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EDITOR'S NOTE

Over the years the *Newsletter* has been fortunate to receive contributions from researchers in many countries interested in the relationship between social environments and the development of thinking. The article in this issue by Grossen and Perret-Clermont, which critically examines the role of social context within Piagetian theory, is the first contribution from a French-speaking psychological group to appear in the *Newsletter*. Veteran readers will note the similarity between ideas presented by these researchers and ideas stemming from the work of Soviet psychologists who have dealt with these topics.

Also in this issue, John-Steiner reports on a study of the learning styles of Pueblo children from a number of Native American communities, Zukow summarizes research on mother-infant interactions in United States and Mexico, and Koivukari comments on the cognitive quality of classroom interactions.

The final article, by Anderson, Díaz and Moll on community-based research, continues a section of the *Newsletter* initiated in our last issue. The intent is to provide a forum for brief reports of work still in the planning stages or in progress. This section will become a regular feature of the *Newsletter*. We hereby encourage submissions particularly marked "Work-in-Progress."

Luis C. Moll

Some Elements of a Social Psychology of Operational Development of the Child

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A Look at the Child Who Creates Otherness

The concept of a child as not simply a miniaturized copy of the adult but as a qualitatively different being having its own way of functioning and its own mechanisms of thought (if not an absolute otherness) has not always seemed evident. On the contrary, those studies aiming to show the otherness of childhood in comparison with the adult state only developed gradually, successively transforming the different educational and pedagogical conceptions arising from them.

At the turn of the century, doctors like Montessori, Decroly, and Gesell insisted on the importance of organic maturation in development. According to them, the child's capacities to discover and understand the physical and social world in which she interpolates herself arose from the organic maturation of her physical, perceptual and motoric possibilities. From this perspective, the cognitive and affective development of the child is a purely internal process, with the implication that a "positive milieu" could benefit this slow development which, stage by stage, led to the adult state. In this view, the role of the educator in the development of the child remained, for the

most part, a passive one: not being able to "force" the physical, affective or cognitive maturation process, the educator assumed the role of "nurturer" in responding to the cognitive and affective needs which gradually appeared in the child.

Following these authors, Piaget proved original in no longer describing the child's development as a direct product of biological maturation but, as the result of the constant interaction between the child and the surroundings. According to Piaget, the child is not only the product of a development that takes place almost "in spite of himself"; to the contrary, the child is the *cause* of this development. In fact the child is *not* adapted to the environment but adapts himself to it actively by a process of equilibration between his need for understanding and the resistance which he opposes to reality. These equilibration processes take form through a subtle play between accommodation (to reality) on the one hand, and assimilation (to the subject's structures) on the other, which permit him to develop the cognitive instruments which are the structures of thought. Piaget thus developed the notion of *stage*, not in order to describe the cognitive development of the child linearly but rather to show that at each step of this development there is a corresponding complex logical structure having its own internal coherence, separate from what could otherwise be the intelligence of the adult. One of the tasks of developmental psychology thus became the description of these stages and an understanding of the processes which allow the individual to move from one stage to another, that is, to construct more powerful instruments of thought. For Piaget, the causes of development are to be sought primarily in the processes of a subject's self-regulation.

On the Limits of the Piagetian Approach

As fruitful as Piaget's theory was for understanding cognitive development, it was at the same time the object of much criticism, principally in that area which concerns Piaget's reference to biology. The processes of self-regulation in biological functioning would be homologous to those observed in the functioning of intelligence: the development of intelligence in which successive stages encompass one another, clearly has a biological and internal origin in the subject. By this conception, both the subject and the object have very peculiar epistemic status (Carbonnel, 1982),

the former because it is considered as a general being, without a real body, independent of the social milieu in which it evolved its position in this social reference group; the latter because it is conceived as a physical object that offers resistance to the subject, but which at the same time exists independently of the subject and the unique significations which it can assume in his eyes.

According to Light (1983), this conception led to a great neglect by Piagetian psychology of the social object on three levels:

1) On the level of *the social object in contrast with the physical object* which gave rise to research (following the early works of Piaget) on the development of social notions, like friendship, altruism, etc. (that of Kohlberg, for example). This research rested on the postulate that a structural homology exists between cognitive notions and social notions, the latter not supplanting the former.

2) On the level of *social factors* liable to influence cognitive development, which gave a place to research on the role of social interaction between children.

3) On the level of *cultural aspects* of the transmission of knowledge (the word "culture" being taken here in the sense of a tacit understanding of that which is implicit in our different forms of social exchange, particularly in the language, in the given cultural group).

In our view, these different points leave unresolved the many ambiguities that arise as soon as Piagetian theory is applied to the pedagogical field. If the role of social factors is minimized, if the processes of equilibration which precede the passage from one developmental stage to another are really biological in origin, the educator may feel reduced to patient waiting while his pupil develops himself actively to the next cognitive stage. There is no prescription for what to do in case some cognitive notion proves itself assimilable by the child only with difficulty. The educator thus would risk concluding that he need not implicate himself personally in the education of the child but, at most would organize a reality "resistant" to the predictions of the child. As if the child would not perceive the teacher except as the organizer of this reality! This view could also lead to neglecting the importance of interaction between children in the acquisition of knowledge.

It would show a preference for learning in individual situations, the pupil being perhaps in the hearing of the teacher or maybe more active and independent, but isolated from different points of view of his comrades and the incidental discussions that would result. Elsewhere, this direction seems to point to the forms of logic discussed by Piaget as the only possible forms (quasi-ineluctable because they are biologically inscribed in the organism) of the evolution of thought. The standard of reference (from "less developed" to "more developed") is, in this system, formal logic. It seems to us that an explication of intelligence in terms of *maturation*, always has as an implicit hypothesis that intelligence is the quality of *one* isolated subject or a characteristic of a *stage*.

As complex as the process of accounting for the structures of intelligence and of the driving mechanism of this development may be, it seems to us, that the evolution of intelligence is not reducible to *one* central determinant, even if organic maturation is indeed a factor of development. Intelligence is not only a cognitive fact practiced for the pleasure of functioning (and "for the beauty of the proof") or because of vital necessity to adapt itself to the physical environment. It is also always a social construction, the fruit of the interaction between many individuals, belonging to a group which has its own objectives. Thus, adaptation is not only vital for an individual but it is so for the social group in its collectivity. That which sets up the development of cognitive instruments, is doubtless, not as much the isolated plan of understanding a physical object as that of understanding the individuals with whom one lives and from whom one expects a reciprocal understanding. The conjoint elaboration of systems of action and of significations thus give a sense (which is not entirely internal and individual) to the development of new competencies which, without this base of intersubjectivity, would prove themselves completely useless and futile.

Let us note, too, that it is not only individuals, but groups and socio-cultural traditions which establish the scale of values that affirm for the psychologist that one behavior is "more adaptive" or "more developed" than another. The criteria of cognancy for logical reasoning did not, themselves, exist *a priori* but are in fact the result of a long elaboration process. Similarly, recourse to these criteria by authors like Piaget is the fruit of a

consensus at the core of a certain philosophical and scientific trends. In short, many factors interact with one another: somatic, psychological, and cultural factors, which in reality are hard to distinguish from each other and which demand rejection of an explanation that, in a reductionist way, considers only one of the terms.

The Conditions of Intellectual Evolution

Some Empirical Illustrations which Demonstrate the Importance of the Social Context

The attention of some researchers, when it was applied to studies of interactions between the mother and the infant, made apparent the contingent aspect of responses with reference to the social context. We cite here, for example, the works of Schaffer (1981) which showed that, from the beginning of life, the newborn is active (and not passive) in the interaction with his mother to such an extent that, even in the earliest social interactions, certain characteristics of organized (not absent) behavior of the baby will have an influence on the behavior of the surrounding people. Schaffer describes the existence of a sort of pre-dialogue between the mother and baby at the time of sucking: mothers interact with their babies in perfect synchrony with the rhythms of the child's sucking. When the baby sucks, the mother remains silent and tranquil in general, then at the moment that the baby pauses, mother begins to talk and to caress the baby. This form of dialogue prefigures, by promoting it, the social interactions which will regulate subsequent dialogues.

The role of social interaction in the development of intelligence has been studied in a series of experiments (Doise & Mugny, 1981; Perret-Clermont, 1979; Perret-Clermont, Brun, Saada & Schubauer-Leoni, 1982) conducted in different operational developmental domains (logical, spatial, numerical, graphical) in particular among children of 4-9 years of different western social backgrounds.

