Some Implications of Methodology for the Development of the Field of Child Language

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This paper will attempt to make explicit the relationship between some procedures utilized in research on child language and the selection of data, and some of the resulting interpretations in the field. I will confine my comments to two areas, one - the acquisition of grammatical structure and two - research on differences between groups.

Acquisition of Grammatical Structure

A great deal of research on the acquisition of grammatical structure has made use of methods which are traditionally used in the study of linguistics. I refer to the procedure of writing grammars which describe an individual child's speech over an extended period of time. As a result, the following major methodological problems must be noted, because they affect not only the basic data collected, but the interpretations of these data as well.

1) Research has concentrated on the topographical description of structures to the detriment of description of functional response classes (K. Salzinger, 1967), i.e., the external (both semantic and structural) discriminative stimuli which control the emission of these classes.

2) Data for the grammars constructed come from small samples of children.

3) The methods of collecting these data often remain unspecified as to the conditions of emission and frequently suffer from such potential methodological biases as are produced by lack of tape recording and difficulty in discriminating a child's speech because of his articulatory immaturity.

The result of the linguistic approach has been to accumulate data which
describe the relative order in which various structures are acquired by children.

The approach first produced the observation that the speech of very young children can be characterized by a pivot and open class construction. This observation probably has reasonable validity due primarily to the fact that the verbal output of the children was quite small. However, although this construction was noted independently by a number of investigators using substantially the same method (Braine, 1963; Brown & Bellugi, 1964; Miller & Ervin, 1964;) there has not resulted any consensus, or even specification as to the stimuli which control the acquisition of this early structure.

Data collected using the linguistic approach on the more complex corpuses of older children are even more subject to methodological problems. However, where other methods have been used as well, observations of the acquisition of certain early response classes can be taken to be fairly well established. For example, there appears to be good agreement on the fact that noun phrases and predicate phrases occur very early as syntactical constituents. They are found by Brown and Bellugi (1964); Karpova found them with slightly older Russian children (1955); and there is independent evidence from two other studies using different methods that they are resistant to being broken up, Salzinger in a study on 3 - 5 year olds (1966); and Huttenlocher in a study on reversals of grammatical and non-grammatical pairs of words (1964).

Then there are a number of studies in which order of acquisition of more complex structures is established solely on the basis of writing grammars for individual children, usually periodically over a long stretch of time, (Brown & Bellugi, 1964; Miller & Ervin, 1964; Brown, Fraser & Bellugi, 1964; Brown & Fraser, 1964; Menyuk, 1963; 1964). These studies have produced sets of generative rules prescribing word order, which, according to these investigators, evolve in an orderly manner thus enabling the child to generate more complex sentences.
Thus far, there are no other kinds of data available on the order of acquisition of grammatical structures which have been collected by independent means to corroborate these observations which have been made on only a few children. It is true that the grammars are based on large samples of utterances but not on large samples of children, thus failing also to deal with the variability to be found among children.

In addition, the method does not provide information as to the stimulus conditions of speech emission. And finally, there are a number of problems which are typical of attempts at topographical descriptions of complex behavior. First, there is the problem of the effect of the stimulus conditions which have been utilized to get the children to speak, on the verbal output itself. Secondly, there is the problem of recording the utterances that the child makes. Assuming that tape recordings have been made, and this is not always done, there is the problem of transcription and reliability. There is, in addition, when dealing with young children the difficult problem of articulation. Unclear or immature articulation produces even more difficulty when investigators try to grapple with the problems of inflection. Even in using the Berko nonsense word design for studying inflection, which is more highly controlled than a study of complex topography, articulation is a serious problem. If, for example, a child cannot articulate final /s/ or /ed/ then the results obtained are more a function of the development of phonology than the development of inflection. And, finally there is the problem of what constitutes a unit (K. Salzinger, 1962) i.e., where does an utterance begin and end; what is an incomplete unit; what is the structural relationship among utterances when locating the utterance boundaries is difficult; how does one deal with repetitions or assign structure to words which are in an undifferentiated form such as "gimme"; or with words which are mis-heard or mis-interpreted from adult speech like "could of." An example of some of these problems can be found in the following excerpt from a story which a middle class
child of 4 yrs., 11 mos. was telling a papier mâché clown under conditions of reinforcement. The child was considered by her kindergarten teacher to be bright for her age, and needed no prompting. The excerpt was taken from speech which occurred after she had been talking for about 5 minutes steadily, thus the stimuli controlling the content and structure of her speech were supplied primarily by her own prior speech.

