I bought for Mary a book which I had thought she would  
like.  
b. \*I washed for Mary the dishes which had been lying in  
the sink all day.

#### 2.2.2.2. Other movements

Movement of a non-dative prepositional phrase to the front of a sentence is at least more acceptable than left-dislocation of a dative prepositional phrase, as we see in (48).

- (48) a. \*For John, I bought the book (on the dative reading).  
b. For you, I'll do the dishes.  
c. \*To Mary, I gave the book.  
d. To New York, I took the car (but to Gloucester I  
generally take the scooter.)<sup>7</sup>

In my dialect, (48) a and c are acceptable (and then only marginally) only if they are conjoined with other sentences -- e.g.,

- (49) For John, I bought the book, and for Mary, I got the stationery.

- (50) To Mary, I gave the book, and to John, I gave the stationery.

Sentences b and d are acceptable without the conjoined sentence. In all,

of these sentences there are dialects which accept the sentence without a comma (i.e., without a pause), but in that case it is topicalization rather than dislocation.

In passives, one may passivize a dative object but not a prepositional one:

- (51) a. John was given the book by Jane.
- b. \*New York was taken the car by me.
- c. ?Mary was bought the book by John. 8
- d. \*Mary was done the dishes by John.

Although in English this is a direct, straightforward consequence of the statement of the passive rule and its order with respect to the rules of indirect object placement, this is not necessarily the case in other languages. In Japanese, for example, a rough equivalent of the passive, which operates without deletion of the postposition, accepts sentences like (a) and (c) in (51), but not sentences like (b) and (d). This will become important in our critique of McNeill (1971) in the next chapter.

### 2.2.3. Reversibility

We apply the term of reversibility to two noun phrases within a sentence which may permute without changing the grammaticality of that sentence, though of course the meaning of the sentence will be changed. The subject and object in the sentences in (52) are reversible, while those in (53) are not.

- (52) a. The boy likes the girl.
- b. The girl likes the boy.
- (53) a. The boy drank the milk.
- b. \*The milk drank the boy.

Reversibility depends, at least in part, on the selectional restrictions of the verb involved, which, in turn, depend on the semantics of the situation. In their study of passives, Bever et al. (to appear) had children 'act out' active and passive sentences using dolls. He found that in three-year-olds, rules of semantic plausibility will supersede syntax, so that the child's performance on sentences such as those in (54)

- (54) a. The milk is drunk by the boy.
- b. The girl is liked by the boy.
- c. The boy is drunk by the milk.

in terms of understanding the grammatical relations involved, will be in the order given in (54), i.e., the most accurate comprehension will be on (a), and the least accurate on (c).

There is also an element of reversibility between direct and indirect objects. Consider these pairs of sentences:

- (55) a. The clown sent the baby the dog.
- b. The clown sent the dog the baby.
- (56) a. The clown read the baby the comics.
- b. \*The clown read the comics the baby.

It is clear that the direct and indirect objects in (55) are reversible, while those in (56) are not. As we shall see below, reversibility has consequences in the syntactic behavior of datives.

Three factors can lead to reversibility or irreversibility. The first is that the verb involved may, as is the case in (56), absolutely preclude an animate direct object in its selectional restrictions, and since virtually all indirect objects are animate, this will mean that the two objects are non-reversible. Other examples in this class besides read are write, tell, and say.

The second factor is that concrete direct objects may freely occur with a given verb, and reversibility or non-reversibility will depend then on what kind of direct object is in fact chosen. In this case, reversibility really depends on the relationship between the direct and indirect objects. The relevant characteristics seem to be relative size of the two objects with respect to one another (to be reversible, they must be of the same magnitude in size) and degree of sentience. In these cases, there is, naturally a very fuzzy border-line between what is reversible and what is not, but there are some clear-cut judgments that one can make. For example, the sentences in (57) are reversible, while those in (58) are not.

- (57) a. The man threw the mouse to the snake.  
b. The man threw the snake the mouse.  
c. The man threw the snake to the mouse.  
d. The man threw the mouse the snake.
- (58) a. The man threw the mouse to the teacher.  
b. The man threw the teacher the mouse.  
c. \*The man threw the teacher to the mouse.  
(starred on the dative reading)  
d. \*The man threw the mouse the teacher.

It should be noted that with respect to the first two factors, the vast majority of verbs taking for-datives, while for the most part requiring animate indirect objects, do not allow animate direct objects. Even for those which do, the direct object must be an object of intrinsic possession, and hence are non-reversible; for example,

- (59) a. Bill found Hortense a husband.  
b. \*Bill found a husband Hortense.
- (60) a. The native got the tycoon a butler.  
b. ?The native got the butler a tycoon.

c. \*The native got a butler the tycoon.

A 'true' for-dative is never reversible.

The third factor is the possibility of interpreting the indirect object as a directional (to-dative) or as a purposive (for-datives). We remarked above that when the indirect object comes before the direct object and without a preposition, any interpretation except the dative is precluded. However, (58) is grammatical on the reading that to the mouse is directional rather than dative though, granted it may sound somewhat implausible if one expects the mouse to catch the teacher, and a sentence like (61) is also grammatical and reversible.

- (61) a. I bought bedspread for curtains.  
b. I bought curtains for bedspreads.

In these sentences, for roughly means 'to use as', so that it is generally possible for more pairs of noun phrases to be reversible if the prepositional phrase is not interpreted as a dative.

Whether a sentence containing an indirect object is reversible or not ought to influence its treatment by a child. We shall demonstrate in Chapter 4 that indeed it does.

#### 2.2.4. Previous analyses

In this section we shall discuss the various analyses that have been presented for datives. We shall pay attention primarily to what base structures have been posited, and to the transformations involved. As we discuss these analyses, we shall try to develop a coherent one ourselves.

#### 2.2.4.1. Postal's argument

Ross (personal communication) attributes the following argument to Postal. Although in Crossover (1971), Postal posits a weak argument for the basicness of the prepositional, rather than the dative, form for both for- and to-datives, he has apparently changed his mind by virtue of the interaction between indirect object constructions and his crossover condition. The crossover condition states that one noun phrase may not be moved in such a way that it crosses over another noun phrase with which it is coreferential. Hence, sentence (62) cannot be passivized either to (63) or to (64) by this constraint.

(62) John killed himself.

(63) \*John was killed by himself. (with main stress on killed)

(64) \*Himself was killed by John.

Now, while sentence (65) is grammatical, sentences (66) and (67) are not:

(65) I  $\left\{ \begin{smallmatrix} \text{gave} \\ \text{bought} \end{smallmatrix} \right\}$  John a picture of himself.

(66) \*I  $\left\{ \begin{smallmatrix} \text{gave} \\ \text{bought} \end{smallmatrix} \right\}$  a picture of himself  $\left\{ \begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix} \right\}$  John.

(67) \*I  $\left\{ \begin{smallmatrix} \text{gave} \\ \text{bought} \end{smallmatrix} \right\}$  a picture of John  $\left\{ \begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix} \right\}$  himself.

There are a number of weaknesses to Postal's argument. First of all, (66) could be out by virtue of left-to-right restrictions on reflexivization. Secondly, (67) is grammatical (or at least more grammatical if himself is changed to him, and him can be coreferential with John if stress is placed on to or for. This shows that left-to

right pronominalization is working, for we can note the ungrammaticality of (68):

(68) \*I gave him<sub>i</sub> a picture of John<sub>i</sub>.

It also shows that the reflexives in so-called 'picture nouns' may be quite different from ordinary reflexivization. Helke (1970) has elaborated on this theme in his dissertation. He argues that picture nouns, and reflexivization in general, can be handled in a framework different from the one which Postal proposes. In particular, he argues that in a sentence such as (69)

(69) John gave Mary a picture of herself.

the picture noun is to be derived from the same structure that underlies (70)

(70) picture of her herself

Surface rules will then determine the grammaticality of sentences containing reflexives. If Helke is correct, then Postal's arguments can be dispensed with.

#### 2.2.4.2. Fillmore's analysis

Fillmore (1965) presents a very interesting analysis. He is basically concerned with the different behaviors of to- and for-datives with respect to the passive. A to-dative can have several passives, e.g.,

- (71) a. John gave the book to Mary.
- b. The book was given to Mary by John.
- c. The book was given Mary by John.
- d. Mary was given the book by John.

For-datives, however, allow only one passive:

- (72) a. John bought the book for Mary.

- b. The book was bought for Mary by John.
- c. \*The book was bought Mary by John.
- d. \*Mary was bought the book by John.

Fillmore argues that the rule of passivization must therefore separate the rules of to-dative movement and for-dative movement, and that these two rules furthermore operate in opposite directions. That is to say, the base structure of to-datives, according to Fillmore, is something like [NP V [to NP]<sub>PP</sub> NP]. If a rule of to-deletion does not apply, then the to-phrase is moved around the direct object. For-datives, on the other hand, are represented in the base as something like [NP V NP [for NP]<sub>PP</sub>], and after passivization the for-phrase can be moved in optionally, with, of course, the concomitant deletion of the preposition. Thus, there is never any scope for passivization to apply on the indirect object in a for-dative.

Because Fillmore was operating in a pre-Aspects form of generative grammar, some of his rules are unacceptable in the present theory, in particular those referring to the interaction between wh-questions and datives (for additional discussion, see Kuroda's review, 1968). These rules need not concern us here.

What does concern us is this: the fact that the two rules are so similar i.e., the rules of to-dative and for-dative makes their separation suspect. Postal (1970) points out that the two dative movement rules could be collapsed by use of rule features, and Emonds makes a similar point as well (1970a).

Furthermore, there is a generalization which Fillmore seeks to capture with his statement of the rules, which he in fact does not. It involves the similarity in constraints between dative movement and



particle movement. We recall that particles cannot occur before a nominal direct object. Fillmore notes that to-datives cannot either, so that just as (10) above is ungrammatical, so is (73):

(73) \*John gave the girl it.

By having to-datives occurring before the direct object in deep structure, Fillmore can collapse the rule of particle-movement with the rule of to-phrase movement, thus enabling him to state the pronoun condition only once. Even allowing this condition to be transformational, rather than an output condition, as we argued above, Fillmore's analysis remains with two holes in it. The first is how to apply the same generalization to for-datives. Sentence (74) is every bit as bad as (73):

(74) \*John bought the girl it.

The other problem is how to account for the perfectly grammatical (75).

(75) The girl was given it by John.

This sentence could not be generated if the derived structure underlying (73) were blocked transformationally.<sup>9</sup> The output condition which we proposed in section 2.1.3. already covers these cases, and also cases like (76) and (77):

(76) I brought Mary  $\left\{ \begin{array}{l} \text{that} \\ \text{some} \\ \text{one} \\ \text{these} \end{array} \right\}$ .

(77) I brought Mary  $\left\{ \begin{array}{l} \text{them} \\ \text{him} \\ \text{this} \\ \text{that} \\ \text{you} \end{array} \right\}$ .

As it stands, however, this output condition is too general. It wrongly predicts that any unstressed pronoun that comes after the verb must come immediately after the verb. According to the condition as now stated, the following sentences should all be unacceptable:

- (78) John brought the book to her.
- (79) Cynthia found a use for it.
- (80) Clem saw the spaghetti and went at it as though he hadn't eaten for weeks.
- (81) That baby is so gullible, it's like taking candy from it.

Obviously, it is only direct objects that are subject to this constraint, and it is quite easy to modify our rule to reflect this, to wit:

- (82)  $W V X \neq \emptyset$   $\begin{matrix} \text{PRO} & Y \rightarrow * \\ [-\text{Str}] \\ [+ACC] \end{matrix}$

where X contains no S boundary

Here +ACC means only direct object, and objects of prepositions are differentiated in some way (perhaps the ablative case is alive and well in English grammar).

The generalization to be made here is that [unstressed direct object pronouns are reanalyzed as clitics on the verb, and as such cannot be separated from the verbs to which they are attached, once they are so attached.] The impetus for making indirect objects into clitics is not so strong, although even here there seems to be a stylistic preference for dative pronouns' being next to the verb -- in my dialect, it seems much more natural to say (83) than (84):

- (83) Bring me a beer.
- (84) Bring a beer  $\begin{matrix} \text{to} \\ \{ \text{for} \} \end{matrix}$  me.

#### 2.2.4.3. Structure-preserving transformation: two arguments

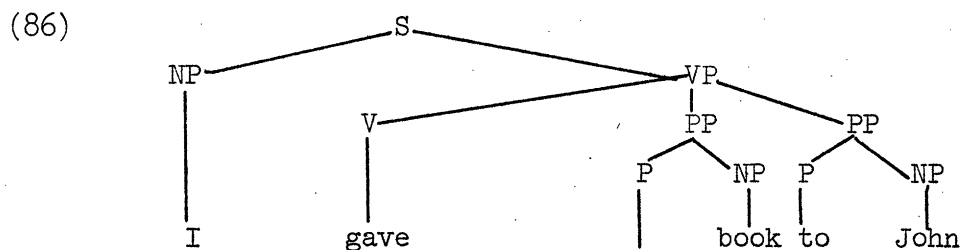
Chomsky (1970b) has pointed out the importance of placing limits on generative grammar. Some sweeping restrictions on the power of transformations have been proposed by Emonds (1970). He suggests that all cyclic transformations are structure-preserving, i.e., the output must be of the sort that could be generated by the phrase structure rules of the base. The only rules that may radically change structure, where a radical change is defined as a transformation whose output could not be generated by the phrase structure rules, are last-cyclic. Since indirect object placement is presumably cyclic,<sup>10</sup> in order for Emonds' generalization to hold, it must also be structure-preserving. Both Emonds (op. cit.) and Bowers (in preparation) have considered indirect objects in this light and have come up with almost opposite conclusions. We shall discuss their respective solutions in turn.

##### 2.2.4.3.1. Emonds

Emonds suggests that indirect objects occur in deep structure as prepositional phrases. In order that dative movement be structure-preserving, he suggests an empty preposition node that goes with the direct object. For example, his deep structure for (85)

(85) I gave John a book.

would be something like (86)



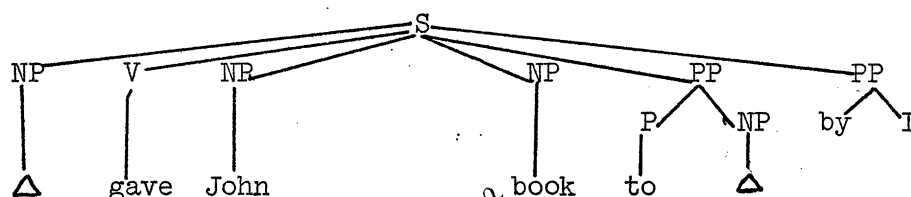
Emonds' evidence for there being a preposition node associated with the direct object is that this node is not always empty. One can say, for example,

(87) I presented John with an award.

Indirect object movement would consist of a permutation of the two prepositional phrases. Further evidence for this solution is presented in Emonds (1970a).

#### 2.2.4.3.2. Bowers

Although Bowers operates in a slightly different framework, he, too, wishes that cyclic transformations be structure-preserving. He suggests that there is a special indirect object position occurring in deep structure before the direct object. For Bowers the deep structure of (85) would be something like (88):



Indirect object movement would be a permutation of the second and fourth noun phrases. The PP node would be completely filled in deep structure either when the to-phrase is directional (and presumably if the for-phrase is benefactive, though for-datives are not extensively discussed)

or when it is dative but can never occur before the direct object, as in the case of verbs such as say or impart. For Bowers, the sentence (89)

(89) I brought the book to John.

would be structurally ambiguous -- for the dative meaning of to John, John would occur in deep structure before the direct object. For the directional meaning, it would occur as the object of to in deep structure.

It seems to me that the whole idea of having an indirect object position in deep structure, aside from the structure-preserving aspects, would be that all and only those noun phrases which can take a dative interpretation would occur in that position in deep structure. In other words, only one interpretive rule, operating at the deep-structure level, would be needed for the dative interpretation.

But Bowers provides no mechanism for a dative interpretation of to-phrases occurring with impart, narrate, etc. He will need special rules for interpreting the objects of each of these verbs as datives. Furthermore, the idea that verb pairs as similar as teach-impart, tell-recite, and give-donate should have such different deep structures when the only difference between them is the number of syllables seems somewhat counterintuitive.<sup>11</sup> We shall discuss another drawback of this theory in Chapter 5.

There are two other problems with Bowers' analysis. The first is another somewhat counterintuitive result, or so it seems to me. Consider the sentence (90)

(90) John brought Mary the book.

Now this sentence is two ways ambiguous, since bring, like sing and a few other verbs, may take either to- or for-datives. For Bowers the deep structures would be identical insofar as Mary is concerned, the only difference being the preposition with the empty object, and Mary is never connected with that preposition.

Secondly, Bowers cannot account in any natural way for the fact that datives and directionals cannot co-occur. For him it is an accident that his indirect object node and to-phrase node are never both filled (see below, p.46 for examples). An analysis which accounts for such complementary distribution would be preferred.

By contrast, Emonds' analysis is quite well motivated, and can easily be incorporated into a more orthodox analysis, such as the more detailed description that we shall present in the next two sections.

#### 2.2.4.4. Interpretive strategies

Klima (to appear) has argued for a general metalinguistic condition on transformations that they must minimize functional ambiguity. His arguments rely on the interaction between datives and wh-fronting. Sentences of this type are also discussed by Jackendoff and Culicover (1970) with similar conclusions. First we note that sentences (91)-(96) are grammatical, while (97) and (98) are not:

- (91) What did he give (to) me?
- (92) What was given (to) me?
- (93) To whom was an umbrella given?
- (94) Who was given an umbrella?
- (95) What was I given?
- (96) Whom did he give an umbrella to?
- (97) \*\*Who did he give an umbrella?
- (98) \*Who was an umbrella given?

In his review of Fillmore, Kuroda (1968) notes (and the above sentences,

with the exception of (96), are his) that it is the action of preposing, rather than wh-attachment, that makes (97) and (98) bad. However, his solution, like Fillmore's, is ad hoc, in that it simply says that some elements may not be preposed. Klima, Jackendoff and Culicover wish to explain why these elements cannot be preposed, using the notion of minimalizing functional ambiguity.

An alternative statement of this condition would be to say that strategies for interpreting sentences cannot cope with certain forms of ambiguity. In the sentences discussed by Klima et al., functional ambiguity is 'coped with' by rejecting the sentence. But there are cases where a different means is used.

In a sentence such as (99)

(99) John gave Mary a book.

there are several passives which are possible, namely

- (100) Mary was given a book by John.
- (101) A book was given to Mary by John.
- (102) A book was given Mary by John.

Not all of these passives are acceptable when the two objects are reversible (see 2.2.3.). The following derivation is unacceptable, with regard to preservation of the original grammatical relations:

- (103) a. The man brought the boy to his friend.
- b. The man brought his friend the boy.
- c. The boy was brought { his friend  
                                  the man's friend } by the man.

When the direct and indirect objects in a sentence are reversible, passivization is allowed only on the indirect object, if that object appears without its dative preposition. Perhaps a better way of saying this is to posit an interpretive rule which adds up to the same thing. What one seems to have to say is that the passive ordinarily operates

on the first noun phrase that it comes to, but is allowed to skip over one just in case the result of doing so will not be ambiguous.

The generalization seems to be, about the wh-fronting case and the above, that if interpretation depends exclusively on order, and if that order is disrupted, then something has to give -- either the acceptability of the sentence or one possible interpretation.

Irrespective of notions of interpretive strategies, Culicover and Jackendoff present an analysis of datives which merits discussion. They argue for the following: First, datives are represented in the base as prepositional phrases occurring after the direct object. Then they posit transformations of PP shift, P-deletion, passive, and to-deletion, in that order.

A quite general optional rule of prepositional phrase shift would derive, loosely speaking, (105) from (104):

- (104) a. John gave the book to Mary.  
b. John bought the book for Mary.
- (105) a. John gave to Mary the book.  
b. John bought for Mary the book.

This rule could also apply, of course, to non-dative prepositional phrases. Jackendoff and Culicover state the rule as follows:

- (106) (their 55) (OPTIONAL)
- $$X-V-\{ \begin{matrix} NP \\ PP \end{matrix} \}---PP--Y$$
- $$1 \quad 2 \quad 3 \quad 4 \quad 5 \Rightarrow 1-2-4-3-5$$

Second would come the rule of Preposition-deletion, which would be obligatory when the preposition came after the verb which governs the deletion. This rule could be governed by the verbs in (105) to



delete the preposition. For non-dative prepositional phrases, it could derive (108) from (107):

(107) He blamed for the fiasco on Jack.

(108) He blamed the fiasco on Jack.

They state the rule as (109):

(109) X--V--P--Y (OBLIGATORY)  
 1 2 3 4  $\Rightarrow$  1--2-- $\emptyset$ --4

After this rule, passive could apply, and it would apply only to a noun phrase right next to the verb.

Finally, another rule of preposition deletion, limited to the preposition to and optional, would apply.

It should be noted first that Jackendoff and Culicover's dialect is different from all dialects previously accounted for in that theirs accepts passivization of the indirect object in for-datives -- i.e. they allow sentences such as (110):

(110) Mary was bought a new wardrobe by John.<sup>12</sup>

There are a number of problems with this analysis. First of all, to account for the usual dialect, in which no for-indirect object may be passivized, requires quite a change in their rules. Assume that P-deletion is still required before passive to account for such sentences as their (77) and (78) (our 111 and 112 below):

(111) The fiasco was blamed on Jack (by him).

(112) Jack was blamed for the fiasco (by him).

Now what about for-deletion? It cannot come before passive, because that would allow (110) to be derived. It cannot be collapsed with to-deletion, because then both (110) and the even worse (112) could be

derived:

(113) \*A book was bought Mary by Bill.

It seems to me that the only way to handle for-deletion in Jackendoff and Culicover's system is to have rule (114), ordered after passive, and obligatory. (Order with respect to to-deletion is irrelevant.)

(114) X V for NP NP  
 1 2 3 4 5  $\Rightarrow$  1--2-- $\emptyset$ --4--5

There is another, and I think in terms of conceptualization, more serious problem, and that has to do with the optionality of their rule of to-deletion. Culicover and Jackendoff need for the rule to be optional in order to account for the grammaticality of both (115) and (116) below:

(115) The book was given Mary.

(116) The book was given to Mary.

These cases, however, along with those places where the direct object is complex,<sup>13</sup> are the only contexts where to-deletion would seem to be optional, and (115) is the only context where to-deletion might need to come after passive applies. In more ordinary cases, it is obligatory. That is to say, a sentence like (117) is not acceptable.

(117) \*John gave to Mary the book.

This case is covered by the above P-deletion rule, if verbs like give govern this rule. In that case, then, sentence (115) is Jackendoff and Culicover's only motivation for having a separate to-deletion rule applying after the passive. An independently motivated complication of the passive rule will rule out the need for the extra to-deletion rule. One can complicate the structural description of the passive as follows:

(118) NP V  $\begin{Bmatrix} P \\ NP \end{Bmatrix}$  NP

Some complication is needed anyway in order to derive (119) and still rule out (120):

(119) This table has been eaten at by many people.

(120) \*This table has been eaten food at by many people.

Using the above rule we can derive (115) in what is for me a more intuitively acceptable way, given a to-deletion (or preposition-deletion) rule which applies before the passive.

Now the only problem is that we would like to order for-deletion after passive so as to exclude an environment for the derivation of (110) and (113). However, the above statement of the passive rule enables us to incorrectly derive sentences like (121):

(121) \*Mary was bought for the book by John.

assuming a derivation by rules of PP shift and passive. We can rule out sentences like (121), however, by appealing to the notion of perceptual strategy, since leaving a preposition dangling right before a noun phrase within a clause evokes a PP interpretation, and thus the application of the passive in this case could be ruled out on meta-linguistic grounds.

To pull this into a coherent analysis, let us assume for the moment that the base structure order for datives is, generally

(122) NP V (P) NP  $\begin{Bmatrix} \text{to} \\ \text{for} \end{Bmatrix}$  NP

The following rules, applying in the order given, will account for the sentences with which we are concerned.

1. PP shift (#106)

2. P-deletion (applicable to for in J. and C.'s dialect, not in mine)
3. Passive (with S. D. given in (118))
4. For-deletion
5. Complex NP shift.

#### 2.2.5. Justification of deep structure order.

In the previous section, we assumed that the deep structure order for datives is (122). First we shall argue for the presence of the prepositions to and for in deep structure.

First, there are intransitive verbs which may take dative phrases, but because there is no direct object to move around, they must remain in the prepositional form -- for example,

- (123) a. John spoke to Bill.  
b. \*John spoke Bill.

- (124) a. Bill talked to John.  
b. \*Bill talked John.

Secondly, as we discussed in the section on verb-particle constructions, it has been argued by Chomsky that in nominalizations only base structure relations can occur, and not derived grammatical structures. Sentences (127 and 128) show that, according to this diagnostic, prepositions must occur with their dative objects in deep structure.

- (125) a. John's gift of a book to Mary was untimely.  
b. John's buying of a book for Mary was untimely.

- (126) a. \*John's gift (of) Mary of a book was untimely.  
b. \*John's buying (of) Mary of a book was untimely.

Note that this last argument cannot serve as a diagnostic for deep structure order in this case, because prepositional phrases may permute

in nominals; thus the sentences in (127) are all right.

- (127) a. John's gift to Mary of a book was untimely.  
b. John's buying for Mary of a book was untimely.<sup>14</sup>

Given the presence of the prepositions, how can we justify the order [V NP  $\left\{ \begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix} \right\}$  NP] as opposed to [V  $\left\{ \begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix} \right\}$  NP NP] ? There are three cases in which it is more parsimonious to have the former as the base structure than the latter. The first two involve lexical and phonological exceptions.

First, there are lexical exceptions to whatever rules of dative placement we might choose. For example, (128) is grammatical, but (129) is not:

- (128) John said an obscenity to the policeman.  
(129) \*John said (to) the policeman an obscenity.<sup>15</sup>

Lakoff (1970) considers it far more normal to mark a lexical item for not undergoing a rule than to mark it for obligatorily undergoing that rule, which is what would be required by choosing (129) as more 'basic' than (128).

Secondly, there are a number of phonological exceptions. The world-famous Naomi Barron pointed out that, in general, those verbs which allow datives to come next to the verb are those which, if they were adjectives, could take the -er comparative suffix: that is, words of one syllable in their underlying phonological representation. Hence, pairs like the following:

- (130) a. John built Bill a house.  
b. \*John constructed Bill a house.  
(131) a. Ann taught Phil mathematical logic.  
b. \*Ann imparted Phil mathematical logic.

