Comparative Cognitive Research: Learning from a Learning Disabled Child

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The work that we describe in this chapter is part of a general effort by members of the Laboratory of Comparative Human Cognition at the University of California, San Diego to characterize the ways in which culturally organized activities influence intellectual behavior. Almost all of our work has been comparative in some respect: comparisons of children of different ages, children from different borne backgrounds, schooled and unschooled children, literate and non-literate adults, and normal and psychotic adults. In this chapter we will describe the beginnings of a different line of comparative research that is directly motivated by problems arising in the course of our earlier studies.

As long ago as 1971, Cole and his colleagues asserted that cultural differences in learning and problem solving reside more in the situations to which people of different cultures apply their cognitive skills than in the existence of such cognitive processes in one cultural group and their absence in another (Cole, Gay, Glick & Sharp, 1971). That conclusion made sense in the context of their research. However, it was an unsatisfying conclusion in several respects. First, there was little more than a casual description of the various everyday tasks in which people seemed to exhibit skills that they appeared to lack in more tightly controlled laboratory tasks. This led us to question whether it was reasonable to assume that laboratory and naturally occurring tasks were measuring the same skills. For example, when somebody learns and remembers riddles, the names of leaves, or one's ancestors, and does so in a fashion that appears remarkable to us, are the essential skills the same as those required in free recall, paired associates, or any other well-analyzed cognitive task?

A second cause of dissatisfaction with the conclusion from our early cross-cultural work was its vagueness; it was unsatisfying because the immediate source of differences in cognitive task performance within the controlled laboratory settings was by no means clear. This point was brought home to us in the course of our research on the cognitive consequences of education conducted in the early 1970s in Mexico (Sharp, Cole, & Lave, 1979).

On the face of it, the results of this latter research strongly supported the notion that attendance at school is responsible for many of the intellectual achievements that are associated with the term "cognitive development" in the United States. Vis-à-vis their uneducated brethren, schooled Yucatecans could remember longer lists of words, they more often organized words according to taxonomic principles, and they performed better on tests of logical reasoning. So long as we confine our inferences to those traditionally made in view of this evidence there can be little doubt that schooling produces a very significant transformation in the ways people think about problems.

But, we think it possible that the traditional line of reasoning is in error. As Sharp et al. (1979) pointed out, the tasks of virtually all cross-cultural cognitive research are extremely similar in their structure to the tasks constructed by Alfred Binet for the purpose of predicting children's success in school. Binet designed tasks to sample problems set for children in educational

settings, not all the possible settings that confront children and adults. It is possible that, because of this bias in sampling tasks, the implication that education is central to the development of cognitive skills might be no more than a tautology built upon unquestioning belief in the validity of these tasks as the metric of intellectual competence. After all, why should it be surprising that people who are given extensive training on school-like tasks are more skilled at doing them than people who have rarely, if ever, encountered them, at least within the context of the typical testing format?

Our cross-cultural problem can be stated concretely as follows: In order to decide whether unschooled people perform poorly on currently popular cognitive tasks because they have had less exposure to such tasks than their educated peers, it is necessary to determine how frequently schooled and unschooled individuals confront such tasks inside and outside of the classroom. In order to determine frequency, we must be able to identify the tasks. But identifying intellectual tasks outside of the carefully constructed and constrained confines of the laboratory or formal psychometric test is a nontrivial problem. There exists no set of rules, no guidelines, no accepted procedures in the social sciences for evaluating the similarity of cognitive tasks unless the analyst has constructed the task in the first place (in which the task-as-constructed provides the basis for claims about task similarity). It follows, then, that there is no accepted method of specifying whether an individual's behavior is, except for topography, the same or different when it occurs in different contexts.

Because none of the prerequisites for inter-context comparison exist currently in the social sciences, we are in a precarious position when making professional statements about the effects of education on human thinking. Statements about the impact of different cultures are even more problematic because we are even less able to specify the relevant aspects of general cultural experience than the relevant aspects of formal educational experience.

These problems took us in several directions. First, we examined the literature in psychology that had led us to believe that it would be possible to discover the "same task occurring in different settings This work produced an examination of the scattered writings on generalizing from experiments, the concept of ecological validity, and the conditions necessary for asserting that a task had occurred in the absence of standard experimental-psychological methods (Cole, Hood, & McDermott, 1978) This literature review led us to conclude that psychological experiments typically rest on procedures that render them systematically unrepresentative of intellectual tasks encountered outside of schools and tests.

We also designed a research program in which we deliberately set out to provide structure for children's activities in a number of settings in an attempt to determine the kinds of activities psychologists would have to engage in if they wanted to make the same task happen in different settings (Griffin, Cole, & Newman, in press).

One of these was the study of children for whom some claim had been made that their behavior was the same in different settings. We challenged ourselves to discover the grounds for such claims. Included among our concerns were the following: How often are the cognitive tasks that have been studied in the laboratory actually encountered in various classroom and club settings? Could we show similarity (or differences) in the behavior of individual children for tasks encountered in the different settings? Granting that the exact form of a given task would vary according to the context in which it occurred, could we specify how the context influenced the particular form of the task and the child's response to it?

CONTEXTS OF OBSERVATION

In the fall of 1976, we undertook a study with 17 children, 8-10 years of age, who attended a

small, private school in mid-Manhattan, New York City. We made both video and audio tapes of the children's activities in a variety of school settings and in an after-school club modeled loosely on those one would encounter at a community center. During one of the club sessions' we conducted an Information Bee in which club members were divided into two teams and competed for prizes by attempting to answer questions from the Wechsler Intelligence Scale for Children (WISC).

We also recorded hour-long individual testing sessions during which each child was presented a variety of laboratory-derived intellectual tasks. The series of tests we selected were meant to be representative of tests used to evaluate scholastic aptitude or cognitive development. Our battery included: (1) the similarities subtest of the WISC, which was modified so that, in cases in which the child experienced difficulty, a third item was added to the original pair (e.g., we added onion to turnip -carrot); (2) a mediated memory test first developed by Leontiev (1932) and Luria (1928) that allowed children to use one set of pictures to help them recall another set; (3) a figure-matching task of the sort used to assess impulsiveness; (4) a syllogistic reasoning task; and (5) a classification task involving common cooking and eating utensils. These tasks were administered by a professional tester who did not know the purpose of the study.

The Initial Paradox

As the project got under way, some members of the group began spending time in the classroom observing the children and looking for examples of laboratory-styled intellectual tasks. Others began to conduct club sessions. The teacher and other school personnel were naturally curious about the children and they wanted to check impressions with us. There was little surprise about the difficulty we experienced with Ricky, a child who was often disruptive in the classroom. But, we were asked, had Archie been a problem?

This question was puzzling to us because Archie had most certainly not been a problem. He had worked cheerfully and industriously with his partner during the cooking sessions we had conducted thus far. Except for his unwillingness to let Ricky join with him in baking, there was nothing remarkable about Archie, as far as we could tell. The teacher's reason for suspecting that Archie might experience difficulties in the club was even more surprising, conditioned, as we were to think of "problems" as problems of deportment. Archie, we were told, is a child with a rather severe learning disability.

