DOCUMENT RESUME

ED 302 077   FL 017 700

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TITLE   Theory and Explanation in Acquisition.
PUB DATE   Aug 88
NOTE   7p.; In: Papers and Reports on Child Language
                Development, Volume 27; see FL 017 572.
PUB TYPE   Reports - Evaluative/Feasibility (142) -- Information
                Analyses (070) -- Speeches/Conference Papers (150)

EDRS PRICE   MF01/PC01 Plus Postage.
DESCRIPTORS   *Child Language; *Language Acquisition; *Language
                Research; *Learning Processes; *Linguistic Theory

ABSTRACT
        A discussion of the role of linguistic theory in
explaining language acquisition proposes that theory draws too narrow
a picture of language to adequately account for the developmental
phenomena of acquisition. While recognizing the importance of
descriptive linguistic research, a new approach cautions against
embracing description to the exclusion of information suggesting what
processes may be at work in language learning. Six theoretically
derived theses on acquisition are presented and discussed: (1) the
concept of language changes as new data come to light; (2) the
crucial question for acqui.ition is not how the child learns which
expressions are syntactically grammatical, but rather which
interpretations he excludes; (3) the child cannot receive significant
negative evidence; (4) input information is contradictory; (5) subset
violations show where principles apply; and (6) change in grammar
over time occurs because an item is either ambiguous or
parametrically contingent. (MSE)

Theory and Explanation in Acquisition

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What I shall say is intended as a contribution to a debate, not a reflection of my innermost views. A debate has its own dynamic and its special value. It achieves a clarification of ideas by juxtaposition which in turn requires that a narrow stance be taken.

Everyone, in an easy·programmatic way, can account for everything in general, but often very little in particular. If we have no deductive structure but only programmatic accounts, then we have made little progress. My goal is to present a set of theoretically derived theses on acquisition, but to present them so narrowly that it becomes absolutely clear that no approach, unlinked to linguistic theory, can possibly lead to an adequate account of the phenomena.

> A) *The concept of language changes as new data comes to light.* [90% of what is currently "definitional" in linguistic theory refers to concepts discovered in the last decade.]

It is a natural feature of a scientific field that its boundaries change as new insights arise. Chomsky (1986) has suggested that there may be no systematic definition or model of language at all, but only a systematic account of grammar. Numerous non-grammatical influences affect language--every aspect of cognition--while grammar remains a skeleton, hard and distinct, within a notion of language whose character is quite diverse. Consider two facts:

> 1. what did you file__ without reading__
> 2a. *who bought a house why
> 2b. who bought what

The existence of "parasitic gap" constructions (1), where one what seems to come from two different positions was unknown until Engdahl (1981) and Chomsky (1982) explored the phenomenon in depth. It has played a central role in the development of new theories.

Equally important (Huang (1982)) is the discovery of sentences which are ungrammatical, such as (2a) which contrasts with (2b). An argument wh-word, required by the verb, can be left in its original position and appear with another wh-word. However an adjunct wh-word, like *why, when, how,* cannot be left in the verb phrase and must appear sentence-initially. (In Asian languages there are important variations.) How does a child know that (2a) is impossible? We certainly cannot ask about its frequency of non-appearance. The frequency of appearance of the alternative, though, is very low. In the Adam corpus, for instance, I believe that there are no instances of (2b) over 3 and a half years.

The existence of these sentences changes the boundaries of grammar and changes what a theory of grammar must explain. One important role of linguistic theory is to uncover new data, forced into observability by powerful theories. The new data remain like rocks. They must be explained by any theory. The emphasis upon theoretical explanation has left this non-theoretical aspect of current work unappreciated: linguistic theory is a complex data-generating device. One can ignore or dislike linguistic theory; it seems impossible to justifiably ignoring the data which it brings into existence. If other approaches avoid this data, then we are not discussing the same object, we do not agree on what has to be

explained, on what has been acquired.

B) The crucial question for acquisition is not how the child learns which sentences are syntactically grammatical, but which interpretations are excluded.

For instance, there is a difference between (3a) and (3b):

3a. whose shoes did he tie
3b. who tied his shoes

In (3b) we have a set of paired readings (bound variables) while in (3a) it is possible that John tied his own shoes, it is not possible for the answer to be John tied John's shoes, Bill tied Bill's shoes, etc. This is both a very refined and a very clear distinction. How does a child know that the first sentence cannot refer to bound variables? In fact Roeper et al. (1985) have shown that very young 3yr-olds do not give bound readings to (3a). At the same time their evidence showed that in long-distance environments, a bound variable reading was available where it should not be, in (4b):

4a. who thinks he has a hat   (bound variable)
4b. who does he think has a hat   (no bound variable)

Roeper et al. found that children allowed a bound reading for both (4a) and (4b) to the age of seven. [1] The question then arises: how do children eliminate one possible reading for (4b)? Note that the presence of non-bound readings for (4b), where someone ties another person's shoes, says nothing about whether the bound reading is possible. Another cardinal principle is involved:

C) The child cannot receive significant negative evidence.