The research that one of us conducted (Perret-Clermont, 1979) studied the conditions of social interaction that precede the elaboration of operational concepts, specifically that of conservation of liquids. This study showed that children of 6-7 years (the age at which the notion of conservation of liquids is constructed), having the chance

to interact around the task with other children of the same age, progress further in the acquisition of this concept than children who have not had this chance.

More exhaustive investigations have supported evidence of facts of three classes:

1) It is interaction between two children of different operational levels which gives rise to the most significant progress. Consequently, it was proven that it was not the distance between the operational levels which permitted operational progress so much as the simple divergence of points of view between the children. From this situation, in effect, results a conflict called *social-cognitive* because it rests on cognitive notions, all the while arising and resolving itself in the confrontation between individuals. Social-cognitive conflict incites each partner to keep track of the point of view of the other in order to resolve the social conflict which, more or less explicitly, arises from this confrontation, and to restructure his thought to arrive at a more global comprehension of the problem posed.

2) Social interaction doesn't always have a structuring effect on the responses of the child. It seems that the very fact of perceiving the existence of a divergence of viewpoint (at the time of such a conflict) presupposes a certain level of cognitive development. The child must thus have a *prerequisite* level to be able to engage in the occasion of social interaction, a prerequisite level which is itself the result of development on organic, psychological and social planes. Recent research seems to show for example, that a child of less than four years rarely profits from a social interactive experience around the notion of number conservation.

3) A closer analysis of the results obtained sometimes reveals differences in the operational level of the subjects as a function of variables of a social nature such as their sex and their social class. From the time when, in the first phase of the experiment (Phase 1), the children individually go through the conservation of liquids task, one sees differences of this type. Often, at the same time, after a phase of interaction between the children, a new individual assessment of each child (Phase 3) makes clear that the differences observed at Phase 1 are reduced or eliminated (Perret-Clermont, 1979; Perret-Clermont & Schubauer-Leoni, 1981).

4) These latter results, perhaps because they demonstrate the impossibility of constructing a "culture free" test even with reference to a genetic theory of development, have led us little by little to focus more fruitfully on the test situation itself, insofar as it constitutes part of the cognitive processes which the child will be able to elaborate. In research conducted in Tessin (Perret-Clermont & Schubauer-Leoni, 1981), the task consisted again of asking children to pour colored liquid into two glasses of identical dimensions and then to transfer the contents of one glass into a glass of different dimensions (higher and narrower, for instance). After Phase 1 (the phase of individual assessment of conservation of liquids), the subjects (6-7 years old) were assigned to one of two different experimental conditions: in the first, one of the glasses was said to belong to the experimenter and the other to the child. In the second experimental condition, the glasses were assigned to two twin dolls. In each condition, the experimenter asked the child if there was the same amount of liquid in each glass, or more in one glass. The results showed an advantage in operational level gained in the first condition (sharing between experimenter and child) over that shown by children in the second condition (sharing between the dolls), the difference between the conditions seeming particularly significant for the girls in the sample at that age.

It appears, then, that the child reaches a higher level of reasoning if he is personally involved in the task. A task which demands a transposition from a more abstract situation seems harder, even if the situation of sharing between dolls otherwise avoids the problem of the respective status of the child and the experimenter, which could also be an obstacle for the child in resolving the task.

From the question of the precocity of conserving behavior to those of the conditions of elaboration of the correct response. Much research has revived Piagetian tasks while proposing variations on the classic Piagetian situation. Donaldson and McGarrigle, for example, got more correct responses on a conservation of number task in a so-called "accidental" situation (in which a clumsy bear transformed one row of counters) than in the "classic" Piagetian situation where the experimenter ostensibly performs the transformation (Donaldson, 1978). The interpretation of these results given by the investigators

was that the accidental situation conferred a significance to the task which is not apparent to the child in the classical situation. According to Donaldson and McGarrigle, only the early conserving responses obtained in the accidental situation (as well as in other modified situations) show the *real competence* of the child while the responses obtained in the classical situation thus merely constitute "false negative responses." This study has since been replicated widely, but only, it seems, with the purpose of verifying the results which pertain to the early advent of conserving responses obtained by the authors.

Parrat-Dayana and Bovet (1982) also entered into the debate by pointing to three sorts of artifacts which, according to them, explained Donaldson and McGarrigle's results:

1) An *effect of distraction*, present in many studies of the same type. The intervention of the "clumsy bear" who destroys the arrangement of the counters diverts the child from the true problem posed, that of transformation. In fact, the circumstances under which the transformation of the row (the game) takes place, cause the child to treat the accompanying modification as unimportant and to neglect this aspect of the problem.

2) The situation of "accidental" conservation does not involve a *demand for justification* of the response supplied by the child, which constitutes neglect on the part of the researchers, of the logical operations and of the functioning that underlies the responses of the child.

3) The *number of counters* used in the "accidental" situation is less than that used in the classical situation, which is a facilitating factor for the child.

In fact, examining this debate closer, it seems to us that the resulting impasse rests upon the fact that it is the *precocity* of the appearance of conserving behaviors that is considered to constitute the heart of the problem. Even if at the outset, Donaldson and McGarrigle strongly insisted on the notion of *context* in which a cognitive problem is posed to the child, the definition that they give to the word "context" remains very limited. In effect, for them, the classical conservation situation obscures the resolution of the task because the experimenter unwittingly leads them to believe that the level of the liquid in the glasses is important. Donaldson (1978) seems to imply that

it suffices to present a cognitive task to the child in "favorable conditions" for the child to solve it without difficulty. At the risk of being a bit polemical, we would say that the interpretation made of classical Piagetian experiments claims: "the context is only important and only plays a role (of screener or facilitator) for the next experimenter!"

Now, it seems to us that if one considers that each situation is *always contextualized*, the question of early conserving responses appears entirely secondary. One would no longer ask if the child *has* or *does not have* the notion of conservation for example (the question asked by both Donaldson and McGarrigle and by Parrat-Dayana and Bovet) but rather, *under which particular conditions* does a child come to elaborate a correct cognitive response or a system of adequate responses. In other words, more precisely: *when does one succeed in proving which understandings and competencies, in which situations and as a result of what kinds of experiences?* One sees directly that the notion of stage does not permit us to answer the question in an explanatory manner since one would have to therefore explain how the individual comes to such a stage, which takes us . . . back to the original question.

Thus, the more interesting issue is to explain the complexity of the complete situation giving rise to learning, because:

1) the situation always means the presence of two social agents. In experiments on cognitive development, these most often include an adult faced with a child, that is to say, two social agents of different social status, not sharing the same cognitive, affective and social acquisitions. This basic fact which has been often neglected, seems to us very important since all apprenticeships entail a cognitive and affective interplay which interacts not only with the task itself but also with the relation which establishes itself between the experimenter and the child.

2) the situation *always* unfolds in a specific scene, that is to say, that each situation always includes a "distractor" or a "screen," the only difference being that in certain cases the experimenter (again as social agent) is aware of it and in others not. In effect, the whole logical problem always occurs as a *specific content* (Haroche & Pecheux, 1971, call it "setting") which refers it to affective and social representations. These, in the

eyes of a child, have a certain importance of which the adult is unaware. For example, in the interactive phases resulting in the greatest gains (Perret-Clermont, 1979) the children often accorded a lot of significance to the color of the candies they were supposed to share, while for the experimenter, the point of the game is plainly quite different.

To go beyond global analysis in terms of stages in order to capture the dynamic of development of behavior in the specificity of contexts which create it. This change in point of view introduces a series of new questions which are legitimate lines of research as well:

1) Can one really assume that the cognitive sphere "functions" independently of the affective and social spheres? Is it not more pertinent to ask ourselves rather *in which situation and under which conditions does the human being reason "logically"?*

2) How to establish *intersubjectivity* between the experimenter and the child in Rommetviet's sense (1976, 1978) and in particular, what are the expectations of the child in the situation with which he is confronted? Several of our studies showed, for example, the considerable importance of the *consignment* which, often inducing the idea that the task is a "game," creates an expectation of another order for a child. Finn (1982), for example, investigated the behavior of a child in a situation where the tasks presented were insoluble, and where the usual rules concerning the manner of posing a cognitive problem to a child are violated. In effect, in Finn's experiment, the first task proposed is insoluble because of a lack of necessary information for resolving the task. The results show that all the subjects except one responded that they *did not know how to solve* the problem, and not that they *could not solve* it. In the second task, the experimenter asked the child the following question related to the notion of class inclusion: "Are there more Compahs or Wombles?" The first term of the question (Compahs) is a word invented by the experimenter whereas the second (Wombles) is known to the child. Almost all the children responded that there were more Wombles than Compahs because they "knew" the Wombles.