By this time, those of us who conducted club sessions had spent several hours with the children. We had observed the children in conversation and while implementing recipes that require reading, measuring, and coordination with other people. Only once had we noticed anything special about Archie that was consistent with his teacher's report. Like many younger children, he mispronounced spaghetti as "pischetti," to the howling laughter of several club members. In general, Archie appeared to us one of the more competent members of the group. This simple disjunction between the teacher's knowledge of Archie as learning disabled and our naiveté was the paradox initiating this work. Once the teacher laid out the list of Archie's problems, we had difficulty understanding how he could simultaneously suffer such general deficits when engaged in scholastic activity and appear to us well within the range of normal behavior in our cooking club.

It required only a little reflection to realize that Archie represented a very interesting special case of the general problem that we were tackling. Here was a child about whom it was asserted that he behaved the same way in a variety of different settings. The challenge was clear: How could it simultaneously be true that Archie was the "same" yet "different" as he moved from

one context to another in the course of a single day. In addressing this challenge, we took as our point of departure the strong claims about Archie's specific deficits (e.g., "He has an... auditory language problem."). We reasoned that such characterizations might be used as a template against which to evaluate the similarity of tasks and behaviors across settings.
In the sections that follow, we first examine Archie's behavior in rather standard "learning disability" terms. We claim that these disabilities, as well as a wide range of striking abilities, are identifiable in all the settings we observed. We use our observations as the basis for a discussion intended to clarify claims about similarity of cognitive tasks and behaviors across settings.

The reader is cautioned to treat the entire discussion that ensues as an exploration in comparative research method, and not as a set of strong claims about learning disabilities.

MANIFESTATIONS OF LEARNING DISABILITY: FORMALTESTS

At no time during our work did we administer tests designed to reveal learning disabilities. However, we were able to interview the psychologist who had made the initial assessment of Archie. She had been following him since he began school, was directing a program of special tutoring for him, and she graciously cooperated in our work.

The psychologist told us that Archie was different from other children even when he started school; he often appeared "disoriented" and "highly distractible." Not long before we first encountered Archie, she administered a WISC that showed his full-scale IQ to be in the normal range. At the same time, his subscale scores fit the pattern reported for children with learning disabilities (e.g., Smith, Coleman, Dokecki, &, Davis, 1977; Traupmann & Goldberg& 1979). Both his Coding score and his Digit Span score were below what one would expect on the basis of his overall IQ score. Although learning-disabled children tend to show depressed Arithmetic scores as well, Archie did not.

Consistent with the standardized test performance of learning disabled children, Archie displayed no indication of neurological problems. In response to rather intensive probing from us, the psychologist appeared certain that were Archie to be given an intensive neurological examination, no evidence of brain dysfunction would emerge.

Archie had been seeing a reading tutor for more than two years at the time we met him, yet he continued to have considerable difficulty reading. He was almost two full years below his third-grade level in terms of standardized reading achievement. He was able to read only a few words by sight. For the most part, he read by sounding out the constituent letters or letter clusters of words. He then combined these into an English word. The reading tutor referred to her instructional method as "blending." At the time we met him, Archie read simple words like "cat" as"/k/-at, /k/-at, cat." His reading tutor remarked that, Archie could see the word "cat" 100 times, but, each time, he would say "/k/-at"; he would not recognize it by sight.

Several other characteristic manifestations of learning disability were mentioned in our interviews, including misperception of auditory verbal stimuli (although his hearing acuity was quite normal), misnaming of objects and their representations, difficulty with higher-order concepts, and so on.

These data are, of course, second hand. We present them because they yield such a prototypical picture of a child with a specific learning disability. We now turn to the observations we made ourselves examining first data from the formal test session and the Information Bee.

Misperceiving   Auditory   Verbal   Stimuli

The two examples of misperceptions that follow are especially interesting because both came in the midst of a similarity test; one occurred in the formal testing session and the other in the Information Bee.

Most of the similarity test items were taken directly from the WISC. One pair, "wing-fin," was included in the formal test because the class had just been studying vertebrate taxonomies and one of their lessons concerned means of locomotion. We wondered whether the children would incorporate into their answers what they might have learned in the classroom. The following interaction took place between Lisa (the tester) and Archie, after Lisa said, "Wing and fin."

(1)   A: Well, wing and thin. [Thin was whispered and Lisa may very well have
                                                         been unable to hear it.]
          A wing is thin.   [Archie laughed as this was said as if to indicate
                                                         that it was not to be taken as the answer.]
(2)   L: Not thin, wing and fin.   [Lisa emphasized the articulation of /f/ in fin.]
(3)   A: Oh, fin I thought it
              was thin.
(4)   L: No.
(5)   A: Um, flying fish   [Said tentatively and with a laugh.]
          um, well, what does
          a wing have to do
          with a thin?

Consider also the following example excerpted-from-the Information Bee at the time that Helen, one of Archie's teammates, was asked:

(1)   K: Helen, in what way are
          beer and wine alike?
(2)   H: They're both drinks.   [Her response was very quick.)
(3)   A: A deer isn't a drink!   ["Hot on Helen's heels.")
(4)   H: and other children
          simultaneously: Beer!   [All responded in a loud and drawn out manner.]

In both instances, the specific misperceptions are predictable on the basis of phoneme discriminability (he heard /th/ instead of /f/ and /d/ instead of /b/). These two instances are especially interesting because they occurred in the context of a similarity test in which perception of one component of the stimulus pair could be expected to guide perception of the other. Archie's perception (interpretation?) of "fin" and "beer" apparently was not influenced by aspects of the companion items that might be expected to exert some control over his response (something like appendage or part of a body) in the case of "wing" and drink in the case of "wine.")

Misnaming   Objects,   People,   and   Their   Representations

According to his psychologist, "even though (Archie) does perfectly average verbally, it is very difficult for him to express himself in language. He gets very mixed up in terms... (and when) looking (at) a series of pictures, he can't produce the word for a lot of common things. "

Misnaming occurs, the psychologist told us, despite the fact that often he "know(s), of course, exactly what it is." Consider some of the examples of our corpus that correspond to the psychologist's impressions.

We encountered many examples of misnamed pictures in the course of the Luria mediated memory task in which Archie first had to name each picture, after which he was tested for recall. He called the picture of an igloo an "Eskimo," a pipe was called a "cigar", and a brush was called a "comb."

Notice that just as the sound discrimination errors Archie made were "near misses" based on acoustic similarity, so too the names offered by Archie, although incorrect, are clearly related to the standard labels. No one reading this chapter should have difficulty imagining how Archie might have come to say Eskimo instead of igloo, cigar instead of pipe, or comb instead of brush. Such errors suggest that some aspect of the stimulus common to both responses (e.g., "hair grooming utensil" in the case of brush and comb) effectively controls Archie's response, but aspects critical to distinguishing between the common label and the one offered by Archie (e.g., having teeth as opposed to having bristles) are ineffective.

We elaborate on the "brush-comb" example; it illustrates that Archie can use the word "brush," and also it suggests something of the complexity of variables controlling Archie's lexical choices. It happened that while Archie was naming one set of 12 pictures, he named several quite rapidly, including "comb" instead of "brush." Lisa was instructed to correct him should he misname any of the pictures. Although she did so on all other occasions, this time she failed. After naming all of the pictures, Archie was asked to recall them and one of the six items he recalled was "comb." He was then shown 12 more pictures. The picture paired with the brush in this second set featured the rear view of a woman's head in which her hair was the most salient aspect. Archie said "hair" in response to the picture. He was then asked to "tell... how the pairs of pictures are related," and, arriving at the brush-hair pair, he said, "Hair, comb goes to hair because it brushes it."

