EDITORS' NOTE

In the September 1974 issue of the *Monographs of the Society for Research in Child Development*, Schachter, Kirshner, Klips, Fredericks, and Sanders reported the results of an investigation of the speech behavior of lower- and middle-class Black and Anglo preschool children living in New York City. Their analysis was based upon a carefully worked out coding scheme, which was intended to categorize each child utterance in terms of an analysis of different speech acts reflecting the basic illocutionary intent of each utterance (expressive, desire implementing, reporting, etc.). The scoring system was applied to utterances said to meet the following two criteria: 1) it must be spontaneous, not elicited, and 2) it must be intended for impersonal communication. The judgments about the category for an utterance and its appropriateness for inclusion in the analysis were carried out "on line" by trained observers who made a "clinical, subjective evaluation, based on the statement, its context and tone. . . ." Inter-scorer reliability was high, and several provocative results were reported.

The procedures for describing and categorizing behavior used by Schachter et al. have a long history in psychology and are in very wide use today, as researchers delve into important issues (such as the relation between social behavior in the classroom and academic performance) or the similarity between talk in the home and the preschool. These issues are not amenable to experimental analysis, and it is the first task of an investigator to arrive at a descriptive system that will enable later analysis. The crucial question becomes: What kind of descriptive system based on what kind of criteria of validity should an investigator use? This question has not always been resolved in favor of on-line, predesignated scoring schemes. In fact, methods for assuring the analyst of the adequacy of her basic descriptive categories is one of the most enduring controversies in contemporary ethnography and, as the article by Bloom which follows indicates, is an issue that must be faced squarely by psychologists who wish to go outside of the laboratory to describe the behavior of their subjects in ways the validity of which is open to inspection. We here reprint Bloom's comments on the Schachter et al. article, by permission of the Society for Research in Child Development, because it represents an unusually clear statement of the role of description in the analysis of naturally occurring behavior. Readers who share our concern with this issue are referred to articles by Mehan, Frake, and Serpell, from earlier issues of the *Newsletter*, which raise the same issues in rather different contexts.

COMMENTARY BY LOIS BLOOM

Languages exist because of the functions they serve, and so how children learn to use language for such different purposes as to get and give information and initiate and monitor interactions with others is a major aspect of their development. Most child-language research has described the linguistic coding system that children learn as they learn to use speech. The study by Schachter et al. has examined children's use of speech in the everyday course of events directly. The central question to ask of this study is the same question to be asked of all studies that describe and attempt to explain child language: How does the evidence that is presented account for the resulting description or explanation?

The question of the accountability of evidence raises two methodological issues in observational studies. The first issue has to do with the manner in which original data are represented and preserved as evidence for analysis. The second issue is interpretative and has to do with how the evidence is organized once it has been preserved—the issue of derived versus imposed categories of analysis. The two issues are obviously related and mutually influential: how evidence is organized and interpreted is restricted by how data are obtained and preserved in the first place. Although separating the two issues is difficult, attempting to do so may be helpful in an effort to reconcile the requirements for both primary evidence and ultimate description.

1. The first methodological issue: obtaining evidence. Schachter et al. report on their observations and interpretations of children's speech behavior. People observe and interpret children's behavior every day, by necessity, in order to interact with children, and they rarely think about it. But researchers establish their distance from the behavior in order to think about it, attempt to describe it, and, hopefully, contribute to explaining it. Behaviors, then, constitute evidence.

The anthropologist Claude Levi-Strauss (1963) has articulated one law of evidence: "On the observational level, the main—one could say the only—rule is that all the facts would be carefully observed and described, without allowing any theoretical preconception to decide whether some are more important than others" (p. 272).

An aspect of evidence accountability, then, would be the accuracy and documentation with which behaviors are recorded without regard to whatever expectations one might have of the data. However, as soon as one begins to think about behaviors, preconceptions will necessarily influence observations. The ethologist C. G. Beer (1973) has phrased the problem quite well: "For both logical and practical reasons, there can be no such thing as pure observation . . . one's ideas evolve with one's research, reading and thinking . . . trying to put oneself at sufficient distance for clear vision is like trying to leap over one's shadow" (p. 49). Accordingly, the evidence for research will invariably reflect the fact that one "has to start out with selection of one out of an infinite number of possible descriptive strategies, in accordance with whatever one's wits and experience offer as the best bet" (p. 54).

There are then the primitive components of a behavior event to be observed and somehow represented or preserved so that one or another kind of operation can be performed upon them. The description of the behavior would be derived in the course of those operations of reduction, division, and classification that are dictated by whatever set of operating assumptions one brings to the task (see, also, Harris 1964, pp. 17–18). Any description of behavior will be necessarily constrained by the process of observation, and the question for evidence accountability then becomes a matter of the degree of such constraint.

As soon as one begins to record, describe, and interpret behaviors, there is loss of information, and successive reductions of the data continue to restrict and limit their informative power. For example, once an event is recorded—whether recorded by hand or by electronic audio or video tape recorder—something is necessarily left out of the record. The microphone and the camera, much less the eye, the ear, and the hand, can never preserve the detail, nuance, and complex circumstances of events. The process of transcription reduces mechanically recorded data further and provides another constraint on the available information: it is not possible to copy off the richness of tone and detail that can be preserved on tape. And as soon as one begins to categorize events for the purpose of description, then other possible categories are automatically ignored: "Description involves division and classification which exclude other possible divisions and classifications and hence other possible descriptions" (Beer 1973, p. 53). The

original behavior, being a temporal event, only leaves a residue of information in the record that is made of it and the ultimate interpretation that is given to it. However, depending upon how accurate a record is made of the event in the first place and how accessible the record is for redivision and reclassification, it is possible to explore and evaluate successive schemes for categorization.

In the present study by Schachter et al. the distance between child behavior and adult interpretation was minimal; behaviors were categorized directly without intervening mechanical record and transcription. Instead of a loss of information in successive steps with data reduction through recording, transcribing, and categorizing, the present study took a giant step of reduction. The data narrowly consist of only the interpretations of aspects of events that were considered important to the categorization scheme. Any other divisions or classifications of the original data were immediately excluded. If the data consist of interpretations (or utterances and interpretations), then it is no longer possible to examine the behavior events again for other interpretations which may be more relevant or more important for understanding how the behaviors functioned for the child. There is then this methodological problem in the study by Schachter et al.: by recording and interpreting behaviors at the same time, they have reduced the data severely and precluded any reevaluation or further interpretation of the original behaviors. This methodological issue is related to the second, almost inseparable, issue of derived versus imposed categorization: whether one obtains descriptive categories from the data, or imposes a predetermined categorization scheme on the data.

2. The second methodological issue: interpreting evidence. The linguist Kenneth Pike (1967) distinguished between etic and emic levels in describing behavior (a distinction anticipated by Edward Sapir many years earlier):

The principal differences between the etic and emic approaches to language and culture [lies in the difference between]. . . . Units available in advance, versus [units] determined during analysis: Etic units and classifications, based on prior broad sampling or surveys . . . may be available before one begins the analysis of a further particular language or culture . . . emic units of a language must be determined during the analysis of that language; they must be discovered, not predicted. . . . Hence, etic data provide access into the system—the starting point of analysis. They give tentative results, tentative units. The final analysis or presentation, however, would be in emic units. [Pp. 37–38]

Historically, the etic-emic distinction was made to apply to the study of phonology, where etic units represent the purely phenomenological aspects of behavior such as the physiological and acoustic parameters of sounds (phonetics). Such units assume

emic status when they can be discriminated on the basis of their meaningfulness within a language (phonemics). The distinction has been extended, however, to social and cultural analyses, where etic systems can be interpretive and carry meaning (Harris 1964).

The goal of linguistic and cultural analysis is an account of the regularities in the organization of behavior. To that end, one would begin with an *etic* scheme or tentative set of hypotheses that might have originated from one's observations and ideas (or some a priori classification), and then proceed to test the hypotheses with the data until one arrives at an inductive *emic* analysis that identifies the relevant variables and their interactions. Such analysis involves successive hypothesis testing with the iterative process of division, classification, and evaluation and then redivision, reclassification, and reevaluation, until a reasonable account is obtained. An alternative to such discovery procedures which obtain a description of language functions from language behaviors is a methodology that imposes an *etic* system of description on data and stops at the point of classifying behaviors according to the preconceived scheme of language functions.

In the preliminary stage of the study by Schachter et al. something like an emic account might have been obtained when many utterances from a large number of children were examined and interpreted. Unfortunately, the descriptive adequacy of this preliminary study cannot be evaluated because the interpersonal and situational variables are described only in terms of the interpretations that were given to them. The result of the preliminary study consists of the set of interpersonal speech functions that was then applied as an etic scheme to the larger body of data for the developmental-sociolinguistic study.

