CHAPTER 4

Culture and Learning

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In this chapter, I will outline how the meanings of "culture" and "learning" have changed over the last forty years since I went to Senegal to do a psychology dissertation on culture and cognitive development among the Wolof. Equally important, I will show how the way we define "culture" and "learning" in our research relates to the kinds of theoretical issues, findings, and conclusions that emerge from it. While drawing primarily on my own research, I will also attempt to situate it with other trends going on in psychocultural studies, both within psychology and within anthropology.

Operationalizing Culture and Learning in the 1960s

Operational definition is a positivistic concept that refers to how a psychological construct is actually "measured" in a research situation: What constitutes empirical evidence for its presence or absence? When I went to Senegal in 1963, the operational definition of "culture" in the not-yet-born field of cross-cultural psychology was primarily that of an independent variable "packaging" many ecocultural influences together (Whiting: 1976). (In psychology, an independent variable is an environmental factor or dimension causally related to some behavior, called a "dependent variable.") The two ecocultural dimensions whose effects I studied were the rural–urban contrast and, within the rural setting, the schooled–unschooled contrast.

More implicitly and secondarily, culture was also defined in terms of the normative reasoning processes used by a particular ecocultural group. My research centered on the development of Piaget's concept of conservation (the notion, from physical science, that, in any physical transformation, some qualities stay the same, are "conserved", while others change) and on the development of conceptual categories. Culture was therefore also defined as reasoning processes shared by a particular ethnic group under particular ecocultural circumstances.

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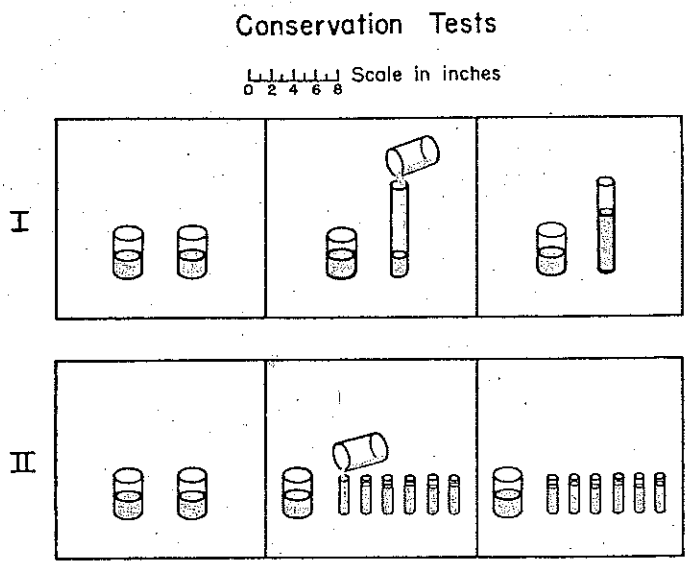

Figure 4.1 Standard test for conservation of liquid quantity. In this procedure, the child is first asked to equalize the water level in both the identical beakers. In I, the literal translation of the Wolof question was "Does this glass of yours and this glass of mine have equal water; or does this glass of mine have more water; or does this glass of yours have more water?" The follow up question depending on the answer to the first question was, literally, "What reason they are equal?" or "What reason this one has more than this one?" The questions for II followed the same pattern.

In sum, my basic research design compared children's development of conservation and categorization in rural and urban environments and, within the rural environment, compared children who went to school with those who did not (Greenfield 1966; Greenfield et al. 1966). For purposes of exposition, the basic conservation and concept formation tasks are shown in Figures 4.1 and 4.2; the figure captions contain the questions that were asked about each visual display.

What constituted learning in this research? Learning was two things, one explicit and one implicit. I will begin with the implicit because it was most basic to the research design. Contrary to Piaget's notion of universal cognitive development that was independent of learning processes, the goal of my research design was to show that learning opportunities, which should vary in different ecocultural environments, would affect developmental processes. In other words, cognitive development was not just a joint function of universal maturational processes and universal opportunities to interact with the physical environment, as Piaget had posited; it was also a function of culture-specific learning opportunities.

My major finding, and one that was extremely surprising at the time, was that cognitive development in both domains, conservation and categorization, depended on Western schooling. In Senegal, formal education was the direct result of French colonization, which had ended only three years earlier. These results implied learning: schooling apparently encapsulated learning opportunities that led to the familiar pattern of response to these two tasks. Figures 4.3 and 4.4 present the basic