Archie's use of "brush" here indicates that his previous naming error could not have occurred because he could not say the word. However, although Archie failed to respond appropriately to the picture of a brush, the brush's function appears to have exercised satisfactory control over the name, brush. The same lexical response was involved in both cases, but the pictorial representation of a brush did not produce "brush" whereas its function did. This example suggests that, although Archie displays some difficulty naming things and their representations, he has less difficulty naming the relationship between things. However, even tasks that permit naming relationships in which one object acts with or on others may yield evidence of difficulty.

In one part of the formal testing session, Archie was required to classify various cooking utensils and tableware items that we included because all of the children had experience with them in the cooking club sessions. In fact, Archie acknowledged this connection when, as Lisa was placing the articles on the table before him, he said: "I'm beginning to think this is the cooking club."

He placed the plate, the glass, and the tablespoon in a group in which he had originally included the mug, but he placed the mug aside when he included the glass. When asked why he constructed this grouping, he explained, "Because drink with this (picking up the glass), you eat off of this
(pointing to the plate), and you eat with this (picking up the tablespoon), n' you drink out of this (pointing again to the drinking glass - not the mug). "And," he continued, "they're sort of like a lunch." Moments later, as Lisa was recording his response, he said, placing the mug in this group, "And, you could put a mug here too with it."

In a second group, he included the measuring cup, the pot, the wooden spoon, and the

measuring spoon, "Because these are all used for cooking."

Archie's groups suggest that he "understands" the relationships between the objects, but the names (or phrases) that he uses to designate those groups were not class-inclusion labels. Either they specified constituents (e.g., "they're all glasses, they're all cups") or they specified a likely action that one would carry out with the objects (e.g., "they're all things to slurp with"). This is supported by the high frequency with which action references emerged in his answers throughout the formal test. For instance, in the mediated memory task, he said that "feet go into shoes;" he acted out smoking in response to the similarity between cigarettes and a pipe, he said that a bat and a football go together "because they're both used for sports," and so on.

Despite the difficulties Archie displays in naming conceptual relationships, it would be inappropriate to conclude that he shows no "understanding" of such relationships. For instance, when in the mediated memory task, he was asked to tell how cigarettes and a pipe are related, it was clearly the act of smoking that Archie mimicked. And, when pressed by Lisa, he said the word "smoke." Responses like these call to mind his psychologist's remark that he "knows" the answer. We suggest that one reason he gives this appearance is that, even when his response is not acceptable according to the criteria of the test, it reflects knowledge of culturally shared aspects of the situation that typically determine "adequate" responses.

Distractibility

Occasionally, Archie appears to be engaged in one task when his behavior is suddenly inappropriate. The following scene, in which Archie called his teammate by the wrong name, provides an example.

The incident occurred during the Information subtest when a member of the opposing team, Laura, was asked, "From what country did America become independent in 1776?" The videotape shows Archie looking towards the opposing team; he may have been attending specifically to Laura. Archie's friend, Peter, was next to Laura. Peter raised his hand when Laura was slow to respond. (Peter's response was entirely in keeping with the rules governing the Bee, which allowed teammates to answer questions not answerable by the one whose turn it was.) Immediately after Peter raised his hand, Ricky, a member of Archie's team, called out, "Oh, I know, I know, I know."' His third "I know" occurred as Peter's hand reached its full extension, simultaneously.

Archie turned toward Ricky who was seated to Archie's left. Within a half second of the time Ricky finished saying his third "I know," Archie, now facing Ricky, said, "Well, raise your hand, then, Peter." More than a second elapsed while Ricky stared at Archie. Ricky asked, "Huh?" Archie replied, "Raise it, raise your hand then." Again, more than a second elapsed before Ricky finally reported, "I'm not Peter, I'm Ricky" "I mean Ricky, raise your hand," was Archie's immediate reply.

It appears that Archie's misnomer was, at least in part, a function of his having attended to Peter as Peter raised his hand. Because Archie's utterance was directed at Ricky, as indicated by the ensuing dialogue, Archie appears to have been "distracted" by Peter's action. As in other examples of erroneous behaviors, however, Archie's response can be seen as appropriate to certain aspects of Ricky's behavior as it occurred in the context of the Information Bee. Raising a hand was the surest route to a chance at the question and, except for misnaming his friend; Archie's verbal behavior was appropriate. Here again is an indication that Archie's verbal behavior manifests "understanding" at the same time that he responds erroneously to certain aspects of his environment.

Controlling His Own Subsequent Behavior

It is unusual for a person to emit a misnomer (for example) and not detect it (imagine, for example, a harried mother calling her child first the name of another child, then by the name of the family dog, and eventually by the child's given name). Archie, on the other hand, often appears oblivious to such behavior. The interchange in which he called Ricky by Peter's name illustrates this phenomenon, but it appears in other contexts as well. Consider the "wing-fin" example discussed previously. When Archie asked Lisa, "Well, what does a wing have to do with a thin?" he gave no clue that just seconds earlier he had said both "fin" and the wing-fin associate "flying fish." Another illustration of this phenomenon occurred when he correctly named the pictures of a pot and of a stove, but when asked how it is that the two go -together, he said: "The pot goes on the oven."

Two other examples reveal Archie responding twice to the same aspect of a stimulus. Especially significant was that, in neither case, did he indicate that he had responded to that aspect previously. To the similarities problem "fork-spoon," he said, "Ya can eat with a fork and you can eat with a spoon." Later, after having given two other satisfactory similarities, he again returned to their function, saying, "They're both used for eating." Similarly, he both began with and ended with the drinking glass when justifying the grouping that he described as "sort of like a lunch."

The evidence presented in this section leaves us with little doubt, and we hope the reader is similarly inclined, that Archie manifests the kinds of erroneous behaviors that led him to be referred to a psychologist upon entering school and which eventually produced-the diagnosis of "learning disabled." However, we did not gather and present this information as a means of proving that Archie is a learning-disabled child. Rather, we have presented these examples because we want to examine the applicability of our description to Archie when he is not in a formal test. The fact that we can plausibly argue that he commits what we have been terming errors is, implicitly, a claim about the context (environment, controlling stimuli) in which the behavior occurs. It is, in short, a claim about tasks and behaviors.

We can now address the question of whether such claims can also be made when we move outside of relatively constrained, test-like scenes into a situation that was not constructed for the detection of errors. In doing so, we will also hope to discover why casual observation does not make any existing difficulties visible.

DESCRIPTION AND ASCRIPTION
IN AN INFORMAL SETTING

As we said at the outset, we did not know that Archie was identified as "learning-disabled" on the basis of his behavior in the club. To us, he was simply one of the eight children who invaded our senses and sensibilities once each week as we, in our attempts to solve the riddles of human cognition, presented them with cooking tasks of varying (and quite unknown) difficulty. In order to illustrate the kind of data we-are dealing with we offer a somewhat lengthy transcript of a segment of one of the club sessions.

The kids are about to make cranberry bread. The situation differed from our usual club sessions because Ken, the club leader, left the room on the pretense of work he had to perform in an adjoining room. We arranged matters this way in order to evaluate the children's performance when they worked without the aid of adults. Archie worked with Ricky this time, because his usual partner and close friend, Peter, was absent. The previous week Archie and Ricky had great difficulty working together, but on this occasion, Ricky began by explicitly

offering to be cooperative.