If one opts to derive the relevant categories from evidence through successive hypothesis-testing discovery procedures, then one is faced with the requirement of many data, and the number of subjects whose behaviors can be observed is limited. As a result, it is only possible to draw inferences about individuals, and the extent to which results can be generalized to groups of individuals may be limited. On the other hand, if one only imposes an etic system of analysis on evidence, then it may be possible to consider fewer data from larger numbers of subjects, but the resulting account will always be constrained by the limits of the original classification. When imposing a classification scheme on data, there is the risk of losing other important variables and interactions that are not included in the original scheme. The potential danger in such an approach is graphically described in a quotation from Edward Sapir presented by Pike that describes:

the experiment of making a painstaking report (i.e. an etic one) of the actions of a group of natives engaged in some activity, say religious, to which [the experimenter] has not the cultural key (i.e. a knowledge of the emic system). If he is a skilful writer, he may succeed in giving a picturesque account of what he sees and hears, or thinks he sees and hears, but the chances of his being able to give a relation of what happens, in terms that would be intelligible and acceptable to the natives themselves, are practically nil. He will be guilty of all manner of distortion; his emphasis will be constantly askew. He will find interesting what the natives take for granted as a casual kind of behavior worthy of no particular comment, and he will utterly fail to observe the crucial turning points in the course of action that give formal significance to the whole in the minds of those who do possess the key to its understanding. [P. 39]

The limitations in the study by Schachter et al. cannot really be separated: (1) the large reduction of the data that occurs when events are interpreted immediately in the situations in which they occur, as they occur; and (2) the use of a predetermined scheme of analysis that cannot be evaluated and that precludes the kind of hypothesis testing that might reveal other variables and, hence, other possible analyses and conclusions. As justification for their approach, the authors offer interobserver reliability scores which, unfortunately, may not be to the point. After all, if both observers have the same set of categories and operating definitions (as well as the same set of cultural and personal biases) to begin with, then the ways in which they judge the functions of behavior may well be similar, and one might expect a high reliability correlation.

The dilemmas in child-language research are many, and none of us can afford to cast stones—that is not the point. Rather, it seems necessary to reflect now and again on evidence accountability in order to place one or another set of conclusions into perspective. The study reported here says something about a sizable number of children and some of the ways in which they use speech, and, as such, it deserves attention and consideration. But all child-language studies require a certain amount of scrutiny. Production studies in general are limited by the constraints of situation and can describe only what children choose to say in those situations. Comprehension studies are similarly constrained in that they can report on only those situations that are presented to children for response (again an etic rather than an emic approach), so that the really relevant comprehension behaviors of the child may well be missed. Anecdotal reports of isolated behaviors reflect what is important in a child's behavior from an adult's point of view. It may well be that the anecdote is important also for the child, but it may also be that it was observed in the first place because of its importance for the adult and, in the larger scheme of things, it is a relatively unimportant event. In analysis of behavior, one needs sufficient data to avoid emphasizing unique or only marginally important

behaviors at the expense of providing an adequate account of the more strongly motivated and productive behaviors—of an individual child or groups of children.

In conclusion, there are three possible methodologies available for observational research. One is a strictly etic plan that imposes an a priori scheme of analysis on evidence and stops there. The second is an etic to emic plan that starts out with the frame of reference or preconceptions of the observer and eventually reaches an emic account of the facts that are relevant from the point of view of the subjects. The third is an etic to emic to etic plan that uses the relevant emic account as an etic set of hypotheses in order to investigate the behaviors of a larger group of children. Such a chain of events whereby a categorization is derived from well-documented evidence from a few subjects, and then applied or tested with evidence from a larger number of subjects, is a reasonable goal for observational research.

The third option may have been the goal of the study of speech usage by Schachter et al. The functions for which individuals speak depend upon the very delicate interplay among individual needs, expectancies, and capacities in relation to the needs, expectancies, and capacities of others—all of whom are in situations in which they have greater or lesser control of the course of events according to many different circumstances. In evaluating the results of this study, it is important to consider how the evidence that is reported accounts for the conclusions that are offered about the functions of the speech used by children of different ages in different socioeconomic environments.

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Elicited Imitation in Two Cultural Contexts*

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Elicited imitation tasks have long been used in language development research, and they have become increasingly popular in the fields of language disorders and second-language acquisition. There are many reasons for the appeal of elicited imitation as a research tool: it is quick and easy to administer, with no stimulus materials needed except a variety of sentences to be spoken by a human voice; it enables the researcher to zero in on particular linguistic structures—as, for example, relative clauses—instead of having to wait for a child to produce such structures. However, these and other reasons all rest on the assumption that how a child performs on an elicited imitation task bears some lawful relationship to the child's other language behaviors, such as production and comprehension of speech in naturally occurring situations. One prevailing view is that elicited imitation provides a measure of linguistic competence that cannot be gotten from natural speech data, which is only a measure of performance. Further, the claim has been made that children's imitations of sentences that are beyond their immediate memory span provide evidence of linguistic knowledge that is beyond the level of their spontaneous productions.

This position, in particular, as well as other theoretical and methodological justifications for the elicited imitation task, has been challenged by Hood and Lightbown (in press). They discuss the relationship between comprehension and production in terms of where and how imitation, both elicited and spontaneous, fits in. In pilot work, Hood and Lightbown found much variation in the performance of eight children in an elicited imitation situation, variation in whether the children would comply, and, if so, in the kind of imitation they gave and its relationship to each individual's own natural speech.

Rather than there being a task environment for elicited imitation that was consistent and constant across or even within individuals, it appeared that the elicited imitation situation was far more complex than had been anticipated. Hood and Lightbown concluded, in part, that "The claim that elicited imitation provides a transparent window through which underlying linguistic knowledge can be viewed is unjustified, especially given the complexity of the task and the great variability in how children perform." In addition, they point out that results of elicited imitation tasks are measures of performance, just as are results of comprehension tasks and natural

*See Note 1a.

speech data, and that there is no reason to assume that any one of these measures is more revealing of competence than the others.

Although the elicited imitation task is a measure of performance, it is a performance that is quite different from natural speech. It clearly places demands on the child that are not present in the usual interaction between child and adult. One task demand inherent in elicited imitation is the constraint of subordinating one's own intentions to those of another speaker—first, the instruction to say anything at all, and the further constraint, to "say what I say."

The two sets of observations that comprise this paper are directed at specifying more clearly the factors which make elicited imitation a complex task for young children. The first example is from an American child who is encountering a novel situation which had, so far as we know, no counterpart in his prior experience.

It is reasonable to assume that some of the demand characteristics of the elicited imitation task environment result from the novelty of the task. For an American child, to "say what I say" is indeed rare. Mothers and other adults simply do not engage in such activities as part of their normal interactions with young children. It is possible that a child's performance on an elicited imitation task, which is not a natural language-using situation for him or her, will reflect the child's interpretation(s) of the task as much as, or more than, linguistic factors per se. Whether the special demands of the elicited imitation-task environment make it inherently more difficult than other uses of language or whether it is merely the strangeness of the task that causes difficulties remains to be determined.

The second example is taken from the natural speech of a Kaluli child from New Guinea, where elicited imitation is a part of the everyday social scene for the two-year-old Kaluli child (and, as such, is an instance of a naturally occurring experimental situation, cf. Scribner, 1976). Because the elicited imitation task does not present the Kaluli child with a novel or unnatural situation, we will have in the comparison of the two situations a fairly direct test of one source of task complexity.

SIMPLE SIMON ISN'T SO SIMPLE*

The following transcript was taken from a session with Peter, who was 32-months old at the time. He had been identified as an "imitator" at an earlier age (Bloom, Hood, and Lightbown, 1974), because approximately 30 percent of his speech consisted of spontaneous imitations of others. We were interested in whether Peter would imitate if asked, as well. Observational sessions had been ongoing for 13 months, so Peter was very well acquainted with the two observers.

Most studies using elicited imitation present children with adult-created sentences which contain linguistic structures that are of particular interest to the researcher (e.g., relative clauses; conjunctions). We were not interested in particular linguistic structures; rather, we were interested in the relationship of spontaneous to elicited imitation. To be certain that all sentences we presented for imitation were within Peter's repertoire, we chose for imitation ten sentences Peter had said spontaneously the day before while playing with us.

During 15 minutes of conversation, we tried in vain to initiate the elicited imitation task with Peter by asking him to "say what I say." Peter didn't seem to understand what we meant. He sometimes responded in a conversationally appropriate manner (for example, in response to "there's the wheel," Peter looked around the room and said "where's a wheel?") or seemed to ignore the model sentence and said something apparently unrelated. After an interim during which the three of us resumed play with toys, we initiated another attempt to get Peter to imitate. This time it worked. The transcript picks up from this point. It will be useful for the discussion which follows to read through the transcript, making your own judgments about what is transpiring to check against those offered.