This research is interesting to us because it shows that a cognitive task does not occur in a social void and that it is never "purely" cognitive.

On the contrary, the child confronted with a problem (as "cognitive" as it may be) always grasps it out of his own experiences and understandings, social and cognitive. These determine the precise expectations of the child, for example the expectation that the adult asks serious questions which have an answer.

3) How do the subject's *social representations* of the task and of the situation he is confronted with interact with the solution of the task itself? In this regard, Doise and Mugny (1981) proposed the hypothesis that situations for the child are easier where the homology between the domains evoked (through the bias of the social representations) and the immediate field are such that the subject can get support from the first for structuring the second. This hypothesis leads us to grant more importance to all that which, in the task, precisely calls upon the "evoked domains" of the child, that is to say, to all that is usually considered as non-pertinent because it is not in the direct service of the logical solution of the task. Elsewhere (Perret-Clermont, Brun, Saada & Schubauer-Leoni, 1982), we have called this the effect of the "scene." We studied it in connection with the work on the notion of conservation of liquids in different conditions of sharing, as well as on the notion of conservation of number.

4) Under which cognitive and social conditions could a subject arrive at a kind of *generalization* of cognitive behavior developed in a specific context? In our opinion, this question was avoided in the many research projects of Donaldson (1978) and others in that tradition, which emphasized the precocity of operational responses. These projects, in their particulars and peculiarities, do not explain why the child attains a solution to a conservation problem at one time versus another in the classic Piagetian situation. They do not allow a means to examine more general psychological processes which underlie the responses of the child.

To answer these questions, it seems to us, would be to facilitate advances in our understanding of the development of intelligence in the child and at the same time to invite us to reexamine in detail the cognitive dynamic of our school settings which are not always as "pedagogic" as we would wish them to be.

Notes

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Learning Styles Among Pueblo Children

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Are there differences in the patterns of thought and in the strategies of learning among individuals raised in different environments? This question, which has interested cross-cultural researchers for a long time, became our focus of research as a result of our educational work in Pueblo communities in Arizona and New Mexico. One aspect of Pueblo life appeared particularly significant in its implications for cognitive development, namely, the opportunity these children have to observe their elders at work over long stretches of time while they farm or produce crafts. The role of observational learning is examined in this study in relation to other styles of learning such as learning through exploration as well as through social dialogue.

Observational Learning

In rural and tribal communities the developing child finds him/herself in the company of elders who are engaged in social productive work; such opportunities for being part of the world of adults are less available for urban children. As many bilingual children or their parents have come from such settings, a closer examination of the implications of this interpersonal mode of learning is warranted. In the case of Native American children raised in the Rio Grande Pueblo communities, we found that they are able to observe adults involved in sequences of activities integrated over time (farming, crafts, pottery, tanning). A child has some freedom in wandering around in these village communities, and he/she is likely to spend time with a favored relative or neighbor. In contrast with formal learning in classrooms where a child's teacher is not part of the child's home life, the young learner in a Pueblo community is free to choose a person of emotional significance as a teacher. Children are allowed and expected to take a larger and larger part in the performance of some of these activities as they grow older, but they are not rebuked for making mistakes; their participation is up to them as learning by observation is not tied to a specific reward system. Some

observations are remembered over a long period of time, even when the activity is not practiced. A young man described his memory of learning to make pottery:

Just this summer the wife and I were talking about taking it [pottery] up as a hobby and maybe there would be some profit in it. We're trying to, we don't know the first thing about it. She says that her mother knows something about it. Yet when I think about it, I do remember a lot of things that my grandmother used to do. She never actually taught me, but I just watched her -- like the kinds of mixtures that they used to make the clay and the way they processed the cow manure and those kinds of things. And how she enclosed the fire pit to bake the pottery. I even went back to the same places she took me to in order to gather that stuff. She used to put them on her back. It really amazes me how much I picked up as a youngster from her just in passing. Maybe, it was because it was never forced on me, I was never criticized about it. *I just watched it and sometimes she would come and say this is the way to do it.*

Observational learning is most frequently identified as a critical aspect of intellectual development by people raised in Indian communities. In these settings, the closeness of family members, the mutual responsibilities shared by members of a community that has limited economic resources, and the belief that Indian traditions are important but should not be "rammed down" children's throats, all contribute to learning by watching, and learning by identifying with loved and respected individuals. It is our contention that such learning takes place in many social settings other than in Indian communities, but it is not as clearly identified or remembered by those who experience it.

All children identify with their elders to some extent. As one Pueblo woman put it: "I think of her [her mother] and I think of all those traits I have that come from her, and I got them early in childhood." In our experience the Indian view of the relationship across generations is different from that of people raised in Westernized settings. The realities of the division of labor and of the specialization of teaching and family roles are so deeply ingrained in the West that it even affects the way individuals raised in such a society think of their childhoods. A clear division is drawn between teachers who instruct you and give you valuable skills, and your relatives. It would be unusual to encounter among those who are

influenced by the rapidly changing lifestyles of industrialized societies the Pueblo view: that one is always an "apprentice" to others who are older and more experienced.

Learning Through Exploration

All children learn from older people, their peers, and friends; and they also learn on their own. There is an alternative rhythm in their lives where time spent in the company of others is interspersed with time spent in solitary exploration. A number of psychological theories also place exploratory learning into a central position, the most important of these being Piaget's work. The examination of objects, taking toys apart, the adventures of the mind engaged in during the slow hours of the day, or roaming the woods and playing in the fields during summertime -- all these playful activities develop a sense of wonder and sharpen children's curiosities.

The sense of wonder is crucial to the development of the scientific imagination. Einstein spoke of it in an autobiographical essay (Schlipp, 1951). He recalled that he received a compass from his father when he was 4 or 5 years old; he was surprised to find that the needle of the compass "behaved in such a determined way." He wrote, "this experience made a deep and lasting impression on me; something deeply hidden had to be behind things" (p. 9).

The effort involved in discovering the hidden aspects of things is seen as an essential aspect of children's mental growth. Piaget (1954) views the growth of operations as fueled by these explorations, which in turn lead to the development of cognitive structures.

Clearly, psychologists recognize the role of exploration in human development; however, in our interviews there was no mention of this kind of learning. Perhaps activities which are here called exploration are seen as play and idleness by people when thinking about their own experiences, and therefore do not emerge when they are discussing "learning."

Learning Through Social Dialogue

Children's observations and explorations take place in a social context as they share the physical and cultural environment of their kin and community, verbal learning is even more explicitly social in nature. It is primarily through spoken

and written language that the accumulated knowledge of a community is transmitted to the younger members of that group; that which is verbally labeled for young children assumes a perceptual salience for them; the activities and social expectations which are verbalized by their elders forms an ever-present framework to the young child's experience. And, the very means of these patterned experiences -- words -- are acquired by children through dialogue. In children the hard work of attaching meaning to their experiences, and internalizing the results of their learning, changes throughout the developmental span.

In our work with Pueblo adults, we found that an emphasis on verbal rules and explanations was of great importance to them in their interactions with children, even though some of the teaching adults have not had much formal education themselves. The emphasis on language in these Indian homes goes counter to some of the widely discussed theories concerning verbal exchanges in the homes of poor and/or rural people. In the literature on class differences in language use (for a review and critique, see Leacock, 1971; John-Steiner and Smith, 1978), the nature of mother-child verbal interaction is stressed, and especially in giving directions. Working class exchanges are characterized as "restricted code," with direct exchanges such as "do this," or "put it this way" and no explanation. Middle class exchanges are characterized as "elaborated code," directions with explanation, and in general, an emphasis on answering children's why questions at length. In all of the verbal teaching reported in the interviews, whether occurring now or 50 years ago (when many more Pueblo people were very poor, and thus in Anglo eyes "lower class"), the people rely heavily on elaborate explanation and seem to take very seriously the necessity of children understanding the reasons for a procedure.