The only exception to this exception that I am aware of is recommend. Again, exceptions like these are more naturally taken care of if the indirect object comes after the direct object in deep structure.

Thirdly, unless the direct object is complex, if there is a to-phrase or a for-phrase, it must come after the direct object in surface structure:

- (132) a. \*John brought to Bill a candy bar.  
b. \*Karen got for Fred a new tie.

## 2.2.6. Deep structure details

We have discussed the transformations that apply to dative structures, and we have determined the deep structure order of dative phrases. Now we shall turn to a detailed examination of datives in deep structure.

### 2.2.6.1. To-datives.

In his dissertation, Fraser (1965) argues that the to-dative should be represented in deep structure as a directional adverbial, i.e., that it should be dominated by the node DIR, and should be introduced into the base by the same phrase structure rule that introduces directional adverbials. His reasons for this conclusion are threefold: first, a to-dative cannot co-occur with a directional adverbial:

- (133) a. \*John carried [the package to Mary] to New York.  
b. \*John carried Mary the package to New York.

The two constructions are, in his words, 'mutually exclusive' (p.141). Secondly, "Intuitively, the interpretation of these indirect objects is the same as the directional adverbials" (pp. 141-142). In other words, they mean the same thing. Thirdly, there are cases such as (134)

(134) John threw the ball to Mary.

in which the prepositional phrase is both an indirect object and a directional adverbial.

While I can agree somewhat with Fraser's conclusions, I do not find all of his arguments valid. In particular, I cannot agree completely with the second and the third. There are clearly factors which Fraser has not considered which influence the interpretation of the construction [to + NP]. Ambiguity between the two interpretations is possible only when the verb involved is a verb of motion and the object of the preposition is animate.<sup>16</sup> Hence, in my dialect at least, while sentence (135) is ambiguous, neither (136) nor (137) is:

(135) John sent the package to Harry.

(136) John sent the package to the storage room.

(137) John gave the package to Harry.

There is a rather tenuous argument for to-datives' occurring in at least the same place within the verb phrase that directional adverbials occur. This is the 'do-so' test (see Lakoff and Ross, 1966). Just as we cannot say (138), so neither can we say (139):

(138) \*John sent book to New York, and I did so to Oshkosh.

(139) \*John gave a book to Mary, and I did so to Fred.<sup>17</sup>

This negative evidence shows that the two kinds of to-phrases are in the same part of the verb phrase, though it does not preclude their both occurring in the same sentence. The fact that they cannot co-occur, combined with the fact that, according to the do-so test, they must both occur in the verb phrase (rather than the predicate phrase,

see Chomsky, 1965), is quite suggestive. The two structures must, however, somehow be differentiated. We therefore suggest the following deep structure representation for to-datives. Strict subcategorization restrictions on a verb will state whether or not a directional adverbial may follow the direct object (or the verb, if the verb is intransitive-- e.g., speak to John, fly to Rome). Selectional restrictions on the verb will state whether or not the head of that adverbial phrase must be animate. For example, throw will be represented as [+\_\_NP (DIR)] , with no specification for animacy in the directional adverbial. On the other hand, say will be both [+\_\_NP DIR] and [+\_\_NP [+Animate]] . Almost all verbs marked in this latter fashion will preclude the purely directional interpretation, and anytime an inanimate object is chosen for the to-phrase, an interpretive rule will preclude the purely dative interpretation. Alternatively, we might wish to have an interpretive rule roughly saying [+Dative] → [+Animate] , to account for personification and metonymy. In addition, verbs which may take animate to-phrases will be marked for whether or not they may undergo the indirect object movement and deletion transformations. Either these transformations will block when the indirect object is inanimate, or the semantic component will block the interpretation of the transform. A redundancy rule will state that the phonological exceptions discussed above may not undergo these transformations. We have yet to explain how a noun phrase gets to be marked [+Dative] . We shall defer discussion of this to a later section.



## 2.2.6.2. For-datives

For-datives cannot be collapsed with benefactive for-phrases in the same way that to-datives can be collapsed with directional adverbials. While there is partial synonymy, the syntactic behavior of these two constructions is somewhat different. Benefactive for-phrases occur in base structure outside the part of the verb phrase in which dative for-phrases occur. Notice that one can say (140).

(140) John did the dishes for Mary and I did so for Tom.

Now, while it is possible to say (141),

(141) John bought a book for Mary and I did so for Tom.

the interpretation of the for-phrase is not a dative one, i.e., it is not necessary that Mary or Tom in the above sentence actually receives the book. Furthermore sentence (144) is also unacceptable:

(142) \*John bought Mary a book and I did so for Tom.<sup>18</sup>

Another reason for concluding that for-datives and benefactive for-phrases occur at different points in the base structure is the co-occurrence relations between them. In general, two adverbials of the same type cannot co-occur within the same simple sentence unless they are conjoined or compounded, or unless one is, in some sense, a proper subset of the other. Hence, for example, while (143)-(148) are acceptable, (149)-(155) are not:

(143) Seymour sliced the salami with his sister's machete  
and with his brother's knife.

(144) Portia cut out the flesh carelessly with gusto.

(145) The World War I flying ace flew from Belgium to France.

(146) The bust took place last night at midnight.

- (147) William lives in England on the Avon River.
- (148) Shane rode off into the sunset toward Waco.<sup>19</sup>
- (149) \*The student flushed the grass by midnight before the bust came.
- (15) \*By using his sister's machete, Seymour sliced the salami with a knife.
- (151) \*The World War I flying ace flew into France towards Belgium.
- (152) \*John flew to Newark to New Jersey.

N.B. (153) \*John brought the book to New York to Mary.

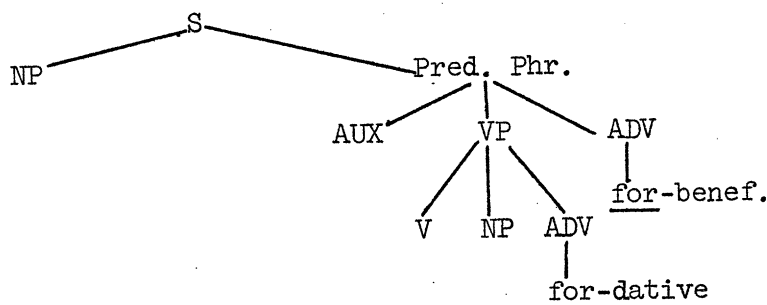
Yet two different for-phrases can occur in the same simple sentence. Even if it is a bit awkward to say (154),

- (154) I bought a book for Mary for her brother.  
(where the first for-phrase is a dative and the second a benefactive)

this is a stylistic rather than a grammatical awkwardness. Indeed, the sentences in (155) are completely acceptable:

- (155) a. I bought Mary the book for her brother.  
b. For her brother, I bought the book for Mary.  
c. For Mary's brother, I bought the book for her.

So, roughly, for-datives occur in the following way in deep structure:



A very interesting thing about for-datives is that they cannot co-occur with either directionals or to-datives.

(156) \*I got John the book to New York.

(157) \*I brought John the book to Mary.

When a for-phrase occurs with to-datives or directionals, it must be benefactive:

(158) I got the book to New York for John.

(159) I brought the book to Mary for John.

Even though for-datives are not semantically related to directionals in the way that to-datives are, the co-occurrence restrictions and the "dativity" of both kinds of phrases make it desirable to collapse to- and for-datives. Since to-datives have already been collapsed with directionals, this means that all three -- to-datives, for-datives, and directionals -- will occur beneath one node. We can call that node DIR-ectional, but it has been suggested (Hale, personal communication) that a more perspicuous label might be Goal. Goal would then be subcategorized for dative. This allows us to describe the co-occurrence relations among these three kinds of prepositional phrases. Benefactives would still be outside the verb phrase.

There is still another argument supporting the idea of there being two different places in the deep structure where for-phrases occur. In The Sound Pattern of English (1968), Chomsky and Halle suggest the application of prosodic rules, of stress placement and concomitant vowel reduction, in a cycle dependent upon the output of the syntactic component of the grammar. Bresnan (1971) has modified this claim, suggesting that the Nuclear Stress Rule in particular, and many of the stress rules and vowel reduction rules in general, apply at the end of each transformational cycle in the syntax. If we consider the

structure of (154) represented in bracketing instead of in tree form,

(160) [ S- [ NP I ] [ PR.PHR. AUX [ VP [ V buy ] [ NP the book ]  
[ DAT for [ NP Mary ] DAT ] VP [ ADV for  
[ NP her brother ] NP ] PR. PHR. ] S

we see that if the cycle applies upward from every bracketing, then the for-dative will be one step further embedded than the for-benefactive, and hence will undergo one more cycle. Now let us consider sentences (161) and (162):

(161) I washed the dishes for him.

(162) I bought the book for him.

In my dialect of English, and in that of most others with whom I have checked, sentence (161) is pronounced in the following way:

(163) ai waʃt də diʃəz fɔɹim.  
3 2 ø 1 ø 3 ø

The second sentence, with a dative reading, is pronounced like this:

(164) ai bɔt də buk fə him.  
3 2 ø 1 ø 3

Now, neither prepositions nor pronouns are normally assigned stress, but any theory of phonology will have to state a convention which permits one to assign stress in the normal way to sequences of the form Prep. + Pro. , since there is always some stress on one or the other in such a construction. Let us consider the stress on for and him in the above two sentences. If we allow the nuclear stress rule to apply to the sequence for him in the normal way, then the innermost cycle will give us

for him  
1 1

Nuclear stress rule, applied once, gives us

2 1

NSR, applied a second time, gives us 3 1

On the third cycle, applying the same rule, 4 1

And the fourth cycle gives us 5 → ∅ 1

The fourth cycle will apply only to the dative for + Pro, and a readjustment rule will have to apply to the stress on him, bringing it down to a reasonable level. But in the case of a benefactive for-phrase, the vowel in for will not be reduced, forcing us to then reduce the vowel in him. This kind of readjustment rule is independently motivated, since when a preposition is contrastively stressed, the normal form of a pronoun object (or indeed a non-pronoun object) is with greatly reduced stress. For example, consider the difference in stress between the sentences in (165) and (166):

- (165) a. Joe doesn't like working for them.
- b. The story of the Ring begins in the River Rhine.
- (166) a. Joe doesn't like working for them, but he would love to work against them.
- b. The story of the Ring begins in the River Rhine, not on the River Rhine.

To summarize, then, we can see that in the case of the stress rules, we will obtain the right results if the for-dative occurs more deeply embedded than the for-benefactive.<sup>20</sup>

#### 2.2.7. Selectional Restrictions, object deletion or incorporation, and possible relations among them.

It has been noticed in the past that some verbs may occur both transitively and intransitively in surface structure. There are two different classes of such verbs. In the first class, the relation between subject and verb changes between the transitive and intransitive forms; for example,

- (167) a. John reddened the paint.  
b. John reddened. (whenever he was embarrassed)  
(\*on purpose)

In the second class, with which we shall be concerned, the subject-verb relations do not change: for example,

- (168) a. John ate something.  
b. John ate.

A sentence like (168b) has traditionally been represented in deep structure as a transitive verb with an indefinite object. This object is deleted at some point in the derivation by a transformation aptly named indefinite object deletion. This transformation is governed only by certain verbs. Hence the following pair:

- (169) a. John found something.  
b. \*John found.

A non-traditional account for (168) is to say that eat optionally takes a direct object in deep structure. The rationale behind this explanation is that there is a semantic distinction between (a) and (b), and that what is 'deleted' in (b) is not really an indefinite like 'something'. This distinction shows up syntactically:

- (170) a. John ate something, and then he ate something else.  
b. ?\* John ate, and then he ate something else.

Which of these accounts we accept is, for the moment, immaterial. What we wish to do here is attempt a general explanation for the difference between verbs like eat and verbs like find.

There are verbs which allow dative constructions which also allow either direct or indirect object deletion. I should like to suggest that for these verbs, and for transitive verbs in general, the transformation of object deletion, or alternatively, the optionality of objects in deep structure, is governed by how 'selective' the

selectional restrictions of that verb are. The generalization to be made is that the more redundant, or 'overdetermined,' the object, be it direct or indirect, the more easily that object may disappear.<sup>21</sup>

Let us take the example of feed. Feed is relatively indeterminate as to what kinds of indirect objects it may take -- one may feed something to almost anything, e.g., a plant, an amoeba, or, not even that metaphorically, a wood-burning stove. On the other hand, what is to be eaten must be edible, i.e., food, so the direct object is redundant. Hence, one can say both

- (171) a. John fed the rabbit some carrots.
- b. John fed the rabbit.

but not

- (172) \* John fed the carrots.

on the reading that carrots are the nourishment, rather than the recipient thereof.

Now, the direct object of eat is just as determined as that of feed. But one can find almost anything, animate or not -- hence the difference in object deletion.

We have seen that feed allows direct objects but not indirect objects to delete. What about other verbs that may take indirect objects? Tell is a verb which has relatively determined direct and indirect objects. What one can tell is relatively well-defined -- it is a story, a sentence, a fact, a joke -- but always something that is spoken. And one always tells something to someone, never to something, unless one personifies that something. Hence we can say these sentences:

(173) John told the story to Mary.

(174) John told the story.

(175) John told Mary.<sup>22</sup>

In certain situations, one can even do without both objects -- imagine one whiny child saying to another:

(176) I'll tell if you don't share your candy.

Verbs of motion, such as bring, take, throw, etc., have selectional restrictions somewhat inverse to those of feed -- here the direct object is relatively underdetermined, but the indirect object is much more determined. Hence, one can say the sentences in (177) but not those in (178):

- (177) a. John threw the ball.  
b. Bill brought some flowers.  
c. Clothilde took a picnic.

- (178) a. \*John threw (to) Bill.  
b. \*Bill brought (for) Mary.  
c. \*Clothilde took (to) Rosamunde.

unless of course, the situation is so defined that there is only one thing that could be thrown -- e.g., if one is describing a baseball game, one could say

(179) Conigliaro threw to the catcher, but it was too late.

Now the question is, where does object deletion occur, if at all? One possibility is that it occurs before, or possibly during, lexical insertion. It would then have the effect of being a rule of object incorporation rather than deletion. This would be consistent with our characterization of why this process may take place, and would entail that verbs like eat be effectively subcategorized as both transitive and intransitive.



The other alternative is for object-deletion to apply in the transformational component of the grammar. Let us first assume that object-deletion comes before passive. We can then derive a sentence like (180),

(180) Mary was thrown to by John. (in a baseball game)

in the following way: first, object deletion, then passive, which as we stated it, can skip over a preposition. But there's a problem in the ordering of object-deletion with respect to PP-shift and to-deletion. If it comes before PP shift, then after it deletes, the environment for to-deletion is met, and to-deletion is obligatory. If it comes after PP-shift, then there is no way to block PP-shift from applying, and if it does apply, we can get the two bad sentences,

(181) John threw Mary.

(182) Mary was thrown by John.

on the reading that Mary is the indirect object. If it comes after passive, we cannot derive (180).

One possible solution would be to revise to-deletion (though not P-deletion) so that it applies only in the environment /\_\_NP NP, just like for-deletion. If we do that, then we can order object-deletion before passive.

With this solution, however, we cannot derive (175): i.e., with the same operation, we cannot have to delete where we want it to, and not delete where we do not want it to. I think therefore, that both solutions, the object-incorporation and the object deletion, are necessary parts of the grammar, though for different verbs. The experiments that we shall discuss shed some light on this.

### 2.2.8. Datives and interpretive rules.

We suggested in an earlier section that interpretive rules were needed to block non-dative readings for instances in which the dative movement rules had applied. These rules can be stated quite straightforwardly for derived structure:

(183) OPTIONAL  
 NP → [ +Dative ] /  $\begin{matrix} V \\ [+Dat] \end{matrix} \begin{matrix} \{to \\ for\} \end{matrix} \begin{matrix} [ \\ +Sentient \end{matrix}$

(184) OBLIGATORY  
 NP → [ +Dative ] / V NP  
 (this rule applies before  
 passive)

Verbs must be marked both for whether or not their indirect objects allow a dative interpretation and also for whether or not they allow preposition-deletion. Thus verbs like say are [ +Dat ], [ -Prep-deletion ]. When we say that rule (183) is optional, we mean that it does not preclude other readings -- the noun phrase may be ambiguous (as we mentioned before, there are some dialects where (183) may be obligatory). On the other hand, if any part of the environment is not met, and in particular, if the object of the preposition is non-sentient, the dative reading will be precluded. However, greater or lesser degrees of sentience are required by different verbs. Feed, for example, allows for a very low degree of sentience, as noted above, offer requires a slightly higher one, and hand an even higher degree.

### 2.3. The interaction between datives and verb-particle constructions

In looking at the relationship between datives and verb-particle constructions, we must consider and be able to account for the

following kinds of sentences:

- (185) John handed over the book to Mary.
- (186) John handed the book over to Mary.
- (187) \*John handed the book to Mary over.
- (188) John handed Mary over the book.
- (189) \*John handed Mary the book over.
- (190) \*John handed over Mary the book.

For the sake of exposition, let us assume that there is one dative transformation instead of three, and that this transformation hence permutes two prepositional phrases and deleted the preposition nearest the verb. Let us further assume that particle movement is to be stated like this:

- (191) (OPTIONAL)
- X V prt. NP Y
- 1 2 3 4 5  $\Rightarrow$  1--2--4--3--5

If dative movement precedes particle movement, we can account for (185), (186), (187), (188), and (189). We cannot account for (190). If dative follows particle movement, the situation is even worse.

Emonds (1970a) has suggested an elegant solution to this problem. If particles are outside the direct object in deep structure, and if they are furthermore represented as intransitive prepositions, the following rule will account for everything, (185)-(190):

- (192) (=Emonds' (30), correcting errors)
- X--V--NP--(P)--
- $$PP \left[ \begin{array}{c} e \text{ --P} \\ \{ \text{to} \\ \text{for} \} \text{ --NP} \end{array} \right] \text{ --Y}$$
- $$1 \quad 2 \quad 3 \quad 4 \quad \quad \quad 5 \quad 6 \quad \quad 7 \Rightarrow 1--2--6--4-\phi-3-7$$

One can fudge this rule suitable to account for variations in dialects, but it really works.

Above (section 2.1.3.), we rejected Emonds' analysis for all particles' coming after the direct object in deep structure, but accepted the idea that directional particles could occur there. It turns out that, with one exception which we shall discuss, all so-called verb-particle constructions that allow datives are really verb-directional constructions, and hence, Emonds' solution is compatible with ours. Examples besides hand over, are pay back, sneak in or out, hand out, pass out, pass over, bring down, type out, read off. The exception is fix up, as in (193)

- (193) a. John fixed up a drink for Charles.
- b. John fixed a drink up for Charles.
- c. John fixed Charles up (with) a drink.
- d. ?John fixed up Charles a drink.
- e. \*John fixed Charles a drink up.
- f. \*John fixed a drink for Charles up.

For my dialect, (193) is more acceptable than the corresponding directional in (190). This is what our theory would predict, since it differentiates between particles and directionals.

There is another exceptional feature about fix up which may or may not be relevant. That is, it is one of those verbs that allows dative movement only when the direct object is indefinite. Compare (193) with (194):

- (194) \*John fixed Charles up the drink.

If we adopt Emonds' analysis for directional particles, this will mean that when these particles occur with to-datives, there will be two directionals in the same simple sentences. We noted above,

pp. , that with certain exceptions, two adverbials of the same type cannot co-occur within the same simple sentence. What we must do now is to find an exception into which these cases will fit. There are several possible alternatives. One possibility is for the two to be some sort of reduced conjunction. Still another is to analyze them as a compound, on the analogy of off of, out of, down from, etc. It doesn't really matter, the point being that the problem can be solved.

#### 2.4 Summary

In this chapter we have investigated the rules involving dative and verb-particle constructions. In the following two chapters we shall discuss psychological theories of learning in general and language learning in particular, using these theories to make predictions as to the acquisition of these constructions by children. Then we shall discuss the experiments we performed to confirm and disconfirm these theories.

Footnotes to Chapter II

1 Of course, sentence (c) is all right:

(c) John's calling the girl up surprised me.

But cases like these, Chomsky argues, are to be transformationally, rather than lexically or morphologically derived, and hence the transformation of particle movement could apply.

2 Sentence (b) is not acceptable in many dialects of English. For those dialects one would have to say that particles, directional or not, must all go next to the verb in deep structure. If both sentences are grammatical, it should be noted that adverbials, particularly prepositional phrases, are allowed to move about rather freely even in nominalizations like these. This further shows the differentiation between particles and prepositional phrases.

3 As is well known, (Culicover, 1967), some idioms are more 'glued together' than others, hence it is possible (or at least somewhat better) to say

(c) ?John set the matter he had been worrying about to rights.

(d) ?Bill has a trick that you haven't heard about yet up his sleeve.

4 If readers are not convinced of the grammaticality of the sentences in (29), I suggest as a useful exercise that they try saying these sentences with and without vowel reduction and the accompanying loss of stress on the object pronouns. I am grateful to Jerry Fodor for bringing this observation to my attention.

5 There are apparently some dialects in which a sentence such as

(a) I sent the paper to Mary.

has only a dative reading. In these dialects, rule (183) below will be obligatory, and sentence of the object of to will be the main determinant of dativity.

6 e.g., This isn't the Mary I used to know, vs. \*This isn't the Mary. See Dean, 1965, Jackendoff, 1968, for fuller discussion.

7 Sentences (b) and (d) should probably be affixed with the Star of David. Sentence (c) is all right in some dialects of English.

8 Again, the 'indefinite datives are exceptional -- i.e., one can say

(e) Mary was done a favor by John  
or, if one can't say it, it at least sounds better than (5ld).

9 See Ross (1967), chapter 3.

10 John was believed by Paul to be expected by George to be given the book by Yoko.

11 It should be noticed that Bowers could get out of much of this interpretive difficulty by making his dative-movement rule obligatory for the above-mentioned verbs. Another way of doing so would be to reserve the to-phrase for datives and have another to-phrase slot for directionals elsewhere in the deep structure. This latter solution ignores, however, the arguments given below for the collapsing of dative and directional to- phrases into one node.

12 They point out that these passives are not acceptable if the indirect object does not get to keep the direct object, though how they could express this restriction is a mystery. They also remark that in their dialect some of these passives are more acceptable than others within the 'get-to-keep' range, but offer no explanation except, possibly, length.

13 Given the rule of Complex NP shift, to-deletion need not be optional for purposes of deriving a sentence like (a):

(a) John gave to Mary the book which he had bought in Paris.  
We can think of the complex NP as moving out (rather than the dative moving in) and ordered after to-deletion. If the environment of

to-deletion is that it deletes when followed directly by two noun phrases, that environment would not exist at the time to-deletion could apply, and hence we could derive (a). If we wish to derive (b),

(b) John gave Mary the book which he had bought in Paris.  
then we can say that in that case PP shift has applied, thus providing the environment for to-deletion.

14 This (b) sentence is really pretty bad. Maybe for-dative phrases can't move so freely. Tant mieux for the order argument.

15 There are idiomatic expressions which are exceptions in the opposite direction (see next fn.). However, these are restricted not to the verbs but to the whole idiom.

16 This is not strictly the case. I have a minimal pair between (a) and (b):

- (a) I sent the pictures to the outhouse.
- (b) I sent the papers to the White House.

There are also sentences such as (c) and (d):

- (c) I gave the door a good swift kick.
- (d) I gave the house a coat of paint.

These are idioms, and occur only with give -- cf. (e) and (f):

- (e) \*I bought the house a can of paint.
- (f) \*I took the house a can of paint.

Outside of sentences such as (c) and (d), anytime an inanimate object is used as a dative, there is a certain degree of personification involved:

- (g) I bought my car a can of oil.

Barring this, and the metonymy in sentence (b), the generalization does seem to hold true.

17 Sentence (139) is almost acceptable on the reading that I gave a book to Mary and somehow this hurt Fred. On that reading, however, to Fred if it is a dative, is of a very different sort.



18 One might argue that this is unacceptable for wholly other reasons. However, Lakoff has argues (class lectures, 1966) that because of sentences such as (a)

(a) The lawn was mowed by the man who usually does so.  
the passive transformation is ordered after do-so. Since for-deletion occurs after passive, the structure would be parallel at the time when do-so applies. If do-so does not apply, it must be that dative for-phrases occur 'further down' in the base than benefactives.

19 It has been argued (Geis, 1970, Fischer, 1967) that examples of the type (146-148) are to be derived from a relative clause containing the more general adverbial dominating a relative clause containing the more specific adverbial. One does not necessarily have to accept this particular analysis, and it does not explain why ( ) is ungrammatical, even though one adverbial is a subset of the other.

20 For some reason, to-datives don't always work this way even though they are as deeply embedded as for-datives. With a pronominal object, there seems to be a pretty free choice as to which element to stress and which to reduce. Perhaps this is motivation for not collapsing the two datives under one node.

21 A paradox here, unfortunately for this analysis, is certain "almost idioms," where the object is so determined that the expression is fixed, e.g., revving a motor or engine.

22 A really crazy thing about this sentence is that what is deleted or whatever is definite rather than indefinite. This may be a different kind of deletion rule.

### Chapter III -- Theories of Acquisition and their predictions

#### 3.0. Introduction

There are a number of substantially different theories of language acquisition which have been proposed, the most interesting of them fairly recently, i.e., since the advent of generative grammar. In this chapter, we shall discuss what I consider to be the most important of these theories, and the predictions that they make about the relative order and ease of acquisition of the specific constructions that we are considering. We shall also consider the interactions between the psychological theories of acquisition and linguistic theories about these constructions.

#### 3.1. Acquisition of langue vs. acquisition of parole

In the generative school of linguistics, we are basically concerned with the internalized competence of a speaker of a language; that is to say, it is the grammar, rather than the output of that grammar, that is central to our field of inquiry. Those developmentalists who accept generative theories of grammar generally accept this as their primary concern as well.

Not all linguists accept the idea of an abstract competence, however; or rather, to be fair, there are linguists whose theories are concerned only with surface manifestations of this competence, what we would call 'performance.' Correspondingly, there are psychological theories which do not allow in their framework the positing of an underlying abstract competence. These theories, when applied to acquisition, must limit themselves to studying the appearance of speech.

(in the sense of Saussure's parole) and are not allowed to posit constructs such as grammars which might underly the child's performance.

