



# THE QUARTERLY NEWSLETTER OF THE LABORATORY OF COMPARATIVE HUMAN COGNITION

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**EDITORS' NOTE:** In the previous issue of the Newsletter we announced that financial difficulties were threatening its existence and appealed for support. We are happy to report that support came in two forms. First, many readers sent in subscriptions. Second, matching funds were provided by the Ford Foundation as part of its support for the training program of the Laboratory of Comparative Human Cognition.

During the coming three year period, we will attempt to make the Newsletter completely self-supporting. That effort will concentrate on cutting costs and expanding our list of subscribers. It will probably include an increase in subscription rates, although not immediately.

You can support this Newsletter in three ways—first through your subscriptions; second, by showing the Newsletter around to your colleagues; third, by sending us interesting material to print so that the quality of the ideas will make the effort worthwhile for readers and writers alike.

We hope to hear from you with suggestions for future issues.

## Introduction to This Issue

This issue of the Newsletter is devoted to research from the Laboratory of Comparative Human Cognition. It is, in the spirit of this Newsletter, largely a set of reports on work in progress.

The research of the Laboratory seeks to investigate the ways that culturally organized experience influences the development of cognition. Our work is, as the name of the Laboratory implies, *comparative*. We use differences in experiences as a tool of analysis. A good deal of the work of the Laboratory has been comparative in the "cross-cultural" sense. We have put special emphasis on the ways that cultures affect the valued contexts within which people must develop the skills needed to succeed as adults. A prominent feature of such scenes is their social organization; thinking is rarely a solitary activity. Another prominent feature of such scenes is the role of language both as a tool of thought and as the medium in which social interaction takes place. Consequently, if we are to understand the cultural organization of cognition,

we must be able to represent cognition as a social accomplishment, carried out in a variety of contexts.

While that bit of reasoning may seem mundane, it presents serious challenges to cognitive psychology and the cognitive sciences more generally, because the laboratory methods developed during the last century to study cognition (the methods upon which cross cultural cognitive research has depended heavily) do not make it easy to measure thinking as part of social interaction. Rather, experiments look at very special forms of interaction, generally between an individual and some array of stimuli in the form of objects, pictures, or sounds. Whatever the specific form of the stimuli, or of the theory used to account for behavior, the format of their presentation is designed to allow analysis from stimulus to response, from context to behavior.

There are excellent reasons for adopting such restrictions on the kinds of interactions used to represent cognition, but this strategy has one large disadvantage. It does not permit us to describe a good many of the phenomena that are of interest in understanding how culture affects cognition, because it allows representation of so few real life contexts for thinking.

The articles in this issue all deal with the problem of expanding the study of cognition and learning outside of the restricted laboratory model with stimulus-presenting devices and a subject as responder/thinker.

The article by Levin and Kareev is the closest approximation in this sample of studies to a standard cognitive-psychological experiment. It is concerned with the issue of how people represent problems and the way that the "perspective" embodied in a representation influences the course of problem solving. However, it departs from most research in this genre by employing two subjects who interact with each other while interacting with a micro-computer that presents the problem. One of the aims of this work is to demonstrate that in attempting to solve a problem together, people represent intellectual resources for each other as well as sources of data for the experimenters.

The use of a microprocessor to present the problem is more than a bit of technological gamesmanship. Interactions involving microprocessors promise to be an increasingly frequent means of problem solving and teaching/learning in the years to come. Levin and Kareev and their colleagues are at the beginning of a research project

that will allow analysis of the way that interactions with such devices occur in the applied settings for which they are being designed.

The learning situation investigated by Moll and his colleagues is of a different sort. Despite a great deal of controversy over the effectiveness of bilingual education and barriers to greater effectiveness, our reading of that research literature gives us too little of an idea of what actually happens in bilingual classrooms that could account for either success or failure. Moll et al.'s work shows that both students and teachers are caught in a bind in the classrooms analyzed. Students who have learned to read by any reasonable criterion in their first language are believed not to be able to read by their second language teacher, who structures their lessons accordingly. The confusion of pronunciation and decoding ability seems to trap students at a low reading level in their second language. Finding ways to help teachers break that trap will be an important and necessary task.

Reading is also the topic of the Anderson group's research, but in this case, the issue is what very young children learn about reading and writing as activities prior to formal schooling. The preliminary research reported in their article shows that "literacy" does not mean the same thing in all homes they have visited, and consequently children from different home backgrounds encounter very different activities involving printed matter. One next step in this work will be to trace changes in the children's notions of literacy, as well as their school-based reading and writing accomplishments, when they enter school. The idea of a mismatch between home and school that is different for different sub-cultural groups has been around a long time. Anderson and his colleagues are directly addressing this problem.

Mitchell's work addresses the problem of thinking in the home. In this case, the research follows Labov's classic study of language-use outside of schools and formal tests, in order to demonstrate in detail the linguistic resources that are brought to problem solving in natural settings. All of us can appreciate Mitchell's examples which, combined with her careful analysis, illustrate one technique for obtaining systematic data on problem solving in the home, where solutions are temporary and certainly an interactional accomplishment!

A great deal of cognitive development research is carried out in schools, but relatively little is known about the way that research in the classroom influences the environment it has set out to study. A central part of that environment is the classroom teacher. Although there has been a good deal of rhetoric in recent years about making teachers co-participants in research, little has been reported about the success of such efforts.

Quinsaas's article illustrates the reactions of one sympathetic and hardworking teacher to being a participant in research in her classroom. As Quinsaas points out, classroom research often considers teachers a "part of the problem," and promises (implicitly or explicitly) to come up with solutions to "the problem." As a conse-

quence, teachers lose their role as protector/sponsor of their students, a role that is vital to their self concept and the way that they organize their classrooms. Researchers who have lamented the over-sensitivity and defensiveness of teachers ought to read Quinsaas's account carefully. There are many important and subtle ways in which the imperatives of classroom research clash with the imperatives of classroom teaching from the teacher's point of view. These clashing imperatives often result in design modifications that researchers view as compromises, weakening their inferential power. We need to examine these different imperatives to understand better why classroom research seems to have so little impact on classroom practice.

Throughout all of this work, the reader will find an emphasis on problem solving in the course of interaction and many references to the work of Lev Vygotsky, the late Soviet psychologist. In looking for a way of thinking about thinking as a social process, Vygotsky's work has offered us more ideas than any other developmental psychologist. Those ideas were not very well developed at the time of Vygotsky's death in 1934 and they have only come under intensive scrutiny outside the USSR in recent years. For those readers who find the references to Vygotsky obscure, I recommend the recent edition of his essays entitled *Mind in Society* as an introduction (Harvard Press, 1978).

It should be clear to the reader, as it is to us, that the work reported here is still in its early stages of development. It is *work in progress*. The authors would be more than happy to hear from readers who care to comment on their work.

We would like to begin to devote, periodically, entire issues to reports of the ongoing efforts of other research groups around the world.

Let us hear from you.

Michael Cole

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*If my analysis has been cogent, it becomes apparent that the development of personality and the acquisition of culture are not different processes, but are one and the same learning process; and that the structuralization of culture and the structuralization of personality are not different processes, but are one and the same process of integration. —M. Spiro.*

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# Problem Solving in Everyday Situations\*

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Most studies of problem solving have taken place in laboratory settings. In contrast, the problem solving that people routinely do takes place in situations considerably different from the laboratory. People usually are not told that they have a problem to solve — they have to determine this for themselves. People are not given a description of the problem, but instead have to represent and organize (and reorganize) the elements of the task on their own. People are not isolated from other people, but instead can draw upon them as a rich external resource.

The motivation for our research is twofold. First, we want to determine the degree of applicability of existing notions of problem solving to everyday situations. Earlier research has shed much light on problem solving behavior. The work of Newell and Simon (1972) contains a wealth of data as well as a conceptual framework within which problem solving behavior can be studied. They show how the task environment and the ensuing problem space affect and determine the steps taken towards the solution — most notably the search through the problem space for productive moves. Even earlier research (Duncker, 1945; Luchins, 1942; Maier, 1931), has demonstrated some of the possible detrimental effects of previous experience with the problem material on subsequent problem solving (e.g., the effects of mental set and the phenomenon of functional fixedness). Finally, recent work has concentrated on novice-expert differences in problem solving ability (Chase & Simon, 1973; Chi, 1978; Larkin, McDermott, Simon, & Simon, 1980) and emphasized questions of the representation of knowledge and the development and emergence of expertise in a given area. We want to see if these theoretical constructs provide a useful framework within which everyday problem solving can be analyzed, to discover if instances of negative transfer occur in such situations, and to examine the emergence of expert-novice differences.

Our second goal is to find out in what ways everyday problem solving activity *differs* from that observed in the laboratory. Initial studies along these lines (Cole & Traupmann, 1980; Lave, 1979) point, for example, to the importance of social resources in determining the kind of approach taken by the problem solver. If other

people play an important role in everyday problem solving processes, then a theory of problem solving behavior should contain elements dealing with help-seeking and help-using. Another difference — briefly mentioned before — is that everyday problem situations are as a whole less structured than their laboratory counterparts. While some laboratory situations are quite diffuse and some everyday situations have severe constraints about what can and what cannot be done, typically everyday problem situations are less structured, leaving the problem solver with a wealth of possible approaches towards the solution. Our overall goal is to find both the commonalities and the differences between problem solving activity in the laboratory and in everyday life.

In trying to study problem solving activity in everyday situations we are faced with the following dilemma: the less laboratory-like the setting, the less control we have over what is happening, and therefore the less we can say afterwards about what has happened. We have settled on a compromise between a completely constrained laboratory setting and a completely unconstrained (by us) natural setting — we set up a “computer club” for 10-year-old children. Since we organized and ran the club, we could control some aspects of the problem solving situations; but since it was a recreational/educational activity for the children, we could observe their problem solving actions in a rich and relatively unconstrained environment. We ran two parallel clubs, each consisting of four two-hour sessions, with between five and seven children attending each session. In the first two sessions we had two computers and a programmable calculator available for use; during the last two sessions there were four computers available in the club. The participants were free to choose from the programs available on the computers. The problems they encountered could be broadly classified into two categories: learning to use the computers, and learning to perform well on the programs. Some of the programs were commercially available game programs, while others were specifically designed by us to present the children with problems to solve.

## Our Data

In our computer club sessions, we collected 28 hours of video tape of the children’s activities. We also had the computers automatically collect a record of the responses that the children made in interacting with some of the game programs. This is a major advantage of the computer club setting over other settings for studying everyday problem solving — that some of the actions that the problem solvers take to deal with the computer are easy to record and already “quantified.”

We indexed the video tape records, creating a running description of what general activity was taking place on the tape (generally, what computer program was being used) and who was involved in the activity. These in-

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dexes enable us to find comparable situations on different parts of the tapes, thus providing us with some of the power of a well structured investigation without the rigid constraints it might impose.

We have been developing coding techniques, which allow trained human coders to observe selected episodes on tape and systematically record the occurrence (or non-occurrence) of specified events. (The indexing and coding are carried out by Marcia Boruta and Cathy Eckols.)

### What We Learned

We are still in the process of analyzing the data that we collected from our computer club sessions. However, there are several generalizations that we can make at this point.

*Conceptualizing the task.* The way the task is conceptualized by the problem solver is of major importance in determining problem solving behavior. The problem solver creates the problem space within which he or she operates. In most laboratory situations this aspect of problem solving is hardly studied (but see Simon & Hayes, 1976); instead the researcher makes sure that the subjects "understand" the problem before they start solving it. "Understanding" the problem typically means that the subjects adopt the organization deemed appropriate by the researcher. However, in everyday problem solving, there are often many different ways to think about any given situation. The selection of an organization is then a critical determinant of success or failure, as some conceptualizations of the task will lead to dead-end "blocked" states. In the computer club we were able to observe how the children organized and re-organized the tasks they were faced with.

While the children were presented with a large number of programs, most of our examples will be based on their activities with a game program we designed, called "The Harpoon Game." In this game, a shark's fin appears on the computer display screen, with "crosshairs" centered over it. The players specify the position of the shark, by entering numbers representing the coordinates of the shark. A harpoon flies across the screen to the point specified, either hitting the shark or splashing into the water (if not close enough). This game, derived from the game called "Darts" (on the Plato computer system), was designed to teach children numerical estimation. The crosshairs are two number lines, and the players are to specify what numbers correspond to the intersection point on each number line.

We programmed the game so that the player would specify the Cartesian coordinates of the shark. However, our analysis of the video tape and keystroke data of the children in our computer club indicates that they used a number of different ways to represent the tasks they were faced with. Different representations especially proliferated when they were introduced to a new program. Some children did seem to adopt the Cartesian

coordinates representation of the problem; others adopted a similar representation but with the X and Y coordinates reversed. Some children responded in a way indicating that they had adopted a polar coordinate organization (angle and distance number pairs). Some children entered numbers and responded during the flight of the harpoon as if they thought the task was to get the path of the harpoon to cross the shark, rather than the end point of the throw, expressing disappointment and anger when the harpoon passed over (through) the shark without hitting it. Finally, some children consistently missed the shark, but their mode of operation is not well described by any of the above patterns, which leads us to believe that there are more ways of organizing this situation that we haven't discovered yet.

In one case we were able to observe a change of representation in the middle of one of the games: the children playing the game were trying to have the harpoon land on the shark's fin (its only visible part). They finally managed to nip the fin, but not to kill the shark, which prompted one of the players to ask "Hey, where's the shark?" They were then told that the best place to hit the shark was at the crosshairs appearing on the screen (just below the fin, where presumably the rest of the shark's body was to be found).

After that, they started another set of throws which at first viewing of the videotape seemed completely off target. As a matter of fact, the harpoon was landing further and further from the crosshairs. Observation of the children indicated that they thought they were getting closer and closer to hitting the shark. Those reactions prompted us to keep looking for what the children could have in mind. We then realized that the children were trying to have the harpoon pass *through* the crosshairs (whereas our conception of the goal was to have the harpoon land there).

We plan to continue this examination of how problem solvers select organizations for problems, and how they switch organizations when they get blocked. We feel that this issue of selecting an organization is critical to problem solving, and that our data contains much information concerning it.

The literature on novice-expert differences in problem solving also stresses that experts often have a number of alternate representations for the same problem, and that they can freely move between them as the need for it arises. We are in the process of looking for corresponding differences among our subjects, both in their playing of games and in their handling of the computer system.