In their childhood recollections, Indian teachers mentioned many situations where they were verbally taught by their relatives in addition to being able to watch them at work. In cooking, the two processes were clearly intertwined; one woman describes the verbal exchanges with her daughter which illustrates the mixture of modes:

I told her, you forgot to put in your baking powder. And she said, how do you know? Because the bread is too hard and it won't rise. It was so dry and it is kind of shiny, that is how you can tell if you don't have baking powder. Then she said, she did put in

some, but maybe she didn't put in enough of the baking powder. So I make sure every time that she is going to make tortillas, I tell her to put in just enough lard and the baking powder and she makes the best tortillas. She makes better than I do. Talking about frying eggs, I have two brothers and one day my grandfather was teaching them, while he was watching them one morning, they were frying eggs too and my grandfather said, no, that isn't how you fry eggs. He said, don't break your egg close to the frying pan, you are going to burn your hand, you have to do it way up here like this.

Among active teaching processes, then, are verbal instruction and explanation. But verbal instruction in this context, unlike the classroom context, is always accompanied by observation, demonstration, and/or the child's imitation of the process; verbal instruction also often takes the form of explanation of the reason for the technique or procedure. Some Pueblo people continue to rely on this close connection between speech and activity, at least in connection with certain types of learning. Thus, a Pueblo woman in her early 40's describes a crafts class.

The oldest person, the old man, was a very elderly man and he was very gifted. He could do just about any crafts he did it very well but he did not stand there and lecture. He'd just show people and if we had any questions, you'd ask. And a lot of times some of the other craft people felt that he should explain more. I got along very well with him because I would sit down next to him and I would talk to him. And he was willing to help but it was very different. He didn't stand up at the blackboard for a long time.

Clearly, in the Pueblo home it is while work is ongoing that learning is most often communicated through speech. The link between words and deeds as a powerful process is captured by Bruner in his introduction to Vygotsky's *Thought and Language* (1962): "Man, if you will, is shaped by the tools and instruments he comes to use, and neither the mind nor the hand alone can amount to much" ¹ (p. vi). The special role of human dialogue in uniting the separate processes of verbal and non-verbal growth is a major theme in Vygotsky's book; Bruner summarizes it in the following way: "For it is the internalization of overt action that makes thought, and particularly the internalization of external dialogue that brings the powerful tool of language to bear on the stream of thought." (p. vii).

The many examples of verbal dialogue and explanation in these Indian homes as described by those we interviewed presents us with a different style of interaction than that which has been observed in middle-class homes. In the latter, language is exchanged as isolated from activities, it is frequently context-free. Thus, it resembles more closely the exchanges which occur between teachers and children in classrooms. Contemporary educators have criticized the purely verbal method of teaching; indeed, many schools are moving in the direction of linking more closely word and deed, and word and image, in the course of instruction. These developments necessitate the reexamination of the issues of verbal learning and teaching.

The material collected in this study seems to indicate that a simple dichotomy of learning environments according to class membership or economic level of the family might be fallacious; the cultural emphasis upon verbal explanations in the Pueblo community raises the question of whether a multiplicity of environmental factors might indeed affect the nature, functions, and styles of language development in children.

The process of how, and to what extent language is used for communication, and the more difficult issue of how language is used as a system of symbolic representation is basic to both our theoretical explorations, and to the data we gathered in this study. One insight we gained in the course of this exploration was the recognition that the strong emphasis upon mother-child verbal interaction as a major factor in the development of language functions may be warranted in urban nuclear families, but in integrated small communities such as the Pueblos a multiplicity of interactions are open to children. Grandparents, and other relatives, even neighbors, participate extensively in the patterning of experiences for young children. They, too, became partners in activities and verbal exchanges with the very young. Thus, the changing systems of children's thought are molded by the tools available to their community; by the prevalent methods of physical and economic survival; by the language and visual symbols used by their family; and most importantly, by the ways in which nurturance and instruction are patterned in their society.

Any theory, therefore, which attempts to capture both the universal and the culturally specific

interactions between learning and the internal representations of what the child has learned is in need of certain theoretical tools. We have chosen to build such a framework by extending Vygotsky's concepts, particularly his formulation of *functional learning systems*. He wrote that, in the course of development, psychological systems appear which unite various separate functions into new combinations and complexes. The aspects of the research most relevant to the study of the functional learning system are summarized in the following sections.

Methods

In this research study we were interested in exploring the intellectual consequences of children growing up in culturally diverse learning environments. We tried a variety of ways of gathering information about the social experiences of Pueblo children and the manner in which different aspects of their learning may be integrated. One technique was particularly productive: we explored through interviews with Indian teachers and aides their notions of the learning process. All interviews with these nineteen Pueblo adults were taped and later transcribed. The interview procedure was informal; it was usually conducted in the home of the interviewee. Initially, the interviews were exploratory and open-ended, but we were able to derive from them increasingly standardized and generative guidelines for topics to be discussed. The final format is entitled *Interview on Learning Experiences* (available from author). The styles of learning elaborated earlier in this paper (observational, exploratory, social dialogue) were enriched by the information from these Pueblo adults.

In order to assess the impact of these different learning experiences within the Native American environment, we worked with children in a number of Rio Grande Pueblo communities. Of particular interest in this study was the relation between visual and verbal representational processes. Two of the tasks which effectively revealed differences were story retelling and drawing. The technique was originally developed during the early days of Head Start as a method of working with children whose languages and cultures differed from the mainstream (John and Berney, 1968). The method attempts to capture both linguistic and cognitive patterning in children's performance; it derives from the fact that all

children are exposed to the thematic discourses of their elders. In tribal communities, traditional tales, such as those told among the Navajo in winter, are an integral part of community life and the socialization of children. In urban communities, the exposure to sequential languages is manifold, and includes the mass media as well as face-to-face experiences.

We know little of the ways in which children select, transform and store these streams of words. It seems reasonable to assume that a general cognitive process consisting in a simplification of sequential language is shared by all children, but that children differ in the extent to which they rely on key *words* and/or *images* in storing a theme, or story sequence. During recall or retelling, a simplified internal version is reexpressed in communicative language. The style in which the child retells the story, and the themes which now appear salient in the child's retold version, may reveal the particulars of cultural emphasis. Among bilingual children, depending on whether the story is presented in their weaker or stronger language, the relative importance of a visual schema of the story may vary.

The story retelling procedure consists of the field worker reading a story to the child, who then retells the story as the pictures are being presented in sequence. The Pueblo children were also asked to draw a picture based on the story after they had retold it. It became evident after a few stories in some Pueblo kindergartens that the children's knowledge of English was limited; the story, when retold in English, could tell us very little about how these children processed visual and verbal information. Arrangements were made to administer the task in Keres, but for various reasons it was possible to obtain stories from only three kindergarten children in their native language.

The retold stories were analyzed for length (number of phrases) and type of phrases. The drawings were scored for cognitive and aesthetic aspects using a scale developed by Mooney and Smilansky (1973).

Results

Among most of the children we worked with, developmental increases in language productivity were found in the story retelling task. A similar increase also exists in children's drawings as they

move from kindergarten to first grade. Of greater interest is the relationship of these different scores as they reflect the internal organization of cognitive skills.

The drawing scores of Pueblo children who were taught in their weaker language, English, were high, while their language scores were low. When children in another Pueblo school whose dominant language was English retold the story in their weaker, Indian, language, they also relied more heavily on visual rather than verbal representation. Further, a group of children who heard and retold the story in their native, and dominant, language revealed a balanced reliance on both visual and verbal representations of the story. The results from these three groups, when viewed in light of each other, may best be explained by the concept of the functional learning system. The differential reliance by these groups of children on visual or verbal representation systems seems to be a functional way of dealing with communication needs in a demanding and contradictory language situation.

Conclusion

The Pueblo communities we studied value and encourage learning experiences which are different from those taken for granted in the urban classroom. The impact of observational learning, for example, is strengthened by the many opportunities for Pueblo children to spend time with a variety of Pueblo adults. Alfonso Ortiz, an outstanding Native American anthropologist, elaborates this point in the following statement:

... until he enters school the whole Pueblo is the child's playground, and everyone is a potential playmate. Games involving large groups of children are the norm, and the children are rarely alone during the waking day. The relatively simple living conditions and the absence of strangers make it very unlikely that children would be hurt. There is also not enough mechanical gadgetry present in most homes to present much danger, and the small size of the average home rarely permits the child to be out of range of parental scrutiny (Ortiz, 1969).