*The analysis and discussion of the Peter data are by Lois Hood.

[*All of Peter's (P) utterances appear in the center; the utterances of Lois (L) and Patsy (Py) appear on the left. Description of some aspects of the nonlinguistic context are presented in parentheses. – – – represents unintelligible speech. Presented on the right is a narrative interpretation of the transcript. The transcript is based on data collected with Lois Bloom and Patsy Lightbown.*]

	PATSY (Py) LOIS (L)	PETER	COMMENTS
1	L: Hey Pete. Do you, do you know how to play "Simple Simon"?		
2		huh?	
3	L: Do you know how to play "Simple Simon"?		
4		yeah	

5	L: You do?	
6		yeah
7	L: You wanna play?	
8		hm?
9	L: Do you wanna play it?	
10		no, no and no, I don't wanna play it. I wan' get on there.
11	Py: Where?	
12		on this
13	Py: On the slide? – – –	
14	L: Patsy, do you wanna play?	
15	Py: Okay.	
16	L: Ummmm. Simple Simon says "do this" (L claps hands; Py imitates; P watches)	
17	L: Simple Simon says "do this." (L puts thumbs on head and waves fingers; Py imitates; P watches)	
18	L: Simple Simon says "do this." (L rolls hand over hand; Py imitates; P watches)	
19	L: (to P) Do you wanna play? (P nods)	
20	L: Okay. Simple Simon says "do this." (L claps hands; Py imitates; P imitates)	
21	L: Good! Simple Simon says "do this." (L puts thumbs on head, waves fingers. Py and P imitate)	
22	L: Simple Simon says "say 1-2-3."	
23	Py: 1-2-3.	
24		1-2-3.
25	L: Very good. Simple Simon says "jump up and down."	
26	(P says it without *doing* it)	jump up and down
27	Py: Jump up and down.	
28	L: Simple Simon says "they're in barrels."	
29	Py: They're in barrels.	
30	(P almost whispering)	– – – in barrels
31	L: Okay. Simple Simon says "a-b-c."	
32		a-b-c
33	L: Good.	
34	Py: a-b-c	
35	L: Simple Simon says "this is broken."	
36		this is – that's broken
37	L & Py: Good.	
38	L: Simple Simon says "it can go this way."	
39		can go that way

Comments:

In the face of Peter's refusal, Lois and Patsy begin to play "Simple Simon" together, with Lois presenting only actions for Patsy to imitate. Peter watches. Their play establishes a frame for responding to commands.*

Lois invites Peter to play and he joins in. At this point, the interactional frame is the same as it was for Patsy alone, with the instructions given for nonverbal imitation ("do this").

Lois changes the interactional frame by not performing any action and by saying "Simple Simon says *say* x," thus introduces verbal imitation. Both Patsy and Peter comply.

Lois changes the frame slightly (by dropping "say") but Peter still complies; that is, it appears that he presently understands the task to be one of verbal imitation rather than nonverbal imitation. Lois and Peter keep within this frame for quite a while, until line 52.

*The term "frame" is used loosely here to refer to those things which members display to each other while they are doing something together. As this paper is designed only to raise the issue of the necessity of a frame analysis of what people are doing together with and by their talk, the rigorous analysis of the frames actually used is not as necessary as it would be if the paper were making the point of how talk is to be analyzed.

PATSY (Py) LOIS (L)	PETER	COMMENTS
40 Py: Good.		
41 L: Yeah. Simple Simon says "the milk's in here."		
42	milk's in here	
43 L: Simple Simon says "a horsie can't stand up."		
44	horsie can't stand up	
(P's baby sister squeals)		
45 L: I think Jenny likes this game too.		
46 Py: Yeah.		
47 L: Simple Simon says "I'm doing it."		
48	– – –	
49 L: Simple Simon says "you made him stand up over there."		
50	stand up there	
51 L: mmhm.		Peter reorganizes the interaction. Lois and Patsy interpret Peter's actions to mean he wants the doll to play Simple Simon; he appears not to understand their questions.
(P gets up; goes over to big doll in chair across room)		
52	I'm gon' get that doll. it's gonna go Simple Simon.	
53 L: Is that gonna play Simple Simon?		
54	huh?	
(P bringing doll to L)		
55 L: Is she gonna play?		
56	huh?	
57 L: (laughing) Never mind.		
58 Py: She gonna play Simple Simon too?		
59	play Simple Simon (This is likely a spontaneous imita-	Patsy breaks the frame in mid-sentence, apparently unsure whether Peter is ready to resume playing.
60 Py: Okay. Simple Simon says–okay, is it my turn now?	tion on Peter's part. While he could be confirming what Lois said, there is no evi- dence in his actions that the doll is, in fact, playing.)	That Peter is ready seems fairly clear—he ignores the change in intonation in Patsy's voice and imi- tates. Patsy then goes back to the original nonverbal imitation frame ("do this") and Peter goes along with it.
61	's it my turn?	
62 Py: Okay. Simple Simon says–"do this." (Py rolls hand over hand; P imitates)		
63 Py: Do this.		
(P imitates another gesture)		
64 Py: Okay. Simple Simon says "do this."		
(P imitates another gesture)		
65 Py: Simple Simon says "this is broken."		Patsy switches back to the verbal imitation instruc- tion Lois had used before and continues it for three
66	that's broken	turns. Peter complies.
67 Py: Simple Simon says, "it can go this way."		
68	– – – go that way	
69 Py: Simple Simon says, "I'm gonna get the cow to drink milk."		
70	get the cow to drink milk	
71 Py: Look at the wheels.		Patsy changes the interactional frame, shortening
72	where the wheels?	the instructions, and Peter does not take this to be
73 Py: Simple Simon says, "look at the wheels."		a request to imitate. For the next seven exchanges, Patsy and Peter alternate interactional frames;
(no response from P)		sometimes they are together, sometimes they are not.

PATSY (Py) LOIS (L)	PETER	COMMENTS
74 Py: Can you say "look at the wheels?"		
75	look at the wheels	
76 Py: Good. You start with this horse.		
77	hm?	
78 Py: Can you say "you start with this horse?"		
79	you start with this horse	
80 Py: Good. Simple Simon says ...		
81	Simple Simon says	
82 Py: I'm trying to get this cow in here.		
83	cow in here	
84 Py: Simple Simon says, "the little horse drinks some milk."		
85	little horse drinks some milk	
86 Py: Good! Simple Simon says "a horsie can't stand up."		
87 (P looking at Py's paper)	horsie can't stand up. where the horsie can't stand up?	Peter reorganizes the interaction.
88 Py: Right there.		
89	hm?	
90 Py: Right there it says, "a horsie can't stand up." (tapping her paper)		

As pointed out in Bloom (1974) and Bloom, Rocissano, and Hood (1976), the conclusions that might be drawn about Peter's linguistic knowledge based upon his performance on this task would clearly be in conflict with conclusions based on his natural use of language. It would seem that the only conclusions that can be drawn from Peter's performance when asked to "say what I say" relate to his *performance on this task*, how it is constructed by Peter and the experimenters, and, perhaps, how it is interpreted by Peter. Although linguistic knowledge may be a factor in his performance on elicited imitation (as it most likely is in almost any use of language), it is certainly not the only one. Peter's performance on this task is all we have to go on, so it is essential that we attempt to discover what precisely the task is in this particular case. The crucial point is the location of the task within its wider context. No matter how constrained the elicited imitation situation is, it is still an interactional one; it is dynamic, rather than static, and it involves not only the child who is being "tested," but the adults present, as well. The child's responses should be viewed from this perspective. The child and adult(s) are doing something together. What is the nature of their interaction and how does it change over time?

Lines 71-84 illustrate the interactional complexity for Peter, Lois, and Patsy in "doing" elicited imitation. For the three turns previous to line 71, Peter and Patsy were involved in the same interactional frame which comprises a successful elicited-imitation context. Patsy then shortens the frame, omitting "Simple Simon says." Peter seems to interpret this as an instance of a natural conversation utterance, as his completion of the turn would indicate. Patsy goes back to the usual elicited imitation instruction (line 73), but Peter does not respond. Patsy then changes the instructions and Peter imitates, apparently interpreting this interactional frame as consistent with the imitation game. Patsy then switches frames again (line 76), and Peter is confused. Whereas it might appear at this point that Peter has differentiated between the imitation frames that have just occurred ("Simple Simon says" and "Can you say") and the nonimitation frame (no introductory remark with "say"), line 80 shows that this does not hold up. Peter appears to interpret Patsy's utterance within the imitation framework—even before she can say the to-be-imitated sentence, he imitates her. Perhaps Peter now interprets the shortened version to be within the imitation task, although Patsy had tried it before (lines 71 and 76) and he had not taken it as such. Or perhaps Patsy has switched so often that Peter is confused. Either way, the interaction between Patsy and Peter is complex. Peter's responses indicate more than his knowledge of linguistic structure, and more than the effect of constraints specific to elicited imitation tasks. They also are part of an interaction he is involved in; he and Lois and Patsy are all doing something with their talk. We can not be certain of what it is they *are* doing together, but we can be sure that they are not merely involved in repeated cycles of "say what I say."

