

The Acquisition of Clausal Complementation

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0. Introduction

The emergence of complex sentences in child language marks a crucial point in grammatical development in that it provides evidence of recursive rules - an essential component of human languages. In this paper I will try to explicate some of the properties of early complementation and the mechanisms responsible for the development of the latter. In particular, I will argue that all complements, including infinitives, are clausal in structure, roughly as exemplified in (1).

(1) I want [[PRO [(to)] [go]]]
 S' S INFL VP

Following Chomsky (1981), Koster and May (1982) and others, I assume that infinitives have a sentential structure in the adult grammar (as in (1)), and thus I wish to claim that child grammars do not differ from adult grammars in this particular respect. The proposal that early infinitives are clausal contrasts with that of Maratsos (1978) and more recently, Bloom, Tackeff & Lahey (1984) who have argued that early infinitives are VP's and that the acquisition data support the VP' analysis of infinitives proposed in Bresnan (1978).

I will also suggest that the acquisition data related to complex sentences support a modular theory of grammar; that is a theory in which various subcomponents interact to determine particular constructions. A modular theory allows for the possibility that certain components develop prior to others, in part as a function of the amount of input data needed to trigger a particular aspect of the grammar. This possibility is realized in the acquisition of complex constructions in that various "non-core" or "peripheral" aspects of the complementation emerge late relative to other "core" properties.

Finally, I will propose that the syntax of complex constructions need not be learned as such, but is rather triggered by the learning of semantic properties associated with particular verbs. The particular analysis I will propose relies heavily on the theory of s-selection proposed by Grimshaw (1979, 1981) and further developed in Pesetsky (1982).

1.0 The Structure of Infinitives

Let us first consider the syntactic structure underlying the child's early infinitives, whether VP's as proposed by Bloom et al., or clausal as in (1). As a point of departure, we may consider the sentences given in (2)-(4). These data are a representative sample of the earliest complex sentences produced by English speaking children (Limber, 1973; Bloom et al., 1984;

1
Pinker, 1984)

- (2) a. Watch me draw circles
I see you sit down
Lookit a boy play ball
See mommy busy
- b. You make me cry
I let it fall
- (3) a. I want take the bridge away
I forgot (to) bring it
Next year I like (to) go bowling
- b. Tell him stand up
Help me (to) make a happy face
- (4) a. I guess she's sick
I think I want grape juice
- b. I remember where it is
I don't know who is it

If we consider the set of matrix verbs illustrated in (2)-(4) we see that complements to perception verbs, causative verbs, factive verbs and verbs of propositional attitude emerge at roughly the same point. Moreover, if we ignore the data in (2), we note that infinitival complements (cf. 3) emerge at roughly the same point as tensed complements (cf. 4). (We return to the small clause complements in (2) in section 3.) If infinitives have the sentential structure given in (1) this result is not surprising. The most parsimonious description of the emergence of complementation would thus be that at a point P the recursive rule given in (5) is introduced into the grammar

(5) VP ----> V S'

The S' complement may be realized as either [+/- tense], [+/-Wh] depending on lexical properties of the matrix verb, as I assume is the case in the adult grammar. On a analysis in which tensed complements have a sentential structure and infinitives are VP's, as illustrated in (6), the co-emergence of the two complement types is fortuitous.

- (6) a. I think [[I want grape juice]]
 S' S
- b. I forgot [(to) [bring it]]
 VP' VP

We find further support for a clausal analysis of early infinitives if we consider what is missing from the acquisition data. During the early period of complex sentences, infinitival complements typically lack the infinitive marker to. (This is indicated in the examples by placing the element in parentheses.)

Bloom et al. note that the use of to increases developmentally but is not consistently found (i.e. 75% of the time) until the child reaches an Mean Length of Utterance (MLU) of 3.5 (roughly age 2 1/2.) The initial absence of to is of particular interest in that this element is treated differently in the S' and VP' analyses of infinitives. As indicated in example (1), on a clausal analysis of infinitives to is a realization of [-tense] features in INFL. On the VP' analysis, there is no INFL in infinitival complements since the latter are non-sentential. Within this framework, to is treated as a complementizer and a constituent of VP', as illustrated in (6b) (Bresnan, 1978) Interestingly, the absence of to in the acquisition data is paralleled by the absence of modals and aspectuals in simple tensed sentences. In Bellugi's (1967) well-known study of the acquisition of modals and negation, she found that children acquire productively control of the modals during what she called Stage C; that is when children have an MLU of 3.5-4.0. Recall that this is the point at which children acquire productive control of to in infinitives. Note that if to is a constituent of INFL (which entails that infinitives are sentential), we expect this element to exhibit the same developmental pattern as other auxiliary elements. On a VP' analysis the initial absence and parallel appearance of to and the modals is again accidental.