The fact that observational learning is facilitated by many aspects of Pueblo culture fits well with our expectation from previous literature on cultural differences that Pueblo children would be more visually oriented than children from urban communities. It is important to stress at this point that there is not a single medium of

expression, either visual or verbal, that is valued above the other. The literature (Feldman, 1974) points out the many ways in which Native American children excel in visual tasks; we find many instances in Pueblo life where teaching and learning are rooted in verbal explanation and conceptualization as well. The complexity of these impressions has forced us to examine the results of our research in a way we did not at first expect. The functional learning system is the conceptual tool which helped us free ourselves from the tendency to view these children through the prisms of our own experience, and to exaggerate, at times, some feature of their lives because it contrasts with our cultural experience. The bicultural demands upon Native American children should not be seen as resulting in a polarization of modes of representation. Rather, the findings of this investigation illustrates how learners adapt to the requirements of shifting cultural contexts; in the process of responding to novel situations, a concomitant reshaping of the organization of cognitive skills takes place. The most effective means we have found for conceptualizing the flexibility of human beings in adapting to change is Vygotsky's functional learning system.

Notes

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¹Bruner is here paraphrasing one of Vygotsky's favorite historical citations, attributed to Roger Bacon.

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Folk Theories of Comprehension and Caregiver Practices in a Rural-Born Population in Central Mexico

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The relationship between verbal and nonverbal conduct which is assumed to express underlying beliefs/attitudes is very contradictory in the psychological literature (Wicker, 1969). Sometimes a relationship can be demonstrated between verbal reports of beliefs/attitudes and nonverbal action expressing them. For instance, Potter and Klein's study disclosed that mothers who expressed positive attitudes toward breast feeding were observed to be more affectionate toward their infants and to make a greater effort to facilitate breast feeding at the time of nursing than mothers with negative attitudes. On many occasions such a relationship cannot be found. The classic study by Hartshorne and May (1930) demonstrated that the trait of honesty was not correlated with honest behavior. However, while in Central Mexico confirming results of an earlier U.S. study on the transition from nonverbal to verbal communication among care-giver-child pairs during the one-word period (Zukow, Reilly & Greenfield, 1982), I also collected intensive interview data which included questions on demographic data as well as questions assessing the local folk theories¹ of child development and child-rearing. I did find a correspondence between nonverbal conduct, care-giver style or practices, their verbal conduct, and responses to the interview assessing their beliefs/attitudes about child development and child-rearing. Sets of verbally expressed

beliefs/attitudes and nonverbal practices appear to be related to the level of formal education attained by the primary caregiver.

First, I will briefly acquaint you with the results from the earlier U.S. study (Zukow et al., 1982) and its confirmation in Central Mexico (Zukow, in press). Second, I will describe scores derived from the caregiver interviews. Then I will discuss the correspondence between verbal and nonverbal expression of beliefs/attitudes in this population and touch on some of its implications. In particular, I'll argue against a causal relationship between verbal and nonverbal expression of beliefs/attitudes. Next, I will treat the ways in which high levels of formal education may shift caregivers' verbal and nonverbal expression of beliefs/attitudes from one set to another.

Original U.S. Study

In earlier work in the U.S. (Zukow et al., 1982), we suggested that the interactive style of middle-class caregivers contributed significantly to the transition from nonverbal to verbal communication. In that work, we asked the following question: How do children who are able to communicate successfully in nonverbal interaction acquire the ability to transact a successful linguistic communication? To study this transition, we selected what is undoubtedly the most basic and well-established interactive routine in *these* infants' sensorimotor repertoire, the adult-initiated offer. The most prototypic offer is probably the mother offering the breast to her newborn infant. Our hypothesis was that a mother could utilize this well-understood interactive context to help her baby progress to the comprehension of offers presented on a purely linguistic level. The specific focus of our research was to examine how the caregiver worked to provide a shared context that was sensitive to the child's abilities at different points in the developmental process.

Very briefly, in a naturalistic experiment we (Zukow et al., 1982) found that early in the one-word period, messages were usually enacted entirely on the nonverbal level. That is, all elements of the *event structure* (persons, actions, objects, locations, and configuration) were tangibly present. For example, when a caregiver made an offer she got the child's attention and proffered an object, such as an apple, by extending it toward her child in her upturned palm. During

the middle level, caregivers often presented messages simultaneously on the nonverbal and linguistic levels, providing a nonverbal 'translation' of the verbal utterance. For instance, the caregiver might say, "Do you want the apple?" while extending her upturned palm with apple in hand toward her child. If nonverbal elements were missing and the child did not initially comprehend the offer, the caregiver often made them available to facilitate the child's eventually successful comprehension of the interaction. In some cases, the apple might simply be on the table when the caregiver said, "Do you want the apple?" If the child didn't respond, the caregiver might confirm that the child was attending and then add the missing gestural component by proffering the apple. When information was not supplied on the nonverbal level, the children were unlikely to comprehend the messages. Finally, at the third level, some messages were comprehended by the children even though nonverbal support for the linguistic messages decreased. That is, on some occasions the caregiver could be comprehended when she said, "Do you want an apple?" or "Do you want to throw the ball?" with little contextual support available.

Apparently, the child was no longer limited to the information provided by the immediate situation, but could bring her or his own knowledge of the world to bear upon the interpretation of ongoing events. Our work supported the notion that the simultaneous presentation of nonverbal and verbal messages at the middle and third level of the one-word period provided a means for the child to crack the linguistic code.

Intracultural Comparison in Central Mexico

Most child language research is based upon data collected from families with a high level of formal education living in urban settings in Western nations. Data from Third World children living in rural settings or from families with little formal education are severely under-represented. The theories that arise from these limited data are implicitly, if not explicitly, ethnocentric. The problem is that the naive or unwary as well as the sophisticated take these norms as universals instead of culture specific courses of development. This intracultural investigation of 16 rural-born caregivers compared and contrasted the ordinary, everyday communicative interactions of two highly educated women and their children. This

study was designed to provide a more representative data base for investigating the universal and culture-specific aspects of the transition from nonverbal to linguistic communication during the one-word period.

Method

To control for language, race, and culture, all caregivers came from the traditional rural culture. To differentiate between varying levels of productive competence during the one-word period, the children were classified by level of semantic development according to criteria set by Greenfield and Smith (1976) and Zukow et al. (1982). Caregivers selected interactive settings representative of those in which the child was commonly engaged and in which the most communication might be expected. Twenty-minute color videotapes along with separate audiotape recordings were made of each child at approximately six week intervals. Each audiotape was transcribed by a native speaker familiar with the rural culture. At least one-half of all the videotapes for each child were reviewed by the caregiver and myself for accuracy. In cases of disagreement, the caregiver was always considered the expert. In this study all instances of caregiver-initiated imperatives to engage in perceptual and action sequences directed to the target child were collected. About 300 were collected for each child.

Results

Preliminary results from the larger sample confirm the findings for the child of one highly educated woman and the child of one woman with little education (Zukow, in press). In this study caregivers with origins in the rural Mexican culture share a common and, perhaps, *universal caregiving practice* which may facilitate their children's transition from nonverbal to linguistic communication. During Levels II and III of the one-word period all caregivers produced many messages simultaneously on the nonverbal and linguistic levels. This pairing provided the children with a nonverbal translation of the linguistic message that may permit them to crack the linguistic code. With these data I demonstrated that messages accompanied by nonverbal support were understood successfully to a significantly greater degree than those which were not so accompanied. Impoverished nonverbal support is overwhelmingly associated with failure to

consummate an imperative sequence successfully. However, supplying the missing contextual information leads to eventual consummation in imperative episodes.

The Mexican mothers, although they shared humble origins, differed sharply with respect to the level of education they received and the lifestyle they currently enjoy. This intracultural comparison revealed that there may be culture-specific caregiving styles or practices related to level of education. The highly educated woman had much in common with her middle-class counterparts throughout the world. Highly educated women living in urban centers have a very distinctive caregiver style (Kaye, 1976; Snow, 1977; Wertsch, 1978; Wood, Bruner, and Ross, 1976) that is constantly finely-tuned to interpret their children's actions and to determine their intentions (Braunwald & Brislin, 1979). These women constantly monitored their children for comprehension and unceasingly repaired faltering interactions. For an example, turn to Interaction 1.