How Kaluli Children are Taught to Speak*

The Kaluli people of New Guinea (pop. 1200) are preliterate, tropical-forest subsistence horticulturalists who live in longhouse communities of 60 to 100 individuals. As part of a study of the development of communicative competence, spontaneous conversations of four children who were beginning to use syntax were tape-recorded for one year. These conversations took place between the child and those people with whom s/he regularly interacted in culturally relevant contexts in which language was acquired. In addition to tape-recording, extensive observations were made and interviews were conducted in the community.

When asked how they thought children learn language, Kaluli adults (usually) replied that children have to be taught by other Kaluli speakers, principally by the mother. The Kaluli use no "baby talk," as such, with children, and expressed dismay when hearing about the practice in my own culture. It is not a good idea to teach children childish forms, they told me, since it is more important for them to hear "hard" speech (to halaido) as spoken by adults, if they are to learn.

Shortly after a child is born, a mother acts in ways that seem to involve the child in dialogues and interactions not only with her, but with others, as well. Mothers hold infants up to themselves or to other people and, while speaking for the child in a special, high, very nasal voice register, move the child as if it were conversing with the mother or a third person. When the child begins to babble, Kaluli recognize and so name this *dabedan* (babbles), which they believe has no relationship to eventual communicative language. However, at this time they begin extensive sound- and word-repetition games, and the child gets involved with the mother in ongoing interactions.

Language is considered to have begun once the child uses two critical words, *no* (mother) and *bo* (breast). I observed a number of small children using other words (the names of objects and animals), but they were not considered to have begun to speak because use of the two critical words was lacking. This establishes the essentially social view of language taken by the Kaluli, as it emphasizes not the learning and using of words per se but learning and using only those words that express the particular first social relationship a person has, which is with the mother mediated by food from her breast (Note 2). Clearly, the notion here is that language use is not merely a verbal skill in and of itself, but a social skill pertaining to and part of relationships between people. Whereas Western researchers have often separated linguistic competence from social competence, these two phenomena are perceived and evaluated by the Kaluli as one thing.

Once a child is identified as having begun to speak (there is no ritual marking this) his/her language is viewed as being "soft" (to mada taiyo). At this point in development, adults and older children begin to teach the child what to say in a variety of situations to help his/her language "harden" (to halaido domɛki). The form taken in this teaching strategy is as follows: when a Kaluli wants someone else to "say what I say," he says the message plus the word ɛlɛma, which is a contraction of two words, ɛlɛ (like this/that) and sama (present tense, singular, imperative, speak/say), which together mean "say like this/that."

Unlike English, in which the child first hears the instruction "listen and repeat after me," followed by the message, in Kaluli the instruction to "say like that" comes after the message is given. This presents some interesting problems for language processing, because one may ask how the child is expected to know that he is to listen to something in order to repeat it. But, as we shall see, ɛlɛma utterances are not random throughout interactions. In addition, there are concomitant cues in voice quality and in other discourse and situational features which signal to the child that he will be expected to repeat.

Caregivers use ɛlɛma to perform a variety of functions in discourse and interactions. Depending on the type of situation and the participants involved, the word can occur with high frequency. Its use is rule-governed in terms of who may command whom to speak. Elɛma usage is not strictly limited to children, and occurs between adults in certain situations, as well.

Elɛma usage occurs in both dyadic and triadic interactions, that is, when the speaker tells the child to say something back to the speaker (dyadic) and when the speaker tells the child to say something to a third person (triadic).

Several important and frequently occurring social interactions take place only with triadic uses of ɛlɛma. These are teasing, shaming, threatening, asserting, and challenging claims of ownership. Although mothers never ask the child to tease or shame the mother (in dyadic interactions), they frequently make use of these routines directed to other children and adults. Such speech acts, which are recognized and named by the Kaluli, are felt to be among the most important for the child to master as a way of controlling other people.

One important linguistic device used to communicate these speech acts is the confrontative rhetorical question. Bolinger (1975) defines rhetorical questions as "questions that do not really ask . . . rhetorical questions call for no answer" (p. 607). Kaluli direct confrontative rhetorical questions (indicated in ex-

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amples below by ?!) to small children and encourage them to become competent in using them.

Teasing, shaming, threatening, asserting, and challenging claims often occur together in speech events. The following example demonstrates some of these verbal strategies, and is typical of the ways in which mothers encourage small children to participate (Note 3).

Wanu (age 26 mo.) *Mother, Binaria* (sister, age 4.10), *Ma*ma (cousin, age 3.7)

At *Wanu's* house. Earlier that morning Wanu's grandmother had given *Mother* a package of pandanus (a tropical vegetable) that had been left over from a meal the day before. During that meal *Binaria* (according to *Mother*) had eaten more than her share, and had been told she wouldn't have any the next day. Upon seeing the pandanus, however, she has been begging and whining for some. The pandanus is taken out of the bag.

WANU

1	M: (examining the pandanus) It's dried out. I'm going to put it on the fire. Wait a bit. (Mother puts it on the fire; Binaria is hanging over her, watching.)	
2	M→B: Over there! Go over there!	
3	What are you looking at?	
4	Did you put yours in there?!	
5	B→M: (whining) ɛm! (negative grunt)	
	(Mother angrily picks up old cooking leaf, offering it to Binaria.)	
6	M→W→>B: Eat! ɛlɛma	
7	(Wanu not paying attention, soft voice)	eat
8	Binaria! ɛlɛma.	
9		Binaria
10	Pandanus.	don't eat!
11	Eat pandanus! ɛlɛma	
12	B→M: (whining) He says don't eat pandanus.	
13	ɛm!	
14		what are you
	(Mother takes pandanus out of fire.)	saying?!
15	M→W: (handing Wanu some) Pandanus.	
16	(Showing me pandanus on his fingers.)	Bambi
17	M→W: Eat.	
18	M→W→>me: Bambi, I'm eating pandanus, ɛlɛma.	
19	B→M: Mother, I want to eat pandanus together with Wanu. (whining) Mother!	
20		ɛm!
21	M→W→>B: No! ɛlɛma.	
22	B→M: Pandanus.	
23	M→$\frac{W}{Ma}$: Yes eat, you *two* eat.	
24	M→W→>B: It's mine! ɛlɛma.	
25		it's mine
26	B→$\frac{W}{Ma}$: (watching them eat) Can you eat that large amount of pandanus by yourself?	

27	M→B: What was left of yours from yesterday?!	
28	M→W→>B: Where did you put it? ɛlɛma.	
29		where – – (food in
30	Is it yours?!	mouth)
31	M→W→>Ma: Mama, you eat some too, ɛlɛma.	
32		Mama eat
33	M→Ma: Mama, you eat. (15 sec. pause) (Binaria tries to get closer to the pandanus.)	
34	M→B: You just try to eat some!	
35	M→W→>B: It's mine, ɛlɛma.	
36	Is it yours?! ɛlɛma. (Wanu busily eats, ignoring his mother.)	
37	Ma→W→>B: Did you pick it?! ɛlɛma.	
38	M→W→>B: My grandmother picked it! ɛlɛma.	
39	Ma→W→>B: My grandmother picked this! ɛlɛma.	
40	B→Ma: Do you usually lick the leaf like that?!	
41	Ma→B: Why?!	
42	B→Ma: One usually licks the leaf later.	
43	M→W→>B: What do you mean? ɛlɛma.	
44	(Wanu offers handful of pandanus to Mother.)	mother eat mother eat
45	M→W: Do I eat too?	
46		yes
47	Okay. (Mother takes it.) You eat too.	

This eating sequence continues for some time. When Wanu has enough, Mother offers the rest to Binaria. She angrily refuses and whines about it. When Mother finally threatens to throw it away, Binaria takes it outside and eats it.

The mother, becoming more impatient with Binaria's whining and begging for the pandanus, tells her to go away from the immediate area (line 2). Line 3, "What are you looking at?" refers to the way in which Binaria is staring at the pandanus. This nonverbal form of requesting (*memelab*—someone begs with the eyes) is tolerated in children who have recently begun to speak, but for an older child, like Binaria, it is considered extremely rude and draws angry admonitions. The mother's next remark (line 4) is the first confrontative rhetorical question in this event. By asking Binaria "Did you put yours in there?!" (referring to the pandanus from the day before in the leaf packet, and knowing that Binaria had *not* put hers in there), she is confronting Binaria about her rights to the remaining portions of pandanus. The mother does not expect Binaria to answer

truthfully, as that would force Binaria to admit that she is not entitled to have any. The desired effect of this question is to get Binaria to stop begging.