There is one final aspect of the acquisition of the modals and other auxiliaries which is relevant to the present discussion. Pinker (1984), adopting a VP' analysis of the acquisition of infinitives, has proposed that modals and semi-auxiliaries (eg. have to, going to, got to) be treated as main verbs which take VP' complements. The structure he proposes is given in (7).

- (7) a. John [[might] [[leave]]]
 VP V VP' VP
- b. John [[has] [to [leave]]]
 VP V VP' VP

As he notes, the structures associated with modals and semi-auxiliaries is entirely parallel to that of the infinitival complements, exemplified in (6b). Thus, all else being equal, on this analysis we might expect modals and semi-auxiliaries to develop in tandem with the embedded infinitives. The acquisition data do not bear out this prediction, however. What we find is that semi-auxiliary constructions, illustrated in (8) (below), emerge with the infinitives given in (3a), while the modals are a significantly later acquisition, as suggested in the previous

2
discussion.

- (8) I gotta get down
 I gon cut as some more
 We have buy some

It thus appears that semi-auxiliaries and main verbs pattern together as against modals. In particular, the semi-auxiliaries

are used productively during the period in which we find other forms of complementation, but in which the modals are lacking. This is consistent with an analysis in which the semi-auxiliaries, like main verbs, take a sentential complement. (We discuss the semi-auxiliaries further in the section 2.1.)

To sum up the discussion thus far, I have argued that the appearance of tensed and infinitival complements (both declarative and interrogative) and the behavior of modals and auxiliaries, including the infinitive marker *to*, suggest that early infinitives have a clausal rather than phrasal structure.

2.0 Modularity

Let us now turn to the modularity issue noted in the introduction. Earlier I proposed that at a particular point P in grammatical development, the phrase structure rule given in (5) is introduced into the grammar accounting for the emergence of the various complements illustrated in (3) -(4) and now (8). Following Chomsky (1981), I take the clausal structure of complements to be a property of "core" grammar. There are, however, other aspects of complementation which depend on or are derived from lexical properties associated with particular matrix verbs. The latter we may consider to be "peripheral" aspects of complementation. Viewed from an acquisition perspective, it seems reasonable to suppose that those aspects of complementation which are idiosyncratic to particular verbs will take longer to acquire, perhaps requiring more exposure to data.

Bearing this in mind, note first that while we find infinitives embedded under control verbs (cf. 3), raising constructions are conspicuously absent from the acquisition data. Early complex sentences include neither raising to subject nor so-called "raising to object" constructions, of the sort given in

3

(9a,b) respectively. (The @ sign is used to indicate that these sentences are unattested in the acquisition data of this period.)

- (9) a. @John tends (to) act crazy
b. @John believes Mary (to) be crazy

On most Government-Binding analyses, 'believe' (and similar verbs) trigger a rule of S' deletion, thus permitting the

4

embedded subject to be exceptionally governed and Case marked. The rule of S' deletion and subsequent exceptional Case marking (ECM) is a marked phenomenon; it is restricted to a small class of verbs in English, and not very common in the languages of the world. By hypothesis, the child must learn, largely on an item by item basis, which English verbs trigger this exceptional process. It is therefore not surprising that such constructions are late relative to other aspects of complementation.

The absence of subject raising constructions (cf. 9a) is a closely related phenomenon. Within Government-Binding, raising verbs also trigger S' deletion and thereby permits the trace of the moved subject to be properly governed by the matrix verb. If S' deletion must be learned for particular verbs on the basis of positive evidence, we expect that subject raising, like ECM, will not be among the earliest complex constructions.

2.1 The semi-auxiliaries

A question which arises in connection with this proposal concerns the structure of the semi-auxiliary constructions illustrated in (8). There is some evidence that in the adult grammar of English the semi-auxiliaries are raising verbs. Pullum & Wilson (1977) point out that the semi-auxiliaries, like raising verbs, take expletive elements and idiom chunks as subjects, as illustrated in (10).

- (10) a. There $\left\{ \begin{array}{l} \text{is going} \\ \text{seems} \end{array} \right\}$ to be a riot in the park
- b. There's $\left\{ \begin{array}{l} \text{gotta} \\ \text{seems to} \end{array} \right\}$ be a solution to this problem
- c. Tabs $\left\{ \begin{array}{l} \text{have to be} \\ \text{seem to have been} \end{array} \right\}$ kept on the students

While the semi-auxiliaries may have a syntactic structure associated with raising verbs, they are semantically distinct in certain respects. True raising verbs, for example, seem, appear, never θ -mark the matrix subject position. The semi-auxiliaries, in contrast, can be thematically related to the matrix subject. Thus in the adult language sentences containing have to and going to are ambiguous between a root and epistemic reading. Consider, for example, the sentences in (11a,b).