Interaction 1 (LP-T, 8/5/81)

- M: "Dónde está el gua-gua?" ("Where is the dog?")
/M. continued to search for the dog to the side and behind L./
- M: "Búscaló!" ("Find it!")
/M. moved toward the doll house directly in front of L./
- M: "Ay, mira!" ("Oh, look!")
/Said while M. was moving some toys away that were in front of the dog./
/L. had been looking in that direction./
/L. picked up the dog and showed it to her sister Lucha./

In this interaction the mother, Maru, slowly provided the event structure prior to directing Luci to engage in the activity of finding the dog. She first got Luci's *attention*. Coincidentally, or because of the shift in attention, Luci stopped playing with her dolls. This readiness to engage in a new activity provided part of the *configuration*. Next, Maru supplied the *demonstration*, searching for the dog. After the imperative presentation, "Búscaló!" ("Find it!"), Maru directed Luci's attention to the doll house in particular and disclosed the whereabouts of the *object*, the dog. When all the elements were present Luci did not merely look at the dog in response to "Mira!" ("Look!"), but grabbed it and proudly displayed

her finding to her sister. This very careful foregrounding of the event structure was more typical of the more highly educated mother.

Most of us have assumed that this style is necessary for the transmission and emergence of (cultural) knowledge (Ryan, 1974; Shotter, 1978; Trevarthen, 1979), rather than simply sufficient. Recently researchers concerned with the emergence of cultural competence in language and play have confirmed that this style is not universal (Ochs, 1982; Ochs & Schieffelin, in press) and have noted that this style can lead parents and researchers to overestimate children's abilities (Wickler, 1976; Zukow, 1983). Less educated women also provided nonverbal support to facilitate comprehension. However, in cases of communication distress their efforts were finely tuned but were less intensively provided at both levels. Further, the source of the event structure appeared to be more serendipitous. Often happenstance in the form of the natural emergence of the contextual information during ongoing activities, the spontaneous actions of siblings, or accidental noticings on the part of the children supplied missing elements. For instance, in the following example (Interaction 2) the mother, Carlota, had seated the child, Irene, and her sister, Maximina, in front of a basin of water and had given them many bottles, cups, and a doll for water play. Carlota seated herself about 8 feet away on a mat. From there she directed the girls' activities.

Interaction 2 (IG-S, 7/16/82)

- C: "Bána la muñeca!" ("Bathe the doll!")
/I. was filling up a bottle of water./
- C: "Lávala!" ("Wash it!")
- C: "Lávala!" ("Wash it!")
- C: "Lávala con agua!" ("Wash it with water!")
/I. dropped her hands from the bottle./
- C: "Echale con este!" ("Pour it with this!")
- C: "Bána!" ("Bathe it!")
/Said as C. was rolling up I's sleeves./ /M. poured water over the doll./
- M: "Yo lo lavo!" ("I'll bathe it!")
/As M. rubbed the doll with water./
/I. washed the doll./

In this episode Irene was *attending* to the *objects* and was seated in the appropriate *configuration* to engage in water play. However, Irene was occupied with filling up a bottle with water and was not free to bathe the doll. Her mother

called out repeatedly to bathe, wash, and finally, to simply pour water on the doll. Carlota did not provide an activity demonstration of any kind. Irene dropped the bottle but did not bathe the doll. However, while Carlota rolled up Irene's sleeves, Maximina responded to the imperative directed to Irene. Maximina's use of the first person singular subject pronoun was highly stressed to emphasize that *she* was doing the specified activity rather than Irene. After the demonstration by Maximina, Irene washed the doll. This episode differed from the previous one only in the fact that the missing element, the *activity demonstration* of bathing the doll, was provided by a sibling.

Note that the differences found in the caregivers' interactive styles *are a matter of degree* and are not absolute. These different styles may be related to each woman's folk psychology.

Folk Theories

Each caregiver participated in a intensive interview designed to elicit the mother's beliefs and values about child-rearing and child development. Fourteen caregivers in the larger study were interviewed. The interview questions were informed by studies by Ninio (1979) and Snow, de Blau, & van Roosmalen (1979). A score was derived from a subset of questions which were related to cognitive development, especially comprehension. These included at what age children began to think or have intentions, what caregivers did to prevent children from doing prohibited activities or to induce them to engage in activities, the importance of conversation in which children actively engaged rather than passively listened or repeated, and the causes of change within the child (from natural unfolding to the exercise of reason).

Two sets of beliefs emerged. On the one hand, mothers with little education consistently voiced the belief that children during the one-word period will comply if they can understand what they were asked to do. If children don't comply it is because they do not have the ability to comprehend at that point in time. The emergence of language is perceived as a natural unfolding of abilities; these children will be able to comprehend sooner or later. Input or effort on the caregiver's part is not perceived to be causally related to the emergence of language. In contrast, motor and social skills

such as walking and food sharing are consistently and patiently demonstrated and guided. (Although directed to slightly different topics these findings are consistent with those of Graves [1967] and Romney & Romney [1966].) On the other hand, more highly educated women believed that children who did not respond appropriately to speech could perform more adequately with help. Talking to very young children and engaging in conversation with them was believed to facilitate language acquisition. Social and motor conduct were promoted as well. Standardized scores calculated for the highly educated mothers permit us to reject the hypothesis that highly educated women belong to the same population as women with little education. The probability is less than .05 ($Z = 1.65$) for one mother and less than .002 ($Z = 3.18$) for the other.

These verbally expressed beliefs/attitudes may be related to the differences in the caregiver's nonverbal practices observed in the present study. That is, the mothers with little education, who believed children didn't perform adequately due to a lack of ability, did not provide as much contextual information to their children on the occasions when the children did not perform the specified activity. The more highly educated mothers, who believed children could comprehend with a little help, did provide more nonverbal information when their children failed to respond adequately to imperatives.

Discussion

The implications of that correspondence touch on several issues: (1) the causal relationship, if any, between verbal and nonverbal conduct expressing beliefs/attitudes and (2) the 'cause' of the shift in caregivers' nonverbal practices and verbally expressed beliefs/attitudes among caregivers with a higher level of education.

First, sometimes verbally expressed beliefs/attitudes and nonverbal practices are correlated. However, there is no robust evidence that one or the other is causal, although it is often an implicit assumption made by researchers (Wicker, 1969, 1971). A third factor common to both variables can be hypothesized to account for the relationship between nonverbal practices and verbally expressed beliefs/attitudes. That third factor may be socialization. Both nonverbal caregiving

practices and verbally expressed beliefs/attitudes are learned as one becomes a competent member of her or his own society. Thus, they are probably independently acquired and not causally related.

Second, highly educated women have different verbally expressed beliefs/attitudes and nonverbal practices than their less educated counterparts, although they presumably had fairly similar experiences during childhood. The two highly educated women were resocialized. They attended secondary schools and universities in Mexico City which reflect the middle-class culture. The teachers and professors in those institutions also appeal to and attribute reason to their charges, believing that with help their students can eventually comprehend difficult material which, at first, they cannot. Further, these women attended courses or lectures on child development, which might espouse these beliefs on a theoretical level. Thus, highly educated women were exposed to and participated in interactions which conveyed middle-class nonverbal practices and verbally expressed beliefs/attitudes. The ramifications of higher education appear to be far reaching. This shift to the middle-class can apparently be made within one generation and affects not only the individual but her children in very profound ways.

Notes

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¹I'd like to point out that Holland and Davidson (1983) suggested that folk models inform our actions by providing us with ways to interpret events, while D'Andrade (1983) discussed folk models as procedures we know how to carry out in action but cannot recount. Thus, verbally expressed beliefs and nonverbal practices seem to have been carrying the same label, folk model, in the literature. We should be careful to keep these notions separate.

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Rote or Comprehension: Does a Teacher Get What S/he Wants?

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In the fall issue of the *Newsletter* (October, 1983) Cole and Griffin describe how a reader delivers correct answers to questions about a text by identifying "physical matches" between words. Some lead words in the question are recognizable in the text and thereby linkable with other words which are *physically proximate* to the lead words.

In the course of my dissertation research (Koivukari, 1982), I had the opportunity of observing similar phenomena in oral class sessions conducted in secondary schools in Zaire. One of the aims of research was to analyze how teachers induced either rote activity (textual reproduction) or comprehension activity among students. The conceptual framework was thus based upon a

distinction between qualitatively different kinds of learning: learning by rote and learning with comprehension. The basic categories of coding were: (1) textual reproduction or rote; (2) reproduction of content; (3) generation of new content on the basis of preceding instruction or experience. Categories Two and Three were assumed to involve comprehension: In Category Two the student went beyond the words which had been given and in Category Three he or she went "beyond the information given."