These psychological and linguistic theories are interdependent-- that is, the psychological theories fail if the linguistic theory calls for notions too complex for independently well-motivated psychological theories to handle, and the linguistic theory is at least on considerably weaker ground if the psychological theory on which it depends is no longer accepted.

The inadequacy of non-generative linguistic theory and behavioristic or associationistic psychological theories have been thoroughly criticized elsewhere (see, for example, Chomsky, 1959, Postal, 1964), and we shall not discuss them here.

### 3.2. Braine -- straddling the fence

While behaviorism and associationism in general reject the psychological reality of an abstract competence, Braine, with his theory of 'contextual generalization' (Braine, 1963) seeks to combine a form of associationism consistently with the acquisition of part of a grammar. In his words,

Contextual generalization may be defined informally as follows: when a subject, who has experienced sentences in which a segment (morpheme, word, or phrase) occurs in a certain position and context, later tends to place this segment in the same position in other contexts, the context of the segment will be said to have generalized, and the subject to have shown contextual generalization.

(Braine, 1963, p.323)

Braine suggests such a system for the so-called 'kernel' sentences and a large number of separate sub-systems for transforms.

A number of criticisms have been levelled at Braine's theory (see Bever, Fodor, and Weksel, 1965, a, b). One criticism is that for Braine, the kernel sentences contain no transformations in their derivation, not even obligatory ones such as affix-hopping. Braine does not wish to posit abstract structures for the child, preferring to have him rely only on his direct experience. He furthermore does not really explain how the child comes to know the relation between kernels and transforms. Generally, the kind of grammar implicated by his theory is tagmemic rather than generative.

Even where Braine mentions structure in language, he does not really pay much attention to semantic interpretation in general. Apparently, in Braine's theory, a node label should provide a uniform semantic interpretation as long as it is in the same position. As we have seen in chapter II, datives and directionals can occur in the same slot, namely immediately after the direct object (particularly when we are concerned with kernel sentences). Braine's theory provides no mechanism which permits the child to differentiate between such sentences as (1) and (2):

- (1) John sent the package to Mary.
- (2) John sent the package to Mary's house.

One more general criticism about Braine's theory is in order; it is particularly relevant to the acquisition of verb-particle constructions. It has been repeatedly shown (see Ervin, 1964, Bever, 1970, Fischer, 1969) that the child consistently overgeneralizes, and then has to backtrack, as it were, and learn the exceptions to his generalizations. In order to have the pronoun object constraint

discussed in chapter II, the child must fail to generalize. Braine would have to posit what in his terms might be called 'context discrimination,' a process which he might conceivably have a mechanism for, but which he does not, discuss.

Because the set of transforms is distinct from the set of 'kernel' sentences in Braine's theory, it is impossible to make any specific predictions from that theory as to order of acquisition of the constructions and rules with which we are concerned. That is to say, with respect to verb-particle constructions, one cannot say whether the external or internal particle is learned first. Similarly, one cannot determine whether, in the case of indirect objects, it is the [ NP V NP NP ] or the [ NP V NP Prep. NP ] structure which is learned first.

One would predict from a "contextual generalization" theory that a great confusion among functionally distinct structures that occur in similar environments would persist in the child; in particular, this should be true regarding the interpretation of datives and directionals. N.B: The fact that datives can occur immediately after the verb and that directionals cannot (unless, of course, the verb is intransitive) will not prevent this dilemma, since the dative structure would presumably be a transform and hence part of a separate system which the child may or may not have connected to the corresponding kernel structures.

### 3.3. The derivational theory of complexity.

Some of the earliest work in 'generative' psycholinguistics was

designed to demonstrate the psychological reality of grammatical transformations. Work was done specifically on the erstwhile 'optional singulary' transformations (see Chomsky, 1957), e.g., passive, negative, and question formation. In a number of different studies done with adults (Miller and McKean, 1964; Savin and Perchonock, 1965; Mehler, 1964) it was found that the more of these sorts of transformations required to derive a sentence, the more difficult it was for a subject to comprehend or recall that sentence. This notion has been termed the Derivational Theory of Complexity (hereafter abbreviated DTC). Simply stated, it says that the complexity (hence difficulty) of a sentence is directly proportional to the length of its derivational history.

DTC fails, however (see Fodor and Garrett, 1966) as a general account of complexity; i.e., when one considers transformations of different sorts, e.g., relative clause reduction and adjective shift, particle movement, and in general those transformations which do not change meaning or which reduce the number of sentoids in a 'surface' tree (as compared with the base tree).

A version of DTC has been suggested for language acquisition by Brown and Hanlon (1968). To apply this theory to acquisition, they invoke the notion of 'cumulative' complexity. This theory states that if a structure S in its derivation requires N transformations to be derived, and if one adds one more rule to this derivation, then the resulting structure S' will be acquired later than S.

For example, the theory makes the prediction that a declarative sentence will be acquired before the corresponding negative, and that

this same declarative will be acquired also before the corresponding yes-no question, but there will be no prediction as to the relative order of acquisition of negatives with respect to yes-no questions, since neither is "included" in the derivation of the other. This allows the cumulative theory of complexity to avoid one pitfall of DTC, since it is not assuming that one transformation is equal to another in contributing to complexity.

However, Brown and Hanlon restrict their discussion for the most part to the same kinds of transformations as were used in the original DTC studies, namely passive, question, negative, tag-question formation and tag-truncation, and hence it would be possible to level the same sorts of criticism against Brown and Hanlon's theory as were directed against the original DTC. For the constructions considered, the predictions of this theory are borne out, but this may be due to reasons different from those which Brown and Hanlon suggest.

If the structures for which we have argued in Chapter II are correct, then the DTC would make the following predictions about the constructions under consideration:

- (1) With respect to verb-particle constructions, the structures like [ V prt. NP ] would be acquired before structures like [ V NP Prt. ] .
- (2) In the case of datives, the first structure to appear would be [ ...V NP {to  
for} NP ] .
- (3) Next would come (these are unordered with respect to one another)

- (a) [...NP {to  
for} NP] (where one or both NP's are pronouns, under the assumption that pronominalization is transformational)
- (b) [... V NP<sub>2</sub> NP<sub>1</sub>] (where neither NP is a pronoun)
- (4) Last of all would come
- [...V NP<sub>2</sub> NP<sub>1</sub>] (where one or both NP's are pronouns).

At present, at least, DTC excludes semantic considerations, and so would ignore the kinds of semantic factors that might contribute to complexity, such as reversibility, directional adverbials [as opposed to datives], and benefactives [again as opposed to datives]. These factors present serious difficulties for any such theory, and they have yet, to my knowledge, to be evaluated. For example, since no additional transformations are involved, but merely lexical items, the DTC would have no way to distinguish between the difficulty in processing a sentence like (3) as opposed to a sentence like (4), where the only difference is in semantic cues to the grammatical relations involved:

- (3) The teacher is bringing the paper to the teacher.
- (4) The teacher is bringing the boy to the teacher.

The cumulative theory of complexity takes as its main assumption that what the child learns first is closest to his base structure. This is an assumption which must be made at this point in the state of our knowledge, if one is to get anywhere in language acquisition. It should be noted, however, that DTC also implicitly assumes, unwarrantedly, that the base structure does not really change from childhood to adulthood; hence what is learned is transformations -- and not just any transformations, but the adult ones. By implication,



there is no provision for the free restructuring of the child's base, nor for deleting or reordering transformations. Only the addition of new rules seems to be allowed. This is probably too rigid an assumption to make.

The unwarranted restrictions of this assumption have been removed in the theory espoused by Bates (1969). Bates makes explicit as a working hypothesis an assumption which implicitly underlies virtually all the work (including mine) done in the generative view of language acquisition, namely that those structures which the child acquires first, or which are easiest for him, are closest to the child's deep structure -- i.e., have the shortest derivational history according to the child's grammar. Bates seems to favor the idea that the child can indeed restructure the base component of his grammar, and by implication the possible transformations, that is, the child can simplify or complicate the phrase structure, sometimes drastically, in order to account for new generalizations more efficiently (see Chapter I). It is important to reemphasize the importance of differentiating between the child's deep structure and the adult's. The two need not always be congruent.

### 3.4. McNeill and Nativism

McNeill's theories of language acquisition go beyond the DTC in two different directions. One is a natural extension of DTC, which takes it back and applies it to the universal neonate. The other direction is to explore possible strategies that the child might use in interpreting sentences. Combining this with his theory of

linguistic universals, one arrives at some very strong claims about the acquisition of grammar.

McNeill (1966, 1970) takes the innateness hypothesis very seriously and rather literally. McNeill states that the formal universals are innate. Furthermore, the basic grammatical relations are also innate (1966, p. 101), and since these relations are defined over the base, a universal base must hence also be innate or at least acquired very early, (1966, p. 112). For McNeill,

It is necessary to suppose that the features of language that correspond to the linguistic universals are among the first acquired. This hypothesis leads us to expect that children's first grammatical efforts will include the abstract features contained in linguistic theory

(McNeill, 1966, p. 101).

The proposal already discussed -- that the basic grammatical relations are part of a child's capacity for language -- provides such a theory. In order to apply the definition of the basic grammatical relations, it is necessary to assume that the information symbolized as NP, VP, D, N, and V is also available to a child

(McNeill, 1966, p. 112).

If the base and grammatical relations are innate, what about transformations?

In the case of syntax, every language utilizes the same grammatical categories, arranged in the same way -- sentences, noun phrases, verb phrases, etc. Every language utilizes the same grammatical relations among these categories -- subject and predicate, verb and object, etc. All of these are characteristics of the abstract underlying structure of sentences.

The transformations of a language, on the other hand, present much more idiosyncrasy....

We can collect these several considerations into a theory of language acquisition. Important aspects of the deep structure of sentences are described by universals; most transformations are idiosyncratic uses of universal transformational types. Assuming that linguistic theory describes

linguistic abilities, we can say that the abstractions of the underlying structure reflect children's linguistic capacities, and are made [*McNeill's*] abstract by children discovering the transformations of their language. One can say that children begin speaking underlying structure directly [*mine*]

(McNeill, 1970, pp. 71-72).

If one wishes to make predictions from McNeill's theory as to the acquisition of verb-particle constructions and datives, one must first determine whether or not he considers any of these to be basic grammatical relations. As for verb-particle constructions, no nativist would claim that particles are innate. For indirect objects, the question is somewhat unclear. It depends on what McNeill means by 'etc.' when talking about grammatical relations. He does not specifically consider whether or not datives are in the universal base.

Furthermore, even if indirect objects are in the universal base, this base is, according to McNeill, perhaps unordered, and since prepositions would most likely not be in a universal base (though I wouldn't know what to say about case-marking), it would not be possible to predict, on the basis of linguistic universals, which form of English indirect objects is acquired first, or innate, if either.

Related to this is another problem: if datives are in the base, which (if either) semantic interpretation is primitive -- the recipient notion of the 'true' dative, or the directional (to-dative) or benefactive (for-dative) notions implied by what in English is the prepositional form? Judging from what McNeill says about an experiment he has run on indirect objects (see below), this latter view would seem to be his position. In that case one might possibly make the prediction that in

English the prepositional form is acquired before the dative form. But this says nothing about whether the prepositional form can have a dative interpretation for the child.

Going beyond DTC in another direction, McNeill has investigated certain aspects of the acquisition of indirect objects, by Japanese children (McNeill, 1971). He tested a group of 3-, 4-, and 6-year-old children, using one verb (ageru -- give) in initial, medial, and final position, co-varying with the presence or absence of one or both of the object-marking postpositions, o (direct object), or ni (indirect object). All sentences were in the imperative, and the child was required to act out the sentences using toys. Sentences were all reversible; if the direct object was animate, so was the indirect object, and if the direct object was inanimate, the indirect object was also. It should be noted that in Japanese, as in English, a sentence containing give and an inanimate indirect object (except for certain idioms) is semantically anomalous.

McNeill found two very interesting results, which are most likely related. The first is that Japanese children have three inference strategies at their disposal for the interpretation of direct and indirect objects. The second is that children switch among these strategies in mid-experiment, often several times within one session.

The first of the strategies is what adult speakers presumably use, namely marking the objects by means of post-positions. This strategy does not seem, according to McNeill's results, to be the most important for children. The other two strategies are, roughly as

follows:

- (1) The direct object is the noun phrase closest to the verb.
- (2) The direct object is the first noun phrase in the sentence.<sup>1</sup>

McNeill found that the order and marking which elicited the most accurate responses was [ V NP NP ni ]; that is to say, when the verb was initial, the direct object unmarked, and the indirect object both last and marked. He feels that this order, taken in connection with the predominant strategies found, is due to the operation of some strong universal constraints. One might be willing to accept such a view, even without any supportive evidence. This is fortunate, since the evidence which McNeill adduces leave a number of unanswered questions.

First, in his discussion, McNeill ignores possible differences between the semantically well-formed and the semantically anomalous sentences in his stimulus material. Although there might not have been any differences, it is unlikely. At any rate, one would prefer to have some information on this point.

Secondly, ni has many uses in Japanese, only one of which is the marking of the indirect object -- other uses which are pertinent here are the directional and the locative. In McNeill's paradigm, there is no way of knowing what the child's actual interpretation of ni is. The child could, for example, ignore the verb altogether and use ni's directional interpretation, and still perform correctly. Thus, many of the difficulties over non-marking of the indirect object could be attributed to reasons different from those which McNeill cites.

Thirdly, the notion 'noun phrase closest to the verb' is

unclear (or at least ambiguous) when the verb is equidistant between the two noun phrases, as it was in roughly 25% of the test sentences. McNeill notes this, but does not offer any explanation.

Fourthly, by having every sentence subjectless, McNeill introduces the possibility that what he designates as the 'direct object' is being interpreted as a subject rather than as an object. e.g., rather like a mediopassive.<sup>2</sup> Two studies (Bates, 1969, and Fischer, 1970) have shown that if a sentence which ought to have a direct object is presented to a child without that object, the subject of the sentence is interpreted by a large proportion of children as the logical object. By making the interpretation that the direct object is the subject<sup>3</sup>, the child would be able to act the sentence out correctly, and would be hindered much less from making that interpretation if the object marker were not there.

S = OK  
for  
object

Fifthly, in the dialect of Japanese which McNeill was working with, if the direct object immediately precedes the verb, the particle o may be deleted, and hence the sentence is perfectly grammatical, and even stylistically preferred, especially when talking to children. So, McNeill is, as in the case of inanimate indirect objects, once again juxtaposing ungrammatical sentences with grammatical ones. If the children at the age he is considering have mastered dative constructions in Japanese, it would be natural for them to perform better on grammatical constructions than on ungrammatical ones.

McNeill's theory, by purporting to be universal, makes some strong predictions for the acquisition of English, namely that the

for adults canonical order V NP  $\left\{ \begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix} \right\}$  NP will be acquired first, and any additions made later, since this structure has the direct object as the noun phrase closest to the verb (ignoring the subject, of course).

It is important here to clarify McNeill's reasons for wanting this strategy, of interpreting as the direct object the noun phrase closest to the verb, to be present in children. He reasons that a direct object is more closely related to the verb (probably semantically related, though he does not specify) than an indirect object. However, while this may be true for ageru, it does not necessarily generalize to give, and furthermore there are cases such as tell or show, in which it is unclear which of the two objects is more closely related to the verb. Moreover, there are verbs which take indirect objects which do not take direct objects, e.g., speak, talk, listen, etc. While there might be a plausible argument for object incorporation (see chapter II) in these cases, it would have to be of a different character from what we have seen previously, since object-incorporation, except in such idioms as talk sense to, would have to be obligatory. While both sentences in the pairs (5) and (6) are grammatical, such is not the case in (7) and (8):

- (5) a. John fed the fish.  
b. John fed the fish some worms.
- (6) a. John hated pitching to Jose.  
b. John hated pitching knuckleballs to José.
- (7) a. John talked to the trees.  
b. \*John talked some sentences to the trees.

- (8) a. John spoke to his mother.  
b. \*John spoke a bad word to his mother.

If object-incorporation occurred consistently at the lexical level rather than at the transformational level, McNeill's theory could still account for the verbs in (10) and (11). However, we attempted to show in Chapter II that some objects are incorporated lexically and some are deleted transformationally. This leaves McNeill's theory in a dilemma.

Part of the reasons for this dilemma may be that McNeill's theory is an attempt to combine at least two other theories. The first is the extension of DTC, and the second is the theories which have developed more fully the notions of interpretive strategies. This latter type of theory is what we shall turn to next.

### 3.5. An alternative to DTC and variations of it

Instead of looking at the step-by-step acquisition of various structures and transformations, there are two theories which go beyond this to look at the content of these structures and the motivations that the child might have for learning them. Both of them concentrate, using different terms, perhaps, on the kinds of short-cuts, syntactic and semantic, that children might use to interpret sentences that they hear. The two theories are complementary.

#### 3.5.1. Complexity

One of the few people who have investigated the acquisition of complex sentences is Carol Chomsky. In her dissertation (1969), Chomsky investigated the acquisition of certain aspects of sentential complement structure, their relation to embedded questions (see



Bresnan, 1970, for synchronic arguments relating them quite closely), and pronominal anaphora. She was specifically interested in the growth of the child's ability to interpret deleted or pronominal material as determined by the verb which embeds that material, the subordinator chosen, and the general syntactic relation between the sentoid in which the anaphora or deletion occurs and other sentoids in the structure.

Her results parallel results obtained in the area of adult psycholinguistics, and we shall discuss the latter first. Fodor, Garrett, and Bever (1968) have found that adult subjects have more difficulty processing sentences of the form [NP V NP] if the verb can take sentential objects as well as nominal ones, even though the sentences under consideration do not themselves have sentential objects. For example, consider the two sentences

(9) Boris drinks the blood.

(10) Boris sees the blood.

In (9), the verb drink is 'unambiguous' syntactically. One cannot say

(11) \*Boris drink that the milk was sour.

(12) \*Boris drank Natasha (to) open the door.

(13) \*Boris drank what to wear.

One way of talking about this is to say that someone who hears sentence (9) and knows the strict subcategorization restrictions of the verb drink has fewer structural options to evaluate in interpreting the sentence.

See, on the other hand, is, syntactically at least, multiply ambiguous:

(14) Boris saw that the milk was sour.

(15) Boris saw Natasha open the door.

(16) Boris saw what to do.

Hence, someone hearing sentence (10) has more structural options to consider before deciding what structure it is an instance of.

Working with children, Chomsky has found similar results, though along somewhat different parameters. Consider, for example, the verbs ask and tell. Both verbs can occur with simple noun phrase, objects, for-to complements, and embedded questions, but with a big difference.

Consider the sentences below:

- (17) a. Boris told Natasha a lie.  
b. Boris told Natasha to drink some blood.  
c. Boris told Natasha what to wear.

- (18) a. Boris asked Natasha a question.  
b. Boris asked Natasha to drink some blood.  
c. Boris asked Natasha what to wear.

There are two differences between ask and tell, both of which make the interpretation of ask more complicated than that of tell. The first is that in addition to (18b) one can also say (19), but not (20):

(19) Boris asked to drink some blood.

(20) \*Boris told to drink some blood.

The second is that while the understood subject of the embedded sentence remains constant for tell, its interpretation when embedded under ask varies according to the subordinator chosen. Thus we see that in (18b) Natasha is the deleted subject of drink, but in (18c) it is Boris that is the subject of wear. Ask, then, sometimes obeys the Minimal Distance Principle (see Rosenbaum, 1967) and sometimes does not. For this reason, Chomsky predicted that constructions using ask would be

more difficult than those using tell.

Chomsky found in fact that sentences like (18c) were more difficult for children to interpret than sentences like (17c), even through age 9. She attributes this additional difficulty to the inconsistencies involved in the interpretation of the deleted subject in a sentence embedded under ask. The difference between Chomsky's experiments and those of Fodor, Garrett, and Bever is that for Chomsky the presence of options for the interpretation of implicit grammatical relations causes difficulty, whereas for Fodor, Bever, and Garrett it is the options of multiple selectional rules that cause trouble.<sup>4</sup> The two sets of results can be seen as complementary. In both cases, the subject can be said to form an expectation, which is likely to be violated when there are more than one possible expectation.

There are, I think, two main predictions that one could derive from Chomsky's theory with respect to the order of acquisition of the structures with which this dissertation is concerned. There are no particular predictions about verb-particle constructions, but for datives, one would predict first, that once the child has arrived at selectional restrictions for verbs which may take datives, reversible sentences should be more difficult than non-reversible ones, since there would be two rather than one possible interpretation of the grammatical relations. However, semantically anomalous non-reversible sentences should be interpreted incorrectly -- this assuming that the theory can be extended to cover these types of grammatical relations.

Secondly, sentences containing verbs which may take only dative interpretations, such as read, give, and tell should be easier,

and hence mastered earlier, than verbs which may take both datives and either directionals or benefactives, such as throw, buy, etc. Pronouns, as absolute exceptions to dative movement, should be harder than full noun phrases.

The theory would also predict that a structure, perhaps one like [NP V NP NP], which violates an expectation (e.g., of a structure of the form [NP V NP<sub>{to, for}</sub> NP]) would be more difficult. If, however, the semantic ambiguity involved in the prepositional form is included in Chomsky's theory, then a contradiction is raised -- the double-object structure has only the dative interpretation, and hence, if the criterion applies here, should be easier than the prepositional structure, which allows two possible interpretations for the prepositional phrase.

### 3.5.2. Learning how to learn

In Chapter I, we gave a brief discussion of the theories of language acquisition developed by Bever, Garrett, and Fodor (see also Bever, 1970, a, b, Bever, Garrett, and Fodor, to appear). The essence of this theory is the stress it places on the importance of the child's development of learning strategies for producing and especially for comprehending his language. In using an inference strategy the child (or the adult) may pay attention to some cues in a sentence and completely ignore other, possibly contradictory, cues. Studies which have been done on adults (Fodor and Garrett, 1967) and children (A. Olds, 1969) have shown that surface cues to deep structure grammatical relations play an important role in comprehension. It was found, for example,

that center embedded relative clauses such as that found in (21)

(21) The man the boy the dog bit chased died.

are understood faster and more accurately if the relative pronouns are left in, rather than deleted.

This theory would predict that verb-particle constructions, which do not delete surface cues, may not necessarily be easier in one form than the other. With respect to the acquisition of datives, this theory would, first of all, tell us to watch out for inference strategies. One plausible such strategy is the one cited by McNeill, namely that the first noun after the verb is the direct object. In the case of English, this collapses with the other strategy posited by McNeill that the noun closest to the verb (not counting the subject) is the direct object.

The theory also argues that trouble would arise for the child if the surface cues as to the deep grammatical relations are deleted or distorted. What this means for our study is that this theory would predict that the deletion of to or for should cause problems for the child; in addition the distortion of order brought about by the movement of the dative phrase next to the verb will also adversely affect the child's understanding.

Surface cues, it should be pointed out, are not restricted to being strictly syntactic. Bever et al. (to appear) have shown that children age 3 perform more accurately on non-reversible passives (where the grammatical relations conform to the semantic plausibility) than on reversible ones, the only difference being an extra semantic cue in the non-reversible cases. Correspondingly, they found that incorrect

non-reversibles (those where grammatical and plausible syntactic relations contradicted each other) evoked accuracy significantly below chance (and below the reversible passives). One might expect the same sorts of results with datives.

It should be noted that the difficulties associated with distortion or deletion of surface structure cues to deep structure grammatical relations bring this theory more into convergence with DTC than might be thought at first glance. These distortions and deletions are, of course, brought about by transformations, and the more distortions and deletions there are -- the more transformations in a derivation -- then the more difficulty. There remain, of course, substantive differences in the two theories, notably in consideration of those transformations which do not distort or delete surface cues.

### 3.6 Some residual linguistic issues relevant to our discussion.

#### 3.6.1. Pronominalization

There are basically two theories of pronominalization involved in current disputes: The transformational theory, as exemplified in Ross (1967a) and the interpretive theory (Dougherty, 1969). The transformational theory says that a noun is changed transformationally into its corresponding pronominal form under identity with an antecedent. The interpretive theory maintains that pronouns are generated in the base and that anaphoric relations are determined by interpretive rules. These two theories have different empirical consequences with respect to the acquisition of both verb-particle and dative constructions.

The transformational theory predicts, that, all other things

being equal, if pronominalization is a transformation for the child and the adult, a sentence containing a pronoun ought to be harder for a child than one containing a full noun phrase. Hence, (22) ought to be harder than (23), and (24) should be more difficult to process than (25):

(22) John picked it up.

(23) John picked the box up.

(24) John gave the book to her.

(25) John gave the book to the woman.

From the interpretive theory one would predict that (22) and (24) would be neither easier nor more difficult than (23) and (25), respectively, and if one brings in considerations of length, those sentences containing pronouns might even be easier than those containing the corresponding full noun phrases.

### 3.6.2. Empirical consequences for linguistics of acquisition studies.

Since it is possible for the child to restructure his grammar, what we may find to be the child's deep representation for pronouns, verb-particle constructions, and direct or indirect objects cannot by itself prove or disprove any theory as to the adult's deep representation of these constructions. However, it is up to those linguists or psycholinguists who wish to argue for an adult structure different from the child's to show what would motivate the older child to change his representation.

### 3.7. Conclusion

We have examined a number of major theories of acquisition which bear upon our investigation of the development of the grammar of

verb-particle constructions and datives in children. In the next two chapters, we shall present and discuss the experiments we performed with children in an attempt to resolve the issues raised here.



Footnotes to Chapter III

- 1 Recall that all of McNeill's sentences are subjectless. It is a non-trivial question what the child's performance would be when confronted with a sentence containing a subject as well as two objects. It could well be drastically different.
- 2 The form McNeill used for the imperative, agete, is not the 'true' Japanese imperative, which is used quite rarely and quite rudely, but rather the 'gerundive.' While this form is used as an imperative, it is also used in non-imperative contexts, e.g., the present progressive (with an auxiliary verb) and in the first conjunct of a conjunction of sentences.
- 3 In fact, a non-trivial number of the subjects I tested on indirect objects had the tendency to repeat the sentences I presented to them, or more often in free production when talking about pictures, by deleting the subject and putting the direct object in subject position, with the interpretation (which I checked carefully) that the new subject was being acted upon.
- 4 It may be that the child must learn, more fundamentally, that the interpretational options are available in the first place. In the case of Chomsky's results, the child would have to learn that there exist possible exceptions to the Distance Principle, while for Fodor, Garrett, and Bever's structures, the child must learn that verbs may take sentential objects.