Kaluli speak about these types of confrontative questions as having an "underneath" (hega). What the mother communicates in line 4 is "You did *not* put yours in there." This speech act is called *sasidiab* (someone shames) and is one strategy for controlling (prohibiting) another person in an interaction. Binaria's response (line 5) is a grunt, indicating her general dissatisfaction. To this, the mother angrily holds up an old leaf, which has the traces of previously cooked pandanus on it, and using ɛlɛma to involve Wanu in teasing his sister, tells him to tell her to eat it. This type of teasing, called *dikidiab* (one teases) by the Kaluli, is used only on children, when someone wants to shame or anger a child. Wanu, however, is not really attending, as he responds in a soft, low voice. In another attempt to draw Wanu into this interaction, the mother uses a vocative (line 8) in a loud voice. Wanu responds to this. However, seeing the old leaf, and knowing that the mother is heating up pandanus to eat, Wanu confusedly responds "don't eat!" referring, according to his mother, to the real pandanus. His mother's explanation of this is that he didn't understand the teasing that was intended by offering the old cooking leaf to his sister. Binaria reports Wanu's response back to the mother, realizing that Wanu is siding with the mother and is unwilling to share the food (line 12). His response to her (line 14) is actually incorrect grammatically (according to the adult model), but is interesting in that it indicates that he understands some aspects of the delivery and contextual appropriateness of a confrontative rhetorical question. The verb he uses is not the correct (adult) form, but the prosodic contour of the utterance leaves no doubt in any listener's mind that he is responding with a confrontative question to his sister.

In line 21, the mother reinforces her position, her unwillingness to give food to Binaria, and further corrects Wanu's negative grunt (line 20) with an explicit "no!" in response to Binaria's request to share food (line 19). To further separate Binaria from her cousin and brother, the mother (line 23) uses a marked dual form, "you *two* eat." As a further shaming (*sasidiab*) move, the mother elicits Wanu in asserting the ownership of the food (line 24) and succeeds in getting Wanu's collaboration. At this point, Binaria changes her unsuccessful whining and begging (*gesiab*—someone makes you feel sorry or pity) to a more assertive style, and begins to pose confrontative questions back to her mother and the others. Lines 26-33 show how these are responded to and, again, Wanu is drawn in, this time successfully. As Binaria tries to get closer to the food, the mother threatens her (line 34) and again starts a series of asserting and challenging the ownership of the food in

question to prohibit and shame Binaria. In these lines (35-43), both the mother and Mama turn on Binaria, using shaming questions as a way of putting her down. It is interesting (lines 38 and 39) that the reasons given for Binaria's exclusion here have to do with who picked the pandanus. Kaluli speakers agree that these are not valid or the actual reasons for denying Binaria pandanus, because Wanu and Mama's grandmother is also Binaria's. The importance of these lines lies not in the reason given, but in the confrontative style of delivery. And Binaria responds not to the content, which is certainly arguable, but to the confrontative style. She speaks confrontatively to Mama, to try to put her down, by suggesting (line 40) that Mama doesn't know the proper etiquette for eating pandanus (which involves finishing pandanus and then licking the leaf). Wanu does not respond to the ɛlɛma utterances (lines 36-39), as he is too busy eating. The mother makes one more attempt to involve Wanu in the conflict (line 43) between herself, Mama, and Binaria, but he doesn't respond.

These attempts to involve small children in conflicts between others obviously serve a number of complicated ends. From an interactional point of view, in addition to teaching the child how to assert and challenge rights, to tease and shame others, the mother can communicate her feelings and attitudes to Binaria via Wanu, using him as a foil. Kaluli people, however, do not think of such interactions in that way. These assertive strategies teach the small child how to say the right thing back and how to protect what is his; they make the child strong, teach him to be angry when he should be, so he can take care of himself and be independent.

The Kaluli strategy of using ɛlɛma to teach children how to speak could be viewed as a naturalistic analogy to an experimental situation of elicited imitation. However, there are several important differences to note before one makes any comparisons between American and Kaluli children.

Unlike the American child described above, Kaluli children do not recognize the request to "say like this" as anything unusual. Furthermore, they are not made uncomfortable by the request, because for them it is part of an interactional strategy familiar to them since babyhood. Unlike the often-isolated research task of elicited imitation in dyadic interactions, ɛlɛma occurs within on-going situations of social importance that frequently involve three or more people. Elɛma occurs in situations where there is usually strong contextual, communicative, and personal motivation for the Kaluli child to participate. In addition to the rewards of collaborating with the mother in shaming and teasing siblings, cooperation often involves a pay-off, in that the child (by repeating what someone tells him to say) obtains desired food or objects that are being negotiated.

Even with such strong communicative motivations in familiar contexts, Kaluli mothers do not always succeed in eliciting speech from their children. The child's own interests and activities, as well as his or her social and personal motivations (and linguistic capabilities), affect both the content of responses and the time of their occurrence. Since ɛlɛma occurs within on-going interactions, the child's behavior shapes and changes that which follows. Even when the Kaluli child seems to be interested and attending, linguistic, nonlinguistic, and social factors often prevent him or her from producing utterances identical to those requested by another speaker.

CONCLUSION

What can we conclude from these two elicited-imitation situations in two strikingly different cultures? They would seem to strengthen the criticism raised at the beginning of the discussion concerning the use of elicited imitation as a measure of linguistic knowledge. To take either Peter's or Wanu's responses to instructions to imitate as indicative of their knowledge of linguistic structure in some general sense would be foolhardy. In Peter's case, for example, we have evidence that he "knows" the very structures he often did not imitate, since he produced them spontaneously the day before.

With respect to the question of the source of the extra constraints elicited imitation places on the child, it seems clear that the novelty of the task for American children is not wholly responsible. The Kaluli child, Wanu, for whom the "task" was a common, naturally occurring, social event, performed with just as much variability as did the American child, Peter.

The participants in the interactions—Wanu, his mother, and sister in one case, and Peter and two adult playmates in the other—were similarly involved in constructing some form of communication with each other, of which only a small part was the actual "say like this" stimulus-response sequence. This wider context must be taken into account when evaluating any child's responses. Rather than reflecting linguistic knowledge, a child's responses reflect the complicated interplay of linguistic ability, social-situational factors, and personal motivation, among other things. One might agree that such would be expected in the Kaluli example, as this is a naturally communicative context. However, the fact that so many of the same behaviors—ignoring the adult, changing the topic by saying something unrelated, or doing something different (Peter getting his doll; Wanu offering his mother pandanus)—occurred in these two very different contexts suggests that such an interplay will exist even in very structured "communication-sparse" situations.

Elicited imitation has no privileged status as an instance of language use. It is different from other instances only in the particular constraints it places on the participants, both child and adult. The nature of these constraints, the specific cognitive and linguistic demands of a request to imitate speech, need to be the topic of future research.

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Lexical Development: A Minilongitudinal Approach

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Many theories of lexical development, especially those which attempt to describe the acquisition of specific semantic domains, use cross-sectional data to describe the learning process. Although cross-sectional data provide adequate group norms, they do not necessarily describe the acquisition process for individual children. Because many lexical fields enter the child's vocabulary rather quickly, it is possible to study that acquisition longitudinally, and within a short, specified time interval.

The purpose of this paper is to demonstrate that cross-sectional data on children's lexical development may oversimplify the processes involved, and that "minilongitudinal" experiments—that is, repeated measures on the same children for a short specified time—are a more appropriate approach for examining lexical acquisition. Each child in our study was assessed at four separate times during a seven-month period. Each assessment represented both a separate cross-sectional study and a means to chart each child's progress and analyze his responses longitudinally.

A well-developed and extensively tested theory in lexical acquisition is Clark's stage theory (1971; 1973), which explains children's acquisition of the temporal adverbs *before* and *after*. As part of a longitudinal study of lexical development, we too assessed the acquisition of *before* and *after*. Briefly, if X and Y are clauses describing momentary events occurring in that order, then *before* and *after* can be used either to parallel the actual order of events (X *before* Y; *after* X, Y) or to reverse the order (*before* Y, X; Y *after* X). For example, Clark (1971), using a cross-sectional design, found that children between the ages of three and five pass through three stages in learning the meanings of *before* and *after*. In the first stage (A), children showed that they understood neither word by acting out the events in the complex temporal sentences in the order in which they were spoken (order-of-mention strategy). They performed correctly on X *before* Y and *after* X, Y (forward sentence constructions) and incorrectly on *before* Y, X and Y *after* X (backward constructions). In the second stage (B), children followed one of two routes. In stage B_1, they began to understand the meaning of *before*, which they demonstrated by performing correctly both on forward constructions and on the backward construction *before* Y, X. Children who took the stage B_2 route overgeneralized *before*, which they demonstrated by performing correctly only on constructions containing *before* and

incorrectly on constructions with *after*. In stage C, children performed correctly on all test sentences.