The students were 11 to 19 year old boys and girls attending the first or the second grade of the secondary school. The teachers (N = 20) were male; none of them were formally qualified to teach at the level where they were actually teaching. All of the twenty classrooms were multilingual, but the common language of instruction was French.

Two pretest and two posttest lessons of geography or technology were tape-recorded in twelve experimental and eight control classes. Between measurements the experimental teachers received 36 hours of pedagogical training, which I provided. The main purposes of the training were to increase student participation in the experimental teachers' classes and to reduce rote teaching and learning in favor of comprehension in those classes. During the class sessions my research assistant, or myself, took notes on the visual events of the lesson. The tapes were transcribed, and the transcripts as well as the observer's notes were used for the data analysis.

In the following, I will describe how the teachers and students influenced -- through the process of interaction -- the cognitive quality of the discourse in the classrooms. For the purpose of outlining the interactional procedures, I will describe a "pure" rote sequence. In reality such sequences were rare, because commonly both rote and nonrote features (those which were likely to generate or express meaning) blended within a sequence. At the teaching (input) phase of a sequence, the teacher repeated a statement a few times, with emphasis. The repetitions were verbatim, i.e., they were lexically, syntactically and morphologically identical. More frequently, some minor variations of the specific input utterance occurred. Such variations were: singular/plural (e.g., *an igloo is/igloos are*), active/passive voice (e.g., *Some Canadians speak French/French is*

spoken by some Canadians), noun/pronoun (e.g., *the Earth is round/it is round*), and surface changes of the word order (e.g., *plains in the center/in the center plains*). At other times the teacher paraphrased one or more nonsubstantive words (e.g., *Abundant rains are characteristic of the Equatorial Climate/Heavy rains are typical of the Equatorial climate*). Several combinations of such variations occurred.

On the basis of previous studies (Bormuth, 1970; Carroll, 1972; Schlesinger, 1977; cf. Nagata, 1983) and my own data I was led to consider such variations as superficial, not involving significant semantic changes. That is, for practical purposes a redundant utterance which presented some surface modifications only as compared to a previous utterance could be considered a textual reproduction of the first utterance. The redundancy probably occurred because unlike reading a written text, it is not possible for a listening learner to check back on what was said previously.

The effect of the repetitive statements, when unaccompanied by extralinguistic stimuli such as visual aids, cued the students to pay attention to those particular words in that particular order rather than to the meaning of the statements. (Experimental manipulations of verbal inputs reveal that subjects can be induced to pay attention to and learn words -- signifiers -- separately from their meaning, and *vice versa*.) The word-to-word repetitive input also seemed to cue the students to expect a particular type of question about the input, questions which would "naturally" result in a textual reproduction of the input. Such questions have been called verbatim questions (Bormuth, 1970; Anderson, 1972; Andre & Sol, 1976; Levelt & Kelter, 1982).

The verbatim questions worked as follows. The teacher transformed an input utterance into a question by simply replacing a substantive word with a question word. (The examples are slightly adapted.)

Example

Input: Heavy rains are typical of the Equatorial climate.

Questions: Heavy rains are typical of which climate?
What is typical of the equatorial climate?

I was led to assume that the form of the question

induced the students to respond with the input statement, for the psychological message of the input and the question seemed to be that the teacher wanted textual reproduction. A verbatim answer ("Heavy rains are typical of the Equatorial climate"), preceded by a verbatim question and a word-to-word repetitive input, was usually rewarded by the teacher ("Very good").

By replacing the substantive words by non-sense syllables we may appreciate that it is not necessary to *understand* the input, the question, or, for that matter, the answer.

Example

Input: TRI DABs are typical of the QUA MAL.

Questions: TRI DABs are typical of which MAL?
What is typical of the QUA MAL?

When the verbatim response was correct, no one knew whether or not the students had understood the input, the question and their own answers. However, as a former teacher, I think that we should know and that there are ways of finding out. I also think that when a verbatim response was embedded in a pedagogical pattern for rote learning, as described above, it was *probable* that the student had not processed the inputs semantically, i.e., that s/he had neither understood nor integrated the inputs. This kind of teaching and questioning does not encourage comprehension, for the teacher asks for and is satisfied with (rewards) textual reproduction.

The students did influence the cognitive quality of the pedagogical process by the quality of their responses. The teaching-learning systems were teacher-centered, so the students were most of the time respondents to rather than initiators of interaction. Occasionally a student gave a newly worded answer to a verbatim question. If the answer was semantically appropriate, the teacher accepted it. However, it did happen that a teacher -- who probably felt rather insecure about the topic he did not know well -- rejected a semantically appropriate (by my standards) answer, clung to the textbook, and required the student to repeat, word-to-word, what the textbook and he (the teacher) had said previously.

At other times, the teacher sought a nonrote answer (e.g., "What do you know about the climate at the Equator?" "What is typical of the climate in Northern Zaire?") but received textual

reproduction ("Heavy rains are typical of the Equatorial climate"). Again, the teacher's reaction revealed whether or not he persevered in seeking the quality of answering expressed by his initial question.

The above examples suggest varying degrees of meaning in classroom discourse. Comprehension is called for by substantive linguistic variations, which direct attention away from words (signifiers) to what those words mean and, above all, by bringing reality into the classroom through the usage or evocation of extralinguistic referents and representations. For if the words simply refer to other words and to nothing *outside* words, teaching and learning will remain *of* and *within* words.

Beeby (1966) has outlined a theory of stages in the life of educational systems, which, I believe, is in harmony with the view that human beings try to make sense out of the world -- even when at school. According to Beeby -- he refers to Western type systems of formal instruction -- it is the gradual emergence of meaning which denotes the evolution of the system. The rote memorization of symbols, deprived of reference, characterizes the lowest stage. At this stage, which reflects the inability or unwillingness of society to invest in education, classrooms are overcrowded, equipment poor, teaching methods formal. The teachers, whose level of general education is low and who are also poorly trained for the profession, do not master the subject they are teaching. "If at the same school stage (the first stage) the connection between the symbol and meaning is often lost entirely, at the stage of formalism (the second stage) the symbol usually has a meaning for the children, but it is narrow, restricted and relatively isolated" (Beeby, 1966, p. 61). Beeby's stage III is that of transition, and it is only at Stage IV that meaning emerges fully. Within-system inequities in this respect reflect, I believe, the inequities of society at large and can only be changed, ultimately, by changing society.

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Work-In-Progress

Community Educational Resource and Research Center

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The Community Educational Resource and Research Center (CERRC), located in San Diego, California, is being developed as a model system for coordinating the research and educational enrichment activities of minority scholars, post-secondary students, professionals, community educators and leaders. We direct our efforts to minority and educationally disadvantaged communities from which we come: Our goal is to increase these children's educational achievement *markedly* at all levels of the educational system -- from pre-school to post doctorates. This model system represents an integrated approach which maximizes the application of emerging computer technologies and human resources to address the educational problems of minority youngsters who

have little access to either computers or positive educational role models.

Training of Ethnically Diverse University Undergraduate and Graduate Students

Minority students remain underrepresented at universities. Moreover, those who are enrolled often do not complete their degrees or they change to academic disciplines perceived as less demanding. The CERRC model changes this situation because it connects academic work to the "real world" in a manner that motivates minority students to complete baccalaureates and to continue in graduate studies. The project permits Black and Hispanic students to put theory into practice in a relevant community setting by engaging them in field practicum courses available at the University of California, San Diego's Third College. The CERRC model system also provides a medium for graduate students to complete their professional training in important community contexts in cooperation with Black and Hispanic research scientists.

The center is staffed and run by minority scholars with strong and direct ties to the University, public schools and community organizations. The design of CERRC is such that it mediates the multiple goals represented by these organizations. It also helps minority scholars balance the demands of their profession with those placed on them by their communities. This allows scholars to investigate problems and populations that they care about without relegating their work to a second class status. CERRC's minority researchers are bringing sensitivity, cultural identity, expertise, and information to the communities in order to solve problems and to make significant contributions for economic and educational development.