Negative transfer from prior experience is a complementary aspect of becoming proficient at a task. We were able to observe a number of instances of negative transfer with our subjects. In some cases this transfer resulted from carrying over an inappropriate set of commands from one computer to another (as when children would search for the BACK SPACE key — available on the terak computer — on the Apple II computer, or

when they would try to CATALOG the directory of the disk, as they had done on the Apple II when using the BASIC language, only to find the terak's Pascal taking the first C as a call for the Compiler, and the ATALOG as the name of the program to be compiled). In other situations there were cases of negative transfer even within a game, as when children continued typing in those coordinates which were appropriate in the episode just over, while the shark was in a completely different area of the screen. Again, further analysis is necessary to determine when (and hopefully, why) such "errors" occur. The important point, though, is the demonstration that such phenomena can be detected in everyday problem solving as well as in the laboratory.

*Progression toward proficiency.* As mentioned before, the emergence of expertise is of major interest in current research in problem solving. Over the course of the computer club, the children learned to be proficient at the games provided. There in fact was a sequence that we observed, both for this game and for other situations in the computer club. Initially, a child would work with other children and would also freely use adult help to learn about a new computer program. Next, children would work together without direct adult participation, only drawing in an adult to help when they got blocked in some way. Finally, a child would work either with a friend or alone, gradually making the task more challenging if the program allowed this.

In the Harpoon game, for example, the children in the computer club soon discovered that they could change the size of the shark (and thus the difficulty of hitting it). The "experts" at Harpoon eventually reached the stage where they could hit a shark much smaller than the one originally presented, and do it in a small number of throws.

This progression illustrates the importance of the problem solver's being able to create for him/herself an environment that is sufficiently supportive to make progress, but sufficiently challenging to be interesting. The children were able to create for themselves this dynamic "zone of proximal development" (Vygotsky, 1978) in the computer club by their cooperative efforts, their use of the adults present as occasionally helping resources, and their setting of the level of difficulty of the game. Further research is needed, though, to determine if this attempt to operate within a challenging environment is a general aspect of everyday life environments or is specific to playful situations similar to our computer club.

*Use of external resources.* As pointed out above, one important difference between the environment in our computer clubs and most laboratory studies of problem solving behavior lies in the availability of help, both from peers and from expert adults. We suspected that the availability of such help might alter problem solving behavior, at least in that it would affect the amount of effort put into search for solution. Even more impor-

tant, the ability to solicit, obtain, and use help becomes an important problem solving skill under such conditions. As a result, we have paid special attention in our analysis to questions of how children interact together, form working groups, and help each other.

When the children were presented with the Harpoon Game at the beginning of the first club session, they immediately claimed and negotiated a set of "turns" at playing the game. However, the person whose turn it was often served only as a typist, with suggestions for the guesses coming from the children gathered around behind the player. This function of "typist" was sometimes made explicit, as in the case of a child whose turn was over but who stayed at the keyboard and said "You guys tell me, and I'll only push the buttons." Of course, being the typist may not necessarily be the passive role that child claimed it to be. The "typist" also controls what is actually typed as an answer, and may be in charge of resolving conflicting suggestions. This question of apparent and actual roles assumed by children brings us to the more general question involving the division of labor within problem-solving groups.

The children typically worked together cooperatively at the tasks, dividing up the work so smoothly that repeated viewing of the video tape is required to analyze the division. One such episode occurred during the first part of the first club meeting. It will give a flavor of the kind of activities in the club, and show some very interesting instances of the ways the problem solvers divide up the task at hand.

The episode mainly involved three children Byron [B], Anne-Marie [A], and Janice [J]. One of us [JAL] was also present some of the time. (Additional information involving the situation appears \*between asterisks\*; [square brackets] indicate speech by a number of people taking place at the same time; and :: indicates trailing speech.) The episode starts with Byron, Anne-Marie, and Janice huddled around the computer, reading the instructions on the computer screen. Byron and Anne-Marie have their chairs closest to the computer.

- B: You are supposed to hit the key return.  
Right here \*points to the screen\*
- J: Push (unintelligible) key return.  
\*A presses the RETURN key, and a  
"shark" (the drawing of a triangular fin)  
appears on the screen. The "bearing" (the  
x coordinate) of the target is 187, and its  
range (the y coordinate) is 63. The players  
don't receive this information, of course,  
since the object of the game is for them to  
guess these numbers.\*
- A: Return. OK.
- J: Aaahh.
- B: \*slight laugh\*
- A: God.
- A: [Thirty two :: \*she points to the screen\*
- J: umm-umm. I'd say one thirty :::] four.  
\*JAL enters\*

A: OK. One thirty four. \*types 134\*

A: Then I do this. \*presses the RETURN key\*

J: No, no, no, no.

JAL: Wait a minute.

A: Yeah, I did. I did it right.

A: \*to JAL\* OK. Now what do I do?

J: And then, no you, you're supposed to, you go one —

A: thirty four.

J: One thirty four, and then —

JAL: And then return \*points to the screen\*

A: [Return

JAL: and then] it will appear up there.

A: Do I copy that? \*points to the bearing guess on the screen\*

JAL: No.

J: [No

A: Then what do I do?]

JAL: [How far up now \*points to the screen\*

J: And then you,] now how far up.

J: [I'd say about] \*this part together with JAL below\*

one tw-, one twenty probably.

JAL: [If this is two —] \*cut by Janice's second half of the above sentence\*

A: There's no zero.

\*This is the first experience these children have had with a computer. For example, here Anne-Marie looked for the zero key next to the one key.\*

JAL: It's over on the right side.

A: Oh \*enters 120\*

JAL: You have to push return.

A: Return. \*presses the RETURN key. Harpoon starts flying across screen\*

JAL: OK, [now it is gonna fly up ...

J & A: O ::: h. ho, hoo]

JAL: ... wherever one thirty four [and one twenty are.

B & J: Ha, ha, oooh] \*harpoon splashes in water.  
THROW #1 \*

B: Let me try.

A: OK.

\*Anne-Marie moves over slightly to let Byron type. Janice sits down\*

A: OK. What do you think (unintelligible)?

OK

B: One twenty

A: bearing of the [shark \*JAL leaving\*

B: bearing] of the shark. One twenty \*types in 120\*

A: OK. Return \*she presses the RETURN key\*

A: Now. Range of the shark.

B: Hmm.

A: Oooh.

B: One hundred. \*enters 100\*

B: Return?

A: Return. Uh-huh. \*nods her head\*

\*harpoon flies over the screen.  
THROW #2 \*

A: Oooh.

J: (laughter) \*she leans over the table\*

B: (unintelligible) \*splash\*

J: Oh, I know

B: Now let me try

J: let me try it again. One [eighty ::: \*she enters 1800000\*

A: (unintelligible)

B: Ninety eight, ninety eight]

B: What are you doing

J: Return \*presses RETURN\*

A: Return.

B: You just blew it \*the message "Number much too large, try again" appears on the screen\*

B: Let me try it. Let me try it. [I think it's eighty nine, eighty nine.

A: Nooo, wait, let her try]

B: Hey, it's much too large, try again

\*Anne-Marie enters 98. This number — which Byron apparently meant to be the range (see later) — got entered as the bearing.\*

A: and return \*presses RETURN\*

B: ummm, one eighty, no, no, no, twenty.

J: One eighty.

B: No, it is too (unintelligible).

A: OK, wait, let me try

J: No, just try [it'll hit right here

\*points to the screen\* the boat will go like that.

A: Oooone] \*enters 180\*

A: Return \*hits RETURN. Harpoon flies across screen  
THROW #3 \*

A: Oooh.

B: Too far.

A: Oh, oh, oh, oooh, oh my Lord.

J: (laughter)

A: Where in the world

B: Let me try. Let me try. I think I know it. I think I know it.

B: umm. Return [no, no,

A: Not return]

J: One fifty six.

B: No. One fifty six \*types in 156\*

B: Now I know this one. Eighty nine.

\*Note that Byron forgot to hit the RETURN key here. He is prompted by Janice, who, in this case, also presses the key for him. This low level instance of task division and help offering turns out to be critical for moving their performance on the computer past the level of being stuck because of forgetting to push the return key.\*

J: Return \*presses RETURN for the 156\*

B: Return. Eighty nine \*presses 89\*

J: Return. \*presses RETURN. Harpoon flies across screen  
THROW #4 \*

A: Sure Byron, sure you do \*harpoon splashes\*

B: Now try, now try, seventy some, seventy nine or something.

\*Janice climbs on top of the table\*

A: One seventy eight \*enters 178\*  
A: [Return \*presses RETURN\*  
J: One, eighty nine]  
A: [and, let's see  
B: Seventy,] seventy nine, try seventy nine  
\*Anne-Marie enters 79 and presses  
RETURN. Harpoon flies\*  
J: It's gotta do it.  
A: It's got to. Oh, come on. Oooh \*harpoon  
splashes THROW #5\*  
B: Let me try. Let me try. Umm, ahh.  
J: Oooh. Let me give her a try.  
A: One seventy nine \*Byron types 146\*  
A: Byron, you just blew it \*Janice moves to  
watch on side monitor rather than  
computer screen\*  
A: [Return \*presses RETURN\*  
J: One forty six.]  
B: Umm \*makes noise with his tongue\* sixty  
::: \*types 69\*  
J: Sixty nine.  
A: Return \*presses RETURN. Harpoon flies  
THROW #6 \*  
A: You blew it there. I told you.  
J: You blew it. You blew it. \*hits her fists on  
the table\*  
A: OK. \*gets in position to type\*  
B: Just, it's, I know what it is \*JAL enters\*  
J: Let me give her a try. let me give her, let  
me give her a try \*moves over to terminal\*  
J: OK. Let me see now.  
A: [One  
J: One]  
A: it's one seventy eight.  
J: One seventy eight \*types 178. JAL exits\*  
B: and now try it, try —  
J: Return \*hits RETURN\*  
B: [And now try sixty nine. It was sixty nine  
six, six, sixty nine]  
A: Sixty nine return \*types 69 and presses  
RETURN. Harpoon flies\*  
A: Come on, come on you got to do it.  
\*Janice moves to the side monitor. Anne-  
Marie pounds table. The harpoon hits the  
shark! THROW #7 \*  
B: [I told ya, I told ya it was sixty nine  
A: Oooh.  
J: Alright, we got it.]

The division of labor in this round of the game is quite clear, especially in this last throw. Anne-Marie suggests the "bearing," Janice enters it. Byron suggests the "range," Janice enters it. The children split the task three ways, with one taking care of the "bearing," one the "range," and the third the typing. Everybody helps and is being helped with reminders about the RETURN key. When Byron yells his numbers he is ignored until it's time to type in the range, when his advice is followed. When Byron ventured into suggesting a bearing as well as a range, his responsibility for the miss was immediately pointed out to him. Finally, the participants claim credit for the hit.

To track the evolution of task divisions, we have coded the sets of suggestions and actions for the Harpoon game. Below is an example, the coding of the last three throws of the game episode presented above.

THROW	Bearing		Range	
	Suggestion	Action	Suggestion	Action
5	B: 70:: & 79		J: 189	
	A: 178	A: 178	B: 70::	
	A: RETURN	A: RETURN	B: 79	A: 79 & RETURN
6	A: 179	B: 146	J: 146	
	A: RETURN	A: RETURN	B: 60::	B: 69
			J: 69	
7	A: 1::		A: RETURN	A: RETURN
	J: 1::		B: 69	
	A: 178		A: 6:: & 6::	
	J: 178	J: 178	J: 69 & RETURN	J: 69 & RETURN
	J: RETURN	J: RETURN		

Some of the divisions of the task — such as the one we just described — were effective for hitting the shark; others not. But the main point is that the children spontaneously worked together to function within the novel environment of the computer club. Our observations point to the need to study how the task is divided, who puts the separate pieces of information together to suggest a solution, and what structure of the group emerges as a result of this process.

Help giving and help seeking also turned out to be important aspects of problem solving in our environment. For one thing, help was often offered even before the child being helped realized that s/he needed it. A longer than usual pause before hitting a certain key would often invoke something like "Hit the 'RETURN'." or even reaching over the other child's shoulder to push the key. As for help seeking, it often replaced the search for solution typically observed in laboratory studies. A case in point occurred when two children who had only a marginal role in a previous episode were left on their own for the following game. Their first attempt sent the harpoon flying to the same area where the shark had been in the previous turn. The only problem was that this time the shark was in another area of the screen. The players looked at each other in puzzlement, and seemed to be about to start figuring out what should be done next. At that moment one of the former players strolled by, and they immediately turned to him and said "Hey, Mitch, how do you make it go over the other way?" Help seeking may have its long term negative effects, of course, but it is undoubtedly an integral part of everyday problem solving.

Help seeking from outside experts (the adult leaders of the club, in this instance) adds another wrinkle to the question of how external resources are used. For example, at one point in time the program halted, and the children could not type anything in. They tried a number of approaches (hitting the backspace, return, and escape keys) previously proven successful in special situations, but nothing worked. At that point one of the two chil-

dren said "bye-bye," and walked away from the computer. The other player yelled aloud "Hey, Mister what-chamacallit, I can't get anything," and one of us arrived at the scene. The other child (probably upon realizing that they were not going to be accused of breaking the computer) also joined back the group, and was instrumental in describing their problem. We feel that questions of who seeks help, and at what point in the solution process, are of considerable importance for theories of problem solving.

Help seeking episodes constitute another sort of useful data. In these episodes the children describe the task and their actions so far, providing a natural "protocol" of their problem solving. In addition, we find that there are sometimes "helping problems," in which the helper and the help seeker miscommunicate about the problem because each is conceptualizing the task in a different way. They then have to solve jointly this meta-problem, renegotiating the ways to think about the situation, before helping can proceed. These meta-problem situations are especially useful data concerning task organization, since each person in the interaction is forced to verbalize his or her organization for the others.

Our observations lead us to believe that help seeking and division of labor are two important aspects of everyday problem solving. Both aspects have received some attention in the past: The work of Levin and Moore (1977) provides a theoretical framework for the study of help seeking; work by Kreutzer, Leonard, and Flavell (1975), and by Newson and Newson (1977) shows how other people are used as "external memories," and similarly the work by Cole & Traupmann (1980) and by Lave (1979) mentioned earlier describe the use of external resources. Also, there is a large literature on the functioning of groups and the division of labor within them (for a comprehensive theoretical framework and review of pertinent literature see Miller, 1978). Our analysis of the data is geared towards uncovering how these mechanisms operate and affect the process and product of problem solving.

### Summary

A "problem" is a situation in which people are unable to achieve some goal, after actions have been taken without success. We have looked at how children recognize these "problem" situations and how they deal with them. Children are able to work together to solve tasks they are presented with, organizing and dividing the task with an apparent effortlessness that beguiles the observer. When they encounter a problem, they either work to reorganize their conception of the task elements, or they turn to "experts" for help.