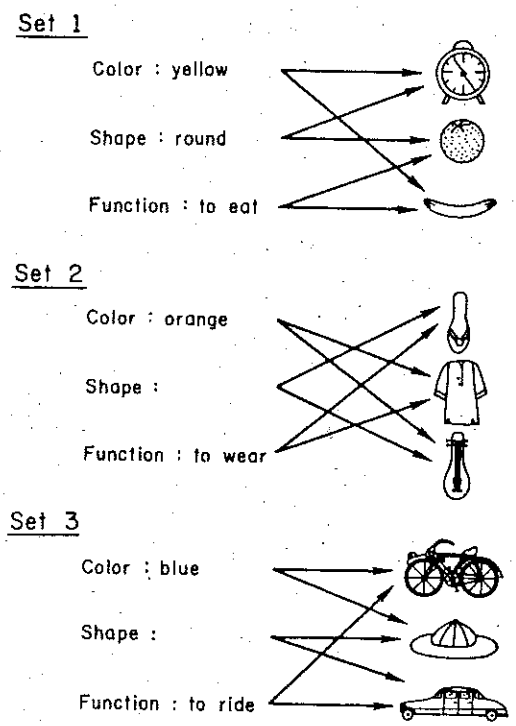

Figure 4.2 The three picture displays with their attributes. Set 1 – clock, orange, banana; Set 2 – sandal, bubu (Wolof robe), guitar; Set 3 – bicycle, helmet, car. Children were asked to show the experimenter the two pictures out of each set of three that were most alike. They were then asked the reason for their choice. The same procedure was then repeated with instructions to show the experimenter "two others" that were alike in each trio, followed by a request for a reason.

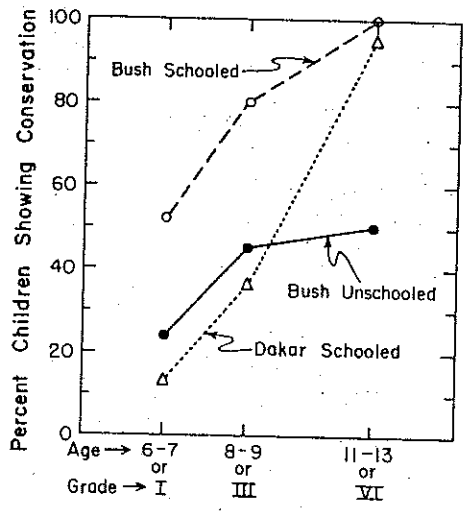

Figure 4.3 Percentage of children of different backgrounds and ages exhibiting conservation of continuous quantity on both parts of the procedure shown in Figure 4.1.

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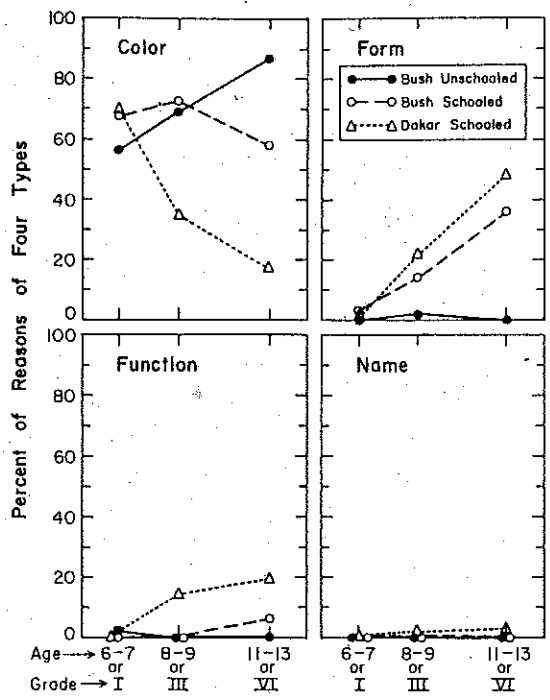

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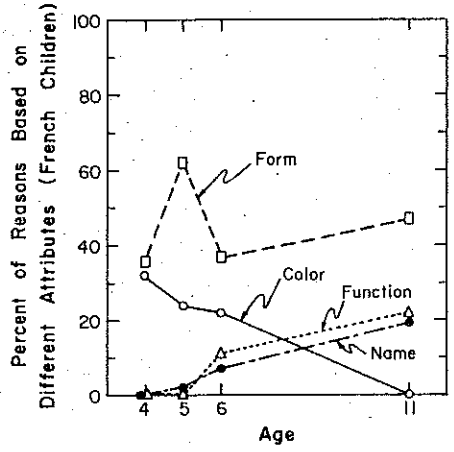

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Figure 4.4 Percentage of grouping reasons of four types: color (e.g., "They are both yellow"); shape (e.g., "They are both round."); function (e.g., "They are both to wear") or name (e.g., "They are both vehicles"). Figure 4.4a shows the results for Wolof children tested in Wolof in three different ecocultural niches. Figure 4.4b shows the results for French children tested in French and living in Dakar, the same city as the urban Wolof children.

developmental results for conservation and categorization. Note that rural or urban residence made little difference, particularly in conservation; the main differentiating factor was schooling. This was particularly dramatic because schooled and unschooled rural participants not only lived in the same bush village, they were also sometimes brothers and sisters. In essence, the graph lines for the school children replicate the patterns that had been found in Geneva, in the United States, and among French children living in Dakar (Figure 4.4b) (Piaget and Inhelder 1962; Bruner et al. 1966). Here a cultural institution, the school, created a difference in opportunities to learn; this difference, in turn, influenced the construction of cultural modes of thought.