In order to test Clark's hypothesis and thereby answer the question: Do individual children pass from stage to stage in an orderly progression? we must first replicate her stages cross-sectionally and then reanalyze the data longitudinally.

METHOD

Subjects. Ten children who were participants in a larger minilongitudinal study of lexical acquisition were studied. Their ages ranged from 2;4 to 3;1 (mean age, 2;9) at the first assessment period, and their Stanford-Binet IQs ranged from 111–154. All the children were native English-speakers.

Procedure. Each child was asked to act out a series of *before/after* sentences at each of four assessment periods, separated by six to seven weeks. All sentences were in the imperative mood and the verb in both clauses was always the same. During the first two assessment periods, every sentence used the verb *pick up*. The sentences were of the form: "Pick up X *before* you pick up Y," where X and Y were names of two familiar toys. During the third and fourth assessments, other action verbs were substituted for *pick up*. Each of the four sentence constructions was tested twice at each assessment period. After a sentence was acted out, the experimenter recorded the child's actions.

RESULTS

In order to test our methodological claim, it was necessary first to demonstrate that we replicated Clark's data cross-sectionally. If our data confirmed Clark's, we could examine each individual child's responses to see if, in fact, the data were consistent with her theory of stage progressions. Therefore, we conducted two separate analyses of the data. In the first, each assessment period was treated as though it represented a separate cross-sectional sample. The analyses were adopted from Clark (1971). In the second analysis, each child's responses were examined across the four assessment periods.

Cross-sectional analyses. The percentages of error responses were computed. Each child's response was scored as an error if: (1) he or she did not follow the described sequence in the correct order (reversals); (2) omitted one of the actions; or (3) carried the actions out simultaneously. Omissions and simultaneous actions accounted for 5 percent and 1 percent of the errors, respectively, across the four assessment periods.

Clark's first hypothesis was "*before* is simpler than *after* and would therefore be acquired earlier" (see Clark, 1971, p. 269 for a more detailed description). Across all assessments, X *before* Y and *before* Y, X in combination produced fewer errors than the two *after* constructions combined, 32% vs. 40%, respec-

tively (using a two-tailed t-test, $t_9 = 1.47$, $p < .10$). Although the difference was not significant, it was in the appropriate direction. "The second hypothesis was that an order-of-mention strategy would be used by younger children" (*ibid*). In other words, forward constructions will elicit fewer errors than backward constructions. Our studies showed that, over-all, forward constructions did indeed elicit fewer errors than the backward constructions, 22% vs. 50%, respectively (using a two-tailed t-test, $t_9 = 4.02$, $p < .01$). Finally, Clark predicted that the position of a connective within a sentence should make no difference. Errors on *X before Y* and *Y after X* combined were not significantly different from errors on *before Y, X* and *after X, Y*, 38% vs. 35%, respectively (using a two-tailed t-test, $t_9 = .59$, $p > .5$).

We did not replicate the error percentages found by Clark (the children in our sample were younger than Clark's), but the relative pattern of results are identical: (1) forward sentences are easier than backward; (2) *before* is easier than *after*; (3) position of a connective within a sentence does not affect the results. Thus, when the four assessment periods were treated as though they were four cross-sectional samples, Clark's predictions were confirmed. This confirmation is important, because it means that our data are probably representative of the kind of evidence on which Clark based her hypothesis.

Longitudinal analysis. Clark also analyzed the error patterns for individual children. She classified children in stage A if they made one or less errors out of a possible four on the forward constructions, and three or more out of a possible four on the backward constructions. Children were in stage B_1 if they made one or less errors on both forward constructions and on the construction *before Y, X*; children were in stage B_2 if they made one or less errors on both *before* constructions and three or more errors on both *after* constructions. Children in stage C made one or less errors out of a possible four on all four constructions.

We did a similar analysis of response patterns for each individual child at each assessment period, with the exception that two correct responses out of a possible two were needed for a construction to be scored correct; one or more errors on a construction was scored as incorrect. Table I shows the response patterns for each child at each assessment. For example, at the first assessment, child #1 was correct only on *X before Y*, which is coded as 1000 (see footnote to Table I). Since there are four constructions, each of which can be acted out correctly or incorrectly, there are 16 possible response patterns. Only four of these are predicted by Clark's stage descriptions. However, out of 16 possible response patterns, 13 were used at least once. And out of 40 observations (10 Ss by four assessments), 17 cases fitted a response pattern identifying one of Clark's stages. Of these 17, it would have been possible for 13 of them to advance to a higher Clark stage, but this occurred in only four cases (shown in Table I by arrows). Child #8 accounted for two of these. This lack of stage progres-

TABLE I

Individual Response Patterns by Subject and Assessment Period

	Assessment Period							
	I		II		III		IV	
Subject No.	ba	ba*	ba	ba	ba	ba	ba	ba
1	10	00	00	00	10	10(B_2)→	11	11(C)
2	11	01	00	00	01	11	10	00
3	10	00	10	00	10	10(B_2)	10	01
4	00	00	00	10	11	10(B_1)	00	00
5	11	00(A)	01	00	11	00(A)→	11	10(B_1)
6	10	10(B_2)	10	00	10	00	01	00
7	01	01	10	10	00	11	11	10(B_1)
8	00	00	11	00(A)→	11	10(B_1)→	11	11(C)
9	01	00	11	00(A)	11	00(A)	11	01
10	11	00(A)	11	00(A)	00	11	01	00

* b = before; a = after. The first ba under each assessment period represents a forward sentence construction; the second ba represents a backward construction. The digits in each column represent the response to the appropriate construction: 0 = error; 1 = correct; letters in parentheses correspond to the name of one of Clark's stages. Arrows indicate possible advances to a higher Clark stage.

sion may be partly explained by the relatively short time span for the longitudinal study.

Moreover, 26 of the 30 observed transitions were different sequences: 22 occurred only once, and four occurred twice. In other words, there were only four instances in which a sequence of response patterns from one assessment to the next was repeated. (These repetitions were made by subjects #5 and #8; #5 and #9; #9 and #10; and, #3 and #6).

DISCUSSION

The purpose of this methodological note is *not* to test Clark's theory, but rather to support the basic methodological claim that repeated measures on the same children can give a much richer picture of lexical growth than do cross-sectional studies. The longitudinal analyses revealed much heterogeneity in the transitions from one assessment to the next. This response variation can be used to investigate the particular strategies used by individual children. It should be emphasized that the above data are merely illustrative of the kinds of information obtainable from minilongitudinal experiments. Replication with more children over a longer time span will be required before we can formulate a better theory of lexical learning in individual children.

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Adult-Child Interaction and the Roots of Metacognition

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During the past few years, there has been a growing interest in cognitive processes which control, direct, and regulate other cognitive processes. These "meta-cognitive" processes have been the object of many developmental studies conducted by such investigators as Flavell (1976) and Brown (1974; in press).

Although it is often assumed that metacognitive processes regulate all areas of human cognitive activity, most of the investigations to date have been concerned only with memory. Relatively little research has been aimed at examining the self-regulation of other types of activities. In this paper, I shall be dealing primarily with one of these other types of human activity—specifically, with goal-directed problem-solving tasks that involve constructing a physical object in accordance with a plan (Note 1).

In order to carry out such tasks, the problem-solver must understand the goal and then organize efforts on the basis of that goal. This involves imposing a strategy on the task situation by identifying and manipulating those aspects of the environment that are relevant (i.e., have functional significance) to the task and disregarding those that are irrelevant.

To date, metacognition research has been concerned primarily with showing that, as they grow older, children demonstrate an increased ability to regulate their mnemonic and problem-solving efforts while acting as independent agents. However, this line of developmental research has not asked a question that may turn out to be more important than those now being posed. This question is: How does the child get to the point of beginning to function as an independent agent? After all, no one would maintain that a child suddenly becomes capable of carrying out tasks that require mature forms of self-regulation after a period of complete helplessness in those domains. What is it about the child and his or her environment that initiates such development?

In order to search for answers to this question, we need to ask ourselves how the child functions in all types of task situations before beginning to carry out goal-directed tasks independently. The obvious answer is: with the help of adults. For the most part, studies of metacognitive development have not included an analysis of the types of adult-child interactions that precede independent metacognitive functioning.

It turns out that these questions have been of great interest to certain investigators in the Soviet Union. Specifically, Vygotsky (in preparation) and several other investigators who have used his theoretical foundations (e.g., Zaporozhets, 1960; Meshcheryakov, 1974) have attempted to analyze the origins of the capacity for self-regulation in humans. The key to this approach is that the capacity for self-regulation displayed by mature metacognitive agents is viewed as growing out of social interaction. In Vygotsky's (in preparation) terminology, regulation appears on the "interpsychological plane of functioning" before it appears on the "intrapsychological plane of functioning."