Our study of problem solving in everyday situations has just begun. The data we present serve best as demonstrations or illustrations of our points, rather than as conclusive evidence. The richness of our data slows

down the analysis process. However, we feel that our data do provide answers to the two broad classes of questions which served as the motivation for our work. First, we were able to demonstrate that processes observed in laboratory studies of problem solving can also be detected in everyday situations. This expands the scope of current theories and models of problem solving. Second, and more important, our work also points to a number of aspects of everyday problem solving which have hitherto received relatively little attention (at least by cognitive scientists). We feel that our data will shed light on these neglected yet important aspects, and also serve as a source of ideas for more structured studies of their effects.

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# The Organization of Bilingual Lessons: Implications for Schooling

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The research reported here attempts to break away from summary measures of classroom performance to see, if possible, how curriculum and instruction are organized in a bilingual program. We videotaped classroom lessons in a school that seemed to provide an excellent case study of children's experiences in such a program. The focus of our attention was the development of reading skills. We sought to specify the variations in the communicative activities that constitute the reading lessons, and to pinpoint sources of interference in the development of second-language skills. The results show that despite their best efforts, teachers are currently structuring lessons in ways that seriously interfere with their curricular objectives.

## Research Procedures

*The setting.* Our study was conducted in a combined 2nd and 3rd grade classroom in a school south of San Diego, bordering Mexico. This school implements a "maintenance" program aimed at promoting academic development in two languages. Two "sister" classrooms were involved in the study — one teaching in Spanish (L1) and one in English (L2). During the course of the day the children received instruction in basic content areas in their native language. The children also went to the other classroom for oral language and reading lessons *in their second language*. Only those children judged sufficiently fluent in English to take part actively in lessons participated in this dual arrangement. Native Spanish and English speakers were mixed for such activities as art, music, and recess, but otherwise "parallel" instruction was conducted in separate languages and in separate classrooms. This instructional arrangement was ideal for our project because it gave us the unique opportunity to observe how the *same* native Spanish speakers participated in reading lessons in two distinctive language and instructional settings.<sup>1</sup>

*The participants.* After several days of preliminary observations and consultations with the classroom teachers and aides, we videotaped 12 target children that formed part of three teacher-defined ability groups. The children, all 3rd graders, came from Spanish-dominant

<sup>1</sup>We also videotaped English oral language development lessons which are not discussed here.

homes and represented varying levels of English speaking ability. In total, 3 of the children were predominantly Spanish speaking, and, according to our observations, the rest of the target children functioned with relative ease in both languages. The results of a standardized English reading test indicated that 2 of the children were at or above grade level, 2 were one grade below, and the other 8 were substantially below grade level. Whereas there was no one-to-one correspondence in reading levels across language settings for each child, the relative number of children at, near, or substantially below grade level was paralleled in Spanish.

The criteria each teacher employed in determining the composition of the groups varied. The Spanish teacher grouped the children largely on the basis of conversations with the children and by having them read aloud. The English teacher relied more on previous teachers' reports and recommendations. Interestingly, neither teacher paid much attention, if any, to language dominance test scores.

The Spanish teacher was a female, Mexican-American, and a fluent bilingual. Her instructional aide was a female, monolingual Spanish speaker from Mexico. The English teacher was a male, Anglo, English-monolingual speaker. His instructional aide was female, Mexican-American, and English-dominant. The English teacher spoke to the children only in English; his aide, almost exclusively in English. The Spanish teacher spoke almost exclusively Spanish; her aide, only in Spanish.

*Design of our observations.* Our primary research strategy was to contrast the different contexts of instruction in order to specify important communicative activities as they interact with the characteristics of the participants. Consequently, we videotaped the high-, middle-, and low-ability groups as they participated in their daily reading lessons in Spanish and English.<sup>2</sup> First, we focused our attention on the three different teacher-defined ability groups *within* each classroom setting. These "ability-level" contrasts were extremely important because *ability group (and individual) distinctions are the very foundation on which curriculum implementation is built; they organize the nature of the experiences for the children.*

Second, we contrasted the ability groups *across* the two different language and instructional settings. We quickly formed the impression that the children encountered markedly different instructional environments when they went from Spanish to English. But, as we will make clear, it is not the language of instruction that is the critical difference. Crucial is the general focus of in-

<sup>2</sup>A total of 20 hours of videotaped data were collected during the months of March and June 1979. The goal in each case was to videotape the 12 target children at least twice in each lesson. This narrow focus made it possible to collect data in several related classroom contexts.

struction and the organization of lessons that this focus entails. The social organization of communication activities in great part determines what the children do or don't learn in their second-language reading lessons.

### The Spanish Reading Groups: Differential Instructional Environments

The children are assigned to learning centers and seated separately in distinct groupings in the Spanish classroom. The three lesson environments under study are organized to provide time on learning tasks that familiarize the children with different aspects of the subject of reading. The specific reading behaviors that the children practice in each group become increasingly complex as we move from the lower to the higher ability groups. This simply shows that students tracked into different ability groups are given different curriculum content.

*The low group.* The primary objective of the lessons was to provide the children with the necessary teacher or tutor help in learning how to pronounce accurately the words on the page. This instruction was carried out, in many instances, without the children seeming to understand *what* was being read. Secondly, the lessons were also structured to familiarize the children with the process of examining the content of the story. This is an important skill to develop, since answering comprehension questions becomes a primary activity in the more advanced groups. In the following example, the teacher questions the student after the student has read a story about decorating a Christmas tree.<sup>3</sup>

1. Teacher (T): Who put the star on the Nativity?
2. Child (C): Fernandito.
3. T: Did they all help?
4. C: Yes
5. T: Did they like it?
6. C: Yes
7. T: Why?
8. C: (silence)
9. T: What paper did they use for the star?
10. C: Paper — ummm —.
11. T: What color do you think it was?
12. C: Gold (without looking at illustration).
13. T: Did they mention the Three Kings?
14. C: Yes
15. T: How?
16. C: (silence)
17. T: What did they compare?
18. C: (Pause) What is that?
19. T: Compare or make a comparison? When they mentioned the Three Kings? Here, look (Reads from book)  
"We are going to make a star,  
A star like the Three Kings saw,  
Big and bright."  
How did they want to make the star? — Like whom? - Like which?

<sup>3</sup>The examples provided in this section have all been translated from the Spanish.

20. C: (silence)

21. T: Like the Three Kings, right? The ones who followed the star.

The child has no problems with the first three questions (1-6). However, when the teacher asks a question for which the child needs to pull information from the text in order to answer, the child doesn't respond (7-8); the teacher simplifies the questioning (9-14) and again elicits a response. She then again asks a more difficult question, and the child does not respond (15-16). After another question, the child requests clarification (17-18). In line 19 the teacher directs him to the exact place in the book where he can extract the answer, *reads the passage to him*, and asks him questions directly related to the passage. *When the child can't answer (20) she provides the response (21)*, and completes the task for the student. The form of this question-answer exchange is typical of lessons at more advanced stages and the primary vehicle used by the teacher for assessing the student's knowledge and/or level of comprehension. However, the structure of the exchange is not typical of advanced classes, because the teacher often ends up supplying answers. In a manner sometimes called scaffolding (Wood, Bruner, & Ross, 1976), the teacher will ask a question at some level of difficulty and, finding that the group or certain children in the group can't function at that level, moves to less difficult levels until the group's instructional level is met (see also Cole, Dore, Hall, & Dowley, 1978; Mehan, 1979). Thus, the teacher provides several kinds of assistance to help the student answer the questions that the student is unable to answer alone. In the example, the teacher even reads the text for the student as an aid in responding to the comprehension questions. Variations in the systematic organization of this mediating strategy, a kind of organization that fits Vygotsky's (1978) idea that learning occurs in a "zone of proximal development," becomes very significant as we examine the middle- and high-group lessons.

*The middle group.* In contrast to the low group, the middle group lessons primarily involve teacher guidance in promoting reading *comprehension*, along with instruction about *how* to answer in ways that communicate the knowledge of content. In the following example the teacher has asked each child to read a question to the child next to him using the questions in the book as a script. The response has to be correct in both content and form (in this case, a complete sentence).

1. T: I want you to ask Marcos this question.
2. J: Do you put a letter in the mailbox?
3. M: Yes, I put a letter in the mailbox.
4. T: Very good. You ask Ali question 2.
5. J: Do you place a letter in an envelope?
6. A: Yes, I place a letter in an envelope.
7. T: Very good, Ali. Okay, number 3 — Ali to Jorge.
8. A: Do you have to give stamps to the mailman?

9. J: No, you do not have to give stamps to the mailman.
10. T: Or, I don't give stamps to the mailman. Number 4 to Ali.
11. M: Does the mailman write the letters?
12. A: No.
13. T: In a complete sentence.
14. A: No, the mailman does not write the letters.
15. T: Very good. Number 6.

12. C: The penguins live in colonies.
13. T: Very good, you have studied. Where do they lay their eggs, Angelica?
14. C: In their nests.
15. T: In their nests, right. Do they (the book) tell us how many eggs they lay?
16. C: Ten.
17. T: Okay, ah, what do penguins eat, Ali? Complete sentence.
18. C: The penguins eat fish.

Although on the surface this activity seems very simple, as in the example provided for the lower group, it provides the students with early and very explicit practice in basic question-answer exchanges (often to known-answer questions), so common in school lessons.

In this example, the children assume a different role in the interaction than the lesson format of the low group requires. They assume (via the use of a script) both the role of questioner and respondent. In comparison with the lower group lessons we studied, the teacher's role clearly changes. The emphasis on content is different and she does not perform as much of the task herself. She also relies more heavily on the reading materials, rather than oral discourse to mediate her interactions with the children. In the above example, the teacher not only has the children use the questions in the book to ask their questions, but also to structure the form of their responses. In the next example, also with the middle group, the teacher is asking the questions, as is most common, but the children are asked to answer *without* looking at their notebooks or at the text book — without material help. Their answers are, consistent with the model she has created, given in "complete sentence" form and faithfully reflect the content of the story. The results of adding *remembered* question-answer formats to the task is reflected in the interaction which is reminiscent of interactions in the lower groups. In at least one instance the teacher provides both the question and the answer for the student.

1. T: What kind of ... I am going to ask the question and you are going to answer it in complete sentences, without looking at your books because I want to see if you remember what happened in the story. What kind of bird is the penguin?
2. C: The penguin is a very famous kind.
3. T: Let's see, yes, no, what does he do, what does he not do?
4. C: The penguin cannot fly, only ...
5. T: Very good, that's the kind of bird, the bird that does not fly. Very good. How are his feathers and what color are they, Ali?
6. C: The penguin's feathers are black.
7. T: Are what?
8. C: Black.
9. T: And are they long or short? The penguin's feathers are black and short, right? OK, how are his wings?
10. C: His wings are short.
11. T: Very good, short. Where do they live, Marcos?

Although the children are not looking at the materials, they are able to answer the questions correctly. With some reminders, they can also phrase the answers in the teacher's desired complete sentence form. After the lesson terminates, the teacher asks the children to write the answers to questions found in the text. She makes it very clear that they have to incorporate the structure of the questions into their answers.

*The high group.* The high group lessons reveal yet other kinds of skill emphasis. The most obvious change is that the children are required to write book reports. But there are also qualitative changes in the way the teacher interacts with the students as a part of reading itself. In the activities the high group shares in common with the two lower groups, the questions are more spontaneous and informal. That is, the questions are less text-bound; they do not come straight from the book. Rather the teacher pursues questions that arise from the exchanges with the students and the topics developed by these exchanges. Furthermore, the emphasis is now on the communication of *generalizations* drawn from the reading and the requests for complete sentence answers are less. Take the following example, in which the teacher starts a combined evaluation/instruction activity after the group reads a popular poem about a cobbler.

1. T: Sandra, what is this poem about?
2. C: About a cobbler.
3. T: What is he doing?
4. C: Using his hammer.
5. T: Right. /Tipi tapa/, who is making that sound?
6. C: The hammer.
7. T: The hammer, right. Does the poem say that he is a good cobbler or a bad cobbler?
8. GR: (Group) (mixed responses)
9. T: Yes or no?
10. GR: He's a good cobbler.
11. T: He is? How do you know?
12. GR: (Several students respond together)
13. T: Where does the poem say that he is a good cobbler?
14. GR: (Several students respond together)
15. T: Sandra, read the part that tells us.
16. C: (Reads) "Ay tus suelas, zapa-zapa-zapatero remendon, Ay tus suelas, tipi-tape, duran menos que el carton!
17. GR: Bad shoemaker.
18. T: Why is he a bad shoemaker?

19. C: "Duran menos que el carton." (They [soles] last less than the cardboard.)
20. T: How long should the soles last?
21. C: A little less than the nails. (The teacher laughs at his response and then the lesson continues.)

It should be mentioned that the poem itself has no direct reference to whether the cobbler is a good or bad shoe maker. This conclusion must be inferred from the information given in the poem. The teacher invites this generalization in line 7. There are some differences of opinion among the group whether the cobbler is good (competent) or not (8, 10, 12). The teacher selects a student who has answered that the cobbler is not too good, to specify which lines of the poem she used to reach her conclusion (15). She does (16), and the group confirms her opinion (17). The instructor then requests more information (18), a child quotes the exact part of the line (19) that tells the reader that the shoes do not last long. In this example the teacher controls alternatives by her choice of questions and by directing the children to find the relevant part of the text. However, some overlap does exist between the way that the high-group's and the middle-group's activities include the use of material objects as support to construct responses.

Consider the following brief example from a lesson in which the students are reading about a Native American group and their customs. In the portion of the transcript presented here the teacher is asking questions regarding the content of the story.

1. T: Who can .... How can the Navajos be hurt?
2. C: The corn, rain, and wind.
3. T: The corn, rain, and wind, and what else? (She looks around the entire group.)
4. C: The sun.
5. T: The sun and what else?
6. C: (Inaudible response)
7. T: What do they (the book) say could also damage them? The what .... What type of thoughts (she points to her head)?
8. C: Bad thoughts.
9. T: Very good, then can you make it into a complete sentence? You (points to a girl who answered previously)? Okay, read the question so you can remember how you are going to construct it.
10. C: (Hesitates in providing answer.) The Navajos can be hurt by the sun, the rain ... (interruption, then the child continues) ... and bad thoughts.
11. T: Very good. (The lesson continues.)

Note the way that the teacher, in requesting that the answer be given in a complete sentence (9), points out to the student that she can use the question in the text to help her organize the response. The result is an independent construction using the text as a tool of verbal communication. In the next example, another student readily provides an answer to a question by incorporating the question into his response:

1. T: What do they do with the hogan when a person dies?
2. C: When a person dies in the hogan, they burn the hogan.

In this case, the construction of the answer is independent of teacher directions or the use of material aids. Note that the student uses the complete-sentence form to respond. This is the same form that the teacher requires so frequently from the lower groups and occasionally with the high group. This suggests the possibility that the student now uses the communication activities previously provided by interaction with the teacher as a means of organizing a response.