As we pick up their interaction, Archie was standing at the end of the table where the two boys had elected to work. To Archie's right three girls were working together; at the opposite end of the table stood Ricky recipe in hand. He was kneeling on a chair observing the group of girls.

Some readers may find reading transcripts especially difficult. They are advised to skip over this particularly long one and come back to it after reading our discussion of it.

(1)	A:	One and one-half of...	[Archie then shook his arms up and down and, while standing in place, he looked about the room.)
(2)	A:	Oh, damn where'd our stripeh... (closest English equivalent)	
			[At this point, Ricky returned and offered the recipe, which Archie was quick to take from him. Ricky kneeled in the chair next to Archie and proceeded once again to watch the girls. Archie began to read the recipe.]
(3)	A:	One and one-half of what? Ricky, Ricky check the Ric-ky!	[uttered with disdainful emphasis.)
(4)	R:	What, what, what?	[Simultaneously, one of the neigh boring girls referred to the second step of the recipe.]
(5)	RB:	Orange peels, orange peels, where's the orange peels?	
			[Now that Archie had Ricky's attention, and while he was pointing to the first line on the recipe, he nevertheless spoke in reference to orange peels.]
(6)	A:	Orange peels we have to do that, too, but w--	[Ricky began to read where Archie was pointing.]
(7)	R:	One, what's this?	
(8)	A:	One and one-half...	
(9)	A:	One and one-half chopped raw cranberries.	
(10)	A:	What are raw cranberries?	[As Archie asked the question, Ricky pointed to the girls across the table who, by this time, were measuring the cranberries for their own bread. Archie looked and then proceeded to the other end of the table where a can of cranberries sat. He picked up the can and a measuring cup and started

			to pour the cranberries.]
(11)	A:	One and one-half...	[Archie poured very carefully, holding both the can and measuring cup at eye level and attending to the graduations on the cup.)
(12)	R:	I don't know what one and one-half is so Archie you have to do it by yourself.	
(13)	A:	I know, I know.	[The girls were observing them on occasion too, and, at this point, one of them interrupted.)
(14)	L:	Not that much cranberries.	
(15)	A:	One cup it says.	
(16)	L:	One and one-half cups.	[Reading from the recipe)
(17)	A:	Right! And that's what I'm doing, you stupid	
(18)	L:	I'm not stupid.	
(19)	A:	We're almost there, almost there.	
(20)	R:	It looks like a big-	
(21)	A:	Yeah! I done it.	[All this while Archie poured the cranberries very deliberately. On reaching the one and one-half cup mark, he was clearly pleased, and before returning to his work station, he placed down on the table the now empty can He made no reference to the fact that it contained exactly one and one-half cups. After the boys finished pouring the cranberries from the measuring cup to a mixing bowl, they continued.]
(22)	A:	Okay, what's the next one?	[He then picked up the recipe, simultaneously touching R on his forearm.]
(23)	A:	Okay next. Four table-	
(24)	R:	Four teaspoons of grate, grated orange peels.	[Said as Archie put down the recipe and went for the orange rind, and
(25)	A:	Uh, what did you guys do...	while Ricky eyed the cranberries.]
(26)	R:	Can I taste a little of this?	
(27)	A:	No, don't, please.	
			[Said as he located a teaspoon among the measuring spoons.]
		How many? Read it again.	
(28)	R:	Four.	

(29) A: Four? Okay.
(30) R: One...   [As Archie put in the first teaspoon of
                 orange rind)
            Let me put that in.
(31) A: Okay, just a minute.
            I'll do the other,   [Archie then left Ricky to the
            third one.   orange peels and went around the
                                                table to where the recipe was lying.
                                                He sat at the chair in front of it and
                                                began to read.]
(32) A: One tablespoon of sugar.   [He read "sugar" as though it was the
                                                solution to a tricky problem. He then
                                                began to search, presumably for
                                                measuring spoons. His search con-
                                                tinued for over 20 seconds when he
                                                asked one of the girls at his table.)
(33) A: Is that, are you th-through
            with those things?   [He then picked up the spoons and
                                                Ricky excused himself from the pro-
(34) R: I have to go to the bathroom.   ceedings.)
(35) A: Okay did you do four?
(36) R: Yeh.
(37) A: Okay good, of baking   This last statement occurred 31
            powder.   seconds after he read the recipe which
                                                called for sugar. It also occurred just
                                                4 seconds after a child at a neighbor-
                                                ing table read aloud the instruction:
                                                'Three teaspoons of baking powder."
                                                No other child uttered the words
                                                baking powder during this period
                                                Archie then located a can of baking
                                                powder, picked it up, and questioned
                                                one of the girls at his table concerning
                                                its contents.]
(38) A: Is this baking powder?
(39) H: Read the box, stupid!
(40) A: Ba-king pow-   [Midword, another of the girls swiped
                                                the baking powder from him]
(41) L: C'mon. I'm using it.
           That is 3 tablespoons,
           not 3 teaspoons.
(42) A: Dammit! it says right   [This time, he read "sugar as
           here one tablespoon   though surprised by defeat.)
           of sugar, ah, I was
           wrong.

This episode lasted 2 minutes and 56 seconds of an hour-long session.

Disabilities   in Club

We recognize that transcripts such as the foregoing one are difficult to read and incomplete in several important respects. We have not, for example, included all the utterances and other behaviors of the participants who were part of this scene and whose behavior might plausibly be expected to have influenced Archie. Nor have we described every physical move that Archie made. The issue of how to produce a relevantly detailed transcript is a serious one, but we cannot deal with it in detail here. Despite its shortcomings, we believe that the transcript contains numerous examples of the phenomena we. encountered in test-like settings. Consider the following, non-exhaustive list:

1.   At the very outset of the segment (line 2), Archie mispronounced "recipe" ("stripeh").
2.   Later, when he apparently was searching for measuring spoons, he asked the girls whether they were done with "those things" (line 33). Use of such a general term is, we believe, similar to his difficulty in naming things discussed earlier.
3.   There were two instances when Archie, seemingly distracted by the activity of others, appeared to lose track of his own verbalizations. At one point, he was "distracted" by the girls whose reference to orange peels occurred just at the moment that he obtained Ricky's attention to the recipe (line 6). At another point, he appears to have been distracted by the girls at the next table who were discussing baking powder. Measuring spoons in hand, he began searching for the sugar, but he ended up obtaining baking powder (line 37).
4.   There are three instances when Archie displayed reading difficulties. One occurred at the outset of the scene (line 3). A second occurred in reading the second line of the recipe (line 23), which Archie started as "Four table…"whereupon Ricky began reading, "Four teaspoons…" The third instance occurred when, in response to the command from a neighboring girl to read the label himself, Archie read, "Ba-king pow…"(line 40). He read the label in just the halting manner described earlier by his reading tutor.
5.   He quickly forgot the number of spoonfuls of orange rind called for by the recipe (line 27).
   We could enlarge this list of examples, but we hope that we have provided enough evidence to show that it is plausible to conclude that the same kind of difficulties Archie manifests in formal test settings are detectable in the cooking club.
   Archie as an Active Agent in Cooking Club.In the examples of task and behavior similarity we have described so far, the emphasis has been on specifying the environmental (task, stimulus) conditions in which Archie makes errors. We have, in fact, used these errors in the manner of chemical tracers, to suggest something about the common task conditions. Crudely speaking, we have seen Archie responding to various environmental demands and have identified some of those responses as inadequate (using variable, poorly specified criteria). However, our observations of Archie in the club make available for analysis a different kind of environment-person interaction, one in which Archie is an active initiator and constructor of the environments to which he responds.
   Ironically, the first piece of evidence that Archie is "learning disabled" provides the first piece of evidence for his skill in organizing his own and other's behavior in order to accomplish better the tasks at hand (here we have in mind getting the cake baked as well as getting a piece of print decoded or keeping track of how many spoonfuls of chopped orange peel are necessary for fulfilling the next step in the recipe).
   When Archie said, "Oh, damn, where'd our stripeh (recipe)... (line 2) he was not responding to a direct instruction to begin baking or to begin looking at the recipe. Rather, speaking loosely,

he was responding to the overall task of baking the cake, a plausible first step of which was to get the recipe. His behavior contrasted sharply with that of Ricky at the same moment. Ricky was watching the girls; the recipe was in his hand. Whatever task Ricky was working on, it did not appear to be in the service of getting the cake baked.