This general idea has played an important role in formulating many of the research problems analyzed by several Soviet psychologists in the Vygotskian school. For example, with regard to the psychological processes involved in goal formation, Tikhomirov (1977, p. 11) has outlined the ontogenetic path as follows:

> ... the fundamental law of the ontogenesis of goal formation can be formulated as follows. The processes of establishing and carrying out goals are initially divided up among people, and then they are united in the activity of a single person. The process whereby one person sets a goal for another can conditionally be called "external" goal formation, and the process whereby a person sets his own goal can be called "internal" goal formation. Thus, the ontogenetic law can be reformulated as the transition from external to internal goal formation.

Vygotsky was concerned with many types of social interactions and their influences on cognitive development, for example, both interaction among children and interaction between a child and an adult. It is interesting to note that Piaget (1950) and his followers (e.g., Doise, et al., 1975) also have, on occasion, stressed the importance of social interaction among children as a condition for cognitive development. For example, the results of the study by Doise, et al. indicated that "subjects who did not possess certain cognitive operations involved in Piaget's conservation of liquids task acquire these operations after having actualized them in a social coordination task" (p. 367).

In this paper, however, I shall limit my analysis to one specific type of social interaction and its relationship to the development of metacognitive skills. Specifically, I shall examine a type of adult-child interaction in which the adult leads the child through a problem-solving effort. Depending on the child's level of mental development, the adult may have to take on a greater or lesser level of responsibility. At a low level, the adult may simply give the child a series of commands—a case somewhat analogous to a computer program. At this level, the child may complete the task but have almost no idea as to what he or she did. In fact, sometimes the child will not even realize that he/she is involved in carrying out a goal-directed task.

At a somewhat higher level, the adult may lead the child through the task orally, but without using commands. In this case, the utterances may consist of questions and statements that are aimed at revealing to the child the overall strategy, the next step, etc. At this higher level of oral regulation, a striking feature of adults' speech to children at home and in the classroom is the large number of "regulative questions" involved. Such utterances are typically questions to which the adult already knows the answer. For example, an adult assisting a child in making a puzzle might ask such questions as: "What shape is this space here?" or "Do you have any pieces that are that shape in your pile over there?" The function of these questions is not to acquire new information. Rather, it is to regulate the child's activity in such a way that the steps necessary to solve the task are carried out.

The various means (verbal or nonverbal) used by adults to lead children through a task are means of "other-regulation." Whereas the mature metacognitive agent will use self-regulation to carry out various goal-directed tasks, the child will often be able to complete certain tasks only with the help of other-regulation.

Let us analyze the special properties of other-regulation that distinguish it from other types of social interaction that are possible when two or more people are jointly engaged in solving a task. First, we should recognize that when two individuals are engaged in a task such as building a tower of toy blocks in accordance with a model, there are many possible ways in which they could distribute the responsibility. For example, they could decide that one party will build the first half of the tower and the other party the second half; they could decide that the two parties will alternate in putting blocks on the tower, etc. However, adults typically interact with children in such a way that is it evident that the responsibility between them is allocated in a much different fashion. After the experimenter has explained the task to both of them, the adult goes over it again with the child. By using verbal and nonverbal deictic devices, the adult draws the child's attention to those aspects of the context that are relevant for solving the task. Subsequently, while carrying out the task, the adult uses statements, questions, and commands to get the child to focus attention on the model, on the copy, or on the building materials in such a way that the next step will be carried out. The adult's utterances constantly regulate several different areas of the child's activity. For example, the utterances: a) remind the child of the goal of the task ("We want ours to look like that one, don't we?"); b) point out that there is a step after the one the child has just completed ("What do we need to do now?"); c) identify certain properties of the materials relevant to the task ("We need the same *color* as this one in the model"); etc. If such utterances are not effective in regulating the child's activity, the adult may resort to giving commands ("Put that red one in your hand on top of this blue one").

In all these situations, the important point is that the responsibility for carrying out the task is distributed between the adult and the child in a very specific way. The adult fulfills the role of providing information about what strategies to use, what step comes next, when to look at the model, copy, or pieces, etc., and provides the other-regulation neces-

sary for the child to carry out the task by supplying the directions about what, when, and how something must be done. The child is then responsible for following those directions and is responsible for carrying them out physically. The adult and the child have distributed responsibility on the basis of who is in charge of the task's metacognitive aspects. If it is a mature metacognitive agent, a single individual makes the metacognitive decisions and carries them out. In an adult-child interaction, we can consider the dyad as a unit, because two individuals are integrating their efforts in a way that is functionally equivalent to the normal procedure of a single individual with mature metacognitive skills.

One way to illustrate the operation of this system is to compare films or videotapes of a mature metacognitive agent (i.e., an adult) with those of a young child carrying out the task of constructing a block tower, in accordance with a model, with the help of an adult. The task includes a block tower that already has been constructed (the model), a pile of blocks to be used in the task (the pieces), and a second block tower being constructed by the subject (the copy). If we watch the videotape, it is clear that the adult can carry out the task independently, and does not have to rely on instructions from another person. For example, if we watch eye-gazing behavior, we see that it has a definite, sequential structure. The adult first looks at the model to see which block comes next in the task, then looks at the pile of pieces from which the selection must be made; and finally looks at the copy under construction. We see a steady, repeated sequence of gazes—from model, to pieces, to copy. Of course, this is an idealized version, but the adult will approximate it while carrying out the task independently.

If this same sequence of eye-gazes occurs in the child, *it will be controlled by the adult*. That is, the adult will constantly be supplying verbal and nonverbal information about where the child should look while carrying out the task. For example, the adult might say, "OK, now let's see which one is next in the model. It's a blue one, right? Do you see a blue one in the pile of pieces? OK, now where does it go on your tower?" Among other things, these utterances direct the child's eye-gaze first to the model, then to the pile of pieces, and finally to the copy.

Now let us carry our illustration one step further in order to demonstrate how the adult's task performance is functionally equivalent to that of the dyad composed of the adult and the child. Let us imagine that we have lost the sound for these videotapes and have only the visual information about the behavior of the adult and the child subjects as they carry out their task. Without the audio portion, it would appear that both are carrying out the task in roughly the same way (Note 2). Both would appear to be capable of regulating their eye-gaze so that it

follows the sequence: model, pieces, copy, model, pieces, copy, etc. However, without the audio, we would be missing the fact that regulation is being supplied only by the adult (i.e., self-regulation), whereas the child can carry out many aspects of the task only with the "metacognitive assistance" of an assisting adult (i.e., through other-regulation).

Of course, once we realize that other-regulation can allow the child to go through the steps of carrying out a task in such a way that the actual behavior resembles that of a mature metacognitive agent, the next question is whether there is something in this activity that is important for the development of later metacognitive abilities. On the one hand, it is possible to suppose that other-regulation by adults simply serves to "take up the slack" until the child is capable of carrying out tasks independently. According to this view, the development of the child's abilities is not connected with the early adult help. On the other hand, one can hypothesize that the metacognitive assistance provided by adults at early stages of the child's development plays an important role in later growth. Wood, Bruner, and Ross (1976) have, in effect, proposed a form of this second hypothesis when they pointed out that they think the adult-child interaction involved in solving a task "can potentially achieve much more for the learner than the unassisted completion of the task. It may result, eventually, in the development of task competence by the learner at a pace that would far outstrip his unassisted efforts" (p. 90).

At present, it is far from clear just how other-regulation can lead to the development of self-regulation. I shall outline one general proposal here and point out one way that it will lead us to ask questions somewhat different from those we are used to asking in developmental psychology. The type of developmental path to be proposed here has much in common with the approach outlined by Vygotsky (in preparation) and his followers (e.g., Levina, in preparation). However, it is not clear that Vygotsky would agree with all aspects of my proposal.

The basic tenet of this approach is that other-regulation is a necessary (but not sufficient) condition for the development of self-regulation because such a claim would greatly oversimplify matters. We cannot expect a child to develop self-regulation in any area whatsoever only as the result of an adult's leading the child through tasks in that area. After all, a two-year-old will not be able to solve complex problems in algebra simply by being led through them. Rather, other-regulation will lead to the development of self-regulation only when the child is led through a task that falls within a limited range of complexity—one that is slightly too difficult for him/her to solve independently (i.e., through self-regulation). On the one hand, the child cannot already have mastered the task, as then there would be

no need for other-regulation. On the other hand, the task cannot be so far beyond existing capacities that it will be impossible for the child to understand anything done as a result of other-regulation. That is, in order to receive the maximum benefit (i.e., to make maximum progress in self-regulation) from other-regulation, the child must be able to understand some aspects of why he or she is doing something under someone else's direction. Vygotsky (in press) dealt with this problem in his analysis of the "zone of proximal development."