Learning also had an explicit role in the research program. What specific environmental opportunities and learning processes were favoring or disfavoring cognitive development under these task conditions and under varying ecocultural conditions? In the case of conservation, I noted that unschooled bush children had a culturally unique mode of reasoning against conservation (i.e., for explaining why the amount of liquid in Figure 4.1 changed when I transferred it to the long, thin beaker or six little beakers: the long thin beaker, for example, had less water "because you poured it"). I called this the "magical action reason" because children seemed to be attributing magical powers to me, the experimenter. So I tried to develop a learning procedure that would counteract this reasoning: I asked the children to transfer the water themselves (the basic transfers are depicted in Figure 4.1), rather than doing it for them. My reasoning was as follows:

> The child, while perfectly willing to attribute "magical" powers to an authority figure like the experimenter, would not attribute any special powers to himself . . . Any child, moreover, is bound to have more accurate cause–effect notions with regard to his own action than with regard to the actions of others. The child with little experience in manipulating environmental objects – as would be truer of children in the passive Wolof culture than of children in America – might also be more prone to attribute puzzling changes to extrinsic powers. Experience in producing effects on the physical world might combat this tendency. (Source?)

Price-Williams' (1961) results among Tiv children of Nigeria substantiated this interpretation. His participants were much more active than Wolof children in spontaneously performing and even reversing the pouring action themselves. Correlatively, he found 100 percent conservation judgments among unschooled children by age 8.

The results of pouring themselves are shown in Figure 4.5, which compares unschooled bush children who received the "do-it-yourself" training with another group who received training that was not relevant to action reasons against conservation. As is evident from the graphs, pouring yourself made a big difference, both immediately and on two post-tests where the experimenter once again did the pouring. Even where the impact was smallest (Post-test 1 for the younger group), the rate of success was still much greater than when the experimenter poured in the standard conservation test.

But what exactly did children learn as a result of pouring the liquid themselves? They did not seem to learn something about the effect of their own motoric action, because action reasons for conservation judgments (e.g., "It is the same because I only poured it") were quite rare. Instead, they seemed to learn to pay less attention to an authority figure and more attention to the initial equalizing operation they

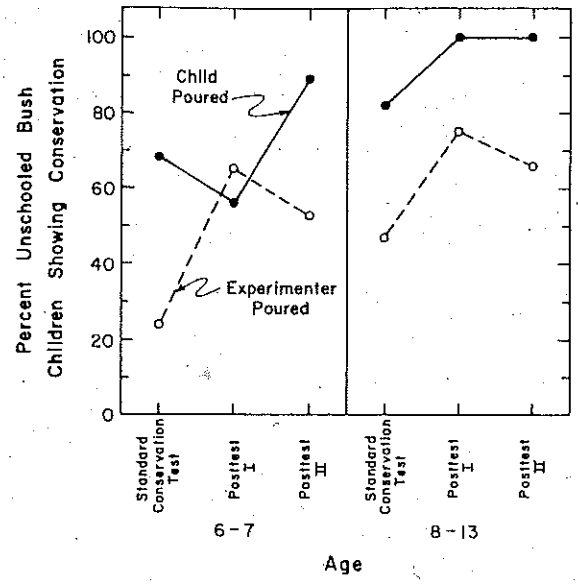

Figure 4.5 Percentage of bush unschooled children showing conservation after pouring themselves or watching the experimenter pour.

themselves had carried out in both the standard and "do-it-yourself" versions of the task (see caption to Figure 4.1). In the "do-it-yourself" condition, children most frequently supported their conservation judgment ("They are both the same") with reference to the initial equalizing operation: "I made them the same." The removal of the experimenter from the action situation made the children pay more attention to their own actions in the situation, actions that were actually the same under both the original and the "do-it-yourself" conditions. The take-home message about culture and learning is that there are different learning paths to the same cognitive end and these paths relate to cultural modes of reasoning about a problem situation.

Also relevant to an analysis of learning, the "packaged" variable of schooling could also be unpackaged into multiple learning components, including a linguistic one. Going to school in Senegal meant, for a Wolof child, learning French, the language of the school, as a second language. Language is a key component of human culture; correlatively, language differences should be a key component of cultural differences. In the case of categorization, I explored the effect of learning French on categorization of the stimuli in Figure 4.2.