## Chapter IV -- Experiments performed

### 4.0. Introduction.

In order to determine at least some of the processes going on in the acquisition of verb-particle and dative constructions in English, the following sets of experiments were performed.

Experiment #1. Examines the differences in children's performance on verb-particle constructions depending on whether the direct object was a full noun phrase or an unstressed pronoun.

Experiment #2. Compares the child's performance on stressed vs. unstressed pronoun direct objects of verb-particle constructions.

Experiment #3. Examines imitation and comprehension of to-datives by the child of four as governed by the parameters of reversibility, direct object pronominalization, indirect object pronominalization, placement of to, and order of objects.

Experiment #4. Examines imitation and comprehension of to-datives by the child of three-and-a-half as governed by the parameters of reversibility, direct object pronominalization, indirect object pronominalization, placement of to, and order of objects.

Experiment #5. Examines comprehension of one-object to-datives as influenced by the directionality of the verb, animacy of the object, and presence or absence of to.

Experiment #6. Examines imitation and grammatical judgments of for-datives by children averaging just under four governed by the parameters of dative movement and verbs which allow or do not allow this movement.

Experiment #7. Examines imitation and grammatical judgments of for-datives by three-and-a-half-year-olds as governed by the parameters of dative movement, verbs which allow or do not allow this movement, and pronominalization of the indirect object.

Although the stimulus material presented in any one experiment was relevant to several issues,<sup>1</sup> we shall discuss each issue independently.

#### 4.1. Experiments on verb-particle constructions

Two experiments were performed which dealt with verb-particle constructions. The first was concerned with comparing the child's intuitions on sentences containing full noun phrase objects with those on sentences containing unstressed pronoun objects. The second compared stressed and unstressed pronoun objects.

##### 4.1.1. Experiment #1. Verb-particle: Full NP vs. Pro.

Twenty-four children, chosen at random from responses and ads, ranging in age from 3-9 (i.e., three years, nine months) to 4-3 were tested individually. The stimulus material for each subject consisted of eight 'minimal' pairs of sentences, each pair differing only in the feature of particle placement. An example of such a pair is (1):

- (1) a. The girl is calling up her daddy.
- b. The girl is calling her daddy up.<sup>2</sup>

- (2) a. The girl is calling him up.
- b. The girl is calling up him.

One-half of the sentences (e.g., (1)) contained full noun phrase objects, while the other half (e.g., (2)) contained unstressed pronoun objects. The order of presentation of stimulus sentences, with respect to the different verbs used, the position of the particle in the sentence, and pronominalization, was counterbalanced across subjects. That is, half of the pairs were presented to the child with the sentences containing the moved particle first (e.g., the order given in (2)) and half with the sentences containing the moved particle second (e.g., the order given in (1)). Pairs with pronouns were interspersed with pairs containing full noun phrases, and the order in which the various verb-particle constructions were presented changed from subject to subject.

Children were requested to repeat each sentence of a pair, and then, when this task was completed, the experimenter repeated the two sentences in reverse order (from the original presentation) and asked the subject to choose which one 'sounded better.' It had been noted in previous experiments (Fischer, 1970) that, all other things being equal, a child will almost invariably choose the last thing that he or she hears. Hence the rationale behind this particular task was that if the child's grammar did not differentiate between two members of a pair, he or she would choose the latter member as sounding better, but if the grammar did differentiate between the two sentences, the recency effect would be overridden, and the child would be more likely to choose the first sentence if it was more grammatical than the second.

This is largely what happened. For the full noun phrase objects, the choice scores leaned slightly towards the particle's being located after the object (see Table I). This difference is not significant. It becomes even less so if one throws out one of the verb-particle constructions. It turns out that wear out, especially in the stimulus sentence used

- (3) a. The fireman is wearing out his boots.  
b. The fireman is wearing his boots out.

is ambiguous between an idiomatic and a directional meaning. If we rule out this construction, the result is striking (see Table II). The only real effect is the recency effect -- children overwhelmingly chose the second thing they heard ( $F = 98.35$ ,  $p < .0005$ ,  $df = \frac{1}{92}$ ).

Table I -- results of full noun phrase objects

	Part. External	Particle Int.	Total
First	11	6	17
Second	<u>41</u>	<u>38</u>	<u>79</u>
Total	44	52	96

Table II -- results of full noun phrase objects discounting wear out

	Part. External	Particle Int.	Total
First	5	5	10
Second	<u>30</u>	<u>32</u>	<u>62</u>
Total	35	37	72

The results for the full noun phrases contrast with those for the pronoun objects. Here, although the recency effect still holds ( $f = 48.5$ ,  $p < .0005$ ,  $df = \frac{1}{92}$ ), the overwhelming factor was the

positioning of the particle ( $f = 159.3$ ,  $p < .0005$ ,  $df = \frac{1}{92}$ ). The results are tabulated in Table III.

Table III -- Results for pronoun object verb-particle constructions

	Part. External	Particle Int.	Total
First	1	31	32
Second	<u>18</u>	<u>46</u>	<u>64</u>
Total	19	77	96

From these figures, it is obvious that the child is sensitive to a restriction on the verb-particle construction. The child's grammar excludes sentences of the form [NP V prt. PRO], at least where the pronoun is unstressed. One thing which the data do not show is what single base form, if any, the child uses for verb-particle constructions. To determine this would require, most likely, looking at much younger children, and even that sort of evidence would not necessarily be conclusive, for there is always the possibility that the child restructures his grammar at some later stage.

If one considered the results from this experiment themselves, one might conclude that by the age of 4 the child had mastered the adult grammar for verb-particle constructions. The next experiment that we shall discuss shows that this was not the case.

#### 4.1.2. Experiment #2: Verb-particle. Stressed vs. unstressed pronoun objects'

In this experiment 16 children, not the same as in #1, between 3-9 and 4-2 were tested. The same method was used as in the first

experiment, except that in this one each child received four minimal pairs (instead of eight) and the two variables, in addition to balancing for which sentence came first or second in a pair, were stressing of the particle vs. stressing, sometimes contrastively, the pronoun object, and pronoun objects which were inherently stressed vs. those which were not. The four objects used were it, him (no inherent stress), and that and one (some inherent stress -- i.e., in assigning normal sentential stress, these will receive some stress).<sup>3</sup>

There was no significant difference in the children between their performance on sentences containing unstressed pronouns and those containing stressed pronouns, regardless of whether those pronouns were stressed syntactically or contrastively. (See Table IV below.)

Table IV -- Results from Stressed vs. Unstressed pronoun objects in verb-particle constructions

	Internal Particle		External Particle		Tot.
	Part. Stress.	Pro. Stress.	Part. Stress.	Pro. Stress.	
First	0	0	7	6	13
Second	<u>8</u>	<u>8</u>	<u>17</u>	<u>18</u>	<u>51</u>
Total	8	8	24	24	64

We recall from Chapter II that in the adult grammar sentences like (4) are ungrammatical, while those like (5) or (6) are not:

(4) \*The girl is calling up him.

(5) The girl is picking up one.

(6) The girl is calling up him.

For these children, sentences (5) and (6) were ungrammatical just as (4) was.

In Chapter II, we accounted for the acceptability of (5) and (6) by stating the pronoun direct object output condition in such a way that it applied only to unstressed pronouns. Given the unacceptability of (5) and (6) to children of this age, there are two ways of accounting for these sentences in their grammar. One is to say that the children do not have an output condition at all, but merely a transformational constraint on particle movement. This would be supported by the fact that children do not differentiate between stressed and unstressed pronouns -- if stress placement applies after the transformations, the children would not be able to differentiate for the purposes of the transformation.

The other way of accounting for the data would be to say that the children do have an output constraint, but that it is more general than the adult's, in that it omits the stress limitation. The only grounds on which to directly empirically distinguish between these two explanations would be to see if the child accepts passives such as (7):

(7) The girl was given it by John.

Unfortunately, 4-year-olds cannot begin to handle sentences of the complexity of (7) -- they have enough problems with one-object passives. Even so, the interpretation of the data which calls for an output condition gains some credence from some of the observations made on the to-dative experiments, which we shall discuss presently.

These results might seem to be rather surprising, since it has been claimed quite extensively in the literature that prosodic features are the child's entrée into his language -- i.e., that the child first



learns intonation patterns and stress contours, and that these give him clues into how the syntax of his language works. Hence the fact that a child of four does not distinguish between stressed and unstressed pronouns even when his syntax is rather developed is quite striking.

Even more striking is the finding by Atkinson-King (1970) that older children, up to the age of 11 or 12, cannot distinguish between nuclear and compound stress -- a child may use the rules, but not distinctively as an adult presumably does. If this should be true for all stress rules, or for all but word-internal stress rules, then it stands to reason that a child could not use the feature of stress in any crucial way in his grammar until he fully learns the uses of the stress rules concerned.

In fact, these findings provide evidence for the theory of stress placement advocated by Chomsky and Halle (1968), which says that the stress rules operate on the surface structure generated by the syntactic component of the grammar. If the syntactic component is not yet fully formed, it is hardly easy for the child to use it for stress placement.

#### 4.2. To-datives

Pronominal objects are involved in a crucial way, not only in verb-particle constructions, but also in indirect object constructions. Hence, we also examined datives. In this section, we shall discuss to-datives.

In investigating the acquisition of to-datives, I was interested in a number of different aspects of the problem. First, what kinds

of cues does the child rely on in the interpretation of sentences containing datives? What relative importance do the features of semantic plausibility, order of objects, prepositional cues, and individual lexical items have? Are there any of these features which change their relative importance over time? Does the child react the same or differently to pronoun objects in a dative context as opposed to a verb-particle context? The experiments described in the following sections are attempts to answer these kinds of questions.

4.2.1. Experiment #3. To-datives: pronominalization, to-placement, reversibility, and order of objects -- older children  
4.2.1.1. Materials

The materials for the first experiment consisted of a set of 48 sentences for each child (different sentences for different children) and 72 pictures divided into two equal sets. The list of sentences was constructed in the following way: for each of twelve verbs, four base-line sentences were made up. Where possible (i.e., grammatical) two of these sentences were made reversible and two non-reversible. This was not possible with four of the verbs chose, namely tell, read, write, and promise, so for these verbs four different non-reversible sentences were made up. Here are some examples of the base-line sentences:

- (8) bring a. The nurse is bringing the doctor to the lady.  
(reversible)  
b. The nurse is bringing the water to the lady.  
(non-reversible)  
c. The mother is bringing the boy scout to the teacher.  
d. The mother is bringing the paper to the teacher.

- (9) read
- a. The mother is reading the comics to the clown.
  - b. The mother is reading the book to the child.
  - c. The daddy is reading the story to the child.
  - d. The daddy is reading the newspaper to the children.

Other verbs used besides the six mentioned above were carry, give, show, send, feed, give, and take. These verbs were chosen because I thought the children I was testing would be familiar with them.

Each of the base-line sentences was rewritten in 24 versions according to four independent parameters: direct object pronominalization, indirect object pronominalization, order of the two object noun phrases, and position of to. The first three were binary oppositions, but position of to varied in three ways. It could occur immediately after the verb, between the two objects, or not at all. Twenty-four lists, one for each subject, were then compiled from these jugglings, using a different basic sentence for each type. All sentences were in the present progressive, as in the verb-particle experiments, both to avoid phonological confusion and to facilitate picture discussion. A few sample lists are given in Appendix A.

Among the sentences used, three of the twelve verbs employed, namely write, promise, and tell, were considered virtually impossible to depict. With these exceptions, each sentence had associated with it two pictures, one differing from the other by the feature that the grammatical relations between the two objects were reversed. So for example, with the sentence

- (10) The teacher is throwing the puppy the stick.

would be associated two pictures, one depicting the teacher throwing the stick to the puppy, and the other depicting the teacher throwing the

puppy to the stick. A sample of pictures used are presented in Appendix B.

#### 4.2.1.2. Method

Twenty-four subjects, chosen at random from responses to advertisements in the Boston Globe, and ranging in age from 3-9 to 4-3, were tested individually. Each subject was tested four times in sessions lasting approximately 25 minutes each. All sessions took place within at most a week's span.<sup>4</sup> In each session the subject was presented with twelve sentences, separated halfway through with sentences from another experiment and a 5-minute break.

Two primary and two secondary methods were used. The primary ones were repetition and picture choice, and secondary ones were paraphrase and picture discussion.

Repetition -- Although it has been claimed (cf. Fraser, Bellugi, and Brown, 1963) that a child can repeat more than he knows, in general researchers have found (Ervin, 1964, Slobin and Welsh, 1969) that a child can repeat a sentence only in terms of his own grammar. For this reason, repetition was one of the main tools utilized in this experiment. I was particularly interested in how the child would repeat or react to ungrammatical sentences, since I had previously found (Fischer, 1969) that these sentences often produce spontaneous corrections or giggles, if the sentence constitutes a violation of the child's grammar.<sup>5</sup> Repetition, then, can be quite revealing as to how the child processes linguistic material.

Each child was requested to repeat every sentence presented to

him or her. The experiment was called a game of 'say what I say.' I said a sentence as many times as was necessary for the child to respond. If a sentence contained one or more pronoun objects, each pronoun was given a natural antecedent. For example, suppose that the stimulus sentence was (11):

(11) The fisherman is throwing to it the lobster.

Then that sentence was introduced in something like the following manner:

"The next story is about an octopus. The story is, 'The fisherman is throwing to it the lobster.' Can you say that?"

In order to offset the possibility that children might treat pronouns differently because they were given antecedents, I often gave a full noun phrase an antecedent as well. Of course, any vocabulary item which was unfamiliar to the child was explained to him until he comprehended it before going on the the repetition task.

Picture choice: After the repetition of a picturable sentence, the child was presented with two pictures. After I had made sure he noticed and could identify everything in both pictures, I again said the sentence and asked the child to choose which picture was 'a picture of the story.' This task was designed to determine how the child was interpreting the grammatical relations in the sentence, in particular, which noun phrase be interpreted as the direct object and which as the indirect object.

Paraphrase and picture discussion: The techniques of paraphrase and picture discussion were used more or less as double-checks on the child's comprehension and the accuracy of the choice.<sup>6</sup> In the

paraphrase task, I asked the child questions like, "What does that mean?" (not really a good question to ask a child under 5) or "What would happen if you had a bear and fed a tomato to him?" or "Who gets to keep what?" This technique was particularly useful in the case of those verbs for which there were no pictures.

In the picture discussion, I pointed to the picture which the child had not chosen and asked him what was happening in this picture, often with a prompt. For example, if the picture was of a hunter feeding the tomato to the bear, I would say, "What's the hunter doing in this picture? (then, if no response) He's feeding...." If the child responded to this with the original sentence, we then went back to the picture choice task again. If one of the objects was a pronoun in the original sentence, I also asked a question including the antecedent in order to elicit the same pronoun, e.g., "What is the farmer doing with the turtle?" This technique worked fairly well when the pronoun in question was the indirect object, and not at all well when the pronoun was supposed to be the direct object. However, children often would pronominalize the indirect object without any prompting, which leads me to believe that my prompting had little or nothing to do with the child's response. Responses were recorded onto a score sheet.

#### 4.2.1.3. Scoring

There were basically three possible scores for the repetition task -- right, wrong, or corrected. A sentence was scored as right if it was repeated either verbatim or with the essential elements included-- i.e., a sentence was not counted as wrong if the -ing was missing from the verb. A sentence was scored as wrong if the child was unable to

repeat it, or if in repeating it he omitted an essential element, such as an object. Corrections were of many types: deletion, addition, or permutation of to, permutation of the two objects, stressing of a pronoun (or changing it to that), performing or 'unperforming' dative movement, etc. These kinds of corrections were counted as wrong for the purposes of statistical analysis, but were taken into consideration in overall interpretation of the results.

There were four possible scores for the picture choice. Children were scored right if they chose the picture which corresponded to the sentence presented to them. (Note: sentences of the type [NP<sub>1</sub> V to NP<sub>2</sub> NP<sub>3</sub>] were scored as correct when the subject interpreted NP<sub>2</sub> as the indirect object.) Three 'wrong' scores were possible. First, a choice could be wrong syntactically, but right semantically, i.e., the child would choose the picture representing the more semantically plausible action. Second, a choice could be wrong according to the original sentence presented to the child, but correct in terms of the way the child had repeated it. For example, if the original sentence was (12), the child might correct it to (13) and choose the picture accordingly.

(12) The farmer is feeding to the turtle the snake.

(13) The farmer is feeding the turtle to the snake.

Thirdly, a choice could be counter to both the syntax and semantics of a situation -- simply wrong. As in the case of repetition, all three 'wrong' scores were counted as wrong for the purposes of statistical analysis, but are taken into account in the interpretation of the results.

#### 4.2.1.4. Results<sup>7</sup>

##### 4.2.1.4.1. The effect of to

In the original stimulus material, placement of to had been varied in three ways: in one-third of the sentences it occurred between the two objects, in one-third before the first object, and in the other third not at all. The placement of to had an enormous effect on both repetition and choice scores (Repetition:  $F = 126.277$ ,  $p < .0005$ ,  $df = \frac{2}{46}$ : Choice:  $F = 16.931$ ,  $p < .0005$ ,  $df = \frac{2}{46}$ ). The most accurate repetition and choice scores occurred when to was in the right place, i.e., between the two object noun phrases. These two scores support the view that for the child, the order [ NP V NP NP ] is not as basic as the order [ NP V NP to NP ] . That view is further supported by the fact that in the 'talking about the other picture' task the children almost invariably used the latter structure, even when the original sentence was of the former form. These results also suggest a possible strategy for the child in interpreting sentences with two objects, namely, to interpret the first noun after the verb as the direct object and the second as the indirect object. In this light, it is interesting to note that a number of children, being sensitive to certain parallelisms (i.e., preferring to use the same structure in production as in the original stimulus sentence) would in the 'other picture' task sometimes omit the to, or even place it before the first object in the sentence, but still intend the sentence to be interpreted as though the to were between the two objects.

The children did pay attention to cues other than order, however. This shows up in the fact that the picture choice scores were



more accurate if to was in the 'wrong' place, i.e., immediately after the verb, than if it was totally absent ( $p < .10$  on the Scheffé test). This shows that the prepositional cue does help, even though the sentence in which it occurs may be ungrammatical. Contrastingly, repetition scores on sentences of the form [NP V to NP NP] were drastically worse than for those sentences in which to was absent. The most common error that children made in repetitions of this sort was to permute to around the next noun phrase. Deletion of to occurred, but was less common. Note that the permutation of to changes the grammatical relations in the sentence, and hence might affect picture choice, but apparently did not significantly do so, possibly because in order to minimize just this effect, I did repeat the original sentence before the picture choice was made. There was no noticeable relation between the way the child repeated the sentence and the way he chose the picture.

To summarize, children responded most accurately, in both repetition and choice tasks, to those sentences of the structure [NP V NP to NP]. Repetition scores were much better for sentences containing no to than for those containing to in the wrong place. In the choice scores the reverse was the case.

#### 4.2.1.4.2. Reversibility and order of noun phrases

Because of the way the experiment was originally set up, we could not directly test for reversibility across all other factors. However, the effect of reversibility did make itself felt in those scores related to the order of noun phrases in the sentence, and particularly that order taken in relation to the placement of to. In

addition, an individual count was made on reversibility across all other factors and the results were quite striking.

There was no significant difference on choice accuracy between reversible and non-reversible sentences. This result is misleading, however, for the non-reversible sentences include both semantically plausible and semantically implausible sentences, and summing across these is what neutralizes the difference between reversible and non-reversible sentences. When we do separate out these factors, we find that accuracy for reversible sentences is only slightly more than chance (56%). The semantically plausible non-reversible sentences give an accuracy of 76.3%. Those non-reversible sentences which are semantically implausible, however, yield only 33.7% accuracy. These results show strongly ( $p < .01$  on the Newman-Keuls test for all 3 differences) that children of this age pay a great deal of attention to semantic cues, many times superseding contradictory syntactic cues.

Let us return now to the order of noun phrase objects and the position of to. The reader should recall at this point that two-thirds of all the sentences contained non-reversible verbs or objects (though for picture choice the fraction was somewhat less, since three absolutely non-reversible verbs could not be pictured), and that two-thirds of these sentences were semantically plausible only if the two objects were in reverse order, since in two out of three sentences to-placement made the first noun phrase after verb the indirect object.

For example, given the base-line sentence

(14) The farmer is feeding the cookie to the snake.

we have the following sentences rewritten according to the parameters

of to- placement and order of objects:

(15) The farmer is feeding the snake to the cookie.

(16) The farmer is feeding to the cookie the snake.

(17) The farmer is feeding to the snake the cookie.

(18) The farmer is feeding the cookie the snake.

(19) The farmer is feeding the snake the cookie.<sup>8</sup>

Four out of these six sentences (including the base-line sentence), namely (16)-(19), require the first object to be the indirect object. Of these, only (17) and (19) are semantically plausible, and these have the objects in reverse order.

The interaction between the placement of to and the order of objects was significant in both the repetition and choice tasks (Rep:  $F = 10.306$ ,  $p < .0005$ ,  $df = \frac{2}{46}$ . Choice:  $F = 10.832$ ,  $p < .0005$ ,  $df = \frac{2}{46}$ ). In repetition, as one might expect the highest accuracy occurred when the noun phrases were in the original order and to was between the two objects. Somewhat worse than this was when the two objects were in reversed order, but the to still placed correctly.<sup>9</sup> When to was absent, accuracy was significantly higher for the reversed order than for the original order of noun phrases -- similarly when to occurred between the verb and the first object, though accuracy was quite poor in this case, and the difference between the two noun phrase conditions was not significant. Similar results show up in the choice task. Highest accuracy was with to in the right place and the objects in original order. Next best is with the two noun phrases in reverse order and to in the wrong place ( $p < .10$  on Scheffé test) -- these sentences are always semantically plausible, and to gives an extra cue. Slightly

worse (no significant difference between these and the previous one) are those cues where the noun phrases are in reverse order and to is absent or in the right place. The very worst accuracy occurred when to was totally absent and the noun phrases were in their original order -- these sentences were semantically implausible the majority of the time.

Summarizing, we see that reversibility does make a difference in a child's production, and especially in his comprehension. At this point in our analysis it looks as though the child is paying attention to three different things in a sentence: the order of the objects (we could call this the strategy of first-noun-phrase-after-verb-is-direct-object), the prepositional cue provided by to, and the semantic plausibility of the sentence. The child seems to rely on the last one most often, and the middle one next most often.

#### 4.2.1.4.3. Pronominalization

One of the more surprising results from this experiment was the role played by pronominalization. We recall that one-fourth of the sentences contained two full noun phrase objects, one-fourth contained two pronoun objects, one-fourth contained a pronominalized direct object, and the final fourth had a pronoun indirect object. Even though those sentences containing pronouns were shorter, I had expected the children to have more difficulty with those sentences containing pronouns, since many were ungrammatical (e.g., The mother is bringing the teacher it.), and since some information is lost when pronominalization is performed. It is true that the worst scores on choice tasks occurred when both objects were pronominalized, but this is somewhat of

an artifact of the scoring method.<sup>10</sup> The really striking contrast is manifested when we compare the children's performance on sentences containing one pronoun versus those sentences containing two full noun phrases. In both tasks the children performed significantly more accurately on sentences containing a pronoun than on sentences containing two full noun phrase objects.

This fact in isolation might be explained simply as a matter of length. However, in choice scores, where comprehension is crucially involved, there was a difference in accuracy among the one-pronoun sentences, depending on which object was pronominalized. Children performed more accurately on those sentences where the direct object was a full noun phrase and the indirect object was a pronoun than vice versa ( $p < .10$  on the Scheffé test -- this is not an accepted level of significance, but it is highly suggestive). This result cannot be explained on the basis of length.

At least a partial explanation can be found by looking at the way the children responded in the picture discussion task. Remember that the majority of the verbs used in the experiment did not require an indirect object to be grammatical (take, bring, send, carry, read, throw). For these verbs, as well as with the others, when asked to describe the picture they had not chosen, response quite often consisted of a sentence of the form [NP V NP], with the second noun phrase being a direct object. If I prompted them with the question 'Where?', many children would respond with 'there' and point to the subject of their sentence.

It may be that another reason for the disparity in the child's

performance on direct vs. indirect object pronouns is that the child actually has some form of the pronoun output condition of the adult, or at the very least a condition on dative movement that makes a sentence like (20) unacceptable to the child, and hence more difficult to process:

(20) The mother is bringing (to) the teacher it.

What can we conclude from this? The purpose of pronominalization, it would seem, is to reduce the amount of information that needs to be processed in order to understand the sentence. Children do not seem to like to consider more than two noun phrases at once, i.e., the subject and one object. Pronominalization permits them to concentrate on two and 'throw away' one. Furthermore, indirect objects for children are not a crucial part of a sentence -- they prefer to do without them, and they can when the indirect object is pronominalized.

Finally, if children have an inference strategy that states that the first noun phrase after the verb is the direct object, and everything else goes by the wayside, then since the children were given only two pictures to choose from, they could choose the correct picture if they could figure out what the direct object was and disregard the indirect object altogether. Judging from what they did in the check-up task, this becomes a plausible strategy.

It looks from this as though the child of about four has the same deep structure representation of to-datives as the adult, if what I have argued in Chapter II is correct. It further looks as though, at least for the kinds of pronouns we have considered, these children have an interpretive rule for determining anaphora -- though this may

be due to the experimental task. The question now is whether younger children have the same deep structure or whether the structure that the four-year-olds have is the result of some sort of change in the grammar. This has consequences for theories of linguistic universals, since the child hypothetically progresses from the universal to the language-specific, and it is the question which we investigate next.

4.2. Experiment #4: To-datives: Pronominalization, to-placement, reversibility and order of objects: younger children

The second experiment on to-datives was performed for two reasons. First, we wanted to be able to test directly for the effects from reversibility. Secondly, by comparing two different age groups, we might be able to see the emergence (or different weighting) of the child's representation of grammatical relations and of his interpretive strategies.

4.2.2.1. Materials and Methods.

Materials and methods for this experiment were identical to those for Experiment #3, with the following exceptions:

1. 18 children were tested, and they ranged in age from 3-3 to 3-8, thus averaging six months younger than the children participating in the first experiment.
2. Sentences containing two pronoun objects were eliminated.
3. Sentences with the verbs write, promise, and tell were also eliminated, since they could not be pictured anyway.
4. Sentences containing read were given equal numbers of reversible and non-reversible objects, instead of all

non-reversible ones. They were constructed by using two animate objects (both human in this case), as in the case of the other reversible sentences. Four new pictures were drawn to correspond to the new sentences.