It is logically impossible for a child to receive negative evidence about an excluded optional reading. The issue has nothing to do with explicit aspects of syntax. No possible reading eliminates an optional reading. No frequency measure of possible readings is relevant to rare structures. Let us establish the point that structures are rare. In all of the Adam corpus we found only 16 examples of clear long-distance movement like "What he went to play with?" There were only 11 instances of the expression *whose* from Adam over three years; there were 35 for his mother. It is logically impossible that the child is computing non-frequency for interpretations. It is implausible that frequency is relevant to permissible and impermissible rare structures like those in (1).

In sum, it is the explanation of how a child acquires "invisible" information which is the heart of the acquisition problem. Any re-definition of the problem toward observable phenomena is a simplification and an essential distortion. Consider the acquisition of the past tense *-ed* form, which has been discussed by Rumelhart and McClelland (1987). The observation of where and when it occurs in child and adult language is a simplified gloss on a complex object. It is not surprising that there is a relation in frequency of gross appearance among adults and use among children. It has something to do with the frequency with which we choose to talk about certain topics. It may be frequency which, in a sense, brings a construction to the attention of a child. Frequency provides, however, no analysis. Much less does it explain the invisible features. Consider this example:

5a. the plant dropped
5b. the dropped plant

Both instances of (5) could refer to a situation in which an agent is present. We might say something like "the plant dropped when he let go of it". However the sentence (5a) does not refer to that agent, while the sentence (5b) can contain an invisible reference to an agent, an implicit agent. The sentence (5b) can be seen as a passive derivative. Passives (unlike (5a) also have implicit agents:

6. the plant was dropped

How does the child know, and when, that (5a) has no agent, while (5b) has an agent? This is the crucial question around the acquisition of the -ed suffix.

The problem is very real because in fact children do allow excluded interpretations and we do not know how they eliminate them. For instance we have assembled evidence that 3-4 year old children allow the elephant , be an agent in (7):

7. the elephant is pushable

It is something about the systematic nature of language which tells the child that the subject reading is excluded. In other words, the elimination of an interpretation can be accomplished only by application of a principle, not exposure to data.

The situation, from an explicit standpoint, is actually worse:

D. Input information is contradictory.

If there are exceptions to a rule, how does the child know that they are exceptions? In the realm of morphology, there are often several hundred exceptions. From the child's perspective, the input is contradictory. Consider the following examples:

8a. the purchasing of a car
8b. the buying of a car

9a. the purchase of a car
9b. *the buy of a car

All nominalizations with -ing are grammatical. The child must conclude that he can freely create novel -ing nominalizations. There are, however, hundreds of examples like (9a), often interpreted as results, but there is no guaranteed productivity, otherwise (9b) would have to be grammatical. [2] Nominalizations without an affix generally do not have a compositional reading. They undergo what one could call "instant drift". Thus income means only money. We cannot speak of the *the income of cold air, although we might speak of the outflow of cold air. Thus we find that (9b) is not grammatical. How does a child know that -ing cases are extendable but not zero nominalizations? The decision must be made on

principle. The basic principle is simple: phonetic affixes are productive, and non-affixes are not (compositionally) productive. The principle cannot be gleaned from the explicit data which contains too much counter-evidence.[3] On the one hand, the child gets no evidence about invisible information, and on the other hand the child gets numerous exceptions which she must know not to use as a basis for generalization.

These problems lead to a heuristic for where acquisition theory is needed.

E) Subset violations show where principles apply.

A theory of language growth can follow the subset principle[4] in ways beyond grammar. A child has a structure, then hears a new one, and expands the grammar to include it. The term "hearing a new one" might be an idealization of a level of frequency. In addition, various pragmatic factors can be learned in the same way. The term "no" is used in a wider and wider range of pragmatic circumstances. When it is used in the context "no you don't say", then it practically means "yes indeed". A child can just add these new interpretations to the pragmatic domains where the structure is relevant.