Participation in the CERRC model system provides the University with a vehicle to educate its minority students meaningfully while addressing the educational problems of younger minority students. But most important, the university works as a partner with minority communities in their efforts to retain the help of their trained professionals and most promising students. Thus, the CERRC model system provides the university with a means to amplify its efforts concerning retention, recruitment, and community enrichment.

CERRC Model Components

Two community learning sites have been established in minority isolated/economically depressed communities of Southeast San Diego and Logan Heights. A third site is planned for the South Bay of San Diego. These neighborhoods have historically been educationally underserved and have had little access to computers. Clearly the result of this neglect has been poor academic achievement of minority students at all levels of education -- elementary school through college. Efforts to treat the social, economic, health, and educational problems have been fragmented at best. Not only does CERRC provide access to computers, but it also directs human resources: minority scholars, students, educators, professionals, and civic leaders work directly with minority youngsters participating in site activities.

The children meet after school and on Saturdays, thus increasing the time spent on learning tasks. The activities capitalize on young people's interest in computers and computer games to teach basic academic skills that are directly relevant to student's ongoing school program. University and high school students work together to instruct young students in areas of computer literacy and applications. The computer then becomes the medium for developing numeracy and literacy skills critical to academic success. The children also become "Computer Experts," who know how to use computers to access information and communicate with people from other neighborhoods, other states and other countries. All of this activity enhances their self-esteem and motivation. Importantly, the University and high school students also develop a strong skills base in computer technology and its educational applications so that they can teach the younger students.

The computerized telecommunication system is the vehicle for inter-site communication between the different units that CERRC coordinates on behalf of the children and their families. Among other educational activities, students will engage in joint problem solving on issues and activities where they have common concerns in their neighborhood, school, and or county. Messages are relayed via the tele-communication system between the three sites to facilitate the joint work. Video tapes are also swapped. Frequently some joint socially valued product is completed through the contribution of all three learning sites.

CERRC, using computers as a medium, links one community to another, as well as to the University. This activity directly addresses the undesirable consequences of racial/ethnic isolation and establishes a continuous communication network between the University and underserved areas.

* * * * *

*. . . we live from birth to death
in a world of persons and things
which in large measure
is what it is
because of what has been done and transmitted
from previous human activities.
When this fact is ignored,
experience is treated as if
it were something which goes on exclusively
inside an individual's body and mind.
It ought not to be necessary to say
that experience does not occur in a vacuum.
There are sources outside an individual
which give rise to experience.
It is constantly fed from these springs. . .
A primary
responsibility of educators
is that
they not only be aware
of the general principle
of the shaping of actual experience
by environing conditions,
but that they also recognize in the concrete
what surroundings
are conducive to having experiences
that lead to growth.
Above all,
they should know how to utilize the surroundings,
physical and social,
that exist
so as to extract from them
all that they have to contribute
to building up experiences
that are
worth while.*

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ANNOTATED BIBLIOGRAPHIES

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For many years now the foundations of scientific knowledge have been undergoing revision. The criticisms of "received view" of logical positivism have emphasized the dependence of scientific facts on the theory from which they are formulated. At the same time, some theoreticians of science have been emphasizing the historicity of scientific knowledge and, as such, the history of science has gradually become a tool for the conceptualization of science itself.

Hübner's work can be included within this tradition. The very title reflects the intention of the author to establish the foundations of scientific knowledge through the use of criticism in the style of Kant or Avenarius. As is the case with these authors, Hübner uses physics as the science to be examined and employs many historical illustrations to support his argument.

The book begins with a systematic exploration of the foundations of scientific knowledge, finding that these foundations cannot be totally supported on either transcendental or empirical bases, because in both cases a series of *a priori* assumptions are necessary and these are of questionable rational or empirical justification. However, as a conclusion Hübner does not resort to a relativism of knowledge. On the contrary, for him the foundations of science have to be found in history, as history justifies the adoption of *a priori* precepts upon which science is built. The result of this reasoning can be no other than the construction of a theory of the history of science which allows the nature of scientific knowledge to be specified. In this way the traditional relationship between the natural sciences (Naturwissenschaften) and the social or human sciences (Geisteswissenschaften) is significantly altered. According to his point of view, they no longer concern two types of knowledge, which are fundamentally different with respect to the nature of their subject. Nor is it the case that the human sciences must assimilate

the methods of the natural sciences. The reverse is true: a human science, like History justifies the validity of scientific knowledge, even in the "hardest" of natural sciences -- Physics.

The theory of history of science which Hübner puts forth has the aim of explaining the adoption of the different *a priori* precepts which in various historical points in time have stimulated change in scientific theories and in the notion of what constitutes science. Such justification, as the historical examples show, is not to be found in any other place than in the very society and culture in which science is developed. And so we find that it is not only impossible to separate an internal and external history of science but that it is external history itself that allows an explanation to be made of the internal history of science and to justify what science is: a product of the society in which it is carried out.

Logically, the next step Hübner takes is to develop the theoretical tools which allow the constitution of facts with which the historian works and the analysis and comprehension of their inter-relationships. That is to say, the creation of a theory of history recognizes the historical character which history itself contains as a discipline, given that it results from actions of human subjects who live in a given time and environment. In this way we recognize that science, just like any other human activity, finds its justification in the history and culture which create the instruments of knowledge and the rules of conduct which scientists follow.

The application of the conclusions reached in Hübner's book to psychology as a science is useful for the understanding of this discipline and its history. Among other things, it allows one to understand and justify the various different "psychologies" as products of different cultural traditions, and provides some theoretical structures which can be of great use to the historian of psychology.

It is important to point out the close similarity in the approaches taken by Vygotsky and Hübner, as both point in the same direction: human action -- within which scientific activity has to be included -- is the result of history and society. It would seem then that the work of these authors can be mutually enlightening. On the one hand, Hübner gives us an idea of science and history which can be of great advantage for the epistemological foundation and for the furthering of the Vygotskian approach. On the other hand, the Vygotsky school of psychology offers a model for human activity which has the same bases as Hübner's points of view, and if it were to be adequately developed as an auxiliary discipline for history, it would indeed aid in the explanation of the actions of historical subjects and contribute to the justification of science through its history.

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Ramirez, M. III (1983). *Psychology of the Americas: Mestizo perspectives on personality and mental health*. New York: Pergamon Press.

In this provocative book, Ramirez proposes a new psychology, a mestizo psychology, for understanding the complexity of all Americans. Ramirez defines mestizo as the "synthesis or amalgamation of Native American and European people, cultures and life styles." According to him, all people in the Americas (regardless of race, nationality, or ethnic group) are considered to be psychological mestizos because they have been socialized in mestizo environments.

The major offering of this new psychology is that it operates from a fundamental principle that respects diversity. Respect for diversity is a sine qua non for any psychology that seeks to understand Americans because diversity is an inherent characteristic of the people and their situations. Ramirez also attempts to develop, or at least propose, an alternate methodology that seriously takes into account the pluralism which characterizes Americans. This means that the method must be able to address the full scope of the "bio-psycho social" system which has organized the individual; to explain the diverse realities and

worlds that have given rise to the mestizo. The new psychology must be aware of the contributions and limitations of European and North American psychology as well as the indigenous explanations of human behavior and cosmology.

In other words, mestizo psychology must combine the viewpoints and methods of Freud, let us say, with those of the Native American shaman. Ramirez' method includes life histories and questionnaires to capture the multifaceted background of Americans. Through this method he addresses issues of mental health and personal adjustments to the complex conditions of life of the mestizo. The method is not new, but it is being used in a novel way and with different presuppositions. In particular, it recognizes the necessity of having to adjust effectively to cultural pluralism, which is the way of life of the Americas. Using the results of the life histories and questionnaires, Ramirez categorizes several personality types with respect to their identifications with a given culture or cultures.

Ramirez reviews an extensive amount of European and Latin American literature. For the U.S. trained psychologist, this review provides an interesting look at a literature which is largely ignored by most North American schools. He also provides an extensive overview of some of the religious and political factors which existed in the Americas prior to the European invasion, and a review of the current status of Americans vis a vis extant political and technological realities.

Ramirez' work is important because it is a genuine attempt to create a cultural psychology for understanding the multiple identity of people from the Americas. This is an immense undertaking and its largeness contributes to the main problem with the book: it tries to do too much in too few pages. The reader is left hungry for more detail and in depth analysis of the various issues. As such, the book is more like a large outline of critical issues and topics that need to be addressed by a new psychology.

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