Finally, consider book reports. This activity typifies the most advanced reading-related activity found in this classroom. The students have to select books of interest to them, and without teacher help, read them, analyze the contents, and write reports. Through the process of writing reports, the children practice reading and at the same time display their mastery of all the skills we observed in the three lesson environments. This activity culminates in the children's carrying out *independently* the reading behaviors with new materials and creating a new product (i.e., the book report) in the process (c.f. Wertsch, 1979, in press). Again, the children are observed to successfully assume the mediations that are the responsibility of the teacher during the reading lesson we have described.

*To summarize.* We have briefly sketched out the nature of the three reading environments found in the Spanish classroom. We have shown that these environments are organized to provide time on learning tasks that familiarize the children with different aspects of the subject of reading. Our basic conclusion is that the specific behaviors the children practice and learn become increasingly complex and, through modifications in the teacher's role, independent of adult mediation and regulation as we move from the lower- to the higher-ability groups. These changes in skill-emphasis seem to suggest a progression of behaviors<sup>4</sup> which may reflect the teacher's implicit "theory" of reading.

### **The English Classroom: A Contrast in the Organization of Lesson Environments.**

Once armed with the analysis on the Spanish reading-lessons we applied the same procedures to the examination of the English reading-lessons for the same children. There was a good correspondence between membership of the high group across classrooms; the target children

<sup>4</sup>We should emphasize that these general "stages" of development of the lesson environments are not as clearly distinguishable as we have briefly described them; and that there is a considerable overlap of activities between them. This is a point to which we will return later in the paper, since we think it may have important implications for the children's transfer of skills across contexts.

in the high group in Spanish were the same children in the high group in English. However, this common membership in groupings across classrooms did not hold for the children in the other two groups; some of the children in the Spanish middle group were assigned to the lower English group.

The following four points will be made in this section: (a) The English reading lessons are also organized differently for each ability group, but at a much *lower level* than the Spanish lessons. (b) The overriding concern of the lessons in English is decoding, pronunciation, and other forms related to the sounds of the second language. (c) This focus is based on the implicit theory that the children need to develop their pronunciation and decoding skills before they engage in more complex reading tasks. (d) Comparing the lessons in the two classrooms, we conclude by arguing that (1) there is an underestimation of the children's level of reading skills in English, and (2) that this misestimation arises from the confounding of phonetic errors and decoding errors. The resulting interaction limits the children's involvement to lessons that are essentially mechanical in nature and at the lower ranges of their abilities.

*The low group.* The predominant activity for the low group involved providing the children with help and practice in decoding (phonetically) the text. Particular attention was also paid to providing the children with practice in producing *correct word sounds*. In fact, all of the lessons emphasized pronunciation skills. The following example illustrates one such activity. The teacher has written words on the board and is asking the students to identify and cross out the letters that correspond to the sound being made.

1. T: mmuh ... mmuh ... Juan (calls on a student) ... mmuh.
2. S: (student crosses out the correct letter)
3. T: All right, what's the letter?
4. S: "m"
5. T: All right, "m." Angelica, thuh ... thuh ...
6. S: thuh (crosses out the correct letters)
7. T: All right, what are the letters?
8. S: thuh
9. T: No, what are the letters, that's the sound ... "t" ...
10. S: "t, n"
11. T: No, that's not an "n" ... "t" ...
12. S: "n ... (hesitates) ... h"
13. T: "t, h," all right.  
(the lesson continues)

In addition to providing help with phonics, the teachers spend a great deal of time on decoding skills, using a textbook. There is an absence of activities intended to familiarize the student with the procedures involved in reading comprehension (such as those we saw students receiving in Spanish).

*The middle group.* Decoding is also the primary activity with the middle group, the same emphasis on pro-

nunciation is prevalent. Thus, the lower and middle group activities are very similar in the degree to which lessons are organized around decoding or phonics, and pronunciation skills. What distinguishes this group is that the teacher also provides help in the identification and construction of words, pluralization, etc. But, as in the lower group lessons, there is an absence of activities related to reading comprehension. Recall that the Spanish middle-group was organized to promote reading comprehension as well as to provide instruction in how to answer in ways that communicate the student's knowledge of the content of the story.

*The high group.* Even in the high group the members of which we *know* can read for comprehension, the lessons are primarily organized to provide time on decoding and oral language practice, such as word construction and the identification of sounds. To a small extent the lessons contain reading activities designed to assess comprehension. In the next example the teacher is assessing whether the children have understood some of the passages he is reading to them.

1. T: "Sue played in the playground after lunch."  
Where did she play?
2. S: (The students bid to answer)
3. T: Julio.
4. S: Playground.
5. T: All right, on the playground. Who was it?  
Who was doing this?
6. S: Sue
7. T: All right. When was it? When was it?  
Eduardo.
8. S: After lunch.
9. T: All right, after lunch. "Joan had dinner at  
night at their own house." When did she  
have dinner?
10. S: At night.  
(Lesson continues)

It is clear that when the children shift from one language setting to another, they do not encounter "similar environments." We did not even find some correspondence of environments for the high group, which, after all, has demonstrated the ability to read with comprehension beyond what they show in the above example. The organization of the reading environments in English is such that students are encouraged to focus primarily on the mechanical tasks of practicing decoding skills or word sounds. Practically absent in the middle and high groups are the key activities that promote reading *comprehension* and help the students learn how to *communicate their knowledge* of content. In short, we do not find the types of functional communication activities related to reading that occur in the L1 setting for these groups.

A possible explanation for the organization of lessons in English (and one suggested by the teacher) is that the children are weak in English and they cannot engage in more advanced reading asks. This "English deficiency" explanation makes sense and initially we were inclined to

accept it. However, as we gathered more information, we began to realize the social organization of lessons in the English classroom is not solely a matter of the children being limited English speakers. Remember that the children are not allowed to participate in English classrooms until it has been determined (through testing and teacher observations) that they have sufficient fluency to benefit from English instruction. This fact, coupled with our observations of the children in various classroom situations made us conclude that *the children were much more fluent in English than they displayed during the videotaped lessons*. In fact, we had taped several occasions of children interacting *outside* of the general structure of the lessons when even children in the low groups were able to speak English in ways that are more sophisticated than those that occur *within* the lessons.

The analysis of the Spanish lessons clearly shows that most of the children, and especially the high group children, have developed decoding skills in Spanish. The high-group children also display good decoding skills in English. In this limited sense, at the very least, they demonstrate that they know how to read. But if the children are sufficiently fluent in English and possess decoding skills, why aren't they being practiced on higher level skills. How is the difference in the level of instruction/performance across classrooms constructed? If most of the children can already decode in Spanish, why are the English lessons organized to place so much importance on phonics or accurate pronunciation as if they did not know how to decode? A likely source of the problem is that in the English setting pronunciation problems and decoding problems are being mistaken for each other. It is assumed that decoding is a prerequisite to comprehension and that correct pronunciation is the best index of decoding. This assumption is often used to guide instruction in bilingual programs (Goodman, Goodman, & Flores, 1979). Consequently, the teacher organizes the lessons to provide the children with the necessary time on tasks to help them practice pronunciation, phonics, and other aspects of language learning such as word construction. To make an accurate differentiation between a child's inability to decode and inaccurate pronunciation of English words, it seems that the teacher would need to assess reading comprehension. But, as our analysis indicates, activities permitting a display of reading comprehension rarely occur in the English reading lessons.

Further information about the interactional sources of this mismatch between language settings came from "viewing sessions" with the teachers. Owing to the teachers' hectic schedules they had never observed their students perform in each other's classrooms. The Spanish teacher's comments as she saw for the first time the children participating in English lessons is revealing: "Those can't be my kids. Why are they doing such a low-level work? They are much smarter than that." What she indicates, of course, is that the children's behaviors

in the English lessons are very different from what she knows they can do on the basis of observations in her own classroom.

One way to talk about the difference in competence levels observed for these children in the two classrooms is to claim that there is little transfer of reading behaviors across language setting. But if we are correct in our descriptions, the problem is not with the children's lack of language or reading skills in English. Instead the problem is in the social organization of the lesson environments. Reading skills cannot be shown to transfer across language settings unless the lesson environments are structured so that the transfer can manifest itself. However, in the classrooms we observed the English-lesson environments are not organized so as to facilitate transfer of reading behaviors from Spanish because the lessons in English presuppose a lack of competence and restrict the children to decoding or phonics work.

Although these different organizations greatly influence what children learn, teachers do not seem to focus on how the structure of the communication activities that make up the lessons in *both* classrooms determine the nature of the experiences of the groups involved in the lessons. As a consequence, the tendency is to attribute characteristics to the children (e.g., language deficits) that are equally attributable to the environments in which the children function.

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# Low-Income Children's Preschool Literacy Experiences: Some Naturalistic Observations

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Our current work is aimed at characterizing the preschool literacy experiences of children from low-income families and communities. As several authors have suggested (Forester, 1975; Goodman and Goodman, 1979; Rubin, 1977; Shuy, 1977; Griffin, 1977), literacy may be viewed as an extension of oral language development. From this perspective literacy exists in the domain of communication and social interaction. For young children, then, developing literacy involves adding "new ways" to transmit and receive meaning through social interaction. We assume that the acquisition of these "new ways" is guided in some fashion.

Our approach to understanding the development of literacy begins with a detailed description of the immediate social environment of the child. We are especially interested in how this environment organizes the child's activity and how the child operates within that organization. Our focus for the study is on literacy events that occur in everyday family and community settings.

Our description of the literacy environment includes at least: (a) a detailed description of the print materials available to the child; (b) a description of the people and social activities involving the child where these print materials exist; and (c) a description of how these people use print as a part of their ongoing activity. Literacy events both within and outside of the home are taken into account. We shall discuss what is meant by a literacy event more fully below; however, for now we nominally define it as *any action sequence, involving one or more persons, in which the production and/or comprehension of print plays a role.*

The sample for our current study includes twelve low-income youngsters (six whose ages at the outset were 2 years 6 months and six whose ages were 3 years 6 months) and their families. The sample consists of three ethnic groups (Black, Mexican-American, and Anglo) with four families representing each group. At the beginning of the second year of the study twelve new families will be drawn from these same groups.

The twelve families presently participating in the study have the following characteristics: the annual income of each family is estimated to be below \$10,000; none of the adults has earned more than a high school degree (the average years of schooling completed is 9.3);

both the mother and father are present in all the families; and the size of these families ranges from four to seven people. Seven of our target children have older siblings, four have only younger siblings, and one is an only child.

As mentioned above, the focal point of our data collection is the literacy event. In order to operationalize our earlier definition we must establish at least a minimal definition of reading and writing. For purposes of our observations and analysis we have defined the terms *reading* and *writing* quite specifically. First, in the traditional sense a reading event will be taken to be any occasion upon which an individual comprehends (or attempts to comprehend) a message encoded in graphic signs. In a like manner a writing event will be taken to be any occasion upon which an individual mechanically manipulates appropriate tools to produce (or attempt to produce) graphic signs representative of oral speech which have meaning to the producer and/or to anyone who might be a reader of those graphic signs. Thus, a literacy event is deemed any occasion upon which an individual alone or in interaction attempts to comprehend or produce graphic signs.

None of the 2 to 4-year-old children in our sample is presently capable of reading or writing in a formal sense. We wish to capture those events which are precursors of this capability. Therefore we look for events in which the child interacts with objects as if s/he is reading or writing. That is to say, if the child "reads" a story or sign or whatever (even though what the child says may have little or no relation to the graphic configuration present), we consider this a reading event. In essence we have expanded the notion of reading and writing to include any reading- or writing-like behavior which mimics components of the activities that are generally considered reading and writing.

We are attempting to adapt and create methods which will allow us to collect and analyze relevant data about the acquisition of literacy in three ways: (a) natural observations, (b) self-report (daily diaries produced by primary caretakers), and (c) controlled behavior sampling.

The natural observations provide us with some idea of the family and community contexts within which literacy events occur. We hope to use them to discover cultural factors controlling the context and frequency of literacy experience.

The self-reports tell us how parents define literacy events by providing us with descriptions that are not constrained (in any direct way) by our expectations. We want to find the features of literate events common to all groups as well as those which may be unique to each.

The controlled behavior samplings present a set of literate experiences common to all subjects in the study. The children's behaviors in these situations provide us with information about cultural diversity in response to stimuli that, in the social science literature, are considered central to the development of literacy.

## Natural Observations

Each family in the study is the subject of four hours of observation per week, and we rotate our observations through all phases of the day and all days of the week. (Such a procedure corresponds to the "spot observations" employed by Whiting, Child, Lambert (1966) and others (see Rogoff (1978)).

Once a literacy event has been identified we attempt to describe activities which lead up to it, events subsequent to it, and any activities which co-occur or alternate with it. And of course, we seek a detailed description of the event itself. From such a description we hope to be able to draw conclusions about the contexts which give rise to literacy events and to determine if these contexts vary according to cultural groups.

We have found it useful during our first six months of observing to classify the print and print-related activities which our preschoolers are exposed to into several categories so that we can draw some general conclusions about the nature of these events (e.g., the participants, media/materials, and activities involved). For instance, print may be present in the home (books, labels, calendars, etc.) or outside the home (signs, billboards, etc.). Print-related activities may involve the child alone (writing/scribbling, looking at a book, watching TV) or in interaction with someone else (being read to, mimicking the writing of a parent or older sibling). The child may be an active participant (as in the previous examples) or an observer (watching a letter being written or the mail being read). Tables 1 and 2 summarize the types and frequency of literacy activities that have gone on in the homes of our research participants during the first five months of observation.

A quick glance at the tables suggests that there is a difference in the pattern of literacy activities as a function of ethnic group. Indeed,  $X^2$  analysis performed on these frequencies (all  $< .005$ ) generated from observations indicates that literacy activity and ethnic group membership are not independent. Closer examination of the proportionate distribution of reading activity suggests that Black parents read to their children less than might be statistically expected, while Anglo parents seem to read to their children more than might be statistically expected. This apparent difference is virtually eliminated when we look only at diary-reported frequencies. Also of interest is the relative low frequency Mexican-American parents were observed to read alone.

The most notable observation regarding writing activity is that Anglo target children and caretakers spend a comparatively large amount of time in "writing" activities, while Mexican-American youngsters spend less time than might be statistically expected working alone in writing activities.