This exploration began with the Sapir-Whorf hypothesis, that specific languages determine or influence specific modes of thought. However, Sapir and Whorf also realized that lexicon (vocabulary) reflected culture as well as affecting individual thought. Their famous example was the fact that Eskimos have many words for snow, whereas English has only one. However, as Roger Brown pointed out some years later, skiers also have a lot of descriptors for snow. In both cases, the Eskimos and the skiers, snow has particular relevance to shared cultural activities and the environment in which they take place. However, the notion that the language lexicon also reflected the culture did not become part of my thinking on this subject until decades

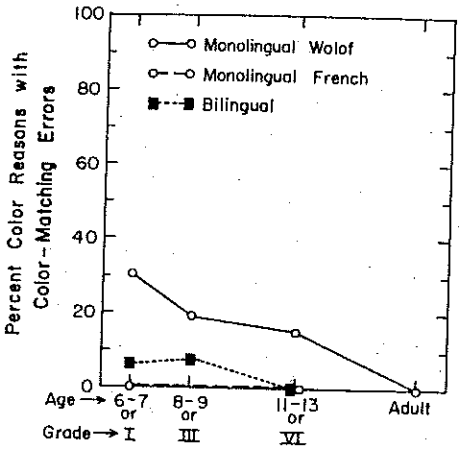

Figure 4.6 Percentage of Wolof monolinguals, French monolinguals, and Wolof-French bilinguals showing color matching errors.

later (see the 1990s, below). In essence, my question was whether acquiring and using a particular language would provide a learning experience that would change the way categorical concepts were constructed.

I first explored the role of language on the level of perceptual discrimination. A relevant fact was that Wolof did not have separate color terms for coding either red or orange; yet this distinction had to be the basis for correct color grouping in Set 2 (Figure 4.2), where the robe and the guitar were orange and the sandal was red. In Set 3, there was no Wolof term to characterize the two blue items. In Set 1, Wolof speakers sometimes use the same term to code yellow and orange, the two colors that must be discriminated in order to make a correct color match.

The first learning question was the following: Does the acquisition of color words that discriminate particular colors in the world constitute a learning experience that helps children make those color discriminations? The answer was "yes." To arrive at this answer, I compared Wolof monolinguals (unschooled children and adults) with Wolof–French bilinguals (schooled children) and French monolinguals (French children living in Dakar). More specifically, I compared these three groups at different ages for color-matching errors. I defined a color-matching error as occurring when a participant who claimed to group by color matched the wrong pictures, for example the clock and the orange in Set 1.

Figure 4.6 presents the results. Clearly, there is a developmental pattern as well as an effect of language. Among the youngest children, color matching errors are the greatest among the Wolof monolinguals, but nonexistent among French monolinguals; Wolof–French bilinguals fall in the middle. Yet, by adulthood, such errors have disappeared even in the Wolof monolinguals. The pattern of the graph lines in Figure 4.6 indicates that presence of color distinctions in a language's lexicon hastens the learning of color discriminations. The take-home message concerning culture and learning is that language acquisition in a particular cultural milieu is a learning input into perceptual discrimination.

A second level of exploration of the role of language in categorization related to flexibility in re-categorizing the same stimuli according to different criteria. For this level of analysis, I focused not on terminology within a domain such as color, but on the presence or absence of a hierarchically structured set of lexical terms, with both basic-level and superordinate terms (cf. Rosch 1973). Basic-level terms would, in the color domain, be "red," "green," "blue," "orange," etc. The superordinate term in this domain would be the word "color." In the case of our stimuli and task (Figure 4.2), the relevant difference between Wolof and French was the absence in French of equivalent superordinate terms to "color" and "shape." French, like English, possessed such lexical items. In Wolof, these domains are semantically structured with basic-level terms only. Consider the following diagram:

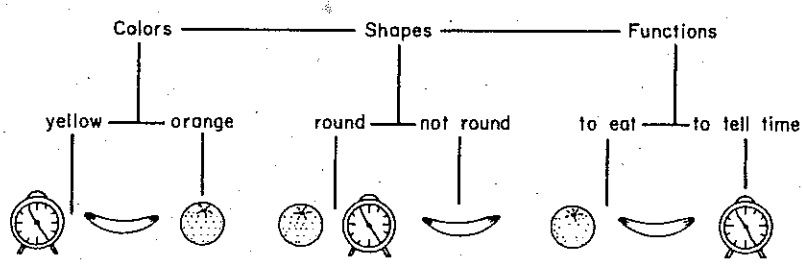

Figure 4.7 Hierarchical organization of categorization stimuli.

Does this hierarchical organization correspond to the type of conceptual structure generated by the participant in order to respond to the task? If so, then the presence of superordinate terms should indicate that the participant is at the highest level of the hierarchy where the domains of color, shape, and function are connected. If this is the case, then one would predict that a participant who used a superordinate term to rationalize a categorical grouping (e.g., "The orange and clock are similar because they are the same shape") would be more able to move from one domain to another when asked to make a second grouping than a participant who was limited to specific attribute words (e.g., "The orange and clock are similar because they are both round"). Indeed, the results indicated an association between superordinate terms and success in shifting the attribute basis for grouping in response to a request for a second grouping. Looking at Wolof school children, there is a definite difference at each age between superordinate word users and those who do not use such a lexicon (Figure 4.7). (Note that the use of such vocabulary involved inserting French superordinates into a Wolof frame.) At every grade level, we see that superordinate word users have greater conceptual flexibility in changing their grouping strategy to utilize a second attribute with the same stimuli. The take-home message is that superordinate terms provide a cultural learning tool that favors the development of conceptual flexibility in categorizing the real world.