- (11) a. John has to leave immediately
b. John is going to visit his mother

On the root interpretation (11a) means 'John is obliged to leave'; on an epistemic reading, the sentence means 'it is necessary that John leave.' Similarly, (11b) on a root interpretation expresses John's intention to visit his mother, while the epistemic interpretation is that of a future visit. Following in the spirit of proposals by Zubizarreta (1982), we may assume that the semi-auxiliaries optionally assign a θ -role to the matrix subject position (perhaps an adjunct θ -role as suggested by Zubizarreta). The epistemic interpretation results when the semi-auxiliary fails to θ -mark the subject position; when the semi-auxiliary does θ -mark the subject position we have the root reading.

Returning to the acquisition data, note that while young children certainly produce semi-auxiliaries (cf. 8), there is little evidence that they are initially analyzed as raising predicates. First, children do not use expletives and idioms early on and hence there is no direct evidence of a raising analysis. Second, if the early grammar licenses raising, we expect to find pure raising constructions, contrary to fact. Third, if the semi-auxiliaries involve raising, this constitutes the only instance of NP movement in the grammar. As is often noted, young children do not produce or comprehend verbal passives. In order to explain the lack of passive, Borer &

Wexler (1984) have argued that the principle of A-binding is lacking in the initial stages of acquisition. If A-binding is not operational, then raising is excluded. Finally, it has frequently been observed that young children treat the predicates hafta, gonna, and wanna as unified semantic class, typically used to express the child's wish or intention to act (Brown, 1973; Bloom et al., 1975). That is to say that initially children understand use the semi-auxiliaries in only their root sense; the epistemic meaning is acquired later (Kuczaj, 1977; Shepherd, 1981) This final observation suggests that on the child's analysis the semi-auxiliaries always bear a thematic relation to the subject, much as want does. The unambiguous interpretation associated with these elements can be explained straightforwardly if we assume that the early grammar analyzes the semi-auxiliaries as control verbs rather than as raising verbs.

On the above hypothesis the child is forced to a control analysis of semi-auxiliaries because the grammar lacks a marked process of S' deletion (and perhaps A-binding). Note that while the input data are ambiguous in the case of semi-auxiliaries, this is not true for the pure raising verbs; that is there is no evidence to suggest to the child that verbs like see and appear are thematically related to the subject. Hence, we do not expect young children to acquire pure raising verbs under a control analysis.

2.2 Overt Complementizers

Let us now consider a second aspect of complementation which is governed by specific lexical items - the choice of complementizer, which reflects the tense specification of the embedded clause. Verbs must be lexically specified as to whether their sentential complements are headed by for, that, or a null complementizer. Thus, want but not try may take a for complementizer, as in (12a,b); guess but not want may take a that complementizer, as in (12c,d), and so on.

- 12) a. I want (for) John to leave
 b. *I tried for John to leave
 c. I guessed (that) John left
 d. *I want that John leave

On a clausal analysis of complementation, sentences (12b,d) represent "accidental gaps" in the sense that English would not be a fundamentally different language if (12b,d) were grammatical. The choice of complementizer is clearly an idiosyncratic property of particular verbs which needs to be learned.

In the acquisition data presented in (3) and (4) we note that the sentences invariably lack overt complementizers. These elements begin to appear at roughly age 3.0; that is, towards the end of the developmental stage in which children acquire complex sentences (Limber, 1977; Bloom et al., 1984). The embedded interrogatives illustrated in (4b) argue against the hypothesis that the early grammar simply fails to generate a COMP position at this stage. Moreover, it is not the case that children lack

the lexical item that since this element does occur as a relative pronoun at this stage. Rather, I will assume that the child's initial hypothesis is that all embedded S's are headed by an

5

empty COMP. This initial hypothesis will be revised for particular matrix verbs based on positive data; that is by exposure to sentences which contain that and for. As in the case of S' deletion, the learning of lexical complementizers is a process which is strongly "data-dependent" and hence not an early acquisition.

2.3 Exceptional Case Marking from COMP

One last peripheral aspect of English complementation which is worth noting is ECM from COMP, illustrated in the example in (12a). Chomsky (1981) proposes that the lexical subject embedded under verbs like want, like etc. is governed and Case marked by the prepositional complementizer for. He further suggests that for may undergo deletion in the PF component, at which point the

6

Case requirement of the embedded subject has been satisfied.