Line 3 offers further evidence of "an information processing disability" accompanied by what we might refer to as a "strategic ability." Archie was standing, head bent, over the recipe as he started to "read." (Here, the question of whether or not he was reading is posed sharply by the fact that he said "One and one-half of' while Ricky had the recipe in hand (line I). Encountering trouble, he reached for Ricky, both figuratively (through the escalating salutations) and literally (by taking Ricky's arm, pointing to the exact place on the recipe that needed reading, and bending over with Ricky as he read). No sooner was this accomplished than Ricky looked up and started to nibble at some food on the table while observing the girls. Archie, on the other hand, despite a momentary distraction, went to get the cranberries and the necessary measuring cup. Ricky's sole contribution to this part of the exchange was to point to the girls when Archie asked what cranberries are (line 10). To Archie went the problem of "measuring" the cranberries. Having accomplished this, he returned to the recipe, saying, "Okay. What's the next one?"

Ricky was still wandering, but Archie, again confronting his trouble reading, reached out and physically moved Ricky into the task of reading; "Four teaspoons of grate, grated orange peels" (line 24). Archie put down the recipe and went for the orange peels. in contrast Ricky eyed the cranberries, saying "Can I taste a little of this?" (line 26). Later, when Ricky excused himself to go to the bathroom, Archie checked to see that Ricky had completed the step on which he had been working.

It seems clear that baking a cake requires two kinds of activities. First, it is important to engage in activity such as retaining information about how many spoonfuls of orange peel are required; it is equally important to decode print. But skill at these kinds of activity are not sufficient to get the cake baked; one must also engage in reading and remembering relevant material the right time. In short, the various component tasks involved in baking a cake must be assembled in the right sequence. Furthermore, each must be completed successfully. If this is not accomplishable by one's own skills (reading knowledge, for example), it must be accomplished indirectly by arranging for someone close to perform that component task. We believe that, just as Archie is manifestly weak in dealing directly with the former kinds of task, he is outstanding in the latter. Unable to read, he nevertheless knows that reading is important and he engaged in it to the extent possible; he moves from step to step in the recipe on completing the prior step; he garners materials as he needs them, and so on. He is particularly skilled at recruiting human resources to circumvent the particular difficulties that were our initial focus of concern.

Ricky is adept at executing just those tasks that bedevil Archie. He reads far above grade level and displays no evidence of any kind of "learning disability." Yet, he seems hopelessly "disabled" when it comes to assembling bits of activity to make up the cake. In common parlance, he is inattentive, his mind wanders. Nowhere in this session did we see Ricky engage in the kind of planful, controlled behavior vis-à-vis baking the cake that Archie displayed. If Ricky "recruits" someone else, it is likely to signal interpersonal trouble. Together, in strikingly complimentary fashion, they get the job done.

Archie as an Active Agent in Tests. These kinds of observation, which occurred consistently in the cooking club, led us to analyze more carefully Archie's performance in the settings from which we had initially drawn our hypotheses about cognitive tasks, the formal test and the

Information Bee. Our analysis led us to reason that Archie's behavior in the club setting both reveals examples of the organism-environment interactions that we label disabilities and a class of other interactions that we refer to as active modification of the problem environment. The logic of our approach urged on us the possibility that these same two classes of interaction would be observable in test-like settings as well. It is, then, to Archie as an active organizer of his formal test environment that we now turn.

That Archie was effective in organizing formal testing situations had been hinted by his psychologist who told us that he needed to have the Arithmetic subtest problems of the WISC repeated over and over. She justified her deviation from standard procedure by suggesting that, if she "had presented them (Arithmetic problems) in a different way, he might have gotten more right." What concerns us is how Archie behaved to generate an impression of competence that was otherwise beyond the immediate display of his ability.

The formal testing-situation reveals a number of examples of Archie soliciting help directly. He usually, but not always, failed, reflecting the constraints that constitute psychological testing when compared, for example, with baking in the cooking club. The tester is constrained heavily by the procedures specified because deviation from these procedures will ultimately reduce the validity of the tester's statements. Our tester, Lisa, was very experienced and clearly followed the dictates of formal testing. In fact, the constraints may even have been somewhat magnified by the presence of our video camera. All the same, there were instances when Lisa responded to Archie in a way that was not dictated by test procedures, ways that we think reflected her response to Archie as he, in turn, was responding to difficult problems. Consider the following example drawn from the similarity test:

(I) L: How about anger and joy?
(2)A: Um… um Anger I can't… too good. Anger and joy would be, Anger and joy is um, um (clears throat) Anger and joy are sometimes. Anger is mad… Hmm. But those don't match. Anger is different from joy.
(3) L: Well, can you think of some way that they are the same?
(4) L: Well they're both different ways, they're both expressions.
(5) L: Okay, there, that's very good.

Archie's initial response lasted a full 51 seconds, before he said that "Anger is different from joy." According to our instructions, which she followed on earlier items, Lisa was to have given Archie a third member of the expressions" category, in this case "sorrow," but she did not. Despite the difficulty of the problem, Archie continued to generate false attempts at a solution, each one aborted in turn. At the same time, he displayed considerable distress; his head was lowered and he pulled his sleeves until he eventually had covered his hands. Lisa also revealed evidence of her distress.

When he made eye contact with her, saying, "But, those don't match… ,"she responded, giving him all of the help that the constraints of her situation allowed; she gave him more time and possibly an "instruction" to respond to the pair in a different way.

Consider another example that occurred during the information Bee:
Archie had several attempts to answer during the first series of questions, which were taken from the information subtest of the WISC, and be missed all of them. He was the only child who, on switching to the next test, had failed to garner any points for his team. The next was DigitSpan, and it was clear to Archie that, by the time it was his turn again, the string of digits would be far too long for him to succeed. He can be heard to say, "Why are they always so hard when they get to me?" At this point, still several turns before his, he bowed his head to the

table. Later, but still two turns before his, one of his teammates asked, "Archie, why are you crying? We pick up the dialogue as Ken said, "Okay, Archie, is it your turn now?