These observed frequencies should be treated with extreme caution. They are preliminary observations organized within an evolving classification system. Several types (categories) of events are not included, e.g., electronically mediated events (watching Sesame Street or

**TABLE 1**  
Total Number of Reading Events and Total Minutes Spent in Reading Activity for Five Month Time Period

Participants	Ethnic Group					
	Black		Mex. Amer.		Anglo	
	Events	Minutes	Events	Minutes	Events	Minutes
T.C. Alone	19	42	21	178	14	110
T. & Adult	9	70	11	158	28	266
Adult Alone	15	148	5	31	18	75
<b>Total Minutes Observed</b>	6129		10008		7350	

**TABLE 2**  
Total Number of Writing Events and Total Minutes Spent in Writing Activity for Five Month Time Period

Participants	Ethnic Group					
	Black		Mex. Amer.		Anglo	
	Events	Minutes	Events	Minutes	Events	Minutes
T.C. & Adult	9	37	3	7	23	268
T.C. Alone	9	34	10	83	17	226
<b>Total Minutes Observed</b>	6129		10008		7350	

the Electric Company on TV) and those which involve participants other than an adult (like an older child). Also excluded is any consideration of the type of material the activity is organized around. Certainly an approach which sacrifices a qualitative analysis for a quantitative analysis raises many more questions than it answers. In fact, its real value in this research has been to generate several alternative explanations for the observed frequencies and thereby suggest additional directions for continued data collection. Some of these alternative explanations include (a) the availability of human resources in the environment (presence or absence of older children or other more skilled members of the environment); (b) variation of more skilled members' conceptions of the instrumentality of literate activities; (c) literacy demands of parent's job (which may or may not carry over into the home); (d) prior literacy training and/or the literacy level of the parents; and (e) a discontinuity between values associated with literacy and the actual daily activities related to literacy. As the work progresses we shall continue to examine how these and other factors affect the frequency of literacy events in each child's life.



In addition to our documentation of print and print-related activities in the environments of our total sample of children we shall eventually look at these factors as they apply to individual children in order to determine if certain forms of print and activities are especially salient or not salient for particular children. Finally, once we have a more thorough documentation of representative events (described as discussed above), we shall look across these to compare, contrast, and better understand the process — as well as gain insight into intervening variables.

Given the number of questions raised by a quantitative analysis, one might doubt that there is any value of this type of analysis. We think, however, that it is the combination of quantity *and* quality of interactions involving print material that guides the acquisition of literacy, and thus we are seeking a systematic description of both.

### Literacy Event Analysis

In addition to noting the types of literacy materials in the children's environment and describing in general terms the situations in which the child and others in the home are involved in reading and writing, we are conducting detailed analyses (micro-analyses) of particular literacy events. These micro-analyses permit us to examine the ways in which the social environment organizes and conducts literacy events for the target child. The analyses are of central importance to the study because they reveal the dynamics of the literacy environment and serve to suggest hypotheses for future investigation and to sharpen the skills of the researchers on the project. The following is a shortened version of one such micro-analysis which shows the way in which these analyses are performed, and the types of information we are obtaining from them.

#### Literacy Event R<sub>1</sub>

Researcher arrives at 9:30 a.m., sits on couch in the living room. Present in the house are the father (F), mother (M), a target child (D) aged 3-9, and the target child's 18-month-old sister (K). At approximately 10:20 F 'settles' into his chair in the living room after completing a repair of the television. He talks with M who is in the kitchen fixing breakfast and with the researcher. (The actual remarks between F and the researcher were not noted; however, they could be characterized as general chit chat.) Beginning at 10:25 a.m. the following takes place:

- (001) F: (to D who is in the kitchen) Did you ever show [researcher] that whole book you can read?  
 (002) D: What book?  
 (003) F: *Toys in. Things in My House.*  
 (004) D: I don't know.  
 (005) F: You read it except for a couple of words.  
 (006) D: Yeah.

- (i) [D comes to living room, F looks around living room for book].  
 (007) F: Here it is. (has *Things in My House*)  
 (008) D: (takes book from F, goes to couch, sits down) Here it is (to researcher).  
 (ii) [F sits on couch to left of D, puts right arm around behind D on couch. F holds book with left hand, D with both hands. D opens book to first page (title page) then begins to turn to first of text. F stops him].  
 (009) F: We have to start reading here. What's this say? (pointing to words of the title moving from left to right direction.) Things in ... ? (waits approximately three seconds) Things in My House. (turns to first page of text)  
 (010) D: A shoe. (pointing to picture on the bottom of the page)  
 (011) F: No, we have to start up here at the top (points to first word of sentence at top of page). [in reading prosody] There are all kinds of things in my house. A ...  
 (012) D: ... things ...  
 (013) D: ... shoe.  
 (014) F: No, have to go from the top of the page to the bottom. So what's this? (pointing to the word *hammer* and partially obscuring the picture of the hammer) A ...  
 (015) D: Hammer.  
 (016) F: A ... (pointing to the word *shoe*)  
 (017) D: Shoe.  
 (018) F: (on next page pointing to word) A ...  
 (019) D: Pencil.  
 (020) F: A ... (pointing to word)  
 (021) D: Sock.  
 (022) F: An ... (pointing to word)  
 (023) D: Apple.  
 (032) F: A ... (pointing to word)  
 (033) D: (two second pause) I don't know this one. It's too hard.  
 (034) F: Yes, you do. A /li ... /  
 (035) D: -----  
 (036) F: It's the things on trees. A /li ... /  
 (037) D: Leaf  
 (046) F: (points to picture of a pair of glasses)  
 (047) D: Glasses.  
 (048) F: A ... (pointing to word)  
 (049) D: -----  
 (050) F: /bl ... /  
 (051) D: Block.  
 (052) F: And a ... (pointing to word)  
 (053) D: Cap.  
 (054) F: Hat.  
 (069) F: A ...  
 (070) D: ----- (looking at book)  
 (071) F: It's what you measure things with.  
 A ...

- (072) D: -----  
 (073) F: /ru ... /  
 (074) D: -----  
 (075) F: (beings to 'sound out' word)  
 /ru - lár/ (D mimics this sounding  
 out)
- (103) F: And a ...  
 (104) D: -----  
 (105) F: It's what you put on a letter.  
 (106) D: I don't know. A square.  
 (107) F: No, if you don't put it on a letter,  
 they won't send it. A
- (108) D: -----  
 (109) F: Stamp.

Turns to final page of book.

- (120) D: And the stars and the moon.  
 (121) F: (points to first word) A ...  
 (122) D: -----  
 (123) F: (points to frame around window,  
 outlining it) A window and outside  
 the stars and moon.
- (iv) [At this point D's younger sister (K — 18  
 months) picks up book and drops it on  
 floor. D goes after it but F's father comes  
 to the door at that point and the event  
 ends. (10:40 a.m.)]

An analysis of this event provides useful information about D's literacy environment and it serves both to suggest research hypotheses and to guide further observations (and interviews). We are especially interested in what messages the environment provides for D about the nature of the reading situation, the conventions of books and of reading, the information which can be found in books, and the purposes of reading and affective factors associated with reading. Also, we are very interested in how F, as one caretaker in D's environment, negotiates the zone of proximal development with him in a literacy event.

This event is a highly structured, rather formalized situation. In it F creates a two-part structure: he calls for the name of an object and provides the lead in ("A ...", "An ...") and D is supposed to provide the label for the object. When D provides the correct label, there is no verbal reinforcement; however, when D is incorrect, a tactic (discussed below) is used by F to help D get the right label. We have mentioned the concept of the zone of proximal development — a paradigm for examining the notions about the acts of reading and writing which the child receives from people in her/his environment and which s/he is thus likely to internalize him/herself. In the literacy event noted here, F helps D to complete the task of reading *Things in My House*. By doing so, F provides for D, through his questions and statements, certain "information" about what reading is and how it gets done.

Where D is unable to supply the appropriate label for the object in focus (032-037; 048-051; 069-075; 103-109 are examples included here), F provides information for D to use to obtain the message encoded in the book. On

the first occasion that D does not know the appropriate label (033), F supplies a phonic cue (034). This cue proves insufficient (035) so F offers some "world knowledge" about this thing/word and repeats the phonic cue (036). D is then able to provide the label (037). For *block* (048-051) F provides only a phonic cue. With the *stamp* episode (103-109), only "world knowledge" is offered.

In some cases, D is ultimately successful at stating the label (037); in others, he is not (108). However, in all cases, the way in which F attempts to help D negotiate the meaning of the book can serve for D as examples of strategies to be used in reading. For instance, F's "sounding out" of the initial part of a word is one strategy which D may glean from literacy events like this one. Another is the use of world knowledge. This latter factor will be especially interesting to investigate as the adults in D's environment interact with him in reading narratives. Researchers have placed a great deal of emphasis on the importance of the use of background knowledge in reading comprehension; we shall pay close attention in future events to how D's use of such knowledge is fostered (or not fostered) when reading.

In another respect, we can see how F's interactions with D in this literacy event provide information about the conventions of using books and of reading. By his statements and actions in 009, 011, and 112 and by repeatedly pointing to words in the text and moving his finger in a left to right direction under the words, F demonstrates to D (a) that in reading one proceeds in a left to right, top to bottom direction and (b) that the graphic markings on the page are used in reading. These understandings about reading are, of course, crucial for young children.

We are also concerned with affective factors associated with literacy by our target children and their families. Analysis of this literacy event provides us with some clues about affect and reading for the family. F could not be described as excited or enthusiastic during this event. In fact, his demeanor seemed rather like the formal, structured situation itself. As was mentioned, at no time does F verbally praise D for getting a label correct. It would have been interesting to note what F did in this regard at the end of the reading were the event not peremptorily closed by K and by the arrival of F's father. We plan to continue investigating the affective nature of literacy events between D and his parents in the future to determine if the "feel" of this event is typical of book readings in this family.

These aspects of the micro-analysis, then, demonstrate how we are investigating the literacy events we observe in our attempt to characterize the ways in which the children and families in our study interact with written communication. As we continue in these analyses, we feel that an overall picture of each child's literacy environment and of the child's interactions in that environment will become clear.

Another facet of these qualitative analyses is an attempt to describe the contexts which give rise to and sustain literacy events for low-income families. We shall be studying the events which precede, co-occur/alternate with, and follow all literacy events to see if there are discernible cultural patterns to the practice of literacy for our subjects. This type of analysis, combined with the micro-analyses discussed above, should give us a more complete understanding of the interactional contexts which are literacy.

### **Self-Report**

Audio-tape recorders have been placed with each primary caretaker and the following minimal instructions were given: "Please take about five minutes at the end of each day to record all of your child's literacy activities which took place during that day." This constitutes the first phase of "taped diary" data collection. There are two reasons for giving this minimal set of instructions to our primary caretakers. We wanted to determine both what parents would consider literate activities to be and how much information the parents would spontaneously give us about the literacy events. We have found that the diary reports vary a great deal along these two dimensions. All parents mention the occasions upon which their children write/scribble or interact with books. Several, however, mention little beyond these typical, or well-marked, literacy events. A few of our parents go beyond these typical events and cite instances when their children play with mail, read labels or signs, spell their names, listen to stories, and so forth. One parent has even mentioned such things as her daughter's sorting of cards into categories according to the symbols on them. In terms of the amount of information supplied about each literacy event there is also a range in the entries. Some provide very brief entries like these:

Karen had memorized her Sunday School verse and she was holding the paper saying the words as if she was really reading from the paper.

Karen is holding her medicine bottle reading the label her way. She is explaining how supposedly she is to take it or not to take it.

Then there is this type of report (for one day):

Wednesday. This morning, early, Kristin played with some old Medi-Cal stickers. She likes to get some papers and glue them on. Then she pretends she's a lady at the doctor's office that fixes them all on and she tells them what they're for — like this one is for Doreen got a shot or this one is for getting sick and going to the doctor — and different things like that. And I showed her which ones were for who by names on them — we even spelled them out for her so she can see; and pointed out each one started with a certain letter. And later on when the mail came, there was some junk mail from HBO saying, "Buy our service." And I let her have that to play with. She likes it because there's lots of pretty colored pictures. And she particularly asked me, though, when she sat down by me and asked me exactly what each

word said, and I had to read the whole thing to her while she pointed to each word. And then afterwards ... (continues with entry).

Overall from the taped diaries to date we find that parents tend to regard as literacy events only typical situations like book reading or writing and that they tend to give very little information about the literacy events in which their children are involved.

Once we have established for each of our parents a 'base line' idea of their unprompted notions of a literacy event, we shall begin giving the parents more detailed instructions for making their taped diaries. Our objective will be to have our parents produce tapes which provide a much more complete description of the literacy event and to have them supply information about the events which precede, co-occur and alternate with, and follow it. We will ask parents to do this within phases of the day. As they become more experienced over time they should generate descriptions which approximate the detail of our naturalistic observations.

### **Controlled Behavior Sampling**

Our approach to behavior sampling includes two basic techniques: interviews and the staged literacy event. As regards the first technique, the children in our study will go through a variety of interview-like situations in order to determine the extent of their print awareness and conceptions about writing. For assessing print awareness we have generated lists (for each child) of products and logos that are common in the children's environments and that may be familiar to them (e.g., Aim toothpaste, Superman logo, road signs, etc.). Drawing on these lists, we will take our youngsters through a three-phased interview on three separate occasions. First, our children will be presented with the print in a context one step removed from its normal environmental setting. The children will be shown, for example, a cut-out portion of a cereal box which has been pasted on a flat surface rather than retaining the shape of the original. Second, youngsters will be presented with representations of these graphic units without familiar accompanying color or texture of material. (For example, Coca-Cola in its usual script but without its distinctive colors.) Finally, language units presented in phases 1 and 2 will be presented in standard print. Subsequently we will conduct these interviews approximately every 3 months in order to note changes in our youngsters' awareness of print.

Another of the aims of this research is to examine the children in relation to writing. To that end, we are attempting to describe (a) the functions which writing serves for these children, and (b) the children's conception of the writing system at various points in their development. The research of Luria (1929, in Russian; 1977-78 English translation) and Ferreiro (1978) have served both to suggest the aspects of writing which might profitably be studied and to provide a methodology for doing so.

Luria was concerned with charting the development of the child's realization of certain functions and conventions of a writing system. He demonstrated that children passed through developmental stages in understanding that a graphic system can represent meanings and thereby act as a mnemonic device. The actual systems that Luria observed were ones idiosyncratic to the particular children in the study. Thus, his work can be considered an exploration of the precursors to the culturally elaborated system. Ferreiro, on the other hand, examined the child's conceptions of the nature of the culturally elaborated system. She identified six developmental categories of responses which show the children's ideas about what can be found in a written text.