When a subset violation occurs, though, then grammar change is probably involved. A violation occurs when a child allows two interpretations for a structure which has only one. If he allows these interpretations, then what will eliminate it? For instance, what enables a child to rule causatives (like "don't giggle me") out of his grammar after they are in.[5] One suggestion that I have pursued is that when children learn that the language has an object => subject rule, then it parametrically eliminates subject => object.[6] If a child hears "you giggled" and then says "don't giggle me", then he has, against the adult grammar, converted an intransitive into a transitive. What happens, then, is that a principle enters the grammar which causes a reanalysis of certain structures. The change is fundamentally indirect.

In the interpretive domain, we find that there are subset violations whenever a child allows too many interpretations. How can one be eliminated? What drives change? The only available answer is: a change in the grammar eliminates certain readings. Why does the grammar change over time? There are several possibilities:

F) the trigger is (a) ambiguous, or (b) parametrically contingent.

Or there is either cognitive or formal maturation. Each of these factors could lead to a wrong or partial grammar which had, as a consequence, the mis-analysis of certain data.

Let us quickly illustrate. The expletive *there* which putatively sets the pro-drop parameter is both an expletive and a locative as Hyams (1986) has argued. Unless a child hears a sentence like *there is a man there*, it is very difficult to know that the expletive is not a locative. The presence of expletive sentences in the environment is insufficient. The child must give the correct analysis to "primary data" before they are triggers. Because the analysis itself may depend upon parameters, i.e., vary from language to language, the grammar's growth may involve a real sequence.

Another example. Suppose a child does not know where a complementizer position occurs. It could occur on either the left or the right. Or suppose the complementizer position itself must mature. The child would then analyze questions as if they were topics. This could be a reason why children do not perform inversion, as in "what I can drive". It would be like "truck I can drive". Then the child cannot perform a question transformation which moves successively through a COMP position. Therefore, in the long-distance case, the child would be unable to move at all. The lexicon demands that a transitive

verb has an object. Therefore it must be filled. One way to fill it is with an invisible default pronoun. This appears typically in substandard dialects (*Who$_i$ did you think we saw his$_i$ brother and him$_i$*). For this reason, in the child's grammar, we would have (a) *who$_i$ did John put a hat on (him$_i$)*, instead of (b) *who did John put a hat on trace*. This would allow coreference between *who* and invisible *him* in just the way that *John$_i$ put a hat on him$_i$* can be coreferential. In sum, the interaction between misanalyses of the primary data and uncertainty over parametric settings will produce intermediate grammars which are incomplete and counter to the adult grammar. If we can explain how the misanalysis occurs and is eliminated, then we have a powerful, direct explanation of language growth. Such an explanation, but not a programmatic one, could serve as input to a theory of neurological growth.

This mode of explanation is crucial for the explanation of the acquisition of invisible information. It can, of course, be centrally involved in the acquisition of many visible phenomena. However wherever the phenomena are visible, numerous other factors will be attached, just as we attach numerous associations with any object, like a car. If we consider a word or a sentence to be like a car, then it is no wonder that we have a mass of confusing pragmatic and functional information that makes the attempt to figure out how a car works rather difficult. Cars involve beauty, value, functions, fears, physical comfort, and other things. A catalogue of the ways in which cars are used will not reveal how a carburettor works. Neither can a catalogue of the external features of language reveal the mechanism behind it.

One might construe this as a challenge to much of the cross-linguistic, taxonomic work in both adult and child language. It is not a challenge at all, but a caution. In every science, descriptive work provides the first step and much of the descriptive work must be abandoned or re-investigated as theoretical insights raise new questions. No one can visit an unusual place, gather data, and feel confident that he or she will not need a return trip.

The data which has been gathered in linguistics may fail, here and there, to provide an adequate technical analysis. Our work, though, has important general consequences. Details of cross-linguistic variation, sudden similarities between a far-away language and our own, serves to prove in minute fashion how subtle human language is, and hence how subtle human beings are. Thus linguistics intrinsically involves a respect for human beings. Acquisition research deepens our respect for children. We should never let scientific zeal diminish these moral values.

Footnotes

1. See de Villiers, Roeper, & Vainnikka (1988) for further discussion of these issues.

2. Note that "a good buy" is grammatical. It is precisely the full nominalization which is excluded. The notion of "blocking" will not work here since "a good purchase" and "a good buy" should block eachother. In addition, the concept of blocking is itself rather dubious, since it can always be escaped by refined gradations of meaning.

3. The principle itself requires the correct analysis of a word into stem+affix which may take time.

4. See Berwick (1985) for extensive discussion.

5. There is an extensive literature on this topic now. See in particular Lebeaux (1988) and references therein.

6. Originally proposed by Alec Marantz. See Roeper (1982) for discussion, although the domain is quite complex.

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