Whereas this research began with Western concepts and then looked at how they were learned in an African cultural and linguistic context, Gay and Cole (1967) pioneered the study of indigenous cultural concepts and an analysis of their role in school learning. In *The New Mathematics and an Old Culture* Gay and Cole integrated the study of indigenous mathematical concepts into a traditional ethnography

of the Kpelle of Liberia. However, the Western school was also a cultural focus of their attention. Indeed, their goal was to improve the teaching and learning of math in school by helping teachers to build on indigenous concepts in the domains of arithmetic, geometry, and measurement. In the course of reaching this goal they, too, investigated the effect of school learning on cognitive development among the Kpelle. In line with my results in Senegal, they found large positive effects of school learning with procedures that were culturally foreign, such as time estimation or resorting cards along multiple dimensions, similar to my categorization task. On the other hand, school learning did not improve performance in culturally familiar math tasks such as estimating volumes of rice. Gay and Cole also exported learning experiments from the US directly to Liberia, such as concept identification in which an arbitrary stimulus in an array is selected as the concept (e.g., different arrays of one circle and one triangle, where circle is always the correct choice), and the participant must infer which stimulus is the chosen "concept."

Procedures such as this one used indigenous concepts (here, shape), but they embedded them in learning procedures that were culturally foreign. In this research on culture and learning, culture is defined as indigenous concepts. Learning is, on the one hand, school learning; on the other hand, it is procedures taken from American learning theory. In my view, one enduring value of Gay and Cole's research lies in its suggestions for bridging cultures in instruction when school culture is markedly discontinuous with home and community culture. The other enduring value of this research lies in the study of indigenous concepts. Extended in 1971 with the appearance of *The Cultural Context of Learning and Thinking*, this work formed a transition to research on culture and learning of the 1970s.

Operationalizing Culture and Learning in the 1970s

The 1970s saw a critique of measuring learning and cognition by means of assessments that come from the culture of the researcher, rather than the culture of the participant. If school was so important an influence in Africa and school was an instrument or residue of European colonialism, then clearly many learning experiments were missing indigenous forms of learning. *The New Mathematics and an Old Culture* stimulated a new learning question: What learning takes place as a result of everyday experience in cultures in which schooling is an imposition from the outside?

Inspired by Gay and Cole's study of indigenous concepts from everyday life, as well as by Price-Williams and colleagues' study of the cognitive effects of pottery making (albeit on Piagetian tasks), Carla Childs and I studied the effects of learning to weave on pattern representation in the Mayan community of Zinacantán (Greenfield and Childs 1977; Price-Williams et al. 1967). I developed the representational task out of the cultural skill of weaving itself; the task was not imported from our culture and country. For a Zinacantec girl, learning to weave was the functional equivalent of going to school.

We found that weavers (teenage girls) were analytical in their approach to representing familiar woven patterns – they frequently represented them as they were actually constructed with thread. In contrast, non-weavers (teenage boys) often represented

the patterns in a global way, as they might look from a distance. Schooling (which had until recently been restricted to boys only) was an alternative learning experience that also made teenagers more analytical in their representations. Apparently both the cultural experiences, weaving and schooling (albeit originating in different cultures), encouraged an analytic approach to pattern representation.

Jean Lave, working with the Vai and Gola in Monrovia, Liberia, studied how the occupation of tailoring led to particular kinds of mathematical learning that were used in the tailor's craft. This type of research became "everyday cognition" in the 1980s and 1990s (Rogoff and Lave 1984; Schliemann et al. 1997). In both Zinacantán and Liberia, the researchers had an interest in seeing how situated learning generalized beyond itself to new problems. Our conclusion was that it did not necessarily transfer, that learning in concrete situations often remained there (Guberman and Greenfield 1991). Indeed, it was not until the 1990s that I realized that generalization is a form of novelty and that traditional cultures like the Vai or Zinacantec value conforming to tradition rather than creating novelty (Greenfield 1999).

In the 1970s, I (like a number of other investigators) began to integrate culture and learning in a new way. We began to study the sociocultural processes by which culture is learned and transmitted. We also began, almost unconsciously, to explore the ontogeny of these sociocultural processes. In the area of cultural transmission, I carried out a study of weaving apprenticeship in the same Zinacantec Maya community in Chiapas, Mexico. Relevant to the ontogeny of cultural development and co-construction was a study of language acquisition in the United States. In these research projects, my operational definition of both culture and learning differed from what it had been in the 1960s. For the study of weaving apprenticeship, we operationalized culture as indigenous techniques, such as weaving, that were transmitted from generation to generation. In this same study, we operationalized learning as the apprenticeship processes through which transmission took place. For the study of language development, culture became the co-construction of linguistic propositions by child and mother; the process of language acquisition constituted learning. This refocusing on the actual transmission and creation of shared culture in everyday life entailed a corresponding change on the level of methodology: I therefore moved from experiment to naturalistic ethnography, sometimes involving video records. At this point, my methodology became more anthropological, less psychological in nature.