/ the little girl saw the mommy and daddy that it was them and they knew it was them so then another stranger came in and then they saw the little girl and then went and then they saw the little girl again the was a real stranger so then the the stranger was he went out and he met somebody else's house so then he went in to another person's house and then they saw the other person's house and then he saw the other person's house so he saw the little girl there too he saw the little girl at every house he thought she was lost and she was lost she didn’t know where her apartment was so then he saw he thought it was her apartment so she went in and it and it wasn’t their apartment and they went everywhere around but the mommy and daddy moved away and they couldn’t find it her and then she went and she saw we are moved and then they knew that she moved and they knew that the mommy and daddy moved/

I think the technical problems become apparent.

The primary result of the preoccupation of workers in the field with the topography of verbal behavior, despite the problems of validity and reliability, has been to focus attention on the fact that there may be an orderly development of grammatical structure which may be correlated with neurological development (Lenneberg, 1966) and which appears to offer the child at each stage the ability to
greatly expand his functional use of language. This has lead to theories of acquisition which are primarily maturational, which characterize language development within certain limits as being automatic. Such theories may, in fact be correct. Certainly the human organism is built for language, but in view of the fact that none of the methods utilized have dealt with the controlling stimuli in the child’s environment in other than the most cursory manner, I think the theories which place a lot of the burden of explaining acquisition upon such notions as the Language Acquisition Device (McNeill, 1966) are premature.

Unfortunately, investigators whose approach has been that of learning theory have only begun to study this area. However, if acquisition is viewed within a learning theory framework an entirely new set of variables is specified which can then be studied. Although there have been some fascinating observations made with regard to language universals by many people such as Greenberg, (1963) and Lenneberg, (1966), the various language systems that a child has to acquire, show enough dissimilarity that they must also be studied from a point of view which deals with, and which specifies, the kind of stimulus configurations with which the child is confronted, as well as the variables which determine the means by which the child incorporates new responses into his repertoire.

With regard to the first problem we can make the assumption that children acquire, within the limits of their memory span and in the presence of semantic referents, structural response classes which are embedded in the flow of speech to which the child is exposed. Since speech is very variable and presents the child with a tremendous variety of word orders we must make some attempt at discovering which stimulus regularities the child is most likely to respond to, or which are most salient. One guess would be that the likelihood of acquiring a response class would increase with its stimulus frequency. Certainly there are other data in language where frequency has played an important role in determining acquisition order -- e.g. in vocabulary acquisition, or in phonemic
acquisition. In a study with adults, K. Salzinger, Hammer & Polgar (1965) found communicability to vary as a function of amount of contact between the communicators.

In another adult study (K. Salzinger and Eckerman, 1967) it was shown that the difference in acquisition of a simple declarative sentence and a passive negative query (the sentences having been constructed of nonsense syllables, with bound morphemes and function words added, to make them appear as English sentences) could be attributed entirely to differences in frequency of occurrence of the two different structures.

The frequency data we have available on adult English speech has not been collected in a way which makes it acceptable as a model frequency distribution for structural attributes. Most of the data has been gathered from single word counts or sequential dependencies of only pairs of words, or the relative frequency of occurrence of grammatical classes in single positions. I think we have reached a point where our technology is good enough to count much more complex units involving sequential dependencies over longer sequences, and I think that the linguists' descriptions of grammar have certainly come along far enough to help us determine the units we want to count. We need, for instance, to know not only that nouns occur with a certain frequency in a certain position, but also whether they function as subject or object in that position.

Recently in our verbal behavior laboratory Richard Feldman (1966) completed a dissertation which attempted to determine whether sentences per se (which were composed by Ss, having to fill in 5, 6, and 7 word blank sequences) were response units, regardless of their length. He found, among other things, that grammatical redundancy shows characteristic patterns of variation over sentence positions; that variation in sentence length (5, 6, or 7 words) is a weak constraint; that the extreme positions of sentences have strong effects which show themselves in sentence
frames; that grammatical categories show characteristic positional variation in sentence responses; and that relative sentence position constitutes, in and of itself, context which exerts strong constraint on the emission of sentence responses.