(1)	Teammate 1:	Will you pass it to me, please Archie?
(2)	A:	I'm not passing it to anybody.
(3)	Ken:	It's your turn now Archie, right? All right.
(4)	Teammate 1:	Why are you crying Archie?
(5)	Opposing Player 1:	'Cause it's hard. It's hard for him.
(6)	Mike: (other club leader):	Weil, just pass it by, that's all. It's no big dell.
(7)	Teammate 1:	I'll do it for your Archie, please?
(8)	Teammate 2:	You want…
(9)	A:	No I don't want to pass it by.
(10)	Opposing player 2:	No let him do it by himself.
(11)	Peter:	He wants to answer questions but they're hard.
(12)	Ken:	He can try it.
(13)	Mike:	Everybody misses some of them.
(14)	Opposing player 1:	Um-hm…
(15)	Ken:	Okay Archie, you ready? Six, one, five, eight.
(16)	A:	Six one five, eight?
(17)	All:	Yeah!
(18)	Teammate 2:	Give me five, Archie. Please?

But, Archie did not reply. Instead, he resumed his head-in-hands posture, indicative of the Pyrrhic victory he had achieved. It turned out that the pain he displayed, no doubt exacerbated because of the competition, led to a change in the task he was about to receive. His turn called for Ken, the tester, to administer a seven-digit string, one that Archie was very unlikely to reproduce correctly. Ken administered a four-digit (!) string instead. Archie was able to reproduce this string, but not without informing everyone that he was accorded special status because of his difficulty in such tasks. That, however, did not prevent all present from cheering on as if they had been released from an extremely painful situation.

Of course, in a formal test, Ken would not have been able to restructure the task in this way (although, that some restructuring typically occurs is evident in Lisa's actions and in those of Archie's psychologist). Nor is it likely that he would have had to because the procedures for administering the WISC, for example, call for termination of the task when the child demonstrates consistent failure. That is, formal tests are arranged so as to preclude the extreme situation that the competition of the Information Bee provided, competition that rendered highly aversive the impending failure on Archie's part. It is also significant that the Information Bee allowed Ken the freedom to alter the problem confronting Archie so as to permit his turn to end with a success and alleviate social disaster.

GENERAL DISCUSSION

Across all situations in which we have observed him, Archie has shown us that he experiences

difficulties when confronted with certain kinds of tasks and that he actively organizes his environment to avoid or mitigate the consequences of his difficulties. Dozens of instances, gleaned from the club, classroom, and both formal and informal testing sessions suggest that such behaviors can be identified in whatever context they occur. Now, we turn to the more general questions motivating this work. What has Archie taught us about describing cognitive tasks that can be of use not only to the study of learning disabilities, but to comparative cognitive research more generally? Recall that the discussion began with the issue of how to specify the cognitive consequences of education. We knew that in many cognitive tasks, years of education predict performance when other variables, such as age, do not. Why be surprised we asked? After all, experimental contexts require some quite specific skills in addition to the general abilities they may entail. Schooled individuals, by definition, benefit from a lot of practice in such tasks, so of course they should have mastered the tricks of that particular trade (to use Goodnow's, 1972, expression).

In order to move beyond speculation on this topic to hard evidence, we set out to discover what it would take to specify cognitive tasks outside of school so that we could make the relevant population comparisons on tasks of equal familiarity to schooled and non-schooled populations. That search led us to a classroom of 9- and lO-year-olds and our cooking club. The cooking club perplexed us because intellectual tasks were so difficult to identify. Like Charlesworth (1978), we would have had to conclude that problem solving is a very rare event if we used the evidence provided by task environments borrowed from experimental psychology.

The problem of task specification that we encountered in the cooking club rendered even more acute the issue that embarked us on this journey in the first place. If we could not do the necessary descriptive work in the confines of specially designed clubs with microphones and TV cameras present to help us capture details of people's behavior, what chance did we have for implementing such ideas in cross-cultural settings?

Despite the obvious remaining uncertainties and difficulties, we believe that our work has advanced our general goals, in addition to providing some information of more immediate use in the area of learning disabilities. We have learned something useful about task specification in different contexts, including more about what we mean by "task." Because the difficulties of talking about cognitive tasks are related to the settings for behavior we have been studying, features of those settings must be considered.

Testing sessions and laboratory experiments show the following features of concern here:

1. The physical environment is highly constrained and the person being evaluated is instructed to respond to certain, specific features of the environment; the fact that the tester constructs these stimulus constraints allows that person to specify (correctly or incorrectly) the relevant stimuli.
2. The person evaluated is told the domain of behaviors that will be observed, making it highly probable that such behaviors will be emitted.
3. The domain of behaviors is chosen to produce hypothetical relations with the stimuli presented.

All these design features of experiments and tests facilitate, among the other things, the identification of errors.

When Archie pointed to the picture of an igloo and said, "Eskimo," we were able to identify his response as a misnomer because: (1) the picture was a line drawing representing an igloo, and it was called an igloo by all the other children in Archie's class; (2) he had named correctly several

pictures just previously, indicating that he was responding in accordance with Lisa's instructions to name the pictures; (3) we can identify a reasonable relationship between his response and the acceptable name, so we are led to regard his response as a "misnomer" rather than say, a "misperception"; (4) the tester corrected him in accordance with our instructions, indicating that she, as a participant in the session, also regarded the response as an error; and (5) Archie accepted the correction, saying, "Oh, yeh, Eskimo." Each kind of evidence is made available to us by virtue of the special organizational properties of testing sessions.

   Environments such as cooking club differ from tests in several significant respects. Importantly, they are not designed to provide for displays of intellectual behavior that are intentionally graded and controlled so that somewhere in the proceedings the individual has to fail. Intellectual activity is rarely the goal in such settings. Instead, people have come together to construct some thing(s); although individual participants may be interested in creating situations in which someone else commits errors, a great deal more behavior is best interpreted as helping get the agreed-upon task accomplished (in our case, baking a cake). In the course of getting the task done, individuals provide a good deal of assistance to each other precisely because such assistance directly facilitates what they are doing.

The fact that many individuals are involved in such scenes is important, too. Their histories of interaction together provide the potential for many different problems to arise, problems that co-occur with cake baking. Although we believe that tests also embody many different tasks, as a rule, such tasks are ignored in analysis; they contribute to error variance. They are, however, amenable to the same kinds of analysis as any other cognitive task (see, for example, Cicourel, Jennings, Jennings, Leiter, MacKay, Mehan, & Roth, 1974). (We often alluded to this aspect of tests: Lisa was distressed by Archie's difficulties, displaying her task of testing Archie without making him so miserable that negative social sanctions were likely to occur.)

   The club was not organized for the purpose of evaluating performance against intellectual criteria; yet, we were able to cull several instances of Archie's appearing "disabled" in just over two minutes. Our identification of his response, "stripeh, as a mispronunciation of "recipe" is a particularly useful case to discuss precisely because of the ways in which the context of its occurrence deviated from the constraints of formal tests. There was no task definable in the sense in which the formal test had called for him to name things. He was not pointing to anything, and there was nothing that we are able to detect in his field of vision resembling a recipe. Nor had he been naming things when he said "stripeh." Moreover, he gave no indication that his question was addressed to anyone in particular.

There are, nevertheless, aspects of Archie's behavior in this context that lead us to identify his response as a mispronunciation:

1. The formal properties of his response, "stripeh," are not recognizable as an English word or words. We have never heard Archie emit such an utterance on any other occasion, so it is at least reasonable to suppose that he mispronounced something. "Recipe" is a likely candidate if only because it resembles Archie's response phonetically.

2. The response occurred in an identifiable linguistic context, his question, "Oh, damn, where'd our stripeh?... " The term in question occurred in the place in his utterance appropriate for the name of an object. In addition, "where'd" indicates the absence of some thing that was present previously, and "our" indicates that there are more than one such thing in the vicinity, only one of which belongs to him.