Through the earliest use of video in the field, we were able to show that weaving apprenticeship involved an exquisitely sensitive process of learning and teaching in the service of cultural transmission. Teachers were sensitive both to the skill level of the learner and to the difficulty level of each component process. For example, our video microanalysis showed that observation of models was most frequent for the least experienced learners and least frequent for the expert weavers. It was also most frequent on the more difficult components of the weaving process and least frequent on the easier parts of the process. Perhaps most important was the help that teachers, most often mothers, gave to their daughters. Weaving apprenticeship was highly scaffolded, so that teachers provided whatever help the learners needed to complete the weaving without any gross errors or missteps. Four hands on the loom was the paradigmatic image of weaving apprenticeship in 1970 (Figure 4.8).

Figure 4.8 Four hands on the loom: Zinacantec weaving apprenticeship in 1970. Video image by Patricia Greenfield.

The close analysis afforded by video also allowed us to correct some accepted generalizations from anthropology about informal education in non-literate societies, notably that it is non-verbal. Instead, we found that verbalization was intrinsic to the teacher's role and that, like non-verbal guidance, it too was sensitive to the skill level of the learner. So, for example, teachers used mostly commands with inexperienced learners, who needed more direction. The proportion of commands decreased, while statements increased, as we analyzed the apprenticeship processes of more experienced learners. In this research, culture and learning had now been integrated into cultural learning; this was a new operationalization of both "culture" and "learning." Cultural learning was tied much more to everyday practices in a given culture, much less to standardized learning assessments that could simply be imported from one culture to another (cf. Greenfield 2000). Cultural learning and apprenticeship were expanded and generalized in the 1990s with the publication of Barbara Rogoff's important book, *Apprenticeship in Thinking* (1990).

In language, the notion of co-construction as the ontogeny of culture emerged, and a model for the construction of human culture, was born. From today's vantage point, I can see that I operationalized culture as co-constructed discourse, while learning became the acquisition of normative language structures. In my study of the one-word stage of language development, I identified a basic form of co-construction: a

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two-person sentence in which the child provided a one-word component, and mother provided the rest. For example, here is an instance of paradigmatic substitution whereby a child, Nicky, age 22 months, implicitly inserts his word into his mother's sentence to make a new two-person structure. Mother says, "Can Matthew have your Teddy?" and Nicky replies, "Nicky," implicitly substituting his name for Matthew's and thus indicating that he wants his Teddy (Greenfield and Smith, 1976). This type of shared meaning, we now realize, is the essence of and early manifestation of the co-construction of culture on a micro-level. It demonstrates the early capacity for intersubjective sharing that makes human culture possible. This co-construction is a cultural process that ensures one particular kind of cultural learning, language learning.

In the 1970s other language researchers, notably Ochs, Schieffelin, and Platt (1979), came up with similar ideas and data about the co-construction of linguistic communication in early ontogeny. Most important to the notion of culture as social sharing was the establishment of a shared focus of attention. In this same period, Jerome Bruner (1975, 1983) investigated preverbal co-construction of normative routines by even younger infants, in concert with their mothers. In essence, these are ontogenetic processes of cultural learning that mirror and provide the foundation for what we observed in early weaving apprenticeship: a two-person (learner and teacher) co-construction incorporating language within its boundaries.

Operationalizing Culture and Learning in the 1980s

One important new development in the 1980s was an appreciation of the role of cultural tools as mediators of learning. Vygotsky (1978) provided the theoretical foundation for this work. On the empirical side, Scribner and Cole published their classic book, *The Psychology of Literacy*, in 1981. This book explored print literacy as a cultural tool of learning and cognitive development among the Vai of Liberia. Its theme was that almost all effects of literacy on learning are not general, but are specific and arise from the particular uses to which a given type of literacy is put. The Vai were a wonderful "natural experiment" for Scribner and Cole because they have three different literacies, each with its own pattern of apprenticeship and uses: English learned at school, Vai script learned in community settings, and Arabic learned in Koranic schools. In this research, literacies constitute both learning experiences and cultural tools. They also have an impact on learning. For example, Scribner and Cole also included one explicit laboratory learning task – learning by rote memory – and found that it was enhanced by Koranic literacy.

In the same spirit, I explored the nature of and impact on learning of the newer cultural tools of television, video games, and computers (Greenfield 1984). Subsequent experimental research indicated that the virtual tool of video games enhances visual skills, develops parallel processing, and fosters a transition from written to iconic communication (Greenfield and Cocking 1996). These experimental studies utilize a before–after and control group learning paradigm to assess these impacts. In other words, this research program demonstrates short-term learning as a function of experience with these tools of electronic culture.