Each of these researchers has focused upon factors in literacy which are important to our research concerns. At the time of this writing we are in the first phase of conducting interview-like situations with our research participants using instruments constructed to tap these factors. Following Luria's model, we are engaging the children in memory tasks that are too difficult for them to accomplish alone and noting the ways in which they use writing to accomplish these tasks. Also, as Ferreiro has done, we are presenting the children with written sentences and attempting to elicit their conception of what is written in those sentences. Subsequently we shall employ the two instruments approximately every three months in order to note change in these aspects of the subjects' interactions with written communication. This procedure will allow us to examine the areas outlined above. Of course, our on-going naturalistic observation will also be used where appropriate to supplement and/or elucidate findings from the interview situations, especially to tie in what is found about each child's developmental level in writing with the nature of the child's literacy environment (in particular the way in which the zone of proximal development is negotiated in writing activities involving caretakers and/or older siblings with the child).

In environments where literacy interactions do not normally occur, our final behavior sampling technique involves staging such events. On these occasions we ask the primary caretaker (and/or another member of the family) to, for example, read to the child. These staged events contribute to our understanding of the child's literacy environment because they provide an indication of the parents' conceptions of what is involved in such an event and how such an event is organized and carried out. For example, one of the mothers in the study has an extremely low level of literacy. She has never been observed to read herself or to read to her child. We staged a literacy event between this mother and her 3½-year-old son. The interaction was set up by asking the mother if she would mind "looking at" a book or some books with her child and having the event taped. She was compliant and seemingly at ease with the idea.

Three simple and brief books in Spanish were made available: one about a farm, one about fish, and one

about baby animals. During the interaction the mother and child faced each other much of the time, the book being oriented to the child and the mother turning it occasionally to get a better view of something. The interaction generally took the form of the mother's leafing through the book, beginning more often in the middle or at the back than at the front and not necessarily proceeding page by page or stopping on each consecutive page. The mother did stop on pages which had pictures that interested the child.

Most often the mother would ask, "What is this?" to which the child would provide an answer. The mother would then approve the response or probe for a different or more differentiated response, either by disagreeing (e.g., "Look closer; this isn't a cow") or providing the answer (e.g., "No, it's a calf"). In addition, the mother would frequently provide related comments (e.g., "The seals are climbing on top" or "There are peaches on *our* tree"). The interaction could generally be described as a question-response-evaluation format which was non-threatening to the child.

When the mother came to the book on fish, she asked the researcher if it were written in English. The researcher replied, "No ... Spanish." The mother then produced "pes-ca-do" while looking at another word.

There are several things we have noted initially from this staged literacy event. First, there are indications that interaction between mother and child around print is a rare occurrence. The awkward postural configuration arranged by the mother and the mother's unorthodox handling of the books (starting sometimes at the back of the book, sometimes at the middle) and her rather random progress through the pages suggest this to be the case. (By staging another literacy event employing wordless stories which have a conspicuous sequential plot, we plan to determine if this method of proceeding through a book is typical for her.) Moreover, this virtually illiterate mother worked around the print in the books, except for her one attempt to sound out a word.

Also, we find very important the messages about the conventions of literacy which the child is likely to obtain from this type of interaction. The mother does little to arrange for the child to learn about directionality, the fact that the print carries meaning, or book handling knowledge.

As to the affective factors associated with literacy events, it was evident that in spite of the novelty this task presented to both participants, the mother's approach was enthusiastic, and she incorporated the child's comments and responses smoothly and appropriately. He often turned pages himself and occasionally turned back to pictures they had already discussed. Similarly, on occasions when, triggered by a picture, the child referred to personal experiences (e.g., a trip to Disneyland, the peach tree outside), the mother explored these and related them to the picture and their discussion of it.

Thus, we feel that such staged literacy events between caretaker and child are useful for exploring several areas

of interest in this study. We shall continue this data gathering technique where appropriate and attempt to infer both the caretaker's theory of how literacy events with children are structured and the ideas about the conventions and techniques of and values associated with literacy which the children may be obtaining from interaction with their environments.

We are aware that our behavior sampling techniques will alter the child's normal literate environment. For example, Hood and Schieffelin (1978) present data which show that elicited imitation (and our procedure is but a variation of that linguistic procedure) represents a complex *new* task for the child which is unlike any event which naturally occurs in the child's environment. It is therefore possible that this type of intervention could provide sufficient contrast to contribute to some degree of vertical elaboration of existing notions about literacy. We shall be very sensitive to this possibility and remain alert to employ procedures in our analysis of data which will inform us about the consequences of our intervention.

### Discussion

This investigation was initiated in order to study systematically an area of considerable speculation. It is generally *believed* that the home experiences of low-income and ethnic "minority" children do not prepare them effectively for becoming literate. The home backgrounds of such children are often cited as a source of their school difficulties in reading and writing. It is assumed that insofar as reading and writing are concerned, a mismatch exists between the home and the school.

Large scale studies (e.g., Bulcock, 1977; Grant & Lind, 1975; Thorndike, 1973) are of little help on the issue of a mismatch; they serve only to demonstrate that lower class children in general and Blacks and Mexican-Americans in particular, do not, on the whole, learn to read and write as well as middle-and upper-class children. There is little systematic evidence about the everyday literacy experiences of the children that schools need most to respond to. What evidence there is is collected in ways that force the children's histories to fit the school's expectations and therefore may ignore important parts of the real histories. By investigating the literacy environments of the children in this study in the ways outlined above, we hope to be able to shed light on the children's preschool experiences and thereby provide information which schools and teachers can use to help them respond more effectively to low-income and "minority" children.

Our results are at present only suggestive of what is transpiring in these environments. We hope by the completion of the study to have developed an exhaustive taxonomy of the types and frequencies of literacy events which occur in the lives of these preschoolers. In addition, our approach to the research will facilitate a qualitative analysis of these events. Finally, we hope to de-

scribe the social organization of literacy in the homes and communities we are studying and gain insight into the relationship between this organization and the resulting kinds of literacy which particular children develop.

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# Hassling in the Kitchen: A Context for Betting and Making Rules

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Linguistics deals with the phonological, lexical, syntactic, and semantic features of language; sociology deals with its social aspects. The gap between the two fields has now been bridged by sociolinguistics, a field concerned both with the referential functions of speech and with its social dimensions. Sociolinguistics is the investigation of social rules that govern discourse and the analysis and description of how people use these rules to communicate effectively in ordinary conversation. Recently, sociolinguists have applied an ethnographic perspective to the ways children use language as well. Ethnographic methods are "needed to provide full information about [children's] sociolinguistic development ... [such that] our understanding of the repeated and continuous socialization of adults, as well as culture change, is facilitated by the study of children" (Ervin-Tripp & Mitchell-Kernan, 1977, p. 23). Cook-Gumperz (1977) expands Ervin-Tripp & Mitchell-Kernan's views by suggesting that linguistic investigation should begin in the home since it is there that the child develops the ability to communicate and interpret meaning. It is also a setting where one can assume the existence of a body of shared knowledge (p. 105). In their study on sibling rivalry, Sutton-Smith and Rosenberg (1970) report that research examining the day-to-day interactions on siblings has been largely neglected, and Leichter, in *Family as Educator* (1974), notes the absence of research on the process by which siblings influence each other (p. 18). This article addresses issues on language use in home environments.

## **A Descriptive Analysis of Afro-American Siblings in Their Home Setting**

One Wednesday evening, after dinner, an Afro-American mother (myself) before retiring to her bedroom instructed her two children to clean the kitchen. Jill was told to clean the counters, stove, and table top, put clean dishes left in the drainer into the cabinets, sweep the floor, and take out the trash. David's assignment, considered the less desirable by both children, entailed washing all the dishes, pots and pans (Speech Event One). Since chores were customarily alternated in the family, the following evening the mother told Jill to wash the dishes and David to do the other chores (Speech Event Two). Eleven months later, after a Saturday morning breakfast, the children were simply told to clean the kitchen with no specific assignments made (Speech Event Three).

Both children had wanted to watch situation comedies on television after dinner those Wednesday and Thursday evenings and their favorite cartoons that Saturday

morning. Neither child wanted to work, and the way chores were allocated also contributed to their irritation. As a result, quarrels erupted on all three occasions.

Jill and David were audio-taped, without their knowledge, during each of their three "clean the kitchen" assignments. The tape recorder, in each event, was hidden in a kitchen cabinet over the sink. Each recording captures thirty minutes of naturally occurring conversation. At the time of the first two events, Jill was nine years old and her brother David was eight. When Speech Event Three was recorded, they were ten and nine.

The central question the research addressed was: What are the processes involved in status and role negotiation? Subsumed under this general concern was the question: How is the phenomenon of "one-upmanship" constructed in speech, i.e., how does a child use "talk" to convey his/her purpose so that the other is aware of it?

Strategic issues in the interactional events analyzed involved the micro-politics of sibling rivalry. Selected aspects of the children's sociolinguistic repertoires were analyzed — teasing, fighting, insisting, punning, mocking, and making up (Mitchell, 1978, 1979).

The children and their mother in this study constitute a microculture that includes within its boundaries specific formal and informal cultural knowledge that enable family members to function competently. Jill, for example, often responded to what she believed her brother David was anticipating and planning, and reacted to what she thought he assumed was happening. This multilayered process of social perspective-taking was reflexively sustained throughout all of their interactions. The levels of analysis that the siblings brought to the speech events constituted their informal knowledge, knowledge to which an outsider might be oblivious.

My dual role as researcher-participant was fraught with both complications and advantages. As the siblings' mother, I was able to add a dimension of background in "emic" tradition. As one with an interchangeable role, who could alternate between an etic and emic approach, I could systematically analyze the data as an external observer (etic) and at the same time bring socio-cultural knowledge to the interpretation of events (emic). The two siblings served as emic sources. They were interviewed to obtain background information, clarify their unclear utterances and ambiguous meanings and to gain an emic perspective of their intentions during the events.

The descriptive portion of the analysis relies on an approach developed by Dell Hymes for analyzing speech, which he terms "the ethnography of communication" (Hymes, 1974). This method "investigates people's ability to speak and understand one another in a real world" (Ervin-Tripp & Mitchell-Kernan, 1977, p.6).

Studies on status and role negotiation and children's quarrels have been conducted by Brenneis and Lein, Mitchell-Kernan & Kernan, and Watson-Gegeo and Boggs. Brenneis and Lein (1977) studied White middle-class children in role-play conflicts; Mitchell-Kernan & Kernan (1977) analyzed how low-income Black children

use directives to negotiate status and role. Watson-Gegeo and Boggs (1977) found patterns of contradicting routines among part-Hawaiian children during co-narrational "talk story." But the work done here differs from all of these studies in a number of aspects. First of all, most conversational analysis investigates peer, not sibling, interaction. So far, linguists have analyzed conversational competence among White middle-class, Black low-income, bilingual, and preschool children, but the children in this study are a Black, monolingual, middle-class, pre-adolescent brother and sister. This article will explore how these siblings used rules and bets during their interactions to define the situation and to negotiate status and role with one another.

Rules are socially organized and govern interactions, informing people how to interpret the behavior of others and how to behave in appropriate ways themselves. The siblings used bets and rules throughout Speech Events Two and Three to make clear what their expectations and perceptions of the situations were. Bets were interspersed throughout; rules were more apt to be invoked during the power and control negotiations and one-upmanship strategies. The children used a "time-in/time-out" rule as a vehicle for altering the rules and bets that were in effect at any given time and got in the way. "Making pinkies" is a betting device used to prevent an opponent from renegeing on a bet. The "call it first" rule, which appeared in Speech Event Three, is a strategy used to either avoid doing undesirable chores or to grab something desirable. Jill used a "count warning" to inform David when he was deviating from an assigned role. Some of the rules that the children used, e.g., "time in/time out," were modified versions of traditional game rules. "Making pinkies" is considered a serious bet, equivalent to adults' shaking hands on an agreement.

Several examples from the transcripts of Events Two and Three illustrate the children's practice of betting.

Speech Event Two:

- D 145: I bet I won't say "pop" or "hum di dum."<sup>1</sup>  
 J 149: I bet you won't say "pop to the mat" the other way at least.  
 D 436: I make you a two-dollar bet!

Speech Event Three:

- D 425: Dollar bet?  
 J 515: Make a bet?  
 J 517: Make a bet?

In Speech Event One Jill cites an apparently ad hoc rule to indicate the inappropriateness of her brother's behavior when he throws a sponge at her.

- J 191: Stop it David.  
 J 192: Its a *rule* not be throwing sponges at me.

She threatens to tattle to their mother if he continues.

- J 193: Do it again and I'll tell.

The children and their neighborhood friends were interviewed to determine the social meaning of the rules

and the appropriate contexts for invoking them. David, for example, claims that breaking a rule is associated with the one-upmanship game of tricking one's opponent:

- Researcher: How do you know when she's trying to break your rules?  
 David: When she's tryin' to trick me.

Bets were used to challenge the validity of what the other said, or to prove one's own credibility. Although an ante was often included in the bet making, collecting was never essential, winning was. The one-upmanship victory as proving the other wrong or proving oneself right. The siblings enjoyed putting a monetary value on their bets:

- Researcher: When you make bets do you usually put money in it?  
 Jill: Yes. Almost all the time.  
 Researcher: But you never expect to collect?  
 Jill: No. Hopefully — you'd won it [the bet]. Well we like doin' it.

Much to Jill's chagrin, David incessantly chanted a speech play, "pop to the mat," throughout Speech Event Two. He is aware that Jill, although she has not protested yet, is quite wearied by his chanting. Therefore, he initiates an intricate betting, rule-making, rule-breaking scheme to stimulate their ongoing one-upmanship games. The wrangling which results from the bet sets the pace for their encounters and continues throughout the event.

- D 119: I bet — I won't say — "pop" anymore — for two days.  
 D 120: Okay?  
 D 121: I bet I won't say it anymore for two days starting from now.

David initiates a shift in topic (D 119) and establishes a rule for interaction over the next two days. He seeks Jill's confirmation that the bet is on (D 120), elaborates on the time dimension of the bet (D 121), and takes Jill's silence as agreement. The topic of the bet is not pursued. Less than a minute later, however, David decides to renege and declares "time-out" as a legitimate escape.

Although the children used the "making pinkies," "call it first," "time-in/time-out," and the "count warning" rules during the three events, this article will only describe the strategies the siblings used in the "making pinkies" and "call it first" rules.

### The Making Pinkies Rule

Six neighborhood children were interviewed to determine how they use the "making pinkies" rule during interaction. None of the children had heard of the rule, or perhaps did not recognize the siblings' nomenclature for

<sup>1</sup>Line numbers refer to the numerical listing of utterances in the transcript. Brackets [§] indicate overlapping utterances. Initials (D and J) refer to the siblings, David and Jill, and (M) the mother. Italicized words are stressed.

it. Jill was asked what it meant.

- Researcher: You said [on the tape], "Some things you do pinkies; some things you don't." What did you mean?
- Jill: Yeah, like some things he *would* do a bet on, because he wouldn't do "pinkies" on somethin' if he knew I was right. But he *would* do it if he *thought* he was right — and he knew I was wrong.