The general approach I am proposing points out that the child acts (or is made to act) as if he or she had a plan or strategy before it is possible to devise and carry out that strategy independently. The child does not first master a strategy that guides action and then begin to act, but first acts and then begins to master the strategy that guides the action. Undoubtedly, some form of self-awareness is involved in the transition from other-regulation to self-regulation. That is, the child begins to regulate his or her own activity by becoming aware of what has already been going on for some time under the direction of others.

Only future research will tell us how strong a claim we can make in this area, but it must be pointed out that this general framework for examining the problem of metacognitive development calls for a specific approach to the ontogenetic analysis of concepts, strategies, etc. Rather than assuming that a child first develops a strategy and then begins behaving as if he or she had that strategy, we should look for instances in which a child first behaves (or is made to behave) as if he/she had a strategy (through other-regulation) and then begins to acquire that strategy. At early stages, this may even mean that the child carries out activities based on various strategies before even realizing that there *are* such things as strategies, let alone before realizing the nature of particular strategies.

This has important implications for choosing starting points in our developmental analyses. Under the approach proposed here, we would not take the mastery of a concept or strategy as the crucial point in our analyses. Rather, our starting point would be when the child begins to be led through a task that will eventually be mastered in the realm of self-regulation.

It should be noted that undoubtedly other-regulation is not the only precursor to self-regulation. However, its importance has been underestimated in much of our present-day psychology in the West. It may hold the key to understanding a great deal about general (perhaps universal) metacognitive strategies. In addition, by studying differences in the modes and styles of other-regulation, we may eventually be able to develop a better understanding of how thought processes differ among individuals and cultures. In any event, this approach calls for us to place a re- newed emphasis on analyzing social interaction in developmental psychology.

NOTES

1. While no actual data are reported in this paper, the tasks and hypothetical behaviors used as illustrations are based on a mother-child interaction pilot study which Maya Hickmann and I have recently completed. Also participating in this research were Nancy Budwig, Gillian Dowley, and Joan McLane.

2. This illustration is concerned only with eye-gazing behavior. Our actual data show that in other areas there may be important differences between older children (four-and-a-half-year olds) and younger children (two-and-a-half-year olds) in eye-hand coordination, fine motor skills, etc.

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The three works under review assert that the metaphor that memory is a storehouse in which past experiences are *stored* and current memories are *retrieved* does not have the attraction that its persistence might indicate. From the storehouse viewpoint, recall is often thought of as a search process, the more effective the search strategy the better the recall performance. Search problems (or problems of remembering) are often handled by a special filing system, like the catalogue-card system in a library. Bransford and his colleagues raise some puzzling questions concerning these search strategies. For example, how many different filing systems exist? How does one select the appropriate filing system?

It is just such questions which lead Bransford and his colleagues to another metaphor which they believe avoids these perplexities. For them, remembering is an act which "sets the stage." When enough context is present, the event is simply remembered. It is as if you have finally appointed the stage with enough detail so that an audience will recognize it as a parlor or a backyard in South Philadelphia. Within this metaphor, "search" involves the attempt to find the objects or details to evoke the scene. When enough *context* is provided, the to-be-remembered item comes to mind.

Malcolm's book does not provide an alternative to the storehouse metaphor, but does present a very detailed analysis into its origin and suppositions. Malcolm devotes most of his energies to attacking the notion that a "trace" in memory has a close correspondence to experience, and that the link between past experience and present memories is causal. He cannot understand the need for mediators; rather, I believe, he views memory as a direct process.

These works are important because they criticize an almost unassailable psychological model. Malcolm brilliantly illustrates the dogmatic view psychologists adopt toward this metaphor. Metaphors are ways of talking about things and, hence, should not be thought of as "facts." The success of any metaphor depends on the degree of interest it generates, the number of penetrating questions it raises, and the amount of confusion it dispels. Bransford and Malcolm testify to the confusion caused by the storehouse metaphor. Whether another, such as "stage setting," will dispel the confusion and also raise interesting new questions remains to be seen.

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OSHERSON, DANIEL N., and WASOW, THOMAS. 1976. Task-specificity and species-specificity in the study of language: A methodological note. *Cognition*, 4(2): 203-214.

Comparisons among the intellectual capacities of different species or among humans are central to theories of cognition, language, and neuropsychology. Such comparisons are intended to answer questions concerning the extent and significance of similarities and differences between, for example, the linguistic capabilities of humans and those of such other creatures as chimpanzees, or the mental faculties underlying performance on spatial tasks with those underlying linguistic performance.

This paper makes the important point that such questions, which concern species-specificity and task-specificity, may be answered differently depending on one's criteria for theoretical adequacy. "Adequacy" will be defined by the scientific discipline asking the questions, and for the study of language, the authors consider three major disciplines, or levels, in a reductionist hierarchy: linguistics, psychology, and physiology. On the questions as to whether chimpanzees possess "linguistic competence," these sciences would respectively seek similarities between the classes of automata sufficient to formalize the languages, the psychological processing of the languages, and the neural substrates for language skills. The authors present similar, but more extensive, arguments on the task-specificity question, where debates have centered on evidence for whether the human language faculties depend on components *specific* to language. We are also cautioned against cross-level translation of results: universal linguistic transformations may have neither neural loci in the brain of the language user, nor correlates in a process model of language use and understanding.

The points about comparisons are general ones with profound significance for those concerned with comparative human development: the comparisons which different scientific disciplines make will generally be both conceptually and empirically distinct, even as they address the same general question. One problem not discussed still remains: given that the different disciplines *are* asking the same general question, how do we reconcile differences we obtain in our comparisons at different levels of description?

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KARMILOFF-SMITH, ANNETTE, and INHELDER BARBEL. 1974/5. "If you want to get ahead, get a theory." *Cognition*, 3(3): 195-212.

This study is the first in a promised series of Genevan publications which describes research that goes beyond the child's cognitive structures to focus explicitly on the dynamic cognitive *processes* involved in development. In their detailed analyses of the action sequences of 67 chil-

dren between 4;6 and 9;5 in various block-balancing tasks, Karmiloff-Smith and Inhelder place emphasis on the development of "theories-in-action": children may interpret success/failure at block-balancing as positive/ negative "action-response," or in terms of confirmation/refutation of a theory-in-action. Successful balancing, for example, could *refute* a theory-in-action if it had not been predicted, and would result in subsequent actions that would differ from those if the child's interpretation of the result was centered on the goal of success at block-balancing.

The important point to note is that an analysis of *products* and the degree of success at balancing alone would have been inadequate. For example, there were more failures at balancing blocks among 5;6- to 7;5-year-olds than among 4;5- to 5;5-year-olds. The older children's theory-in-action—that the center of gravity necessarily coincides with the geometric center of an object— actually resulted in perseverant failure-in-action when inconspicuously and asymmetrically-weighted blocks were involved. The younger subjects relied on the proprioceptive information of the block falling as they attempted to balance them, and were more adept at making appropriate corrections.

The implications for comparative research are at once theoretical and methodological: comparisons involving structures or products alone may leave developmental differences mysterious when they, could be explained by a careful evaluation of the dynamic theories implicit in the processes by which those products were realized.

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CAPRA, FRITJOF. 1975. *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism.* Berkeley: Shambala Press.

Piaget, in his investigations of the origins of intelligence, has developed a constructivist-structuralist theory of the growth of the mind. Intelligence is not an internal trait that belongs to the organism, but is a structuring process which develops from the interactions between the organism and the environment. In a similar fashion, Garfinkel has proposed that social structures are not simply external constraints; they are reflexively tied to and emerge from interactional structuring activities.

Structurally similar interactional theories are being proposed across many other disciplines. This book by Capra introduces the nonscientist to an interactional theory in the field of high-energy physics. The atomistic science of the ancient Greeks, which has so long been the model used by social scientists, has been found untenable by modern physicists. Post-Einsteinian physics no longer accepts the notion of an indivisible unit as the building block of the universe. The universe is not divisible into smaller and smaller distinct entities, but is a homogeneous, "organic" whole whose subatomic particles are inseparably linked to their environment, and whose properties can only be observed and understood in their interaction with the rest of the world. In other words, we can not understand the properties of subatomic particles without an understanding of their mutual interactions because the basic unity of the subatomic world is dynamic patterns.

In addition to providing such a clear presentation of high-energy physics, Capra takes us one step further. He draws for us the parallels between modern physics and Eastern mysticism. By doing so, he obliquely enters the continuing debate among comparativists and developmentalists about the structure and organization of thinking among different people. By juxtaposing the words of modern physics with Eastern mysticism, he demonstrates a surprising structural similarity.

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