I have also made the argument that these symbolic cultural tools are responsible for much of the recent increase in non-verbal IQ performance in the United States (Greenfield 1998). Again, these cultural tools constitute both an aspect of culture and a medium of learning. As a medium, they impact various sorts of learning. For example, the skills they develop have potential applicability to learning computer and other technical skills, as well as learning visual spatial skills, skills in iconic representation, and strategic skills for processing simultaneous visual information in more than one location (Greenfield and Cocking 1996).

A second new development in the 1980s was the extension of cultural learning to include social learning. Most notable were the studies of the acquisition of morality, a universal attribute of shared symbolic culture. The cultural apprenticeship of morality was one important area of study, paralleling studies of the cultural apprenticeship of technical skills. As an example, Edwards found in Kenya that children learned moral and conventional rules through accusations, sanctions, commands, and responsible suggestions (Edwards 1987; Eckensberger and Zimba 1997). At the same time, different pathways of cultural learning in the domain of morality began to take shape, notably with Joan Miller's comparative studies of moral development and behavior in India and the United States (Miller and Luthar 1989). This line of research foreshadowed one of the notable new developments of the 1990s and the new millennium: the integration of research on cultural learning into mainstream areas of social and developmental psychology (Markus and Kitayama 1991; Greenfield 1994).

Operationalizing Culture and Learning in the 1990s

Extensions of time scale, both historical and phylogenetic, characterized new developments in the way I, and others, characterized culture and learning in the 1990s. I begin with the evolutionary time scale. An influential article, "Cultural learning," by Tomasello et al. (1993) extended the concept of cultural learning into phylogenetic time. These authors started discussion of the evolutionary history of cultural learning by placing it in a species comparative framework. Their analysis centered on important human mechanisms of cultural learning, such as imitation and collaborative learning, and the extent to which these mechanisms were or were not shared by living non-human primates (chimpanzees) sharing a common phylogenetic ancestor in most recent evolutionary time (between five and seven million years ago).

With Tomasello et al.'s article in mind, Emily Yut, Christopher Boehm, Ashley Maynard, and I took a cross-species comparative approach to tool apprenticeship. We did a video-based analysis of the learning techniques used by chimpanzees in Jane Goodall's Gombe Reserve colony to transmit tool-based termite fishing from one generation to the next. Towards the end of the decade it became accepted that termite fishing was, in fact, a cultural skill, one possessed by only certain chimpanzee colonies (Whiten et al. 1999).

In our analysis we compared the learning techniques, both social and non-social, used by chimpanzees in the wild to acquire termite fishing with those used by the Zinacantecs to acquire weaving skill (Greenfield et al. 2000). Our logic was that

techniques shared between the two species were good candidates for an ancestral foundation of cultural learning in the human species, that is, basic techniques that may have been present in some form or another in our common ancestor five to seven million years ago. We found evidence, for example, of heavy reliance on observational learning as young Gombe chimpanzees acquired skill in utilizing tools to extract termites from the ground. Hence, observational learning became a good candidate for an evolutionary precursor of the human capacity to learn and transmit cultural skills from generation to generation.

Let me now move to an expansion of the historical time scale for research on cultural learning. Here the question was the following: Would processes of cultural learning be historically contingent or historically constant within a given society? There had always been an implicit assumption of the latter, but I was not so sure that this assumption would hold up in the light of empirical investigation.

In order to find out, I returned to Zinacantán with my collaborator, Carla Childs, 21 years after our initial research. Our main purpose was to investigate historical changes in modes of weaving apprenticeship. In the intervening decades, Zinacantec society had transitioned from a mainly subsistence economy/ecology to a mainly commercial one. A major goal was to investigate the relationship of this ecological shift to modes of apprenticeship. I had hypothesized that heavy reliance of cultural apprenticeship on observation and close guidance was adapted to the maintenance of tradition, characteristic of cultures based on subsistence economies. In contrast, I expected a more independent, trial-and-error type of learning to be better adapted to entrepreneurial commerce in which innovation has a more positive value (Greenfield and Lave 1982). Returning to study the daughters, nieces, and goddaughters of our original 1970 sample of weaving learners, we found that the predicted change in cultural learning had indeed taken place. Learners were now more independent and separate from their teachers (Figure 4.9). However, as of the early 1990s, economic change had been uneven, and it was precisely the girls who, with their mothers, participated more in textile commerce (e.g., selling their weavings) who showed the more independent trial-and-error style of cultural learning (Greenfield 1999). These results indicated that styles of cultural learning are both historically contingent and adapted to particular ecocultural niches.