The children consider "making pinkies" a serious bet, for the "pinkies rule" prohibits retraction:

- Jill: Well, "pinkies" really means that you make a bet. You take your two pinkies and you cross them over. I take one of David's pinkies, and one of mine, and we cross it over together and that means that the bet, no matter what, has to keep on going. Even if you — remember, "Oh yeah, let's not have the bet any more because I just remembered" [that I was wrong].
- Researcher: Is this kind of bet more serious than most?
- Jill: Yes.

An excerpt from the transcript of Speech Event Two forms a context for understanding the "making pinkies" rule:

- D 431: Jill, this ash tray is really mine.  
D 432: Know why?  
J 433: No it isn't.  
D 434: Because I found it.  
J 435: You did not find it.  
D 436: [increased tempo] I make you two-dollar bet!  
J 437: Okay, you can do it later.  
J 438: [unintelligible] later.  
D 439: [opens bedroom door] Mom?  
D 440: Do you remember that small ash tray?  
D 441: I'll show you — this one.  
D 442: Didn't I find this?  
M 443: I don't know.  
M 444: I remember that you found one.  
M 445: But uh — it had uh ...  
J 446: She — she don't know.  
M 447: If that's the one I don't recall because [unintelligible]  
J 454: See David?  
J 455: Some things you do pinkies — some things you don't.  
D 456: Mn hm.

In this sequence, David boasts to Jill that the ash tray on the kitchen table belongs to him (D 431). When Jill doesn't respond, he says (D 432), "Know why?" (Gloss: "You are probably wondering why an 8-year-old boy would have an ash tray.") Jill refutes his ownership, and a contradicting routine ensues (J 433-435). To validate his claim, David makes a two-dollar bet (D 436), and al-

though Jill accepts the terms (J 437-438), she indicates that she does not expect proof at the moment, but does expect it later. According to the children and reflected in the dialogue from the manuscript, the children then most likely hooked their little fingers together to seal the agreement.

David was confident that he had substantive proof, and proof of which Jill was unaware. Several weeks earlier, he had found an ash tray and had given it to their mother. The mother would therefore surely support his claim, and he would have undisputed proof. When he asks for corroboration, however (D 439-442), unknown to David, the mother had overheard the bet and purposely avoided confirming his claim to avoid starting another fight. She was not aware, however, of the "pinkies" aspect of the bet.

Jill interprets the mother's reluctant response as David's lack of evidence (J 446), but David refuses to admit defeat and elaborates, hoping to jog his mother's memory (D 448), but she remains noncommittal (M 449-450).

Subdued, David resumes his chant, but without his usual fervor (D 451, 453). Jill, having scored an upmanship point, gloats and says (J 455) "Some things you do pinkies — some things you don't." (Gloss: "Never seal a bet unless it's a sure thing.")

Jill explained how the "pinkies" rule was used during Speech Event Two. David's explanation, given a year later, the opposite of Jill's demonstrates that rules are not immutable but are sustained, redefined and elaborated, changing with contexts and over time. His explanation reflected the rule's revision over the year: bets can now be cancelled by calling "pinkies."

- David: "Pinkies" is, — if you make the bet, then you say, "There's pinkies here." And then ... you say, "I call pinkies." That means the person has to stick out their pinky and then the bet's all off.
- Researcher: Is *off*? (surprised)
- David: Yes.
- Researcher: I thought the bet is on if they call "pinkies."
- David: No, it's off. "Thumbsies" is on. That's what Jill made up, too.
- Researcher: So if you make a bet, and someone says, "I call pinkies," it means ...
- David: It means you have to say there's pinkies in this bet. The person knows that the bet is alive, then you have to say "No pinkies" before the other person says "pinkies."
- Researcher: Oh. So if the person says "pinkies," you're not gonna break the bet. And you've got to say "no pinkies" [before the other person calls pinkies] first, so you won't get trapped.
- David: Yes.



If one speaker wishes to prevent another with whom he or she is betting from cancelling a bet, the first speaker must call "no pinkies" before the second called "pinkies" only if it is called first. We might speculate from this explanation in David's interview that the rule has changed and been elaborated over the year's time since Speech Event Two. Perhaps rules are modified after they lose their effectiveness or outgrow their expediency for those who use them. The gamemanship comes in being able quickly to learn and use the counter-responses to the modified rule: if a person can respond to the new version of a rule with an appropriate counter-strategy, the person will hold his own and not be "upped." The trick is not only getting the modification recognized as legitimate, but also creating counter-strategies, including "cheats," for the new rule system.

David's and Jill's emic explanations illustrate the complexity of children's rules and how cultural knowledge is essential for interpreting and using them.

### The Call It First Rule

The "call it first" rule is a strategy permitting a speaker to dictate the order of turn taking and thereby to control a situation. The player can choose either to be first in a desirable situation or to be last in an undesirable one. The siblings are negotiating for power and control when they invoke this rule; Jill explains when and how:

Jill: Well, we do it in almost everything which you do not like to do, and if you do like to do it, you ... say, (singing) "I get to do it! or "I do it first!" ... If there are ten children to play pin the tail on the donkey everybody wants to be first. So like I call out "First," and somebody else calls "Second," and *two* people call out "Third," and they'll fight over *who* called it first.

Researcher: And everybody tries to be faster than the others?

Jill: Yes. Unless you would *like* to be last. If you call it, you're not gonna have to do it, [unless you want to] do — [it] you say, "I *do* wanna do it first," and that means that you get to do it first — cuz you said it 'fore anybody else could say it.

Researcher: Is that a rule?

Jill: Yes, kind of.

Researcher: If you say you call first, ... that you don't want to do dishes, does David have to do the dishes?

Jill: Yes.

Researcher: Because you beat him to [calling] it?

Jill: Yes.

Jill invokes this rule several times in Speech Event Three.

D 335: Jill, you have to sweep the floor.

J 336: *Don't* just throw the things on the floor on purpose.

J 337: (singing) You'll clean the counter.

In this example, when David (D 335) commands Jill to sweep the floor, she accuses him of making her work harder by purposely throwing things on the floor for her to clean up. Before he can retort, she invokes the "call it first" rule (J 337) which mandates that *he* clean the counter since she stakes a claim not to. In another, similar situation, invoking the rule exempts her from a chore:

D 57: I'm doing everything I messed up.

J 58: David, we have to clean the whole kitchen.

J 59: (singing) I don't do the dishes.

D 60: Uh, uh, I'm not doing the dishes ...

J 61: (unintelligible)

D 62: No.

D 63: Uh,uh Jill.

J 64: David, I called it first.

J 65: David, I called it first —

J 66: Sorry.

D 67: No Jill.

D 68: No Jill.

J 69: I ...

J 70: David I'm not doing the dishes.

D 71: I'm not either.

By telling Jill that he is cleaning only some parts of the kitchen, David implies that she is responsible for all the rest (D 57). Jill picks up the implication and reminds him that they are both under an obligation to complete the entire job (J 58). Without giving him time to answer, she then sings out the "call it first" rule (J 59) to release herself from dishwashing. When David protests (D 60, 62-63) she cites the rule's regulation (J 64), saying in effect, "Too bad. I beat you to it." In the end, both siblings despite the rule, refuse to do the job.

All the rules, "time-in/time-out," "making pinkies," "call it first," and the "count warning," are devices to negotiate status and role in the two speech events, and define the situation in the siblings' struggle for power and control. Each rule has its own appropriate context and conveys its own rights, privileges, and obligations. The rules can also be amended and new rules created to undo existing ones. In both events, attempts to bend or break rules, as well as the rules themselves, were used as strategies to gain one-upmanship points.

Analysis of these three naturally occurring speech events suggests the complexity of children's rules in general and of the key role that cultural awareness plays in the interpretation and use of rules. Some researchers have suggested that the abilities that children demonstrate in the culture of their home or community environment are often not reflected in their classroom performance (Shultz, 1976; Labov and Fanshel, 1977). Further analysis of the contexts in which children successfully use rule-making, decision-making, and problem-solving

strategies may reveal valuable information about how these skills can be generalized to other environments such as the classroom.

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*Young children acquire their linguistic and thinking habits only through communication with other human beings. It is only this association that makes human beings out of them. . . . K. Chukovsky.*

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## "But It's Important Data!"\* Making the Demands of a Cognitive Experiment Meet the Educational Imperatives of the Classroom

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As a relative newcomer to research on children, I have noticed a trend in the titling of research papers. Authors have found a creative outlet in using cute phrases from children who are their subjects to exemplify the intent of the paper. I have chosen a cute phrase, but this time the saying is from the classroom researchers "But it's important data." This paper is intended as a reflection on the difficulties encountered, and how consequent decisions were made, while I was the teacher in a classroom where psychological research was being done. It is also intended as a comment on the difficulties encountered by the practitioner among researchers.

The research described in this paper took place in my 3rd/4th grade classroom. The three-year project (two years in the classroom have been completed, one year of analysis remains), sought to study the cognitive demands children are faced with when learning to deal with the "same task" in different classroom situations. Videotaped data were designed to trace specific cognitive tasks through different settings: large-group lessons, small-group lessons, one-to-one tutorials, children-only school interactions, and after-school clubs. A set of lessons incorporating all of the settings within a curriculum-cognitive task unit was called a "cycle." A more complete description of the project from the researchers' point of view is available in Griffin, Cole, and Newman (in press).

It was extremely important that the teacher work closely with the project to help with the planning of cycle lessons, documentation of decisions which might affect the kind of data collected, and analysis. In many respects the practitioner and observers had much of the same relationship as others who had been involved in classroom research. (Florio & Walsh, 1976; Mehan, Cazden, Coles, Fisher, & Maroules, 1976). Florio and Walsh labeled the teacher's role "Observant Participant," giving the impression that researchers and practitioners collaborated in finding and making observations about the classroom. However, while in previous classroom work researchers were primarily observers, in this project, researchers set up and participated in specific

\*I would like to thank Denis Newman, Peg Griffin, Mike Cole, and Bud Mehan for providing comments about the paper, and for helping me get through the first two years.

tasks in order to systematically explore the ways in which cognitive tasks are influenced by the interactional and curricular variations necessary to run a classroom. Researchers sought to understand the context of cognitive tasks, and the teacher had a more responsible role in the project. The problem of coordinating the needs of cognitive research with the ongoing business of teaching and learning in the classroom had to be confronted continually.

### Background

At the beginning of the project, I had two years experience teaching in public schools. Prior to that, I had been a Sociology major and had graduated from the same university and the same teacher-training program with which the research was associated. Much of my upper-division work emphasized learning about current educational research, considering the teacher as ethnographer, and using video-tape equipment to study classroom interaction. When Bud Mehan contacted me about participating in this research I thought it might give me a chance to build on my undergraduate background, allow me to get a glimpse of what graduate work would be like, and perhaps show me something about my teaching. But I considered self-improvement to be an indirect objective of my involvement in the project, since the project was not directed at changing my teaching.

It is important to note that I had some prior experience which put me at an advantage over many teachers who might find themselves in such a situation. I had been video-taped while teaching as an undergraduate. I knew that video-taping could be an extremely important and beneficial means of gathering data about teaching. Despite the fact that I had this experience. I still felt somewhat uncomfortable about the prospect. At the outset, the researchers assured me that they were not interested in looking at my *teaching* as data. The *students* were the "subjects"; aspects of "how they learned" were the data.

I soon began to understand the design and interests of the project, and realized that, although I was not primary "subject," my role as the teacher, and the way I taught, were extremely important to the analysis. Although the study was not focused on teachers, knowledge about the teacher's role in designing lessons, making decisions about what and how tasks should be learned, and his/her actual implementations of plans would be essential to specifying what the task was and how the children perceived the task. These considerations were central to claims about social organization and cognition. As the teacher, I clearly had privileged sources of knowledge. As I came to understand my role in the project as a mediator between abstract research plans and concrete classroom reality, meeting the demands of both teaching and the process of doing research became more difficult.

### Problems in Doing Classroom Research in General

Before proceeding to the specifics of our research, I want to review problems that may arise when teachers become involved in classroom research in their own rooms. Although it is rarely addressed openly, the first hurdle to doing classroom-based research is the difficulty in finding educators willing to participate. In principle, it should be expected that educators would be interested in keeping up with educational research because of its implications on how teaching should go on in the classroom. However some teachers feel an unwillingness to cooperate in classroom research, afraid of work disruption, and especially of accusations of failure to keep abreast of new trends in their field. Fear of such criticism is, in fact, central to the reluctance of teachers to participate in such work.

Many teachers I know assume that educational researchers end up exposing and criticizing the practitioner and/or the educational system. It is easy to see how teachers might get this impression from the kind of research that is published about teachers and schools. Aside from curriculum research, teachers usually hear about work that shows how teachers are doing it all wrong. *Pygmalion in the Classroom* is a good example. It points out that a teacher can make or ruin a student's academic potential without even knowing how the influence was accomplished.

Why, one might ask naively, should a competent teacher worry? If everything was going alright, there would be nothing to hide. This point of view really *is* naive. I am willing to admit that things go wrong in my classroom more often than I would like, as would any honest professional. And if video-tape equipment recorded what was going on, it would be extremely easy to find cases which could be embarrassing.

When observers are in the classroom, especially observers who are presumed to be experts on the teaching/learning process, teachers experience an unpleasant role reversal. Under ordinary conditions, the classroom teacher is regarded as an agent of benefits for the children. S/he is responsible for helping them acquire the academic skills necessary for success in their everyday lives, a responsibility that extends beyond textbooks to the social organization of the classroom as well. Once an observer/researcher enters the classroom, the teacher begins to feel his/her role change. The researcher is there to improve classroom effectiveness. The researcher is an advocate for the children, even if s/he does not know their names or their academic histories. The researcher's advocacy may result in recommendations for changes in the classroom. Some of the changes may stem from an evaluation of the teacher, viewed as part of "the problem," instead of as a beneficial agent.

Many educators I know are discouraged with their work, and have good reason to be. Complications with the demands of the public, bureaucratic organization, high student-teacher ratios, and other constraints all add to the stress of the teaching profession. Given the oppor-

tunity, they would like to talk about the difficulties of teaching in addition to the difficulties that face the children. Yet such conversations rarely happen as a part of the research process because to enter such a conversation is to undermine one's own authority with little hope that the risk will pay off in terms of improved classroom conditions.

### **Cognitive Experiments in the Classroom**

These very general remarks about classroom research are intended as an introduction to the special problems of the project that I engaged in. I did not simply agree to have someone observe in my classroom over a two-year period while I went about my own business. Instead, I agreed to participate in a project that would, from time to time, involve me in the planning of lessons that were motivated by the researcher's focus on specifying the way that the children processed information at each step in the lesson. Based on my past experience, I had ideas about what kinds of lesson content and structure would work well with my room full of 4th graders. But my ideas didn't always fit the requirements of the research.