Chomsky's analysis of want type verbs together with the hypothesis that the child must learn the complementizers associated with particular verbs makes a clear prediction concerning the point at which the child will control sentences like that in (12a). The prediction is that the child will not produce lexical subjects in infinitives as long as he fails to produce lexical complementizers. This prediction is confirmed by the acquisition data. Sentences like that in (13) (below) are first produced at roughly age 3 (Bloom et al, 1984). Recall that this is the point at which children begin using lexical complementizers.

- (13) I want Mommy get it
I want this doll to stay here

There is, however, a narrower prediction, namely, that children will not produce the sentences in (13) until they give evidence of knowing that want takes a for complementizer. We thus expect to find alongside the sentences in (13), those in (14).

- (14) @I want for Mommy get it
@I want for this doll to stay here

Unfortunately, as indicated by the @ sign, the sentences in (14) are unattested at this stage (Bloom et al, 1984). It is possible, however, that the non-occurrence of (14) is actually an effect of sample size. In the study conducted by Bloom et al, for example, they found that sentences containing infinitives with lexical subjects (i.e. the context in which we would expect to find for) constituted only 4% of the total number of complex

7

sentences. Given the relative unnaturalness of the construction, as compared for example with sentences containing an intervening adverb as in (15) (below), it is likely that even in a random sample of adult utterances, sentences like (14) would be extremely rare.

(15) I want very much for John to go

We have seen that the acquisition of complementation can be factored into "core" versus "peripheral" properties. The latter include choice of complementizer, S' deletion, and ECM from COMP. Each of these was shown to be a relatively late acquisition as compared to the acquisition of clausal structure of complements, the "core" property. I have also suggested that the acquisition of the so-called peripheral properties is strongly "data-driven"; that is, such properties are learned in association with particular lexical items on the basis of positive evidence. This is consistent with the fact that choice of complementizer and ECM, for example, are not generalized. Thus, we do not find

8

acquisition errors of the sort illustrated in (16).

(16) @I tried for John to go
@I want that John go

3.0 The Clausal Structure of Complements

In this last section I would like to briefly discuss the small clause complements in (2). I will assume, following Chomsky (1981), that small clauses are non-maximal projection of a lexical head which contain a subject. Thus, sentences like those in (2) have the structures in (17).

(17) a. Watch [[me] [draw circles]]
 V* NP VP
 b. See [[mommy] [busy]]
 A* NP AP
 c. You make [[me] [cry]]
 V* NP VP

Although small clause complements contain a subject-predicate sequence, they are non-sentential in that they lack the inflectional structure of sentences, i.e., INFL. On the analysis I have assumed thus far, in which complementation is introduced into the grammar via the PS rule in (5), it is unclear why small clause complements should emerge at this same point. I would like to suggest that the PS rule in (5) is in fact a derivative acquisition and that what is actually introduced into the grammar at point P is a principle which maps propositions onto syntactic categories, small clauses representing one possible syntactic realization.

Grimshaw (1979, 1981) argues that in addition to subcategorization features, predicates must bear features which select for the semantic type of their complements. Her theory of s (=semantic)-selection allows predicates to select complements categorized as Q(uestion), P(roposition), (E)xclamation). She further proposes that each semantic type has a canonical structural realization (CSR). For example, the CSR for an object is N and the CSR for an action is V. On Grimshaw's account the CSR for an embedded P or Q is S', as in (18).

To the best of my knowledge, such errors are unattested with perception verbs, though they occasionally occur with the

12

causatives let and make (Pinker, 1984).

The second possibility, and one which I will pursue, is that the child analyzes small clause complements as NPs - this being the second option given by (19). Higginbotham (1982) argues that in the adult grammar small clause complements to perception verbs and the causative verbs let and make exhibit many of the semantic properties of quantificational NPs. More precisely, he proposes that the logical representation of perceptual reports and causatives involves quantification over indefinite events. Thus, on his analysis the logical representation of (22a) is as in (22b).

(22) a. John sees Mary leave

b. $[\exists x: x \text{ is an event \& leave (Mary, x)}]$ John sees x

Ignoring many interesting details Higginbotham's analysis, he proposes that complements to perception verbs and causative verbs undergo Quantifier Raising (QR) on the mapping

13

from S-structure to LF leaving behind an NP trace. Thus, the LF representation of (22a) is as in (23).

(23) $[\underset{S}{[\text{Mary leave}]}_i \underset{S}{[\text{John saw} [\underset{NP}{t_i}]}]$

The grammatical representation in (23) is ultimately converted to the representation in (22b).