#### 4.2.2.2. Results<sup>11</sup>

##### 4.2.2.2.1. The effect of to

Overall, on the repetition task, this group of subjects performed with lower accuracy than the older group, but still with the same pattern. That is, they performed significantly better than chance (70% accuracy) when to was between the two objects, around chance (47.7%) when to was absent, and significantly below chance (12.9%) when to occurred in the 'wrong' place ( $F = 40.553$ ,  $p < .0005$ ,  $df = \frac{2}{34}$ ).

On the choice task, however, there is a most interesting difference between the two groups. We recall that the older children had the highest accuracy when to was in the right place, next highest when to was in the wrong place, and worst when to was totally absent. We concluded from this that a prepositional cue helps the 4-year-old, even if it occurs in the wrong place.

While the younger children similarly had the highest accuracy when to was in the right place, and while placement of to had a significant effect ( $F = 11.357$ ,  $p < .0005$ ,  $df = \frac{2}{34}$ ), the difference between the other two factors was not significant, and in fact went the other way; that is, there were more correct responses when to was absent than when it was in the wrong place (though not significantly more). This suggests that the younger child may be paying attention to the prepositional cue in a different way from the older child, or perhaps merely



not as much.

#### 4.2.2.2.2. Reversibility

Unlike the other experiments, reversibility was directly represented in this experiment. In repetition, it didn't make much of a difference, as might be expected, since repetition does not seem to require the child to make crucial use of semantics in the way that comprehension tasks do. In the choice scores, reversibility did make a difference. As in the first experiment, if one compares reversible with all non-reversibles, there is no significant difference between them. However, if one separates out the semantically good non-reversibles from the anomalous ones, there is indeed a difference, as can be seen in Table V.

Table V.-- Choice scores in Experiment #4.

	Percent accuracy
Good non-revers.	66.67
Revers.	57.10
Bad non-revers.	40.12

If we compare these results from the reversibility factor with those of experiment #3, we see that the older children are more accurate than the younger ones when there is a good semantic cue, and less accurate when there is a bad one. In fact, for the younger children, the only significant difference ( $p < .05$  on the Newman-Keuls test) in the younger children is between the good and bad non-reversibles. It would seem from this that the younger children are not relying as heavily as the older ones, and hence are not helped (or hindered!) by

them as much. We shall discuss this result further in section 4.2.3.

#### 4.2.2.2.3. Pronominalization

We have seen that the children in this group are not paying attention to the placement of to as much as the older children, and are not paying as much attention to the semantics as the older children. What on earth are they paying attention to? The results of the pronominalization variable lead to an answer.

In repetition, there were no significant differences in performance due solely to differences in pronominalization. However, in the choice scores there were significant differences ( $p < .01$  on the Scheffé test) between direct object pronominalization and both other factors, though not between indirect object pronominalization and no pronominalization. In other words, when the direct object was pronominalized, performance was significantly less accurate than when it was not. This is in sharp contrast to Experiment #3, in which there was no significant difference between sentences containing a direct object pronoun and sentences containing no pronoun.

The depression of the choice score for the younger children when the direct object is pronominalized suggests that the children are relying more heavily than the older children on the strategy of first-noun-phrase-after-verb-is-direct-object. If an object is pronominalized it gets skipped from consideration as the direct object -- as though it weren't a noun phrase any more, and the first full noun phrase the child comes to after the verb, regardless of intervening pronouns, is the direct object.

23  
★

#### 4.2.2.2.4. Other effects

In order to speak of the other effects involved, in a concise way, I shall use the following abbreviations:

[+Rev] = a sentence in which the direct and indirect objects are reversible.

[-Rev] = a sentence containing non-reversible direct and indirect objects.

[NP<sub>1</sub>] = The two objects are in their original order; i.e., if non-reversible in the order inanimate -- animate -- e.g., the teacher is throwing the stick (to) the puppy.

[NP<sub>2</sub>] = The two objects are in their reversed order -- i.e., if non-reversible in the order animate -- inanimate -- e.g., the teacher is throwing the puppy (to) the stick.

[DO PRO] = pronominal object

[IO PRO] = a sentence in which the indirect object is a pronoun.

[∅ PRO] = a sentence in which both objects are full noun phrases.

[+to] = a sentence in which to occurs between the two objects.

[∅to] = a sentence in which to is totally absent.

In the repetition task, there was an interaction between pronominalization and the positioning of to. Outside of variation due to the positioning of to, which we have already discussed, the only significant difference among conditions<sup>12</sup> occurred between the configurations [+to, IO PRO] and [+to, DO PRO]. Repetition was significantly more

accurate when the indirect object was pronominalized than when the direct object was a pronoun, if and only if to was in the 'right' place. I am not exactly sure why this is so -- however, one possible explanation is something we touched on before -- namely the fact that the child seems to consider the indirect object not as intrinsic a part of the sentence as the direct object. Again, pronominalization permits the child to 'get rid of' consideration of the indirect object, and this may be important for imitation as well as comprehension tasks. Militating against this view is the fact that there was not a significant difference in accuracy of repetition between [DO PRO] and [IO PRO] in the other conditions of to-placement. This may, however, be accounted for if one considers that the positioning of to is such an overriding factor in repetition when it is unnaturally placed or deleted unnaturally for the child, that is that it could wash out possible differences -- only where to is 'naturally' placed could these differences show up.

Also in repetition there was an interaction among the variables of reversibility, order of noun phrases, and pronominalization ( $F = 3.858$ ,  $p < .05$   $df = \frac{2}{34}$ ). The interesting (i.e.,  $p < .05$ ) differences occurred in some cases where the pronominalization factor was constant and one or (in one case) both of the other variables were changed. These were:

1. [-Rev, NP<sub>1</sub>, DO PRO] > [+Rev, NP<sub>1</sub>, DO PRO]
2. [-Rev, NP<sub>1</sub>, IO PRO] > [+Rev, NP<sub>1</sub>, IO PRO]
3. [NP<sub>2</sub>, DO PRO, +Rev] > [NP<sub>1</sub>, DO PRO, +Rev]
4. [NP<sub>2</sub>, -Rev, DO PRO] > [NP<sub>1</sub>, +Rev, DO PRO]

It should be recalled here that, disregarding to, it is the interaction between reversibility and order of noun phrases that affects semantic anomaly, so that what might be happening is the semantically anomalous sentences could be repeated with less accuracy than semantically well-formed ones. This would be a rather surprising result, for in general, children do not really pay much attention to semantic well-formedness in repetition. Furthermore, there are some semantically anomalous sentences in all the above oppositions except (3), and in all cases repetition of the non-reversible sentences is more accurate than that of reversible ones. We can nonetheless perhaps use this explanation if we fudge by saying that, as for comprehension, repetition is more accurate for a semantically well-formed non-reversible sentence than for a reversible one.

But this will only explain contrast (4), and does not touch (3) at all -- recall that with the order[ NP<sub>2</sub> ] two-thirds of the non-reversibles will be all right. Furthermore, it would predict that contrasts (1) and (2) should be the opposite of what they are. This may in fact be a spurious interaction (especially since I can think of nothing which can account for all of these contrasts).

The final significant interaction in repetition occurred among the variables of reversibility, order of noun phrases, and positioning of to. While the interaction itself was not that significant ( $p < .10$ ) there was a 5% difference among some cells. These differences suggest that the notion which explains contrast (4) above may be the correct one after all. The significant contrasts are given

below:

$$5. \quad [-\text{Rev}, \text{NP}_1, +\text{to}] > [+ \text{Rev}, \text{NP}_1, +\text{to}]$$

$$6. \quad [-\text{Rev}, \text{NP}_2, \emptyset\text{to}] > [+ \text{Rev}, \text{NP}_2, \emptyset\text{to}]$$

In both these cases, the non-reversibles are semantically well-formed, so that the explanation of contrast (4) may indeed be the correct one.

On the choice scores, there are two effects which we have yet to discuss. The first is the order of noun phrases. As in the first to-dative experiment, the children performed with greater accuracy when the order of noun phrases was reversed than when they were in the original order ( $F = 12.423$ ,  $p < .0005$ ,  $df = \frac{1}{17}$ ). This stands to reason when one considers that the reverse order would be the semantically correct one two-thirds of the time for the non-reversibles. This semantic strategy for comprehension is confirmed in the other interaction.

There was an interaction, as one might expect, among the factors of reversibility, order of noun phrases, and placement of to ( $F = 13.668$ ,  $p < .0005$ ,  $df = \frac{2}{34}$ ) -- these are the three factors that contribute to semantic well-formedness. Those differences which were significant and those which were not tell us a great deal about the strategies the children are using to interpret sentences. Listed below are some of the significant differences and some interesting non-differences:

A: significant

$$7. \quad [+ \text{Rev} \text{ NP}_1 \emptyset\text{to}] > [- \text{Rev} \text{ NP}_1 \emptyset\text{to}]$$

$$8. \quad [+ \text{Rev} \text{ NP}_1 -\text{to}] > [- \text{Rev}, \text{NP}_1, -\text{to}]$$

9. [-Rev NP<sub>2</sub>, - to] > [+Rev, NP<sub>2</sub>, -to]
10. [+Rev, NP<sub>2</sub> +to] > [-Rev, NP<sub>2</sub>, +to]
11. [-Rev, NP<sub>1</sub>, +to] > [-Rev, NP<sub>1</sub>, {~~to~~} to]
12. [+Rev, NP<sub>2</sub>, +to] > [+Rev, NP<sub>2</sub>, {~~to~~} to]
13. [-Rev, NP<sub>1</sub>, to] > [+Rev, NP<sub>1</sub>, +to]
14. [-Rev, NP<sub>1</sub>, +to] > [-Rev, NP<sub>2</sub>, +to]

B: interesting non-differences:

15. [-Rev, NP<sub>2</sub>, ~~to~~] > [-Rev, NP<sub>2</sub>, 1 to] [-Rev, NP<sub>2</sub>, +to]
16. None of the [~~to~~] -- [-to] alternations are significant.

These are a lot of differences to consider at once, but their explanation, with one exception, is quite straightforward. The exception is contrast (12). Here, not only is accuracy of comprehension of the configuration [+Rev, NP<sub>2</sub>, +to] greater than the term shown, but it is also significantly greater than every other term except [-Rev, NP<sub>1</sub> +to]. The accuracy of comprehension could be expected to be high -- sentences of this configuration are semantically well-formed, and to is in the right place, but it is not obvious why it is so unusually high.

The others can be explained, however. Contrasts (7), (8), (10), (11), and (14) reflect the superiority of semantic plausibility over semantic anomaly and syntactic rules. In other words, the child is, in these cases, using the what's-semantically-right-must-be-syntactically-right-too strategy. In the cases of (10) and (13), we have the same situation we have already established -- that there is more accuracy when there is a non-misleading semantic cue than when

there is not (the other cases just above show that there is better accuracy when there is a good semantic cue than when there is a misleading one).

The lack of difference noted in (16) has been discussed in the section on the main effect of to. But why (15)? If semantic plausibility is the only factor involved, then (9) ought to come out the reverse of (11), i.e., it ought to be  $[-\text{Rev NP}_2 \{\emptyset\} \text{to}] > [-\text{Rev NP}_2 +\text{to}]$ . Here, however, the positioning of to comes into play. In effect, I think that having to in the right place compels the child to use one of the other strategies at his disposal -- namely of first-noun-phrase-is-direct-object -- over the semantic one.

It should be remarked here that not all of the sentences in the configuration  $[-\text{Rev}, \text{NP}_2, +\text{to}]$  are necessarily anomalous -- those containing directional verbs could be interpreted as directional rather than as datives. However, directionality does not help in the alternation in (11). There are two possible ways of accounting for this situation. The first is to say that it is not the semantic plausibility factor that washes out the difference in (15). The second is to say that the child knows that object-permutation precludes a directional interpretation. Since these children, insofar as I was able to determine, are not particularly aware of the get-to-keep aspect of datives, with the possible exception of give, I think that the former explanation is probably the more likely: namely that in this case the child is using a syntactic rather than a semantic strategy. In any case, some of the results with marginal significance are probably spurious, due to the nature of the analysis of variance. It should be noted that,



with these children, as with the first group, the choice of verbs, between directional and purely dative, did not significantly affect the results.

#### 4.2.3. A comparison of the Experiments #3 and 4.

There are obvious similarities in the performance of the two groups and also some interesting differences. It is these differences that show part of the path that children follow when they learn to-datives.

First, the four strategies we have discussed appear to be present in both groups. These strategies are:

- (1) Semantic plausibility, when available
- (2) Use of to as a cue for indirect objects
- (3) Looking for the direct object right after the verb
- (4) Throwing away pronouns

All of these strategies appear, to a greater or lesser extent, in both groups of children -- but there seem to be different emphases involved. Thus, we have noted that the younger children seem to rely less on semantic cues than the older children, though it remains a strong factor. This is, in fact, rather surprising, since it has generally been assumed that younger children are more dependent on semantics and less on syntax than older children. Our results seem to violate this assumption.

However, it may still be the case that the younger child is relying just as much, or even more, on semantic cues, but that the younger child does not know as much about the real world as the older

one, and hence either has less confidence in his semantic judgments, or simply does not see as many semantic anomalies as the older child might.

Anecdotally, the older children giggled more often than the younger ones in response to anomalous sentences; it is possible that this stems from their greater appreciation of semantically plausible (and implausible) situations.

We have remarked already on the differences between the two age groups with respect to their use of to. It would seem that the older children used it as a surface cue that told them, "Watch out, the next NP is an indirect object," regardless of whether to occurred right after the verb or between the two objects. The younger children, on the other hand, used to only when it was in the 'right' place in the sentence, and of course this is congruent with the third strategy.

The fact that strategy (3) was used by both groups of children, though perhaps a bit less by the older group, shows that for these children, as for the adult, the deep structure order for to-datives is [...V NP to NP]. Thus we did not find, as we might have, that the older group's deep structure representation had changed drastically from the younger group's, but rather that the older group may be developing an awareness of the rule of dative movement which the younger group did not have as strongly.

The fourth strategy, again, seems to be a bit stronger in the younger group than in the older group. This, in conjunction with the third strategy, accounts for the direct object dip in the younger children and the much-less-of-one in the older children.

#### 4.2.3. Experiment #5: To-datives: Verb and object effects

There were a number of unanswered questions arising from the first two experiments on to-datives, and the third experiment was designed to investigate some of these questions. Specifically, we were interested in finding out differences between verbs which could be interpreted only as datives and those which could be both dative and directional. This was particularly important in terms of a strategy which the children sometimes appeared to be using: namely finding the direct object and ignoring the indirect object, both in comprehension and in production. While this strategy could prove very useful for directional verbs, which do not necessarily require datives in their strict subcategorizational restrictions, it might be expected to break down in those verbs which require datives, and particularly those verbs whose 'direct' objects have a dative interpretation if the 'real' direct object is deleted, as is true in the case of feed and show (see Chapter II, section 2.2.7.). These differences are also important in terms of the predictions made by C. Chomsky's theory of complexity as discussed in 3.5.1. Furthermore, I was concerned with how much perceptual help to provide for the child, and also how the animacy of the object affects the child's performance. These issues were partially resolved in Experiment #5.

##### 4.2.3.1. Method

Sixteen children ranging in age from 3-9 to 4-2 were tested.<sup>13</sup> Each child received a total of eighteen sentences, presented in nine pairs, one for each of the picturable verbs used in Exp. #3. The only

task used was picture choice. I selected the non-reversible pictures from one of the sets used in the experiment #3. For each pair of pictures the child was given two sentences, differing in the animacy of the object. Each sentence had one object rather than two. In addition, half the sentences (4 for 8 of the children, 5 for the other 8 -- 9 does not divide exactly) contained to. The two sentences for each pair of pictures were presented together, and balanced across children for order of presentation. Surprisingly, children did not feel constrained to choose a different picture for each sentence (if they had, I would have done the experiment differently). Following is an example of stimulus material:

- (21) a. The hunter is feeding to the bear.
- b. The hunter is feeding to the tomato.
- c. The Indian is carrying the popcorn.
- d. The Indian is carrying the bird.

#### 4.2.3.2. Scoring

Children's responses were scored as correct if they interpreted the noun phrase following the verb as the direct object in the case where nothing intervened between the verb and the object, or if they interpreted the noun phrase following the verb as the indirect object when to was present. This is not totally consonant with the absolutely correct interpretation in the case of show and feed. However, in all but one case relevant to this issue, the children split right down the middle anyway. The one case where it made a difference was the sentence

- (22) The hunter is feeding the tomato.

All eight children who were given this sentence to interpret construed tomato to be the direct object.

#### 4.2.3.3. Results.

On the whole, accuracy was significantly higher for those verbs which could be interpreted as directional than for those which could not (73.5% as opposed to 57.8% -- this counting the feed data as accurate -- if we count it as wrong, the percentage of accuracy is only 51.6 %) ( $F = 6.13$ ,  $p < .025$ ,  $df = \frac{1}{24}$ ). One can attribute this result at least partially to the fact that one-object sentences with directional verbs are grammatical, whereas they are grammatical with only some non-directional verbs. Furthermore, and probably more importantly, with the directional verbs an animate or inanimate object is plausible in either direct object or indirect object position, as long as the to-phrase is taken to be a directional adverb rather than a dative. This is not possible for those verbs taking only datives.

The position of to also had a significant effect on the results ( $F = 7.41$ ,  $p < .025$ ,  $df = \frac{1}{24}$ ). In both directional and non-directional cases the presence of to served to confuse the child. That is to say, accuracy was lower (57.6%) when to was present and higher (75.7%) when to was absent. Although this is the opposite of the results from the other two experiments, where it was found that presence of to increased accuracy, it should be borne in mind that in all cases save one, that one being

(23) The mother is reading to the clown.

sentences containing to, since they had only one object, were

ungrammatical.

We also observed some interesting interactions among the experimental variables. While animacy of object was not a significant factor by itself, it did affect the results in interaction with other variables, notably the presence or absence of to. Hence, in those cases where the object was inanimate the presence of to wrought havoc. Accuracy for inanimate object sentences was 83.3% when to was absent, and only 43.1% when to was present. Furthermore, in the non-directionals [only dative interpretation allowed] , to and animacy had a switchoff effect on each other. For these verbs, if to was present, accuracy was far better if the object was animate than if it was inanimate (75 % vs. 31.2 %), but if to was absent, then accuracy was better when the object was inanimate (78.125% as opposed to 43.75%). These results stand to reason when one considers that in those cases where the accuracy is high, this is the only semantically plausible way to interpret the sentence, and when the accuracy is low, the 'syntactically' correct interpretation runs counter to the semantically plausible. If this is a good explanation, then one would expect less variation along these lines in the directional cases, where all sentences are semantically plausible if not all fully grammatical. This is exactly what we find -- though there were similar differences among the results for directional verbs taken along the same parameters, the differences are too small to be statistically significant.

Table VI -- results from Experiment #5 (in percentages)

A -- directional verbs

	<u>to</u> present	<u>to</u> absent
+anim	72.5%	90.0%
-anim	50.0%	85.0%

B -- non-directional verbs

	<u>to</u> present	<u>to</u> absent
+anim	75.0%	43.75%
-anim	31.25%	78.125%

4.2.3.4. Discussion

One obvious conclusion from these results is that the directional verbs with one object are easier than the non-directional, or 'dative only' verbs. The question is why this should be so. I think the answer lies in several factors. First, the directionals, as pointed out above, do not necessarily require that an indirect object be present -- they can be complete with only a direct object. This is not true of most of the dative verbs. The children also seem to be aware that when a noun phrase follows a dative verb, it may be the indirect object, particularly if it is animate. This animacy issue leads us to consideration of another factor which might be a partial explanation of our results. As we remarked above, sentences containing directional verbs are semantically plausible regardless of

the animacy of either object. Again, this is not true of the non-directional verbs. If there are two objects, in a sentence or a picture, and if one is animate and the other inanimate, when a non-directional verb is involved, the most natural semantic interpretation is for the direct object to be inanimate and for the indirect object to be animate. In this light, the fact that accuracy was higher in the non-directionals for the [ $\alpha$ to,  $\alpha$ anim] configurations than for the [ $\alpha$ to, - $\alpha$ anim] ones shows, I think, that semantic strategies here are superseding syntactic ones.

The fact that, over all, sentences containing to were less accurately interpreted than sentences without to is most likely an artifact of the experiment. Only one verb, read, is grammatical without a direct object and with a to-phrase. Some children ignored the presence of to and interpreted the only noun phrase after the verb as the direct object. Here again there is a conflict of strategies -- one says that the noun phrase after to is the indirect object (cf. the results of the first to-dative experiment), the other that if there is only one noun phrase after the verb, it must be the direct object. The former strategy was used slightly more than the latter, but the real determinant of which strategy was to be employed was the interaction of these strategies with the semantic one.

In summary, children performed more accurately on directional verbs than on non-directional ones. One-object 'true' datives confused them, showing their sensitivity to the selectional restrictions and transformational possibilities of dative verbs as opposed to directional verbs. This does not mean that these children know



datives perfectly. However, the knowledge that they do have is a necessary prerequisite for the acquisition of more complex dative constructions. The fact that non-directionals make for more interpretational options is relevant to Carol Chomsky's theory (see Chapter III) and will be discussed in Chapter V.

#### 4.3. Experiments on for-datives

Having done experiments 3-5, we now have some ideas about how children interpret and use to-datives. We have seen, however, in Chapter II, that for-datives are a little bit different from to-datives. The child may treat them differently. For this reason, experiments #6 and #7 were performed.

Two experiments were performed which related to for-datives. The first concentrated on manipulating for-datives with two full noun phrase objects, and the second brought in the variable of indirect object pronominalization.

##### 4.3.1. Experiment #6: For-datives: Good verbs, bad verbs, and dative movement.

This experiment was designed to investigate the question of whether 4-year-olds are sensitive to for-datives, and to determine also what kinds of lexical restrictions the children might have on dative movement.

##### 4.3.1.1. Materials and method

Unlike to-datives, for-datives are not really picturable, so that a different means from that used in the to-dative experiments had to be employed. I decided upon the method used in the verb-particle

experiments, namely presenting the child with a minimal pair of sentences, in one member of which dative-movement had applied, while in the other member it had not. The child was to repeat each sentence in the pair, and then, after the experimenter had said the sentences in reverse order, the child was to choose which one sounded better. Each child heard four pairs of sentences, two of which contained 'good' verbs, i.e., verbs which for adult English allow dative movement, and two 'bad' verbs, i.e., verbs which in adult English do not allow dative movement. The verbs used were: 'good' -- cook, buy, make, save; 'bad' -- stir, fix, color, keep. All objects were non-reversible. Lists were balanced for each child with respect to order of presentation. If a child was unable to say any sentences in which dative movement had applied, I asked him in addition to try to say a sentence containing a pronoun dative, such as (24):

(24) The daddy is buying her the car.

Sixteen children, ranging in age from 3-9 to 4-2, were tested, the same children as in Experiments #2 and #5.

#### 4.3.1.2. Scoring

On the repetition task, children's responses were scored as correct, wrong, or corrected, using the same criteria as in the to-dative experiment. Corrected responses were counted as wrong for the purposes of statistical analysis but kinds and frequency of errors were noted.

In the choice task, I noted which sentence of a pair the child had chosen, and whether or not it was the last sentence he had heard,

since I expected the recency effect to influence the results.

#### 4.3.1.3. Results<sup>14</sup>

In the repetition task, children performed much more accurately ( $F = 28.36$ ,  $p < .0005$ ,  $df = \frac{1}{12}$ ) on sentences of the form  $[NP\ V\ NP_1\ \text{for}\ NP_2]$  than on sentences of the form  $[NP\ V\ NP_2\ NP_1]$ .<sup>15</sup> Accuracy was 87.5% on the former and 42.2% on the latter. This was partially due to the fact that there were five children who were unable to repeat any of the dative sentences, when the indirect object was a full noun phrase. All of these children were able to repeat sentences of this form if the indirect object was a pronoun.

There were three common errors of repetition of the dative sentences. One was 'detransformation,' i.e., permuting the two objects and inserting for between them. This occurred even when a sentence of this type occurred at the very beginning of the experiment, at which point the child had not yet been exposed to sentences of the type he was uttering. The second kind of error was the deletion of the indirect object. The third, and one of the most interesting, was changing the indirect object into a possessive. So, for example, if I asked a child to repeat the sentence,

(25) The daddy is buying the mommy the car.

the child would respond with

(26) The daddy is buying the mommy's car.

Interestingly, when in these cases I asked the child who got to keep the car, he almost invariable answered 'the mommy.' All of these errors show that the child does indeed understand for-dative constructions.

In the first case, he is not de-transforming to just any old sentence. In the second, if it were simply memory overload, one would expect the child to delete the direct object as often as the indirect object. In the third, one would expect the child to think that the subject of the sentence kept the direct object, if he did not comprehend the grammatical relations obtaining in for-datives. However, in spite of their comprehension of the construction, it is obvious that something makes the dative form more difficult for the child to produce than the prepositional form.

There was a tendency for the child to repeat a 'good' dative more accurately than a 'bad' one, particularly in the dative form. However, they were more accurate, within these groupings, with some verbs than with others. Fix, for example, was treated in repetition like a 'good' dative verb, whereas for an adult an utterance like (27) is out.

(27) \*The daddy is fixing the mommy the car.

It would seem, then, that the child allows more verbs to undergo dative movement than the adult.

On the other hand, the choice scores show that the child is reluctant to have any verb undergo dative movement, at least where both objects are full noun phrases. What seemed to determine their choices was not whether the verb allowed dative formation or not, but rather, either the recency effect ( $F = 39.2$ ,  $p < .0005$ ,  $df = \frac{1}{24}$ ) (which version of the sentence came second) or whether or not the sentence was in the prepositional or dative form ( $F = 28.8$ ,  $p < .0005$ ,  $df = \frac{1}{24}$ ). There were 44 (out of 60 -- in 4 instances no choice was made) instances

where the prepositional form was chosen, and only 16 where the permuted dative version was chosen. And out of those same 60 choices, there were 18 instances where the children chose the first sentence, and 42 where they chose the second.