The project conducted in my classroom was focused on the ways that the social organization of a learning task influences how well children master the material. Intuitively it seems that some children learn best when left with paper-and-pencil work; others respond well when working with a small group of other children; still others can't seem to understand the material unless the teacher is working with them on a one-to-one basis. These intuitions are a part of classroom folklore, but they are very difficult to pin down because so many aspects of the lesson change from one kind of teacher-student interaction to the next. Our research tried to find a way to evaluate such ideas.

The basic idea was to present the kids with the same basic material in lessons structured in very different ways. We had large-group lessons where I presented material to the whole class at once. We had some lessons where a small group of children worked with the teacher, and others where the same small group worked independently. Finally, we created "tutorials," one-on-one reviews of a whole unit, that were supposed to evaluate what the child had learned — while teaching the child as much as possible by way of a lesson wrap-up.

This systematic variation in the way that lessons were organized was the first source of problems for me. I like to organize my classroom so that I am usually working with a small group, while other groups are working on their own, rotating these groups throughout the day. My classroom was not organized in such a way that large group lessons would be easy to do, so we had to make arrangements to accommodate that need. Whenever the research was in progress, my normal routine occasionally had to be modified to allow for the scheduled kinds of lesson organization.

A second area where I had to modify my usual procedure was in the forming of lesson plans. The research

sought to evaluate the influence of different kinds of social organization on the performance of specific cognitive tasks. This meant either finding a ready-made curriculum unit that fit our needs, or developing our own. In many cases we had to work quite hard to find ways to implement research ideas in the classroom. It was in this area that the research team relied most heavily on the teacher. I was regarded as the expert on presenting curriculum to 4th graders, so in the translation between abstract research goals and practical day-to-day activities I had to be the translator or at least arbiter of translations. For example, we decided to teach a cycle on Household Chemicals. The unit had the potential of being a success, especially if the lessons included some "exciting" experiments. It also had the potential of being a disaster, if the content or the cognitive task was too difficult. I had to insure that the materials used were interesting and accessible to 4th graders. Abstract formulations from a college text wouldn't work.

These goals were not completely incompatible. The researchers accepted my goals and I accepted theirs. I, too, wanted the children to master the cognitive skills underlying the curriculum. But implementing these two goals simultaneously turned out to be one of the central difficulties of the project. It didn't take me long to learn that whatever areas the researchers might be experts in, tailoring classrooms lessons to the needs of cognitive psychological analysis was not one of them!

A useful example of conflicting goals occurred soon after the beginning of a cycle on Mapping. The children were given areas to measure and then were instructed to draw an accurate map of the area, given the measurements they collected. As the lesson progressed it became clear to me that many of the students were eager to do something with their measurements, but didn't quite know how to go about doing it. I felt that a lesson on scaling was in order, but that lesson wasn't planned to occur until later. I got together with the research team and negotiated a change in the cycle. Since I was interested in teaching the concept of scaling, I was made responsible for writing up the lesson plan. This aspect of the cycle had previously been guided by the researchers' notions of the structure of the topic. During the course of this replanning, it was also decided that the lesson would be done as a tutorial instead of a small- or large-group lesson. This procedure was different from past tutorials, which occurred at the *ends* of cycles in order to serve as assessments of what a child knew. For the mapping cycle, the tutorial was in the middle of the cycle, and definitely oriented toward teaching.

Implementing this new piece of research/curriculum produced a new kind of conflict. I viewed the tutorial as an opportunity to teach the concept of scale. I believed that this was what the children needed to know in order to get on with the upcoming lessons on mapping. The research team, on the other hand, viewed this tutorial like the others, as an opportune time for the teacher to do some careful assessment of what the children knew,

while incorporating good teaching. What constituted "important data" for them was a chance to look carefully at the levels at which children were able to do the scaling task. This conflict led me to believe that even the idea of doing tutorials, or individual evaluations on my students, was a luxury which I couldn't possibly engage in during regular classroom instruction. The researchers needed tutorial situations in which children were taken to the limit of their abilities in order to determine exactly the level at which they could process the information from previous lessons. Given my time constraints, I certainly didn't need that precise an evaluation. More general evaluations of my students would have been enough for me to see how to go about teaching them.

The conflict is in the fact that, as a teacher, it is important for me to find ways in which children can succeed as well as possible in their academic work. Yet this was not necessarily the goal of the researchers since they were also interested in the ways and situations in which children were having *difficulties* with cognitive tasks. Sometimes situations would occur that could only be "negotiated" while I was in the process of teaching. I took it as my responsibility to make certain that lessons went as well as possible once the planning phase was over, no matter what the logic of the research demanded. Sometimes I would modify what I should have said or done in lessons, using my intuitions about the needs of individual students.

My modifications during the lessons complicated life for the researchers. It would have been convenient, from their viewpoint, for my lessons to be uniformly structured. They weren't, of course. But the changes eventually became part of the data since we wanted to know when the requirements of classroom goals would require changes in the cognitive demands placed upon the children. This simply alludes to the idea that research, as well as teaching, often needs to be modified as the process under observation unfolds.

It is important to note that the primary reason I was willing to negotiate changes in the lesson plans was not to improve data collection, but to act as a guardian for the children. This advocacy was carried on simultaneously on several grounds. Research is intended to be a benefit for the children in the long run. But in the immediate circumstances, it is up to the teacher to protect the child from research situations which might violate their rights. For example, it is well-known that classroom research involves possible invasion of the subjects' privacy as well as the potential disruption of classroom activities.

All participants in this project were covered by a Protection of Human Subjects Declaration. The criteria for protecting the rights of the children while collecting data were quite stringent. Yet knowing when a child's rights were violated remained rather ambiguous. For example, one part of the Human Subjects Protection Declaration required that video-tape and camera equipment remain as "unobtrusive as possible" so that regular classroom

business could continue. "Unobtrusive as possible" is a difficult phrase to translate into classroom reality. I was left as the agent for the children in deciding what equipment got in the way, and in negotiating how equipment could be set up to obtain proper sound and camera angle for data collection purposes.

Conflicts were minimized by spending energy educating each other. I often felt that I was the student. For example, at the beginning of the project, it was unclear to me why the tutorials for each child were necessary. I welcomed the opportunity to teach one-to-one lessons in the classroom, but the idea of teaching 27 "identical" tutorials per cycle, some lasting an hour, while the rest of the children went about their business, promised a lot of strain on my part, not to mention the effect it might have on classroom management.

The researchers carefully explained the importance of doing tutorials in the way they had in mind. I was given recently published research to read on new methods of mixing evaluation and teaching that the tutorials were designed to model (Brown & French, 1979). I found the ideas interesting and we had several discussions about how we could organize such extensive one-on-one work.

Over the following two years, the research team worked to help me understand all facets of the project. They provided large amounts of background reading, made themselves available for questions and discussion, provided access to helpful consultants, and invited me to participate in Laboratory meetings where our own and other related projects were being discussed. This program of education, centered on the research, provided me with the information needed to make intelligent decisions about what needed to get done in the classroom.

As the project continued, the goals of the research became clearer to me, and to the researchers as well. I began to understand that research is a continually changing process. I was given more responsibility in the planning of the lessons as my interest and understanding of the research grew. One of these areas was in the planning and teaching of a Division cycle.

Division cycle was an ongoing activity throughout the second year of data collection. Since division is a standard part of the 4th grade curriculum, and children were seen to do the calculation in other lessons, it was decided to tape any occurrences where children were trying to solve problems involving division.

At first I thought that this cycle would be much easier for me. There would be no long hours of planning and lesson preparation. However, in a sense, what occurred was even more difficult than the specially planned lesson. It was important to the researchers to have a very detailed specification of what each lesson entailed. This specificity was normally accomplished by the pre-planning of each regular cycle. In this case, the information was contained in my notions of what I thought the lesson was and how I thought it should be taught. I found myself being questioned about every aspect of the division process. Why did I choose the algorithm I

taught? What were the steps involved? What did the child need to know in order to do each step? How did it help some children and not others? How did I come to learn this algorithm? These are all good questions, but they are not the kind that I ask myself when I teach division. I began to feel defensive about my work, feeling that the researchers might now be investigating me!

### Understanding Why It's Important Data

The division cycle provided another example where the everyday demands of the teacher's job come into conflict with that of the researchers. To a teacher, it is not necessary to be able to specify all aspects of a lesson. It is enough to be able to find or create lessons which serve the purpose, are appropriate to the class, and are manageable. If a teacher were to work on it, s/he could spend the time figuring out the specifics of the lessons in the way that the research team needed it, but it would demand a great deal more time than the competing demands of the curriculum permit.

But, to the researchers, that very specificity of lessons is what enables them to understand what the children are doing. As one of the researchers pointed out, the teacher's specific notions about the lessons were important data, because they shaped the way that the children experienced the curriculum. I began to understand better that everything that happened to shape classroom lessons was important. The students alone were not the subjects. Interaction was the "subject" also. And in the sense that interaction was the subject, the teacher became a subject, too.

I recall several occasions when I made a casual observation. A researcher would stop me and ask me to clarify my statement. At that point, the researcher would mutter, "We've got to remember to write that down." No one could specify ahead of time all that constituted good data, so at any point anything could be important.

In reflecting generally on the past two years of data collection, it is difficult to know exactly how the re-

search has affected the children or their ability to do schoolwork. One hopes the children gained some knowledge from the curriculum areas taught. I know from being with them that they found the cycles to be interesting as well as fun.

However, I feel that I probably was affected the most. I spent hours working on the project, to the point where it seemed like a second job. Those hours often included negotiations which were made difficult by the ambiguous, paradoxical conditions of advocacy. Yet I felt that I had emerged after two years from the best teacher-training inservice program I had encountered.

The experience I've gained from having been involved in research continues to have a great impact on my work. Designing curriculum for the cycles and the amount of specificity involved in doing that made me more aware of the quality of materials that I was coming in contact with in my classroom. Getting to understand better the theories behind our research project and learning how to be critical of theory taught me how to analyze the vast number of educational curricula that I encounter. The analysis of my classroom thus far reveals that I do plenty of things I wish I could do better. But I think in the long run, it also reveals that I am learning how.

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## ANNOTATED BIBLIOGRAPHIES

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**Elias, Norbert.** *The Civilizing Process: The History of Manners*. New York: Urizen Books, 1978.

**Foucault, Michel.** *Discipline and Punish: The Birth of the Prison*. New York: Pantheon Books, 1978.

When the Editors first introduced this Newsletter, they urged comparisons "across cultures, across species or across ages within a species" (1 (1), 1). A

brief glance at the articles and bibliographic notes that have appeared since then shows that most of the comparative human developmental research reported has been across cultures or across contexts within a culture. The books under review here are comparative in a different way: they trace human development across great stretches of historical time.

Elias's book presents the changes in European manners and morals since the middle ages. Elias docu-

ments the gradual domestication of humans, and shows how the psychological makeup of modern people differs in significant ways from that of earlier times. In so doing, Elias shows that behavior we consider to be "natural" is a matter of "culture," a function of a long history of cultural construction.

Elias's thesis is similar to Freud's, although Elias's domain is the history of civilization, not the biography of a person; the civilizing process has evolved as a progressive control of impulses and emotion. The development of habits and restraint are first imposed by superiors on inferiors, and later in the history of the culture, become internalized constraints, operating whether others are present and observing or not.

While the theory of the internalization of external constraints can be found recapitulated elsewhere, what makes this book remarkable is the ingenious use of historical materials and documents. Elias consulted various etiquette and manner books written and used since the days before Erasmus, systematically comparing their content over time. He takes these texts as guides to changing life styles and senses of propriety.

Medieval writers tell their readers that one should not gnaw a bone and then throw it back into the common dish, that diners should not wipe their noses on their hands nor spit into the plate, not poke in their mouth or scratch themselves while eating. By the 16th Century, manners were more constraining:

If there are sauces, the child may dip into them decently, without turning his food over after having dipped one side.

It is a far too dirty thing for a child to offer others something he has gnawed, or something he disdains to eat himself, unless it be to his servant. Nor is it decent to take from out the mouth something he has already chewed.

(from *Civilité* by Calviac, quoted in Elias, pp. 90-91).

As time went on, people were taught to use forks instead of hunting for pieces of meat in a common bowl, taught to use their knives unobtrusively. The gradual internalization of the various rules for civil eating is one of the ways that Elias says people gradually learned to repress "natural" drives.

To Elias, all these proscriptions index basic changes in the way people use their bodies in interaction with each other. Bodily functions gradually become shameful, and were not to be seen in public. Increased pressures to restrain impulses and repress spontaneous behavior have led to the development of a modern personality — one which puts distance between people and their bodily functions, and which relies on self-control and societal reactions which evoke embarrassment, rather than overt admonitions to constrain behavior.

If the increase in the use of shame and embarrassment as the tools of social control are the hallmark of the civilizing process for Elias, the increase of psychological punishment rather than physical torture are its hallmarks for Foucault. *Discipline and Punish* is the latest in Foucault's genealogy of control mechanisms (prisons, schools, hospitals), and the social sciences linked to them (psychiatry, medicine, criminology). Here, Foucault traces the shift in forms of punishment from physical torture and public spectacles to more discreet psychological forms of punishment. The shift is from the body as the major target of penal repression, to the mind. Instead of torture, branding, dismemberment (original documents about which Foucault quotes liberally), we now have isolation, rehabilitation, guilt, shame, and re-education in prisons. The purpose of modern punishment is to punish more deeply into the social body of the society, rather than the corporeal body of the individual prisoner.

But the emergence of indirect, subtle, anonymous forms of power are not limited to the prison. Foucault is tracing a historical process which culminates in the "Panopticon" — a total institution that places its inhabitants under constant surveillance from a central place, be it a guard tower, a teacher's desk, a nurse's station. Foucault maintains that the more general forms of classification, ordering, registration, and surveillance which are to be found in schools, hospitals, workplaces, and monasteries contribute to this panoptic principle. Foucault parades details of the demands for exact handwriting in schools, placement of work benches in factories, arm movements on the parade grounds, in order to convince us that modern people are being adapted to a "panoptic" modality of control throughout society. We are subject to examination all of our lives: in schools by teachers, in hospitals by doctors. Records are kept on us without our knowledge or control. We are constantly classified by institutional orders. The reform of prisoners, the instruction of school children, the confinement of the insane and the supervision of workers all become "projects of docility" which are related to the new political order, one which is founded on a panoptic vision of control and domination.

Readers will probably be delighted with Elias's manner of marshalling evidence and the evidence itself. They may also withdraw from the severity of Foucault's predictions and bristle at the liberties taken with interpretations of texts. Nevertheless, both of these books are worth consulting; they are stellar examples of comparative research on a grand, historical scale.

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