I would like to suggest that these characteristics of sentence responses may function as discriminative stimuli for children acquiring speech.

If such data were collected on adults for shorter word sequences, given additional constraints that they must convey certain information with a limited vocabulary, we might well find response classes which resemble not only the pivot and open class constructions but also the telegraphic speech (Brown & Fraser, 1964) of very young children. Such a result would indicate that given the fact that length of sequence is constrained in very young children by memory what is selected for production are those words, or units, carrying the most information. Such data might help us discover to what aspects of adult speech the child responded.

This brings us to another group of the discriminative stimulus characteristics of the adult language which might determine order of acquisition. These have been suggested by Slobin (1966) after consideration of acquisition of Russian grammar and can be categorized as complexity. They involve such things as how clearly marked a structure is in the adult language, how limited are the number of functions a structure must perform, how clear are the semantic referents of various types of structures.

A learning theory approach demands a study of the effect of the complexity of discriminative stimuli on the acquisition of response classes since both discrimination learning and concept formation are influenced strongly by this variable. There is an interesting study done by Herrnstein (1964) who conditioned pigeons to discriminate human figures among a variety of stimulus configurations. Although the acquisition time was fairly long, the response was maintained in great strength.
I suggest that this happens in language as well and that one of the reasons that verbal responses, and specifically structural responses are retained in such strength is that they have been conditioned to occur in a tremendous variety of contexts, or discriminative stimuli, not only structural but semantic as well, and that these many stimuli have acquired discriminative control over their emission. This suggests that we begin to study the adult language for those stimulus characteristics which have been shown to affect acquisition of responses in other organisms and in other areas for the human organism.

With regard to the second problem namely the means by which the child incorporates new responses into his repertoire, I would like to make a few comments.

Learning theory specifies a number of variables which operate in the acquisition of response classes. Although the psycholinguistic approach has found the concept of imitation inadequate due to the fact that the child does not achieve a perfect match of the adult grammar, there are indications that the verbal behavior of children resembles behavior which is in the process of being shaped rather than asymptotic performance. This is an experimental problem and should be studied as such.

Some intensive work (Salzinger et al., 1965) using reinforcement techniques with a speech deficient boy between the ages of 4 to 6 years in our laboratory has shown the acquisition of a structure i.e., "gimme candy," by means of reinforcing imitation of these words. It also demonstrated the way in which he placed new words into that frame e.g. "gimme toilet," "gimme no more cloudy again." Further, the importance of reinforcement was illustrated by the fact that these particular verbal sequences later dropped out in favor of sequences more like adult sequences and more likely to receive reinforcement outside the laboratory on the ward. The study also shows how the constitution of response classes, in this case the words following "gimme," are formed by response generalization and how they are changed by subsequent differential reinforcement.
Group Differences

I will confine this discussion to the problem of differences between the children of English speaking subgroups, namely between middle and lower class subgroups, although I believe that it can be generalized to other groups as well. There is an enormous literature detailing differences in language between middle and lower class children. To mention a few, Cherry (1965) found differences in comprehension of middle class speech by the two groups; Lesser (1965) found a pervasive lowering of mental ability scales. Deutsch (1965) described a language deficit which cumulated from first to fifth grade for children of lower socio-economic status and which was most pronounced for variables which required the children to categorize. C. Deutsch (1964) found that performance on Wepman's auditory discrimination test correlated with tests of verbal ability and reading ability. Templin (1958; 1966) reports poorer performance for lower class children on articulation of vowels and final consonants, grammatical complexity of remarks, vocabulary recognition at school age, and length of remarks at younger ages.

The list of differences is so varied that it appears to be based on a purely empirical view of the field. I shall report on still another study (Salzinger, 1966) which in some respects has the same problem except for the fact that it was conceived as a developmental study rather than a study of differences and the resulting similarities and differences which did emerge serve to raise some important questions about the kind of data and methods the field lacks.