3. Ricky returned from girl watching immediately on orienting to Archie's searching and laid the recipe on the table in front of Archie.

4. Archie's search terminated at the moment he said "stripeh and picked up the recipe. His

quickness in retrieving the recipe suggests that the recipe was the object in question.
5. We have often observed Archie referring to the recipe. For instance, he referred to it for instructions to steps two and three after he completed steps one and two, respectively.

  It should be clear to most readers that, however incomplete this list, it is possible to build a rather strong case for claiming that Archie's response, "stripeh," was a mispronunciation. It is possible to do so, moreover, even though the club was not arranged for the purpose of making such errors salient.
  There is a second difference between clubs and tests that is relevant to the issues we are addressing. In clubs, the behavior of Archie or of any of the other children is likely to modify their environments in ways that facilitate whatever actions are in progress. But in tests, the environment has been prearranged. The prearrangements determine the response of the environment within constraints over which the subject has minimal control. This frequently gives the interactional dynamics of tests a very peculiar caste. For example, when Lisa gave Archie the similarity pair "turnip-carrot," Archie's response was the "unacceptable" question; "What's a turnip?" Lisa's reply, "Well, suppose I said, turnip, carrot, and onion?" was clearly governed by the testing format, the rules under which she was operating for purposes of making the test work. It is important to note, too, that there is an excellent example of Archie's soliciting help to deal with a difficult problem. In this setting, however, with rules operating to restrict the kinds of help that Lisa can legitimately give, his effort failed.

Learning   Disabilities

  What emerges with special clarity from the comparative analysis of Archie in different settings is that we cannot understand either his behavior or comparative terms like "similarity" or "difference" that may be attributed to that behavior if we fail to appreciate that we are always describing an organism-environment interaction: Archie acts on his environment, which acts on him.
  When we characterize Archie's behavior interactively, we lose faith in the notion that he can be characterized as an organism with fixed attributes. To say that he suffers a particular "memory deficit" or that he is "distractible" turns out to be a statement about the structure of certain interactions he has with only some of the multiple environments he encounters. The use of psychological trait names itself is made possible and plausible because of shared (if poorly analyzed) ideas about the interactions that are possible in those special contexts (tests, for example) that are the criterion settings in which we substantiate labels such as "learning disabled." Without the kind of careful context description that we have struggled with in our work, such terms are static snapshots of a presumably fixed, universally representative environment. It is a mistake to treat the variable factors that organize the contexts producing judgments like "learning disabled" as universal. Because contexts are not universal, descriptions predicated on universality lead inexorably to contradiction.
  These remarks frame the implications of our work for the field of learning disabilities. We have tried to make clear that the study of learning disabilities is not our focus, but rather serves as an occasion for solving general problems in cognitive psychology. The implications we can legitimately draw about learning disabilities are understandably limited on this account. However, certain of our observations seem to speak directly to current controversies in that field of research.
  First, assuming that there is some generality to our analysis of Archie and his friends, there should be no mystery about the inconsistencies in the application of the diagnostic categories

used to describe specific learning disabilities, nor in the supposedly school-based nature of learning disabilities. Both the diagnostic inconsistencies and context dependencies arise from a single source: the fact that different contexts place different constraints on people in terms of which they are permitted (or encouraged) to behave.

By virtue of their socially designated purposes, psychometric tests (and, to a great extent, the school settings in which they predict behavior) seriously restrict the possibilities of organizing conditions for achieving the solutions of the problems posed. Those constraints are part of the task-as-constructed. It is "cheating" to engage in activities that reduce the difficulty of the task. Even so, we can see rudimentary forms of such behaviors in experimental contexts where they appear as "deviations from standard procedure."

It is of interest that our classification of the behavior we see Archie engaging in has a rough parallel in the psychometric literature on learning disabilities. Several investigators (Smith et al., 1977; Traupmann & Goldberg,1979) have pointed out a special patterning in the psychometric test performance of learning-disabled children: a profile of very low scores on tasks involving the holding of information in short-term store (digit substitution, backward memory span), but better-than-average scores on "spatial" subtests. This finding is the essential byproduct of the definition of specific learning disabilities, which emphasizes that such children have "normal IQ's." Low scores on part of the test must be balanced by high scores elsewhere.

We know from his diagnostician as well as our own observation of his behavior in our test-like settings that Archie demonstrates this typical learning disability profile. What our cooking club observations yield is a new understanding of the implications of this profile in terms of everyday problem-solving environments the club setting provides a richer and more detailed notion of what is specific to a specific learning disability. Observations in all the settings from which we have data indicate that Archie frequently misperceives, misnames, and so on. Yet, he steadfastly, almost doggedly, sticks to the task. In doing so, he makes dramatically visible the distinction between general and specific disabilities.

We believe that these observations merit systematic study. For example, some training programs for the learning disabled place them in small, soundproof cubicles to help them learn, free of the distractions of irrelevant stimuli. Even when such isolation proves effective in speeding the acquisition of certain information-processing skills, without supplementary arrange-ments, such prosthetic environments are not likely to deal comprehensively with the problems facing a child like Archie. Instead, we recommend a program that simultaneously teaches children to make the relevant kinds of discriminations when faced with important tasks such as word recognition and retention while allowing them to exploit existing skills in a flexible manner to deal with the multiple goals that such information-processing activities typically service outside of the sound proof cubicle.

It also seems sensible to arrange environments that overtly reinforce Archie for his successful intellectual behavior Finally, although Archie's failures are often given attention, his success in organizing his own and others' behavior to deal with the tasks confronting him frequently goes unnoticed. As a result, Archie often has to work to conceal his difficulties and to deal with other people's attempts to make an issue of them. In part, the emphasis on errors can be attributed to the possibility that they are more easily detectable than his successes, but it also seems that Archie's difficulties are an occasional source of reinforcement for his peers (points discussed at greater length in Hood, McDermott, & Cole, Note 1). It is often suggested (e.g. Estes, 1970) that educational programs should build on students' strengths, not their weaknesses. Our investigation of Archie has suggested some specific ways in which this therapeutic goal might be accomplished.

Comparative   Cognitive   Research

In closing we want to consider briefly the problems in comparative cognitive research that made studying the behavior of a learning-disabled child in different settings seem a promising analytic vehicle.

It should be clear to the reader, as it is to us, that we have failed to produce a general set of rules for identifying the environment-person relations of the sort that we have labeled cognitive tasks. We cannot even offer an abstract set of tasks that we believe relevant to an understanding of Archie. Some of our claims seem very compelling - claims about mispronunciations, for example. Others seem less compelling - the claim that "those things" resembles the misnomers that we encountered in various tests, or the claims to the effect that many of Archie's behaviors recruited help in anticipation of difficulties with a next step of the recipe. The underlying logic in all of these cases is, we believe, the same, but the implementation of this logic varies greatly from one case to another. In all cases, we come to our analysis with some notion of relevant environmental events and potentially appropriate behaviors. The sources of these notions are quite varied. They may come from shared knowledge (often implicit) of the rules of English phonology; they may come from some notion of appropriate levels of specificity in naming objects so that a listener will be able to identify the referent from all other objects; they may come from hypotheses about recipes and the steps in making a cake. Whatever their source, these ideas about the environments for behaving and how responses are related to the environment become our claims about "cognitive tasks."