Closely related to historical change in cultural apprenticeship are the conflicting cross-currents of cultural learning that occur in situations of immigration from one society to another. Weaving apprenticeship (and other aspects of socialization) had moved, in Zinacantán, from a more interdependent model to a more independent model of learning as the ecocultural niche changed. This shift over two decades was parallel to the more rapid shift experienced by many immigrants, as they moved from societies that value the cultural learning of interdependence into societies (such as the United States) that value the cultural learning of independence. An international and multidisciplinary group of researchers explored the relationship between cultural learning in ancestral societies in Asia, Africa, and Latin America and cultural learning by the same ethnic groups after their transition to the United States, Canada, or France (Greenfield and Cocking 1994). This project implicitly recognized not only historical change, but also the globalization of cultural learning as it occurs in transnational immigration.

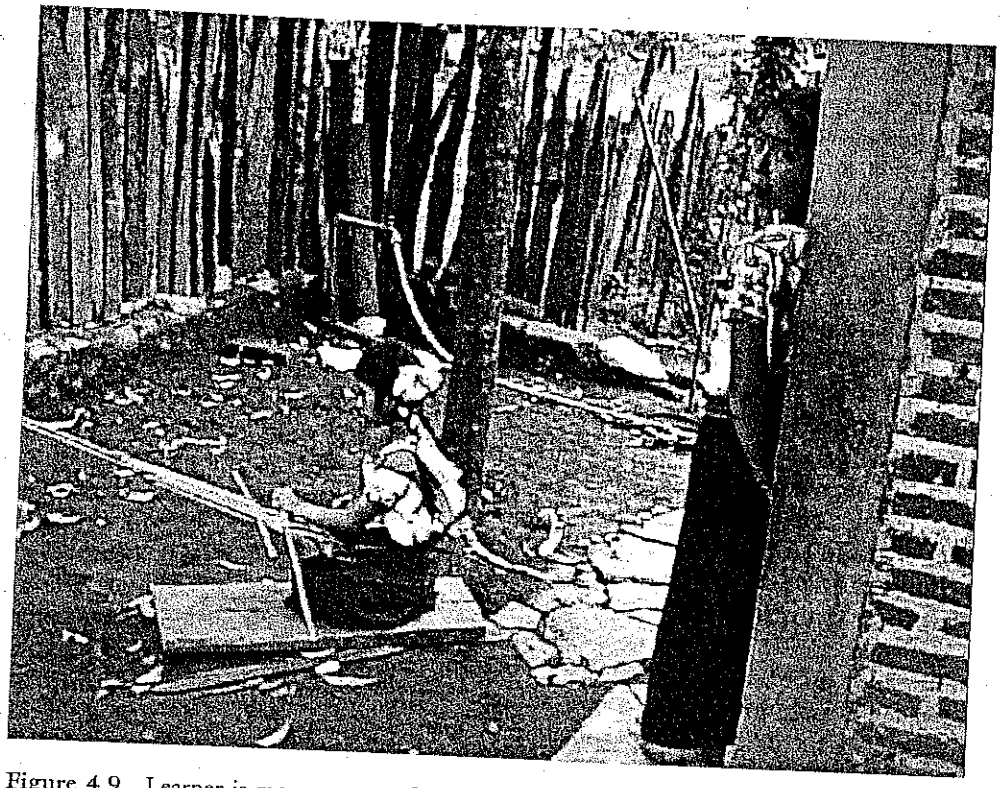

Figure 4.9 Learner is more separate from and independent of teacher in the changed weaving apprenticeship of the early 1990s. The learner in this video image is the daughter of the girl learning to weave two decades earlier, shown in Figure 4.8. Video image by Patricia Greenfield.

The New Millennium

In my own work of the new millennium, I began to make the interaction of contrasting goals of cultural learning experienced by immigrants an explicit focus of study. For example, our research demonstrated how Latino immigrant parents want their children to learn one set of cultural priorities (e.g., helping, sharing, family values) while their children's teachers want them to learn a different set (e.g., independence, respect for personal property, and individual achievement) (Greenfield, Quiroz, and Raeff 2000; Raeff, Greenfield, and Quiroz 2000; Raeff et al. in press).

A second focus of my work in the new millennium has been to mainstream notions of cultural learning into developmental psychology. A large body of research has congealed around the notion that cultural learning has a longitudinal trajectory with two major pathways through universal developmental issues, a pathway towards independence and a pathway towards interdependence (Greenfield et al. 2003). These cultural pathways refocus and link all of the classic topics in developmental psychology (e.g., attachment, cognitive development, adolescence) with each other and

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with cultural learning. This last development places culture and learning at center stage in developmental psychology. At the same time, there is resistance to this formulation from anthropology (e.g., Harkness et al. 2000), with its preference for particularities and local theory. Whether my own formulations of cultural learning and development spread and become typical of the millennium, only time can tell.

Over the last forty years, culture and learning have moved, in my own work and that of others, from strict and separate operational definitions to integration of the concepts of culture and learning with each other and with the field of developmental psychology as a whole; culture and learning have become cultural learning, and cultural learning is fast becoming part and parcel of developmental psychology. At the same time, the domain of culture and learning is no longer contextualized in separate and timeless cultures; the perspective is now historical, evolutionary, and global.

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