Table VII-- results of Experiment #6 -- choice

A. Good verbs

	First	Second	Total
Prep. order	7	13	20
Dative order	<u>2</u>	<u>8</u>	<u>10</u>
Total	9	21	30

B. Bad verbs

	First	Second	Total
Prep. order	9	15	24
Dative order	<u>0</u>	<u>6</u>	<u>6</u>
Total	9	21	30

It might seem that these two effects had about equal influences on the variation in scores, across all kinds of verbs. However, this is not the case, for when we consider the choice scores for the 'good' and 'bad' verbs separately, we find that the recency effect had much more influence on scores for 'good' verbs ( $F = 10.28$ ,  $p < .01$ ,  $df = \frac{1}{12}$ ) than the permutation effect ( $F = 7.13$ ,  $p < .025$ ,  $df = \frac{1}{12}$ ), whereas for the 'bad' verbs the recency effect was relatively smaller ( $F = 24.0$ ,  $p < .0005$ ,  $df = \frac{1}{12}$ ) than the permutation effect ( $F = 51.3$ ,  $p < .0005$ ,  $df = \frac{1}{12}$ ). This is what we would expect if the child knows the lexical

restrictions on dative movement, for the recency effect should be the principal determinant of choice if all other things are equal, i.e., if both sentences are equally grammatical for the child. On the other hand, if both sentences are not equally grammatical for the child, as is the case with the 'bad' verbs, where the dative form is ungrammatical, then one would expect the recency effect to be overridden in favor of choosing the more grammatical form. One suspects that, for this experiment, perhaps the child "reasons" as follows: I know this rule of dative movement, and I know that some things sound better if it doesn't apply, but maybe there are more things than I know about that aren't supposed to sound good, so I'll hedge my bets.

- 4.3.2. Experiment #7: For-datives: Good vs. bad verbs, dative movement, and pronominalization  
 4.3.2.1.. Materials, method, etc.

In the first experiment a number of children treated many 'bad' verbs like 'good' ones, i.e., chose the permuted form for almost any verb, as long as it came second. To avoid this, if possible, I chose some different 'bad' verbs and one different 'good' verb for the second experiment. In addition, I wished to look at possible differences between the child's performance on full noun phrase and pronoun objects. The same technique was used as in the Experiment #6, except that this time the children ranged in age from 3-3 to 3-8 (the same children as in Experiment #4), received twice as many sentences as in the first for-dative experiment, and half those sentences had pronoun indirect objects. The verbs used this time were: 'good' -- cook, save, get, make; 'bad' -- stir, keep, wash, tie.

#### 4.3.2.2. Results

On the repetition task, accuracy was influenced by both whether the form was prepositional or dative ( $F = 49.09$ ,  $p < .0005$ ,  $df = \frac{1}{24}$ ), and also whether the indirect object was pronominalized or not ( $F = 12.88$ ,  $p < .005$ ,  $df = \frac{1}{24}$ ). The prepositional pronominalized form evoked the greatest accuracy -- 98%. Next came the non-pronominalized, prepositional form -- 84%. Worst of all was the dative, non-pronominalized form. There was a very slight tendency for accuracy to be better on forms containing 'good' verbs than forms containing 'bad' ones, but not enough to be significant ( $p < .25$ ). Again, there were a few children who were unable to say a sentence in the dative form at all, if nothing was pronominalized, but who were able to say it if the indirect object was pronominalized. The fact that in both dative and prepositional forms the accuracy of repetition was higher when the indirect object was pronominalized corroborates the informal evidence obtained from the first experiment on for-datives and the experiments on to-datives that sentences with pronouns are easier than sentences containing the corresponding noun phrases. The fact that accuracy was better on the prepositional forms than on the dative forms points out again the desire for the child to avoid sentences containing two objects.

Table VIII-- results on repetition task in Experiment #7

	Full NP		PRO
	good	27	32
Prep	bad	27	31
	good	17	24
Dative	bad	15	20

In the choice scores, I had expected pronominalization to affect the scores such that more dative pronoun forms would be chosen than the corresponding full noun phrase forms, and that in particular the child's restrictions on dative movement would be relaxed when the indirect object was a pronoun. This expectation stemmed both from the fact that the repetition scores pointed to this, and from the fact that I had already noticed a generalization of the pronoun object constraint in the case of verb-particle constructions, and it seemed plausible to suppose that the child might generalize this constraint to apply to indirect as well as direct object pronouns. This did not occur.

Instead, there was virtually no difference between the pronoun and noun phrase sentences; in fact the contribution of the recency effect, which one would expect to be greater in the case of the full noun phrases.



The scores do, however, reinforce the results from the first experiment on for-datives. Overall, the influences of the recency effect ( $F = 59.59$ ,  $p < .0005$ ,  $df = \frac{1}{48}$ ) and prepositional-vs.-dative effect ( $F = 42.36$ ,  $p < .0005$ ,  $df = \frac{1}{48}$ ) were about the same as in that experiment, i.e., more prepositional than dative forms were chosen, and more second-things-heard than first-things-heard were also chosen. The recency effect was overridden more for bad verbs than for good ones, and hence was less of an influence on scores for bad verbs than for good. We can conclude from these results that there is a lexical restriction on dative movement for the child, but that the child nonetheless still prefers the prepositional form to the dative form, even when the indirect object is pronominalized.

Table IX -- results from choice task on Experiment #7

		FULL		PRO	
		1st pos	2nd pos	1st pos	2nd pos
	good	5	14	6	13
Prep	bad	9	14	10	13
	good	2	10	3	9
Dat-ive	bad	1	7	1	8

This jibes quite well with the production data from the to-dative experiments, where when asked to describe a picture, the child usually produced a sentence with a prepositional phrase rather than a dative. I think it is safe to say that for children between the ages of 3-3 and 4-3 their base form for datives of both kinds is something like [NP V NP <sup>to</sup><sub>{for}</sub> NP] . This may not be the case later on in the child's development, particularly in the case of for-datives. Somehow we shall have to account for the fact that in the adult grammar of English, the rule of for-dative movement is virtually unrestricted (this is probably not the proper way to characterize this phenomenon) with respect to verbs as long as the indirect object is pronominalized and the direct object is indefinite -- the peel me a grape phenomenon discussed in Chapter II. Furthermore, I found in some sketchy studies of children older than the ones tested (Fischer, 1970)<sup>16</sup> that the dative form is preferred if the direct object is pronominalized -- i.e., given a choice between the two sentences

(28) \*I saw a pretty flower and I bought my mommy it.

(29) I saw a pretty flower and I bought it for my mommy.

the child will choose (28) as 'sounding better'. I do not wish to base any conclusions on these data, since they really are too sketchy. However, if they should be substantiated by further research, they would show first, that some dative forms come to be preferred over prepositional ones (just possibly becoming the base form) and second, that the development of the pronoun output condition may be far more complex than we thought, since these same children did have the

condition on verb-particle constructions.

There is one further point that I should like to make about for-datives. Subjects tested on them were also tested on to-datives at the same time. While the two tests were non-parallel, and hence one cannot make any statistical inferences about them, nonetheless I got the distinct impression that for-datives were substantially harder for the child to process than to-datives. It has been suggested (Wechsler, personal communication) that the reason lies in the abstractness of for-datives -- that is, the fact that the dative object is the recipient of the direct object is not directly stated in the sentence, but must be inferred by the listener. I suspect that while this is a plausible explanation, it is not necessarily the best one. My explanation would be that the child learning for-datives is exposed to a more confusing (for the child) input than for to-datives. The difference between the and a, for example, can make all the difference in the world as to whether a for-dative sentence is grammatical or not. The child does not learn to pay attention to unstressed items in sentences, such as articles, until relatively late in his development. Hence for the child learning the language, data may come in which, on his surface, seem inconsistent or irregular. C. Chomsky (1969) has suggested that irregularities of this type may affect the child's development in a particular kind of construction, and this would account for the relative difficulty of for-datives over to-datives in young children.

#### 4.4. Conclusions

We have considered in this chapter some processes in the acquisition of verb-particle constructions, to-datives, and for-datives.

These experiments show that a child's performance in syntax is greatly influenced by semantics, that semantic effects become stronger as the child grows older, that application of rules of dative-movement make sentences more difficult for a child to both repeat and comprehend, that pronominalization makes it easier, and that output conditions in all their fine distinctions are quite late in their full development. In the next and final chapter, we shall discuss some of the implications of this research for linguistic theory, and make some speculations about the future development of English.

Footnotes to Chapter IV

1 For example, the first experiment dealt with verb-particle constructions and to-datives, the second with other verb-particle constructions, other aspects of to-datives, and some aspects of for-datives, and the third with to-datives and for-datives.

2 All sentences in all experiments were in the progressive in order to avoid possible phonological confusion, for both the experimenter and the subject, between -ed and it.

3 All pronouns were given antecedents, in order to make both the nominalization and the stress, if contrastive, plausible. So, for example, if the sentence were "the little girl called up him," I would tell the child that the sentence was a story about a mommy and a daddy.

4 This is why two sets of pictures were used. If we tested a child twice in one day, which was the usual case, he would not be subjected to the same pictures in the same day twice, which made the tasks less boring.

5 In particular, I found that a relatively 'syntactic' violation was most likely to produce spontaneous correction in repetition, whereas a more 'semantic' violation often evoked a giggle. However, children of the age we were testing in this experiment are unable to verbalize about why a sentence sounds funny. This is why the picture choice task was used.

6 The picture discussion task was particularly useful in detecting an irrelevant strategy that a number of children used, namely of always choosing the top (or bottom) picture no matter what the sentence was.

7 These results are based on a four-way analysis of variance (2X2X2X3). All results reported have  $p < .05$  or  $p < .01$  unless otherwise indicated. I am extremely grateful to Edward C. T. Walker for

running the data through the computer, and to Adele Abrahamson for telling me where to find the Scheffé test.

8 Of course, no one child would receive all of these sentences -- they would be spread around among 6 children -- but one child would receive all sentences of this type.

9 Possible explanation -- when repeating, children don't necessarily have to exactly understand what they're saying semantically, but having the right syntax helps.

10 There were sentences for which there was no 'right' or 'wrong' choice -- e.g., The farmer is feeding it to it. Since these were not 'right,' they were counted as 'wrong.' Nonetheless, I still had the feeling that the children felt that most sentences containing two pronoun objects, particularly if to did not occur between the two objects, were nothing but word salad. For example, in the repetition task, more than one child, when presented with a sentence such as The cowboy is bringing him him would treat the second object as a repetition of the first, and respond by saying either The cowboy is bringing him, or The cowboy is bringing him him him him.

11 These results are based on a four-way analysis of variance (2X2X3X3). As in the results of Exp. #3, unless otherwise indicated,  $p < .01$  or  $.05$ . I am again grateful to Edward Walker for computerizing the data.

12 A cell may be thought of as a score for a given bundle of distinctive features, e.g., [ +Rev,  $\emptyset$ to, IO PRO, NP ].

13 These were the same children as in Experiments #2 and #6.

14 These results are based on a 2X2 analysis of variance across verbs.

15 For purposes of being neutral and also for abbreviation, we shall term structures of the form NP V NP for NP as prepositional and [ NP V NP NP ] as dative.

16 The children ranged in age from 4-8 to 5-1.

## Chapter V -- Discussion, conclusions and some speculations

### 5.1. The child's grammatical competence

Regardless of whether, in the preceding chapter, we have given a good psychological account for the acquisition of verb-particle constructions and datives, as linguists we are interested in what the child knows as well as what he does. From our experiments, some inferences, though perhaps not all that we would like ideally, can be made as to the shape of this competence.

#### 5.1.1. Verb-particle constructions

In the acquisition of verb-particle constructions, we find, as previously mentioned, an indeterminacy as to what the child's base form is. There is some reason to think that for the directional particles, the base form is something like (1).

- (1) [NP V NP prt.] S  
[+Dir]

However, this does not necessarily generalize to the idiomatic verb-particle constructions.

Even though we cannot determine the base form, we can determine that the child is aware of and uses a transformation that moves the particle around the direct object. The only repetition errors, outside of the ones we shall discuss below, consisted precisely of moving the particle around the direct object in either direction -- this occurred particularly when the direct object was a pronoun and the particle was moved outward.

As for the conditions on verb-particle constructions, we know



at least that these children have not yet mastered the adult rule -- that is, they treat stressed pronoun objects just like unstressed ones. (See Experiment #2.) However, in this connection, it should be noted that a few of the oldest children, when repeating a sentence like (2) or (3)

(2) The mother is washing off it.

(3) The girl is calling up him.

would respond with (4) or (5):

(4) The mother is washing off that.

(5) The girl is calling up him.

This shows an incipient awareness of the adult rule. We shall return to the question of the pronoun output condition in section 5.3.

#### 5.1.2. Dative constructions

In the case of dative constructions, we do have a fairly clear idea of what the child's base form is. From the 'what's-in-the-other-picture' task in the to-dative experiments in which this task was done, as well as the data from these experiments which show the child's relative ease of comprehension, and from the overwhelming results in the for-dative experiments, we can conclude that the base form of datives for children is (6):

(6) [NP V NP (  $\begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix}$  NP )]

I think that the optionality of the dative phrase changes to obligatoriness in the case of those verbs that require dative phrases fairly quickly -- it is present already to some extent even in some of the younger children, though it is still not consistently present in the

older ones.

If (6) is the children's base structure, the next question to be answered is, do the children know the transformations of dative movement? Here I think the answer has to be yes and no -- or, they know it (to a greater or lesser extent) but they have trouble with it. All of the children certainly do better all around, in repetition and comprehension, when the structure of the stimulus sentence is congruent with their base rules. They are helped in some of the transformed versions by strategies of semantic plausibility. On the other hand, one of a child's first words is often gimme. Do they make a connection? I think so, for the following reasons.

First, in the first two to-dative experiments, #3 and 4, the choice scores on reversible sentences, where there are no semantic cues, with [-to] or [øto] are 50% for the older children and 51% for the younger children. The fact that accuracy is not below chance level suggests that they may have some inkling of the rule.

Secondly, in the experiment #5, the children were aware of the possibility that, at least for the non-directional verbs, the first noun phrase after the verb could be the indirect object. Though animacy was a factor here, it did not have the same effect on the directionals.

Thirdly, from the data on for-datives it is obviously the case that dative movement, or to say it in a more neutral way, a structure of the form

(7) [NP V NP NP]

produces more of a cognitive load on the child than a structure like

(6). This load is eased, as we have seen, when there is a pronominal object in the sentence. We shall return to the issue of pronominalization in the next section. For now, we are concerned with the cognitive load of double-object datives.

One might expect the child to reduce this load in repetition in some way. A very interesting way in which he could do this and at the same time show his knowledge of the movement transformations would be to perform the operation we have termed 'un-transforming' the sentence -- that is, given a structure like (8)

(8)  $[NP_1 \text{ V } \left( \begin{smallmatrix} \text{to} \\ \text{for} \end{smallmatrix} \right) NP_2 NP_3]$

to repeat, the child responds with (9).

(9) [NP<sub>1</sub> V NP<sub>3</sub> {to  
for} NP<sub>2</sub>]

This kind of response occurred in all the dative experiments, but the interesting thing about this kind of error is that when we compare the first two to-dative experiments, #3 and 4, the older group made this error almost twice as frequently as the younger group (5% in younger children, 9% in older children)( $p < .05$ ). Four of the older children even performed the transformation of dative movement in the other direction. This shows an awareness of the rule connecting the two kinds of structures, even if a cognitive load prevents the child from saying the sentence.

A slightly more common repetition error which also shows awareness of dative structures is the deletion of to from a structure like (10).

(10) [NP V to NP NP]

In the older children, this happened in 13.5% of possible cases, while for the younger children it occurred in 18.5% of possible cases. While this difference is not significant, it is significant that while overall the accuracy of comprehension of this type of sentence was 53.7 % for the older children and 47.2% for the younger children, accuracy in comprehension of those cases in which to was appropriately deleted was 63.2% in the older children and 70% in the younger children. Deleting to in an ungrammatical sentence to make the sentence grammatical is another way of reducing the cognitive load. We have found previously (Fischer, 1969) that in repetition, a child will spontaneously correct a sentence that violates some syntactic rule.

In the vast majority of cases like (10), the correction consisted in permuting to around the first object. In those cases, albeit exceptional, where to was deleted instead of permuted, those children who performed the deletion clearly had a clear conception of the dative construction, as a comparison of their performances on the comprehension task indicates.

The fact that the children in these two age groups did not really do that well, particularly in the comprehension of reversible sentences, suggests, I think, that while children are aware of dative constructions, they have not yet effectively (i.e., actively rather than passively) mastered them. Perhaps a better way of saying this would be to say that children know the rule, but something prevents them from using it very well. At a later age, as their cognitive capacities increase, they will not have as much trouble with double-object constructions, and may even come to prefer these constructions

when the verb allows only a dative interpretation or when one of the objects is pronominalized.

Saying that double-object constructions place a cognitive overload on the child is basically only saying that datives are hard. Given that we have established that children's basic structure for datives is (6), one possible explanation comes readily to mind, namely that a dative construction violates the child's assumptions about cononical order, and hence his expectations as to which noun phrase is which object are also not necessarily fulfilled. This explanation will work only if the child is really paying attention to order. Other studies as well as this one have shown that at least for American children learning English<sup>1</sup> word order is relied on to a large extent. This is one plausible explanation.

Another is that dative movement rules delete a surface cue to the grammatical relations in the sentence, namely the preposition to. It has been shown (A. Olds, 1969, Fodor et. al., 1967) that both children and adults perform less accurately on sentences where the relative pronoun, which serves as a cue for the inception of a relative clause, is deleted than when it is not. It is certainly plausible to assume that the same factor is involved here.

In our experiments we were able to separate out the two factors discussed above by having the three conditions of to-placement. Our data show that for the older children both explanations are valid -- that is, the order of objects and the surface cues are both used. But with the younger group, on the other hand, the surface cue to is not used.

## 5.2. Pronominalization

In the previous section we mentioned that just as a non-double object reduces the cognitive load, so pronominalization of an object seems to have a similar effect. The most striking example of this occurred in the for-dative experiments, where there were children who were unable to repeat a dative construction unless the indirect object was pronominalized. However, this also showed up in the repetition task for the older children in the first to-dative experiment, #3, and in the comprehension tasks in the first and second to-dative experiments, #3 and 4, in the case of the indirect object pronoun. Given the relatively low accuracy in comprehension in the case of direct object pronominalization for these two experiments, we have concluded (see Chapter IV) that what the child does when he hears (or uses) a pronoun instead of a noun phrase is to effectively throw it away, particularly in the comprehension task that we performed, since with another object in the sentence (and the picture) the child does not have to hold on to the pronoun, except perhaps as a placeholder.<sup>2</sup> He can determine the referent by process of elimination in the picture, assuming he can correctly determine the grammatical category of the remaining object. This makes the task easier for the child, even if he gets the wrong answer -- and of course if it is the indirect object that is pronominalized, he is quite likely to get it right.

Throwing away a pronoun is an alternative means, in addition to 'de-transforming' a dative, of getting rid of a double object, which, by the arguments in the preceding section, reduces the cognitive load, at least for comprehension. However, this does not account for the

child's relatively higher accuracy in repetition. If the child were really throwing away the pronoun, he would not be saying the sentence containing it correctly. But in general he does better. Why? One possible answer to this question would be to say that sentences containing pronouns are shorter and hence easier to store in short-term memory. However, the length of all of the sentences in the experiment was so short that the children were able, in practice sentences, to repeat much longer ones, such as (11), which was frequently used to give the child an idea of how to play the game of 'say-what-I-say.'

(11) I'm sitting on the floor and my mommy's sitting over there.

Another explanation harks back to the notion discussed in Chapter III, that what is basic for the child is easier for him. This notion, applied to the issue of pronominalization, would suggest that pronouns occur in the child's deep structure and that an interpretive rule determines the antecedent. I think this may in fact be true for the older children, but for the younger children it is less clear. In the repetition task in the first to-dative experiment, #3, the older children made almost no mistakes (only 5 out of a possible 1,052) in which a pronoun was changed to a full noun phrase or vice versa. In contrast, the younger children, in the second to-dative experiment made the same number (13) of mistakes of each type. It is interesting to note that if a child made one kind of error he did not make the other. Given the assumption that a child corrects in repetition to what is more like his grammar, this would argue that for some younger children pronouns are basic and for others full noun phrases are. An alternative

explanation is that the younger children are playing with the possible variations of a process still new to them.

### 5.3. On the pronoun output condition

We have shown that for verb-particle constructions the children studies have a condition on this construction that if the direct object is a pronoun, it must occur next to the verb. While we did not test for this directly in the case of datives, the kinds of errors in both the repetition and choice tasks<sup>3</sup> on violations of this condition also gives some evidence for the existence of this condition on datives for children of these ages, or is at least consistent with this condition.

The question remains, is this in fact a single output condition for 3 1/2-and 4-year-olds, or is it rather a transformational condition on two different rules? In other words, are we perhaps observing children at a stage where their grammar is non-optimal? We have three kinds of evidence showing that this view is indeed the correct one.

#### 5.3.1. Children as linguists

In Chapter II, we considered three arguments for this condition's being an output condition rather than a transformational one. The first was that if it were transformational, it would have to be stated twice, once for particle movement, and once for dative movement. The second was that if the condition was transformational, it would incorrectly block the generation of sentences such as (12).

(12) Mary was given it by me.

The third was that a direct object pronoun was acceptable in the non-clitic position if and only if it was stressed in some way, i.e., by



normal sentential stress or emphatic stress.

If the second and third arguments were absent, there would be no way to distinguish empirically between the two alternative statements of this condition. It would be an arbitrary choice, and in fact the transformational alternative has been chosen by Fraser (1965), Fillmore (1965) and Emonds (1970a).

Now let us consider the child as a field linguist, gathering data about his language and inferring rules from his corpus. The important point here is that even though the child may be exposed to sentences like (13) or (14),

(13) I picked up one.

(14) I gave Mary this.

he may not yet have reached the cognitive stage at which he can incorporate these kinds of sentences into his grammar. Now, we know that children are not sensitive to some crucial uses of stress until a much later age (Atkinson-King, 1970), and we have seen (Chapter 4) that, at least with respect to particle-movement, children treat stressed and unstressed pronouns alike. So that wipes out one argument that the child might have for positing an output condition.

When it comes to passives, at this stage the child is still on pretty shaky ground. About the only kind of passive he is really sure of (Bates, 1969) is one like (15).

(15) The dog got run over.

If one changes get to be and/or adds an agent, the child becomes confused. Now, in my dialect, at least, (16) is rather questionable:

(16) \*? Mary got given it (by me).

Furthermore, two-object passives are hopelessly beyond the competence of children of this age -- they probably could not pay attention to (12) if they heard it every day. Which they don't.

This eliminates another argument. Given their limited corpus children have perhaps a 50-50 chance of choosing one or the other alternative. There are empirical consequences in terms of further grammatical development, depending on which alternative the child chooses. So while for adults we would not be able to see which alternative had in fact been chosen, in the absence of the other arguments, for children we can by looking at what happens next.

### 5.3.2. What happens next.

Let us assume the output alternative is chosen by the child. What would be the logical development of his grammar? The simplest route to the adult grammar would be for the child at some later stage merely to add the exception to this condition involving stress. A more roundabout way would be to generalize this condition to apply to indirect as well as direct objects, and then, at a later stage, to drop the generalization. This would effectively mean that at the stage at which the overgeneralization is utilized, indirect object placement would be obligatory when the direct object is a pronoun. We know from the for-dative experiments and the assymetry of the to-dative experiments that if this happens at all, it does not happen immediately.

The way the output condition of children at this age would have to be stated is something like (17):

(17) W Verb X ( $\neq \emptyset$ ) PRO Y  $\rightarrow$  \*  
[+Acc.]

[+Acc.]

where X contains no S boundary

Notice that this rule makes no mention of any transformation. It would then be very strange indeed we might even call it marked for a later stage of development to suddenly drop a transformational rule, or rather the output of that rule, from this condition.

However, it would not be strange if the pronoun condition were a condition on two transformations in the first place. Let us turn now to the possible consequences of the transformational alternative. First it should be noted that, being non-optimal, this latervative is probably inherently unstable -- i.e., it is likely to be subject to perhaps rather rapid change.

There are several kinds of changes which could take place. Again, the most direct route to the adult grammar would be to capture the generalization involved and make it an output condition. But there are other ways in which the child may, in a certain sense of the word, simplify his grammar. One possible way would be to change the condition on one rule so that the two conditions would now no longer be identical. This is not, strictly speaking, a simplification, but it would be a stabilizing process. Another would be to drop the condition on both rules. A sort of compromise situation would be to drop the condition on only one rule. This really would be a simplification, since in place of two conditions the child would have only one.

This last process is what in fact seems to occur. It is the only way I can think of to account for the fact that 4 1/2- and 5-year-

olds (see Fischer, 1970) cannot say (18) but can say (19):

(18) \*John called up her.

(19) I  $\left\{ \begin{array}{l} \text{gave} \\ \text{bought} \end{array} \right\}$  my mommy it.

The process of dropping the pronoun condition on dative movement can only be accounted for if the younger stage had two transformational conditions and not one output condition. Presumably, at some later stage the child then re-introduces the condition on datives and captures the generalization.

### 5.3.3. What occasionally happens afterwards

A further argument for the transformational solution is that some adults have not re-acquired the condition on dative movement. That is to say, they accept (19) as grammatical. If datives are not included in the pronoun condition, then that condition can no longer be an output condition. Hence, one would expect a sentence like (20)

(20) I picked up that.

to be ungrammatical for these people, since if it is a transformation, then stress has not yet been marked when the transformation applies. Those adults whom I have asked who accept (19) confirm the prediction and reject (20).

### 5.4. A re-examination of theories of acquisition

In Chapter III, we discussed various psychological theories and the predictions that these theories would make with respect to the acquisition of verb-particle and dative constructions. We now return to these theories and compare their predictions with our results.

#### 5.4.1. Braine

Since the kinds of sentences we have discussed are syntactically rather simple, Braine's theory might be expected to apply to them, even though it may not be able to account for more complex cases. It fails, however, to account for the conditions on pronoun objects -- or any condition on a transformation, since there is no provision, as discussed in Chapter III, for context discrimination. Furthermore, there is not, contrary to what Braine's position implies, any far-reaching confusion between datives and directionals in children, except where the sentences involved are acutally ambiguous.