We have pointed out that, in all settings, behavior is multiply determined; that is, the environment consists of several tasks co-occurring with the task in which a person (subject) is engaged. This statement is as true when our data come from specially constructed experimental tasks, as it is when we observe behavior in clubs. As experimental psychologists, we tend to forget this fact. For us, the experiment specifies what behaviors are relevant to our analysis. It gives us our dependent variables, as we like to say. In this sense, the experiment is a ready-made coding scheme.

We know, of course, that we omit a great deal of behavior from our descriptions. We also know that our specification of the task can be incorrect. One way of handling this untidiness is to interpret it as part of the error term in an analysis of variance. Another is to run a new experiment that more accurately creates the model system that we assume characterizes the subject-stimulus interaction. Of course, some scientists, even some psychologists think that these procedures simply sweep trouble under the rug. Our oversights as experimenters usually begins to bother us most when someone comes along and claims that our error terms are masking important phenomena; but, because these inadequacies are difficult to deal with and because they are often seen as irrelevant to our concerns with identifying a cognitive process, they receive little systematic attention (we have in mind here work such as that of Cicourel et al., 1974).

We cannot provide a complete specification of all the tasks that Archie engaged in when we observed him (although, as a tour de force, such ethnographers as McDermott, Gospodinoff, & Aron (1978) can take that enterprise surprisingly far). But, because complete specification is not a likely outcome of cognitive research based on experimental manipulations either, this shortcoming of observational studies should not bring enterprises like the current one to a halt. Instead, we must content ourselves with specifying one or more of the tasks that a person is engaged in at any point in our analysis. This specification will always be incomplete. But, the incompleteness of our analysis need not stop the enterprise. If our procedures provide us with interpretable regularities, we can leave to our critics the job of demonstrating how a fuller

specification of the tasks at hand will change the conclusions we draw on the basis of our analyses.

 This viewpoint has some clear-cut implications for the problems in cross-cultural research that were our starting point. First, it should be evident that it is hopeless to go looking in everyday life for cognitive tasks in general. Nor does the standard tool kit of the cognitive psychologist with its well-defined problems, puzzles, categorized lists, and word associations represent "cognitive tasks in general. " The primary environment that we use as the source for cognitive tasks, the school, did not arise by accident; it is a historically conditioned system of interaction with a variety of purposes. Those purposes include the preservation and propagation of cultural knowledge, the supply of labor to modern industrial society, and the sorting of people into varied social roles (this list is intended as illustrative, not exhaustive, cf. Tyack, 1974). If we want to see how exposure to the tasks that arise in an institutionalized setting such as the school affects behavior in other settings (the home, the supermarket, the office) we must go to those other settings to determine: (l) if the social organization of behavior there allows for the occurrence of the tasks that we have hypothesized are occurring at our source point; and (2) how people behave in the everyday contexts of occurrence of those tasks.

   We should not embark on such an enterprise convinced that we will encounter behavior organized to fit our template-like notion of a cognitive task. For example, we may find that air-traffic controllers have to deal with an environment that involves something like a keeping-track memory task; but we may not. Rarely could we identify tasks in the clubs using standard cognitive-psychological notions of what a task might be. Should we decide to undertake such an enterprise, two comments seem in order. First, it would be foolish to go looking for cognitive tasks at random. Instead, looking should be constrained to places where our knowledge of the culture tells us that such tasks might occur and where we have a theory of the relevance of experience in one setting for experience in another. When we constructed the cooking club, we had hypothesized, albeit incorrectly, that school tasks would frequently arise in cooking club. We followed this latter strategy more successfully (in terms of finding what we went in looking for) in our recent work on the consequences of learning to read and write (Scribner & Cole, 1978). In that work, we found no "general intellectual consequences" of literate practice. But, when we observed behavior in settings involving literacy, and created detailed model tasks that embodied our notions of what such literate practice might entail, discernible transfer of performance from one socially organized setting for a task to another was detected.

   Second, as the previous remarks suggest, when we got into a new setting to study behavior and we are interested in its relation to a previously analyzed setting, we cannot take for granted that the system of activity we call a cognitive task will occur. By virtue of the enduring functions of different domains of activity, they are unlikely to result in the organizations that we are terming cognitive tasks in the same way. Even if something like the same task seems discernible, many of its details may be changed because the constraints on participants that organize the task will vary. This variability will not defeat us unless we demand a priori identity of tasks across settings (as we did at the outset of this project). Instead, if our interest is in some real-life domain of activity that we hypothesize to be relevant to, say, the experience of schooling, then we must be willing to study it with the same care that we have put into analyzing cake baking. If we proceed in this way, we can indeed carry out research on such matters as the cognitive consequences of education, but, the objects of our analysis will be everyday occurrence, not tasks-as-organized-in-tests. That latter strategy will work only in the rare occurrence of identity of larger contexts that are a part of both settings. Not accidentally, we hope, this conclusion brings us around to the point of view expressed by Brown and French(1979) in their comments on our cross-cultural work. In response to the difficulties we

have belabored here, Brown and French suggest that

what is needed to clarify the ambiguity (of research based on school-like tasks) is an examination of situations, which require schooled and unschooled participants to learn new tasks unrelated to the activities fostered by either schooling or the occupational skills of the unschooled adult [p. 106].

   They suggest, further, that metacognitive skills (checking and self-monitoring activity as in "What is the first step?") should be the object of study, because such skills are likely to be relevant to many settings. This suggestion would fit neatly with our observations of Archie, because the activities we have described in terms of active control map so well onto Brown and French's conception of metacognitive skills. However, Brown and French assume that if we pick the right levels of analysis (in their case, analysis of metacognitive activity), we can proceed on the basis of already accepted methods. We believe that whatever the level of analysis, be it mispronunciations or plans, a careful description of the contexts of occurrence is necessary. If such analysis is not carried out, we are not likely to be able to make well-grounded claims about cognition, plain or "meta." This process of describing the tasks that people construct for themselves and each other as part of their lives in society is the enterprise that we (Laboratory of Comparative Human Cognition, 1979) have called elsewhere an "ethnographic psychology of cognition".

   Finally, our analysis of thinking in test, club, and classroom has, somewhat unexpectedly, highlighted one hallmark of modern cognitive psychology, the active organism. It has done so in an unusual manner: by contrasting behavior across settings and positing the within setting factors that control between-setting variation. In attempting to understand Archie's behavior in the club setting we were forced to consider the many ways in which he actively modifies his problem environment. Once alerted to- the pervasiveness of such behaviors in the club environment, we were encouraged to reexamine the experimental and classroom contexts. They were there to be seen, but only upon rather close observation.

   This asymmetrical situation, in which the experiment highlights one form of interaction and the club another, has far reaching consequences for cognitive psychology in its attempt to characterize the active nature of human cognitive functioning. Experiments, the contexts constructed to make behavior analyzable, are also contexts that discourage the expression of active, adaptive behaviors. This point was made many years ago by one of the few genuine interactive cognitive theorists, L. S. Vygotsky (1978) who pointed out that:

All stimulus-response methods [which in this context refer to all standard experiments in the tradition following Wundt] share the inadequacy that Engels ascribes to naturalistic approaches in history. Both see the relation between human behavior and nature as unidirectionally reactive. My collaborators and I, however, -believe that human behavior comes -to have that "transforming reaction on nature" which Engels attributed to tools. We -must, then, seek methods adequate to our conception [p. 61].

If our analysis in this chapter has a future, that future will have to include the invention of new experimental and analytic techniques that permit a principled study of interaction in addition to reaction.

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