As noted previously, the CSR in (19) states that propositions are interpretable as such only if they are realized as S' or NP at LF. It is thus sufficient that small clauses be realized as NPs at this level. This is achieved if these complements undergo QR in the manner suggested above. Assuming Higginbotham's analysis we correctly predict that small clause complements to perception verbs and causatives will emerge alongside sentential propositions at the point at which the CSR in (19) is introduced into the grammar. It is interesting to note in this regard that other small clause complements which are not quantificational NPs on Higginbotham's analysis do not appear in the acquisition data during the period under discussion. The latter include small clauses containing gerunds, illustrated in (24a) and what Higginbotham refers to as "adjunct" small clauses as in (24b)

(24) a. @I saw [John dancing]

b. @I like [carrots raw]

4.0 Conclusion

In this paper I have made two claims concerning the acquisition of complex sentences. First, children assign a clausal structure to propositional complements. Second, this "core" property of complementation is acquired differently from

various "peripheral" aspects of complementation such as choice of complementizer, ECM from COMP and S' deletion. Various aspects of the acquisition of complex sentence were shown to be consistent with the Government-Binding treatment of complementation, in particular, the clausal structure of infinitives and the core/periphery distinction. To the extent that this is so, the acquisition data support the GB analysis. More generally, the data provide evidence in support of the claim that linguistic theory is also a theory of actual grammatical development - perhaps the only acquisition theory that is necessary.

Notes

1

For some children we find the range of constructions illustrated in (2)-(4) appearing within a 6-week period. For others, the period may last up to 6 months. Most accounts agree that the acquisition of complex sentences begins at roughly 2 to 2 1/2 years.

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For example, Limber (1973) notes that most modals appear in simple declarative sentences several months after instances of the complement verbs. Similarly, Bellugi (1967) found that the modals lagged 3 to 8 months behind the semi-auxiliaries. Pinker (1984) reports that modals and semi-auxiliaries do appear at about the same time. However, of the former category he cites only the forms can't and don't as occurring at this early stage. As noted by Bellugi (1967) and others can't and don't are initially analyzed by the child as negative markers and not modals.

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These observations contrast with those of Pinker (1984), who reports that raising verbs and equi (control) verbs emerge at roughly the same point. However, the raising-to-subject verbs that Pinker cites are the modals (but cf. note 2) and semi-auxiliaries, not pure raising verbs like seem, etc. I will discuss the raising analysis of semi-auxiliaries in the next section.

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See Chomsky (1981) and references cited therein for discussion of the theories of government and (abstract) Case.

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This is also proposed in Pinker (1984).

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The acquisition facts suggest that it is correct to distinguish believe-type verbs (S' deletion) from want-type verbs (ECM from COMP) as proposed in Chomsky (1981). Note that lexical subjects under want (cf. 18) appear significantly earlier in acquisition than infinitives under believe-type verbs. I should also note in this regard that the prior appearance of perception verb complements (cf. 2) relative to complements to believe-type verbs suggests that these two classes are distinct, as proposed within GB. I will discuss the small clause complements in (2) in section 3.

7

Bloom et al. (1984) report that the first occurrences of for

complementation appear with the following matrix forms: time for, hard for, too early for, enough for, and ready for. They further note that the for complementizer is extremely rare in their data and appears only towards the end of the period under study.

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The analysis proposed in this paper is consistent with Bloom et al.'s claim that lexical complementizers seem to be learned in connection with particular matrix forms. A similar observation is made in Phinney (1981). In general, we expect the child to be "conservative" in his acquisition of peripheral aspects of complementation.

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Cf. Chomsky (1981) and references cited therein for discussion of small clauses.

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I am indebted to O. Jaeggli for suggesting to me this particular interpretation of the CSR principle.

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I am assuming that the CSR in (19) is a principle of grammar (cf. Pesetsky, 1982) and not an acquisition mechanism separate from grammar, as proposed in Grimshaw (1981).

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Although I will propose an alternative explanation for the appearance of perception verb complements, the proposal that the child initially misanalyzes these complements as S's cannot be ruled out, particularly in light of the errors noted in the text. D. Bickerton (p.c.), based on evidence from creole languages, has also suggested to me that the child may initially analyze all complements as sentential and tenseless. As noted in section 2, I assume that the core property complementation is its clausal structure. The tense specification of the complement is a peripheral property which must be learned in association with particular matrix verbs. Thus, Bickerton's proposal is not incompatible with the basic analysis given in this paper.

13

Higginbotham is not explicit about the categorial status of the trace. I follow Pesetsky (1982) in assuming that the QR may leave behind an NP trace.

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