#### 5.4.2. The theory of cumulative complexity

We recall from Chapter III that the cumulative complexity theory predicted that in the case of verb-particle constructions, structures like [NP V prt. NP] would be ordered before [NP V NP Prt. ], and that in the case of datives and pronominalization, the order of acquisition would be the following:

1. NP V NP<sub>1</sub> {<sup>to</sup><sub>for</sub>} NP<sub>2</sub> (with no pronouns)
2. NP V NP<sub>1</sub> {<sup>to</sup><sub>for</sub>} NP<sub>2</sub> (with one or more pronouns)
3. NP V NP<sub>2</sub> NP<sub>1</sub> (no pronouns)
4. NP V NP<sub>2</sub> NP<sub>1</sub> (with pronouns)

The prediction is that (1) precedes (2), (3), and (4), that (2) precedes (4), and that (3) precedes (4), assuming pronominalization to be transformational. The predictions of DTC are partially confirmed by our data, and partially disconfirmed, and in just the ways one might

think, in terms of the criticisms given in Chapter III. There is no ordering in the verb-particle data, at least in terms of relative ease. In fact, Brown (unpublished) has found that in the first appearances of verb-particle constructions in children much younger than those we are considering, the construction occurred first with the particle after the direct object.<sup>4</sup> While this may have been influenced by the condition on pronouns, it still casts some suspicion on DTC, if the deep order argued for in Chapter II is correct.

In the case of datives, DTC is confirmed if one disregards pronouns. When one brings pronouns into consideration, the results are the opposite of what this theory predicts. If pronominalization is not transformational, but rather interpretive, DTC has no way on handling our results anyway, since it deals only with the acquisition of transformational rules rather than interpretive ones.

Recently, other doubts have been cast on the developmental version of DTC. In her dissertation, Bates (1969) discusses the structure and acquisition of four types of sentences, as exemplified in sentences (21)-(24):

(21) The girl was hit by the boy.

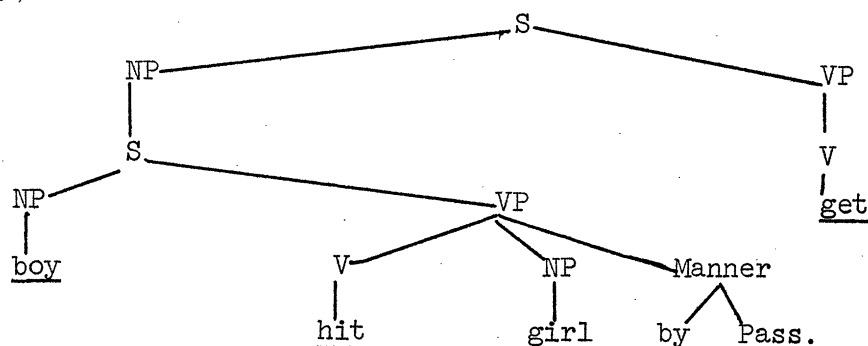
(22) The girl was hit.

(23) The girl got hit by the boy.

(24) The girl got hit.

Sentences (21) and (22) are termed be-passives, while Bates calls sentences such as (23) and (24) get-passives. Bates argues persuasively that the deep structure of a sentence such as (23) is something like (25):

(25)



She shows that (23) can be derived from (25) by independently motivated rules of passivization, subject-raising, extraposition, and to be-deletion. Sentence (24) can then be derived by agent deletion. On her analysis, then, get-passives would have a longer derivation than be-passives, and agentless passives would have longer derivations than passives with agents.

A derivational theory of complexity would predict that the order of acquisition of the sentence types exemplified by (21)-(24) would be exactly the order given above (with the possible exception that (22) and (23) might be unordered with respect to each other, since they involve different transformations beyond the passive). What Bates shows in her thesis is that the opposite is in fact the case.

Bates' results can be quite straightforwardly accounted for if one says that the child's first auxiliary for the passive is get, and that he later acquires an alternate form of the auxiliary, namely be, and that furthermore the child eventually learns the other structures in which get may appear and restructures his get-passives to conform to deep structures like (25). Regardless of whether one agrees with Bates' particular analysis for the adult grammar,<sup>5</sup> this is nonetheless a

get =  
Unbi. passive  
child learns  
be passive  
and get  
to be  
= redundant  
then be  
passive is  
removed from  
the 'get'  
construction

plausible kind of restructuring of the child's grammar, and one which Brown and Hanlon's formulation of the derivational theory of complexity does not allow.

#### 5.4.3. McNeill's theory

In terms of his paper on Japanese indirect objects, McNeill's theory is strongly confirmed by our data. We have found strategies in American children similar to what McNeill purports to have found for Japanese children. His theories have nothing to say about acquisition of verb-particle constructions.

When one looks at his linguistic-universal theory, the picture becomes a little less clear, and I think depends largely on what the universal base looks like -- e.g., what is the order of objects, if any, in a universal base? Are prepositions (or postpositions) in that base? However, since output conditions are among the most language-particular rules in a language, he would predict from this kind of theory that these kinds of conditions would be learned quite late. This is indeed confirmed, but I think for the wrong reasons -- that is, I think this condition is acquired late not because it is language-particular, but rather because the child is not ready until fairly late to pay attention to the contingencies involved.

One further comment on McNeill's theory -- McNeill suggests that direct objects are unmarked and indirect objects must be marked. Intuitively, this is due to the fact that indirect objects are not as closely tied to the verb as direct objects -- that is why they are called 'indirect.' I think that McNeill's view is correct. It would



explain the children's performance on the 'what's in the other picture' task, where they quite often responded with a structure of the form

NP V NP . Furthermore, I think that what dative movement does in English is to effectively tie the indirect object more closely to the verb. Thus, I think that how well a child knows this transformation is interrelated with how closely he feels the indirect object to be an intrinsic part of the sentence and not just an appendage.

#### 5.4.4. Alternatives to DTC

##### 5.4.4.1. Complexity

We derived two predictions from Carol Chomsky's works. The first was that semantically well-formed non-reversible sentences should be easier for the child than reversible sentences, and that semantically ill-formed non-reversible sentences should be more difficult. This prediction is confirmed.

The second was that non-directional verbs should be mastered more easily than directional verbs which may also take datives. In most of the experiments performed, this was neither confirmed nor disconfirmed, since no difference was found. However, the third to-dative experiment, # 5, may shed some light on this prediction. We recall that in this experiment, accuracy was higher on directional verbs with one object than on non-directional verbs. On the surface, this would directly contradict Chomsky's theory. However, one can look at it in another way. One can say that the child is more conscious that the first NP after the verb might be a dative for the non-directionals than for the directionals, and hence would be confused more by a structure like [NP V (to) NP] when the verb was dative than if it

was directional. This would imply that a dative interpretation for directionals is derived fairly late for the child. Looked at in this way, our data confirm Chomsky's position.

#### 5.4.4.2. The strategists

The theories of Bever, Fodor, and Garrett come the closest to predicting our results. They predicted the semantic strategies that we found in the interpretation of reversible vs. non-reversible sentences. They also predicted that there might be some syntactic strategies as well, of the type that we actually found. They suggested that surface structure cues to deep structure relations (such as to or for) would ease comprehension. This prediction is also confirmed by our results. Further, they suggested that where deep structure grammatical relations are distorted, this will have an effect on comprehension, but that where they are not distorted, there will be none. These predictions, too, are borne out by our experiments. We should note that just insofar as the other theories discussed are consonant with this one, they are borne out, also.

#### 5.5. Some rash speculations on the future development of English

We discussed in Chapter I the notion that language change is particularly influenced by how a new generation acquires a grammar. From what we have learned from these experiments, we shall attempt to peek into a rather cloudy crystal ball in an attempt to envisage possible changes in English.

5.5.1. I gave the girl it.

We have already noted that there is a dialect in which the pronoun object constraint holds only for verb-particle constructions and not for datives. If this grammar becomes prevalent, we shall have a restructuring of English grammar -- not a radical restructuring in Hale's sense, but a restructuring nonetheless. It will involve the deletion of the pronoun output condition and adding conditions on two transformations, namely those of idiomatic particle movement (which moves the particle outside the direct object) and directional particle movement (which moves the particle inside the direct object). What it would involve is that huge numbers of children would not progress beyond the 5-year-old stage described in section 5.3.2.

Perhaps because I have rarely heard this dialect, or perhaps because I have studied French, it seems somewhat counterintuitive to me for this kind of change to take place. It would also be a rather marked change, given the assumption that adults now generally have an output condition. The possible change we discuss in the next section seems more likely.

5.5.2. I gave her it.

In numerous languages, there have developed two sets of pronoun objects. One set occurs in stressed positions, and the other, which is unstressed cliticizes onto the verb. For those pronouns which cliticize, there is often what Perlmutter (1968) has called a template, a fixed order in which these pronouns must occur. In one of these languages, namely French, for many verbs if an object is pronominal, it must be

cliticized, but a copy may occur in stressed position as well, as in (26):

(26) Il me l'a donné à moi, ça.

Except for the copying part, I think that this has already begun to be the case for English. It is already true, as we have seen in Chapter II, for unstressed direct object pronouns. The cliticized pronoun seems to be stylistically preferred for indirect object pronouns as well, at least for short sentences. Compare the awkwardness of (27) to the non-awkwardness of (28) and (29):

(27) Bring a beer {for<sub>2</sub> me.  
to<sub>3</sub>

(28) Bring me a beer.

(29) Bring a beer {for<sub>2</sub> me while you're at it.  
to<sub>3</sub>

For all object pronouns except me, there already exist stressed and unstressed forms:

Stressed	Unstressed
you [yuw]	ya [yΛ, ye]
us [ʔΛs]	us [əs]
That	it [it, ət]
him [him]	'im [əm]
her [hər]	'er [ər]
them [təm]	them, [em təm, əm]
one [wΛn]	one, [un wən, ən]
some [sΛm]	some [səm]

Furthermore, there is already a dialect of English which accept (30) but not (31):

(30) I gave her it.

(31) \* I gave Mary it.

The fact that (31) is unacceptable in this dialect shows that there really is an output condition involved which requires an unstressed pronoun object to occur next to the verb. If there are two pronouns, both cannot simultaneously come right after the verb -- in American English it is resolved by having the 'template' specify the order Indirect Object--Direct Object. But this is not necessarily the case. In British English, (30), in order to be grammatical, would have to be stated as (32):

(32) I gave it her.

Is this a plausible kind of change? Note that if one assumes that, say at age 6, the child has acquired the pronoun output condition, it would be quite natural in terms of cognitive development for the child to overgeneralize the condition in just this way -- i.e., by including indirect objects as well as direct objects.

### 5.5.3. Dative movement in this context

If cliticization of unstressed pronouns should become obligatory, this will have consequences for the rules of dative movement, and perhaps even for the representation of datives in the base. Dative movement will, effectively, become obligatory when the indirect object is an unstressed pronoun, and a sentence like (33) will become not only stylistically bad but also grammatically out.

(33) I had a goldfish once and I fed seaweed to it.

Now, what about dative movement when the indirect object is not

a pronoun? There are two kinds of sentences of this type that we have to consider. One is the case where one of the objects, especially if it is the indirect object, though not a pronoun is still anaphoric. In present-day English, these are relatively unstressed and seem to fall together with pronouns stylistically, as exemplified in (34) and (35):

(34) I saw an employed aerospace worker on the street and I gave the poor guy a quarter.

(35) I saw an unemployed aerospace worker on the street and I gave a quarter to the poor guy.

The non-anaphoric type has a different stress pattern in the prepositional form:

(36) I gave an unemployed aerospace worker a quárter.

(37) I gave a quarter to an unemployed aerospáce worker.

Given sentences like (34) and (35), which can be quite naturally extended to any sentence in which the indirect object has been previously mentioned (possibly in another sentence), structures of the type [NP V NP NP] are not likely to disappear from the language. I do wonder, though, about sentences like (38):

(38) I gave a worker a quarter (not an engineer).

If all and only unstressed anaphoric in a very general sense of the term noun phrases occur immediately after the verb, a sentence like (38) should become ungrammatical, and dative movement should become a process, like the passive, which serves to shift the focus of the sentence, as discussed in Chomsky (1970a). This is a quite general problem in English grammar, of how it conspires to construct a sentence such that old material is towards the beginning and new material is towards

the end, and I do not have the space to discuss it here.

If sentences like (34) remain grammatical, then it will probably not be necessary to restructure the base, assuming that the changes we have postulated take place.

Footnotes to Chapter V

1 But cf. Ervin-Tripp, 1970, for a discussion of different learning strategies used by children learning radically different languages.

2 It should be noted that in numerous languages, pronominalization consists of deletion, especially in the case of the third person, which deletion is really throwing it away. It would be interesting to explore the possible relationship between pronominalization and object-deletion or incorporation as discussed in Chapter II.

3 On the choice task, we have already noted (Chapter IV) that the dip in direct object pronoun cases may be partially due to the violation of this condition. In repetition tasks, two types of errors contribute to this conclusion. First, de-transformation was often applied when the direct object was a pronoun, thus having the effect of placing it next to the verb in repetition. Second, an object pronoun was often copied into a position next to the verb, with an additional copy in the original position in the stimulus sentence. This second type of error seemed to me to be quite unconscious, and of the same character of other spontaneous corrections.

4 Brown's corpus of verb-particle constructions consisted of a grand total of four sentences.

5 I think that get is an alternative passive auxiliary for both children and adults, with the restriction that for adults it can be used only with volitional, non-stative verbs.



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Appendix A -- Sample lists from Experiment #3

The baby sitter is giving the cat to the pig.  
The daddy is reading them to it.  
The clown is sending to the cow the grass.  
The turtle is showing the fish it.  
The cowboy is taking to him the tiger.  
The fireman is telling him the story.  
The teacher is throwing to the stick him.  
The nurse is writing her to a postcard.  
The mother is bringing the paper to her.  
The giant is carrying it her.  
The girl is promising to them it.  
The farmer is feeding the snake the turtle.

The policeman is giving the toy to the baby.  
The mother is reading the child to it.  
The mailman is sending to the lady her.  
The Indian is showing the carrot him.  
The nurse is taking to it the lady.  
The teacher is telling him it.  
The fisherman is throwing to the lobster the octopus.  
The boy is writing him to a note.  
The cowboy is bringing him to her.  
The Indian is carrying him the bird.  
The daddy is promising to her it.  
The hunter is feeding the bear the tomato.

The babysitter is giving the pig her.  
The daddy is reading to her the story.  
The clown is sending it the cow.  
The turtle is showing it to it.  
The cowboy is taking the tiger to the lion.  
The fireman is telling to the story the astronaut.  
The teacher is throwing him it.  
The nurse is writing to it her.  
The mother is bringing the boy the teacher.  
The giant is carrying to the queen it.  
The girl is promising the child to it.  
The farmer is feeding him to the snake.

The policeman is giving the baby it.  
The mother is reading to him the comics.  
The mailman is sending her her.  
The Indian is showing the squirrel to him.  
The nurse is taking the lady to the water.  
The teacher is telling to the fairy tale him.  
The fisherman is throwing it the lobster.  
The boy is writing to it him.



Appendix A -- Continued

The cowboy is bringing the flower the woman.  
The Indian is carrying to the bird the fish.  
The daddy is promising him to it.  
The hunter is feeding it to the bear.

The boy is writing a letter to his grandmother.  
The cowboy is bringing her to it.  
The Indian is carrying to the bird him.  
The daddy is promising the bike him.  
The hunter is feeding to him the bear.  
The policeman is giving him the toy.  
The mother is reading to the comics him.  
The mailman is sending her to the girl.  
The Indian is showing the carrot to him.  
The nurse is taking it her.  
The teacher is telling to him it.  
The fisherman is throwing the octopus the lobster.

The nurse is writing a song to her father.  
The mother is bringing the teacher to him.  
The giant is carrying to the queen him.  
The girl is promising a snowball him.  
The farmer is feeding to it the snake.  
The babysitter is giving him her.  
The daddy is reading to the story the girl.  
The clown is sending it to the grass.  
The turtle is showing him to it.  
The cowboy is taking him the tiger.  
The fireman is telling to him it.  
The teacher is throwing the puppy the stick.

The boy is writing his grandmother it.  
The cowboy is bringing to her the man.  
The Indian is carrying it the bird.  
The daddy is promising it to her.  
The hunter is feeding the bear to the worl.  
The policeman is giving to the monkey the baby.  
The mother is reading him them.  
The mailman is sending to her her.  
The Indian is showing the squirrel the rabbit.  
The nurse is taking to the lady it.  
The teacher is telling the witch to it.  
The fisherman is throwing it to the octopus.

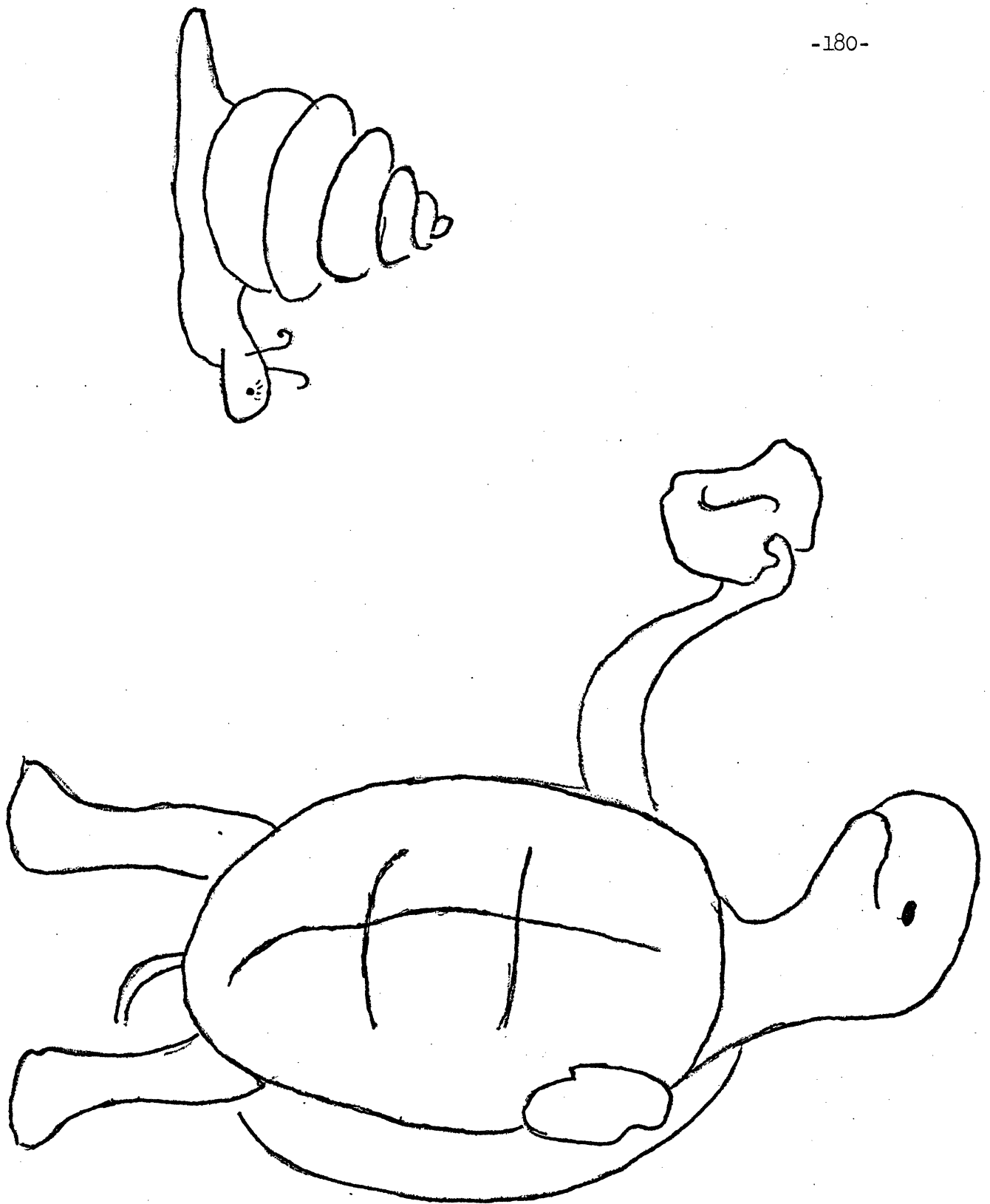
The nurse is writing her father it.  
The mother is bringing to her the paper.  
The giant is carrying him her.  
The girl is promising the lunch to them.  
The farmer is feeding the snake to the cookie.  
The babysitter is giving to the cat him.

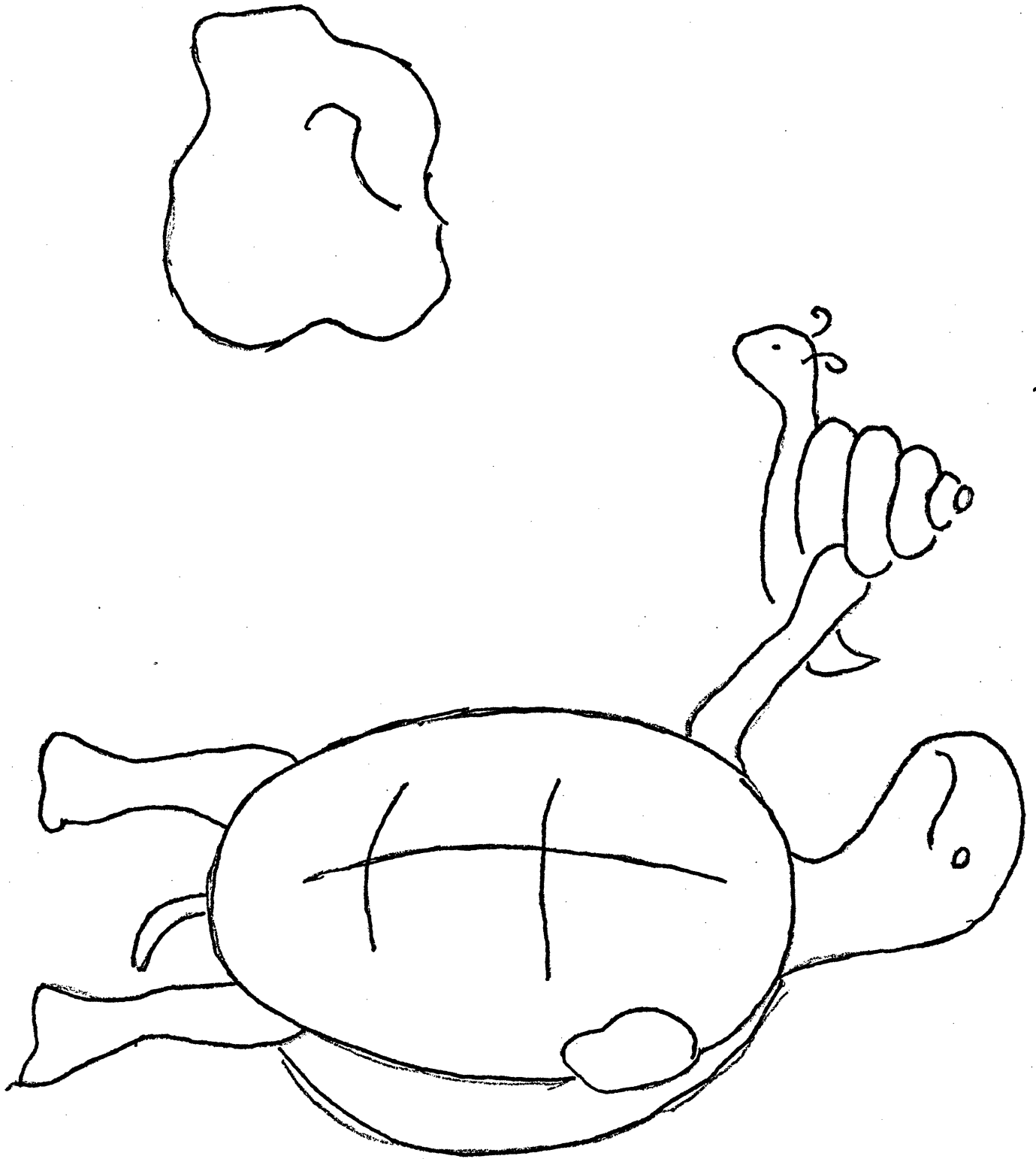
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The teacher is throwing it to the puppy.