The study hypothesizes that any group of English speaking children is exposed to a corpus of the language which exhibits certain invariances that are characteristic of more general English speech. In addition, it assumes that the linking of words through the discriminative properties that constitute their syntactical structure reduces the number of units that need to be encoded in an immediate memory situation. We therefore used a recall measure as an index of the salience
of the syntactical structure in the material. More specifically we presented middle class white children between the ages of 3 and 6 years with 4 and 6 word sequences in which the simple declarative sentence structure was presented intact and with reversals occurring in less and less likely positions, i.e. subject-predicate, verb-object, noun-modifiers, and complete reversal of word order. If the order in which the children recalled the word sequences is consistent with the relative frequency characteristics of English word orders, we can conclude that the children have made the discriminations necessary for utilizing the structures in encoding. If not, then such children, e.g., very young children, might still be functioning at an earlier stage where only gross initial units can be used to improve recall; other subdivisions of these units cannot yet be discriminated by them, and therefore, can not increase their ability to recall such sequences over word sequences arranged in random order.

In short, we found that all the age groups of children, even the youngest, utilized the various word sequences in the same order, i.e., best recall was found for the declarative sentence, next subject-predicate reversal, then verb-object, then noun-modifiers, and finally complete reversals. We then replicated the study on a group of lower class negro children. We also considered some other data collected on the first group as well, as an added control, namely a motor task which required the children to tap out rhythmic sequences from one to seven beats which they heard.

We found the motor performance the same for both groups, thus eliminating any speculation of lack of attention or memory span. We found that the children of the lower class group performed the same as the middle class group with reference to the order in which the various types of word orders facilitated their recall. However, two other findings emerged from the data. The first was that the lower class children's recall was poorer on all the word sequences than the middle class
children. The second was that if we scored the material in terms of the word stems only, i.e., if we ignored inflections, we found that the difference in performance between the lower class and middle class children was reduced. This implied that the middle class children were coding more of the structure of the material along with the word order and that the lower class child was just making use of word order and not inflection.

These two findings call attention to two problems. The first is one which I have mentioned before but which becomes even more apparent when considering acquisition of structure in different speech communities, and that is the need for distributional descriptions of the structure of adult speech in different groups. I would guess that the lower class children's lowered performance on inflections reflects actual stimulus properties of the speech to which they are exposed.

The other problem has to do with the fact that we have never developed techniques for studying the process of acquisition of speech in the home. So far we can merely guess at what some of the controlling stimuli are in the child's environment. There is a growing literature, some of it admittedly speculative (Gussow, 1965) which attempts to explain why lower class children (at a very early age) should perform poorly in the verbal area. In general, the argument is as follows: Lower class children live in smaller, more crowded and noisy circumstances than middle class children (Bossard & Boll, 1966). Much of the adult speech heard around him by the child is not relevant to his functioning with the result that he may therefore learn to tune it out (C. Deutsch, 1964). When it is relevant it refers more often to less abstract topics and more concrete everyday functioning, (e.g., commands) than speech directed at the middle class child. Many of the adult-child verbal interactions which are found in middle class homes may not be found in lower class homes due to the fact that there are fewer ritualized formal occasions for conversation such as meal times (Bossard & Boll, 1960; S. Keller,
1963; Deutsch, 1965). And finally child care is not exclusively an adult task in lower class homes, much of it being undertaken by older siblings. Some investigators (Cazden, 1966) believe that the amount and richness of language stimulation available in the context of face to face exposure to the adult model, accounts for the differences found among different subcultural groups.

Although the factors listed may in fact be key factors, I think they must be taken at this time as hypothetical due to the fact that the descriptions of the verbal environment in lower class homes (and middle class homes for that matter) are based on indirect information gathering techniques rather than direct observations taken in the homes themselves (with the exception of the work of Vivian Horn, 1967). I think that it is only on the basis of detailed observation and analysis of the verbal interactions which take place in the home, of the stimuli, responses, and reinforcement contingencies which operate between the child and others in the home, that we can formulate experimental procedures to test the acquisition of specific response classes in experimental situations. Cazden's work on expansions is a good example of the kind of experimental procedures I would like to see developed from detailed home observations of the acquisition process.

To conclude, I would like to say that I think the problems in these two areas tend to be similar. They are brought about by the fact that we have attempted fairly empirical detailed descriptions of the topography of speech for the child himself. I think that although these have been suggestive it is time to tie up these observations made at many levels with an approach which more systematically explores learning processes which take place and which requires examination of variables other than the response itself in order to understand the controlling stimuli for language acquisition.
So far we have looked primarily at the child's response classes. We must now quantify the stimuli in the adult speech of various language communities surrounding the child in order to see whether the child's acquisition of response classes appears to be shaped to correspond to the adult stimuli, and in what ways that shaping is controlled.
Footnotes

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