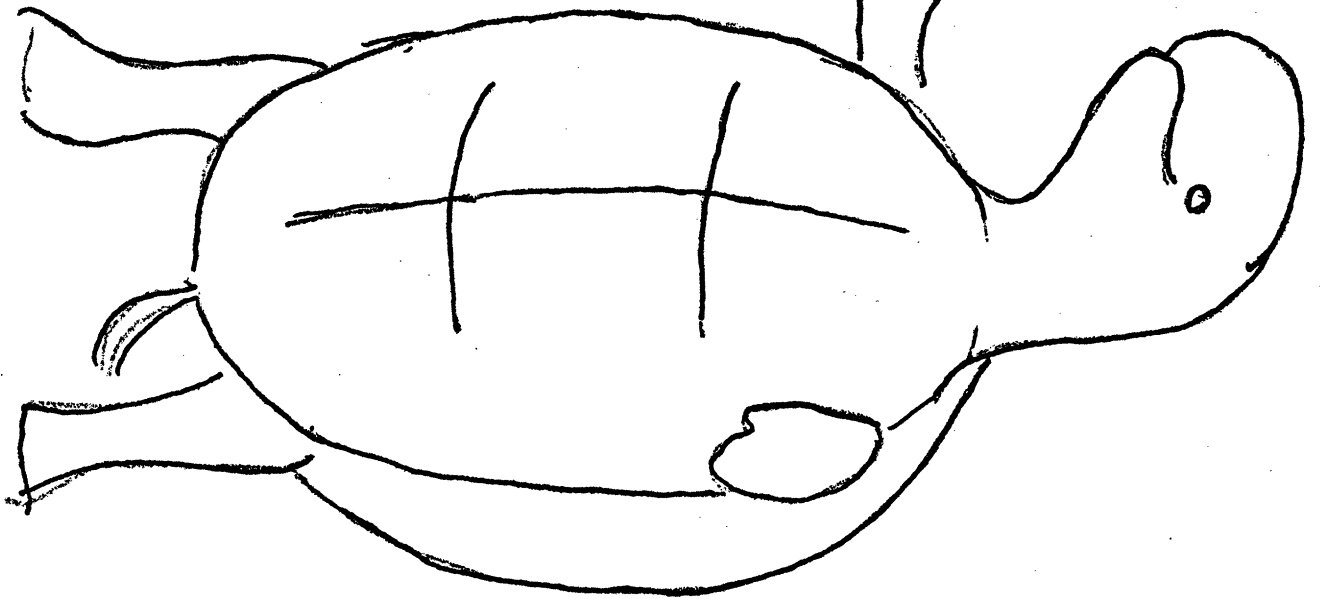
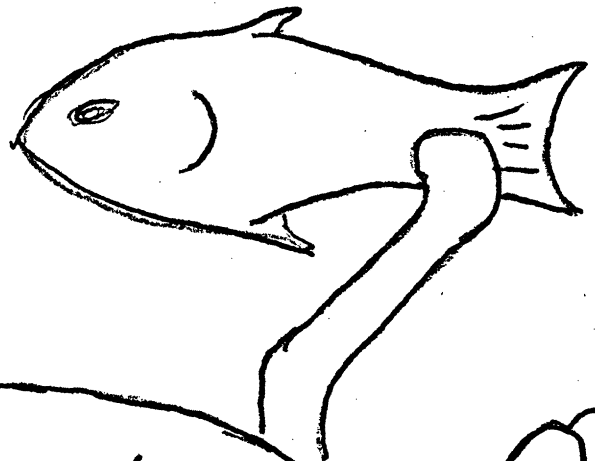
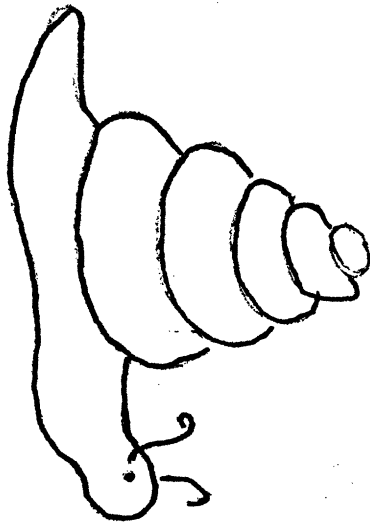
Appendix B -- Samples of pictures used in Experiments  
#3 and #4

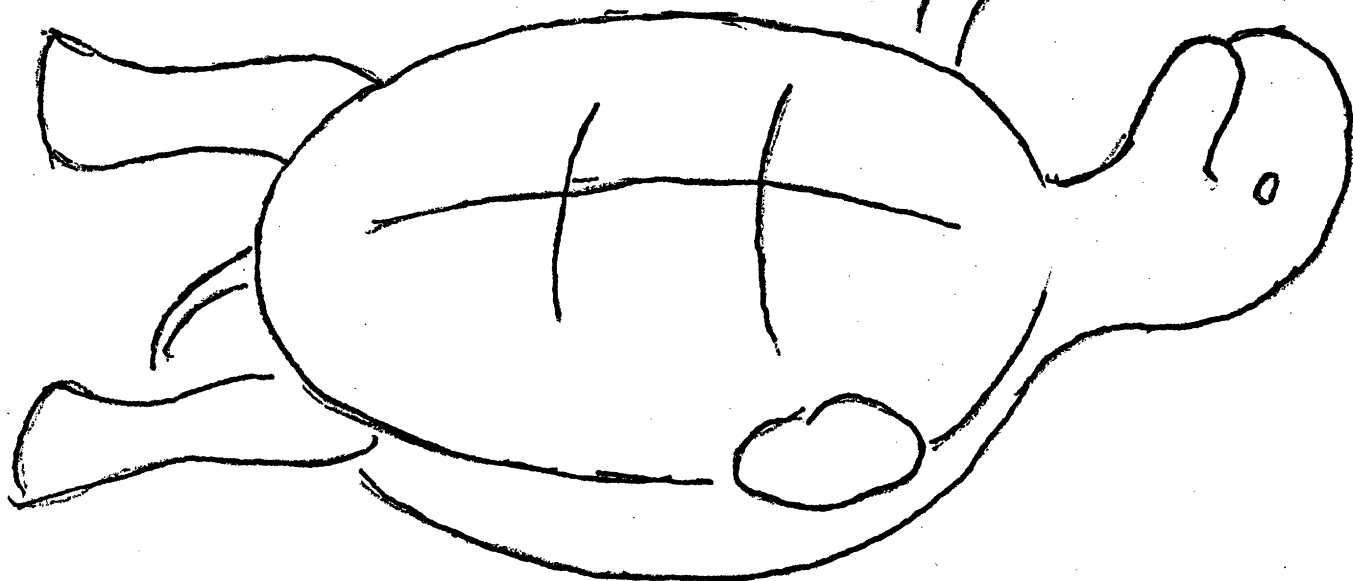
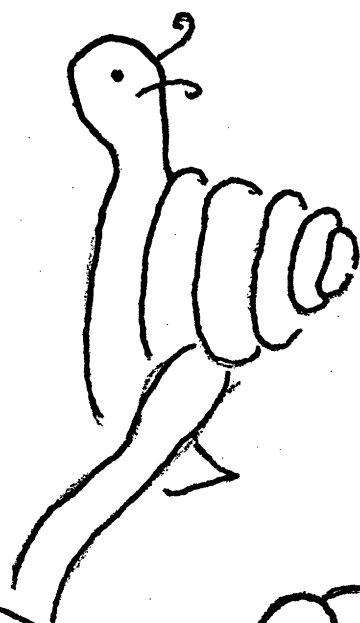
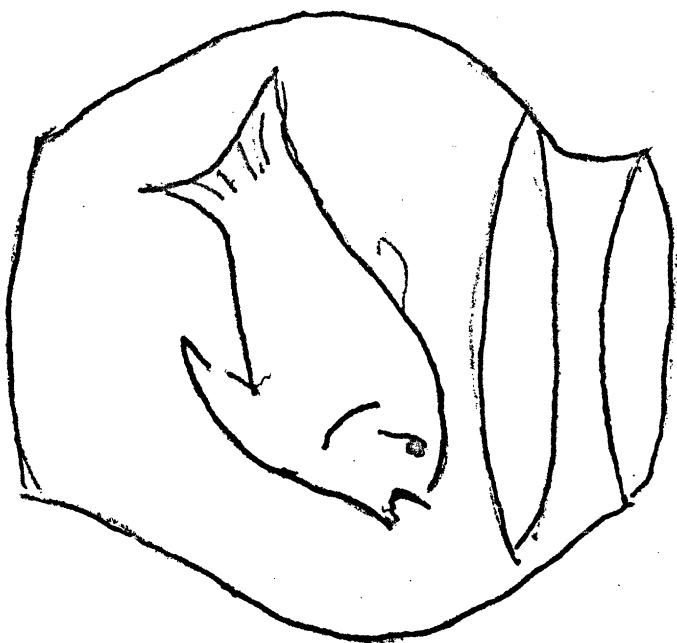
The pictures on the following eight pages represent the two choices  
for the four base-line sentences:

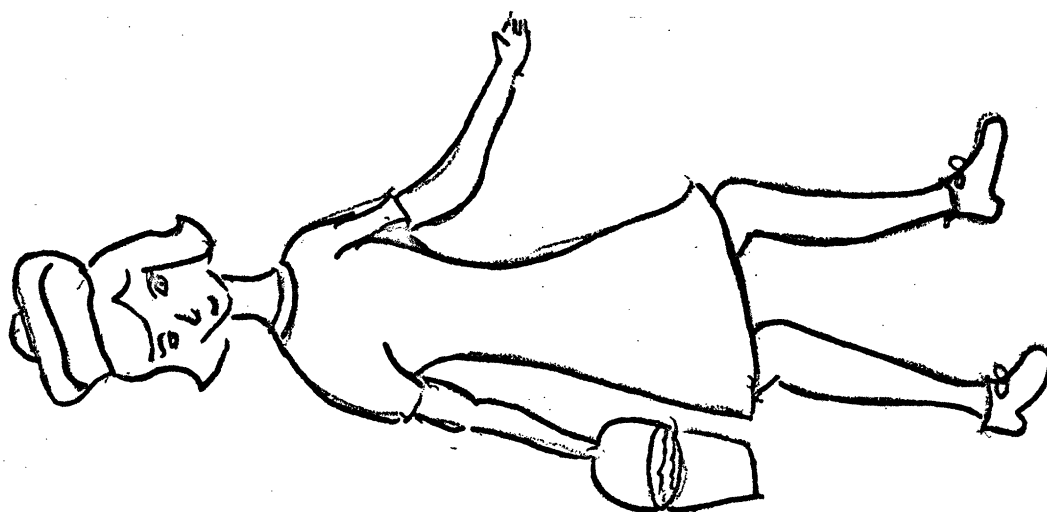
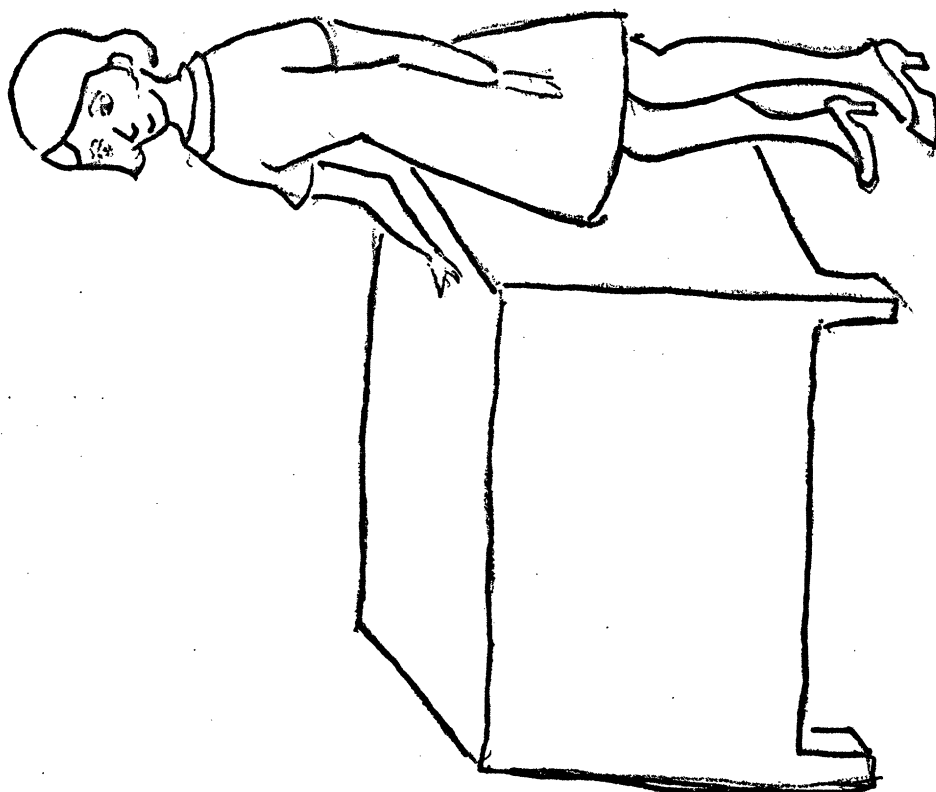
- (1) The turtle is showing the rock to the snail.
- (2) The turtle is showing the fish to the snail.
- (3) The nurse is bringing the water to the lady.
- (4) The nurse is bringing the doctor to the lady.



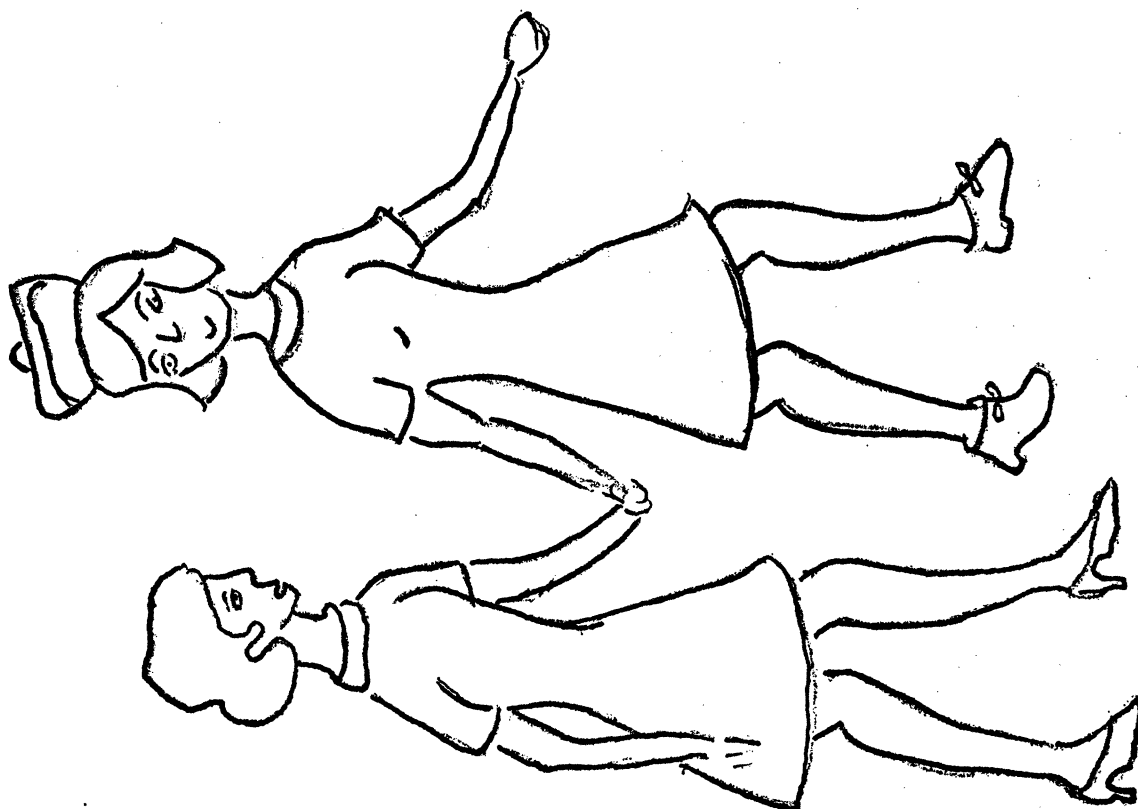
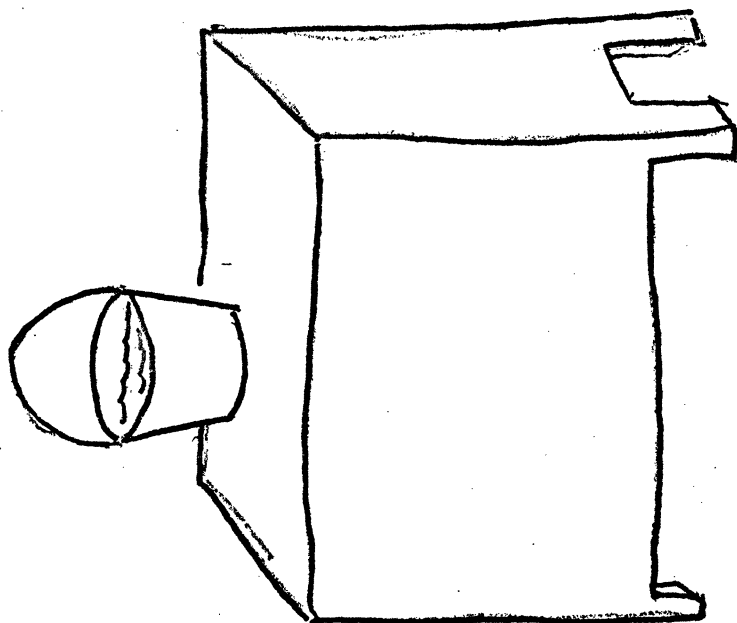


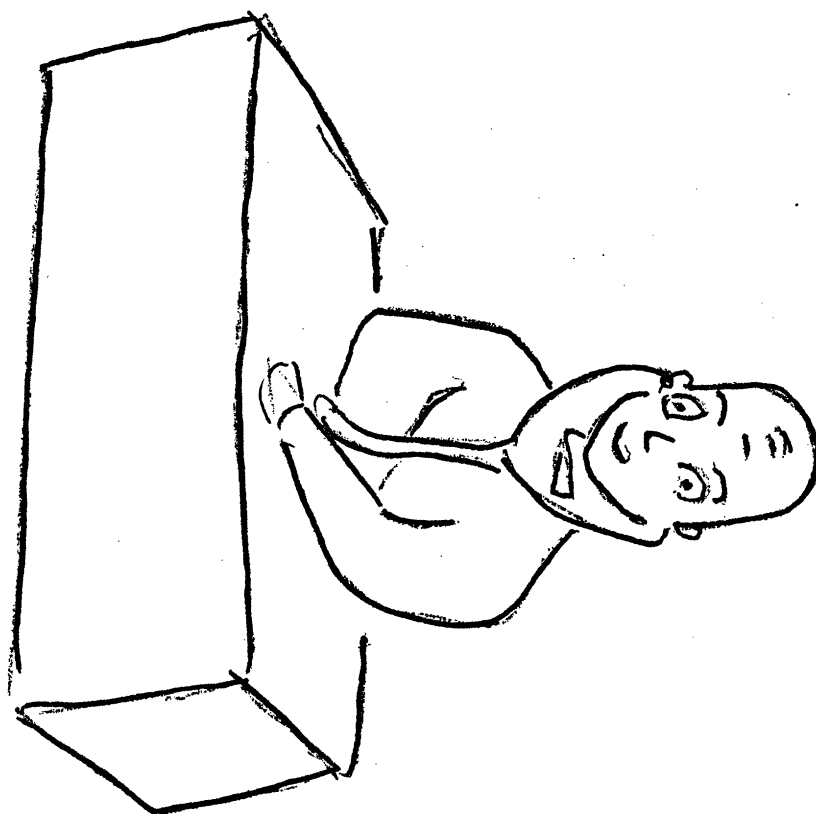
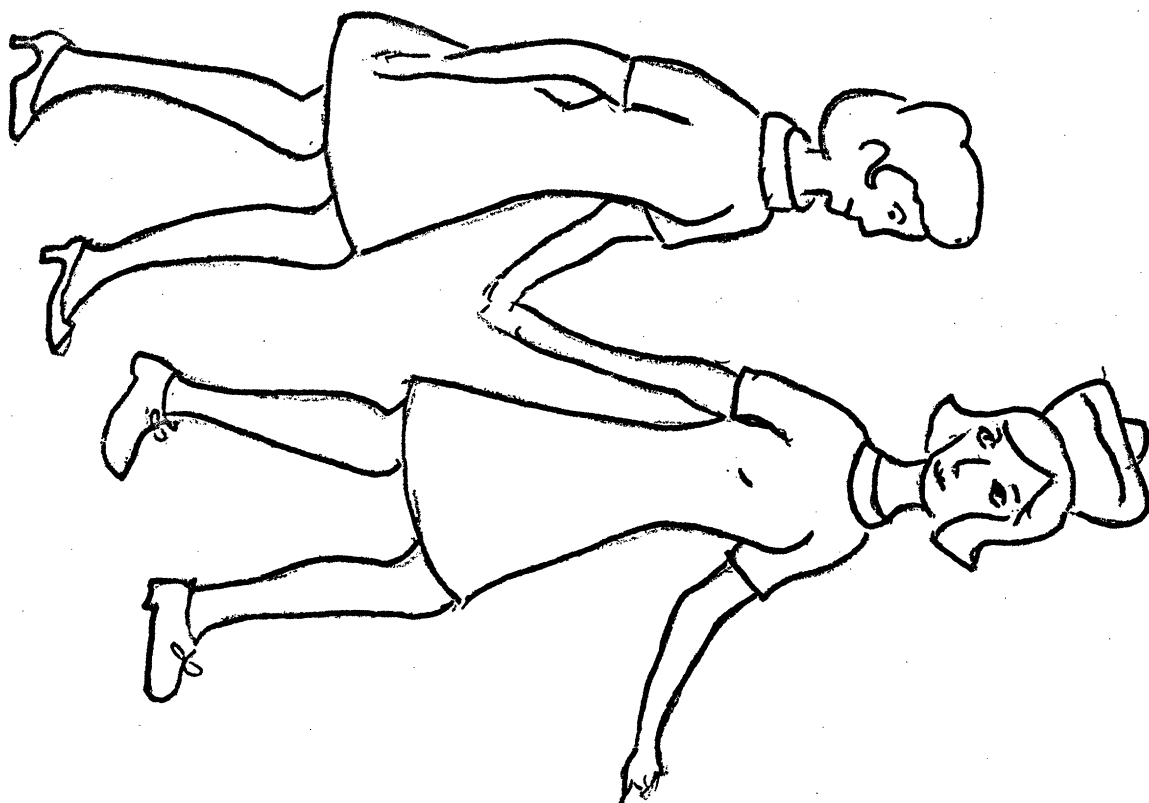


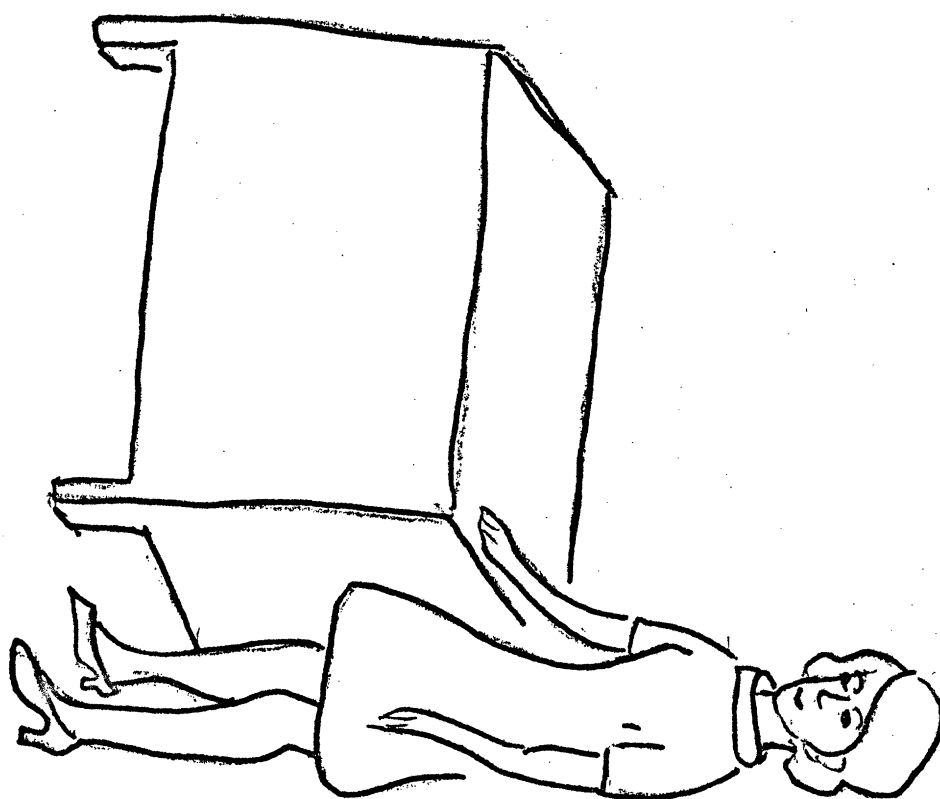
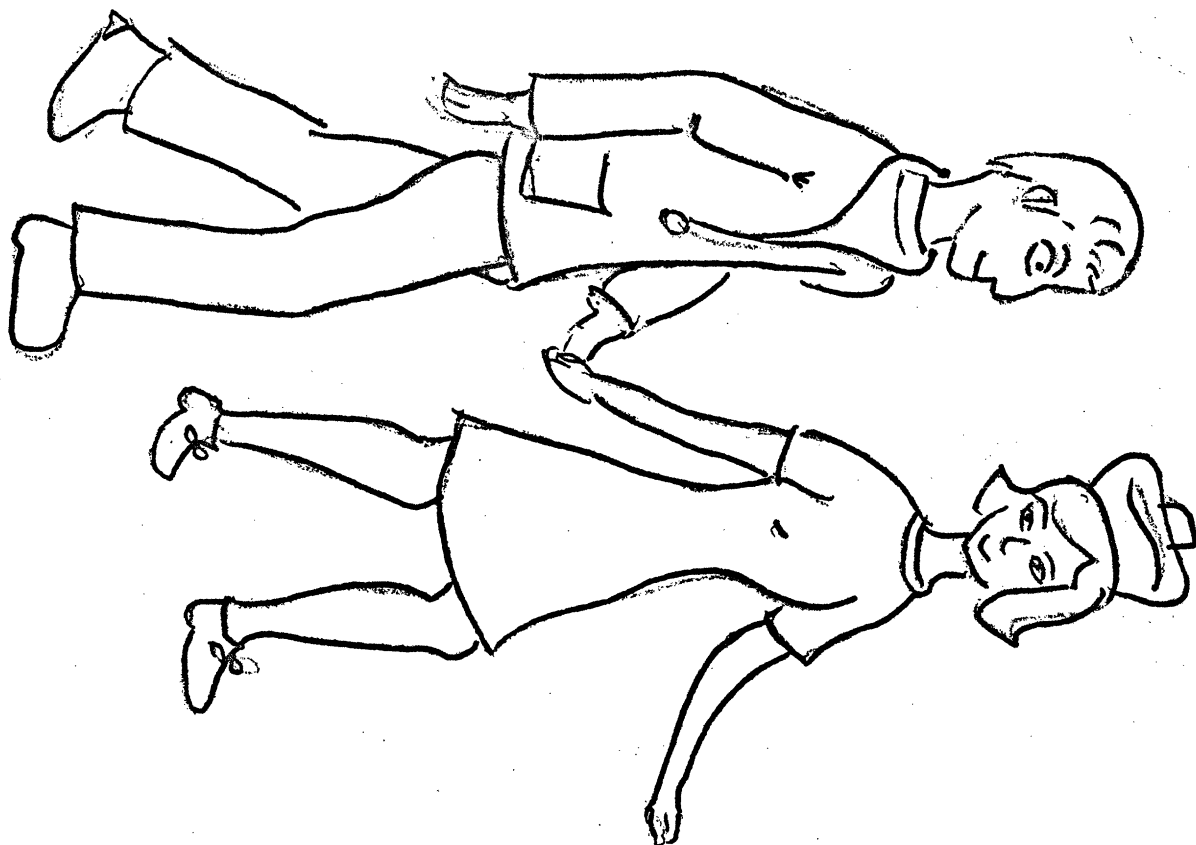












### Autobiography

The author was born in Washington, D.C., in 1945, and lived in Maryland until the age of 13, at which time she moved to Minnesota. After graduating from the public schools in St. Louis Park, Minnesota, she attended Radcliffe College, and graduated magna cum laude in 1967.

She entered MIT in the fall of that year with a Woodrow Wilson Fellowship. After the first year, she was otherwise supported. She is currently working at the Salk Institute in La Jolla, California, where the climate is better.