# What's Become of Research on the Cultural Basis of Cognitive Development?

Barbara Rogoff and Pablo Chavajay
*University of California, Santa Cruz*

*This article describes the transformation of research on cognition and culture from cross-cultural comparisons of psychological tasks to theory and research on people's thinking in sociocultural activities. The authors describe this transformation, not merely for those interested in this particular line of research but also because the study of cognition more generally seems to be struggling with some of the same issues that have been faced in the research on culture and cognition. An understanding of the shift in emphasis of research on culture and cognition can provide leadership to some of the issues more broadly facing the study of cognition.*

This article begins by summarizing the approach used during the heyday of research on cross-cultural cognitive development in the 1960s and 1970s. It then proceeds to argue that at the beginning of the 1980s, a transition occurred in which cultural scholars began to focus more on the theoretical underpinnings of developmental research and to turn to real-life contexts for research settings. This transition was influenced by the findings of the 1970s showing quite specific relations between test performance and cultural experience and by theoretical writings of Soviet sociocultural scholars. By the beginning of the 1990s, these transformations had begun to consolidate in the form of sociocultural theories of development and research directions (which are still developing) emphasizing the integration of practical and theoretical issues and using methods from a variety of social science disciplines.

To make this argument, we first summarize the findings of the 1960s–1970s and note the drop-off of continuing research in that cross-cultural cognitive development tradition. We then describe the theoretical and empirical influences that we think contributed to a transition in work on culture and cognitive development. Next, we summarize recent developments in sociocultural theories and research and provide support for our account by following the trajectories of a number of researchers and scholars who have been active across these three decades as well as by colleagues from various disciplines whose roots are other than cross-cultural psychology. Finally, we attempt to abstract theoretical and research commonalities that are currently emerging in research on culture and cognitive development from a sociocultural perspective.

## Comparisons of Cognitive Tasks: Cross-Cultural Psychology in the 1970s and Before

Cross-cultural psychology in the 1970s and before was characterized by research exploring what would happen if cognitive tasks developed in Europe and the United States were used in other cultural settings. A great deal of this research involved simply translating the procedures and applying them overseas. However, several important conclusions derived from this work. One was that the generality of the tasks, which at the time was assumed to be broad, was questioned by researchers' observations that people who performed poorly in cognitive tasks in the research room could be observed to think impressively in their everyday lives.

Another was that many of the observations of cognitive skill were aligned with the skills and discourse of formal Western-style schooling in ways that European and American scholars had not been aware of. The institution of schooling came to the attention of researchers as being key to understanding the kinds of performance that they

*Editor's note.* Frances Degen Horowitz served as action editor for this article.

*Author's note.* Barbara Rogoff and Pablo Chavajay, Department of Psychology, University of California, Santa Cruz.

We are grateful for the help of Cathy Angelillo, Don Brenneis, Urie Bronfenbrenner, Michael Cole, Pierre Dasen, Jacquelyn Goodnow, Patricia Greenfield, Eugene Matusov, Robert Serpell, Geoffrey Saxe, Harold Stevenson, Dan Wagner, Cindy White, and Steve Wright in the preparation of this article and to the research of Jerry Kagan and Bob Klein, which initiated our collaboration in 1974.

Correspondence concerning this article should be addressed to Barbara Rogoff, Department of Psychology, Kerr Hall, University of California, Santa Cruz, California 95064.



 0003-066X/95/$2.00
Vol. 50, No. 10, 859-877

**Barbara Rogoff**
Photo by Don Harris, University of California, Santa Cruz, Photography Services.

were asking of children when studying cognitive development.[1] Cross-cultural studies in nations in which schooling was not obligatory noted great variation in how much schooling people had and repeatedly found correlations between extent of schooling and performance on the kinds of cognitive tasks that were being used.

The relation of the cognitive tasks to schooling was difficult for researchers to determine before the cultural studies, because most of the research at the time had been conducted in nations in which schooling was compulsory. With no contrasts in children's extent of schooling, researchers took this experience for granted and explained age difference on cognitive tasks in terms of maturation, overlooking the difference in amount of schooling for children of different ages.

To indicate the findings on some specific commonly used tasks and to indicate how they led to the conclusions questioning generality and pointing to the connection between tests and schooling, we describe cross-cultural research centered in the 1970s and before, on Piagetian concepts, classification tasks, logic problems, and memory tests.

### *Piaget Around the World*

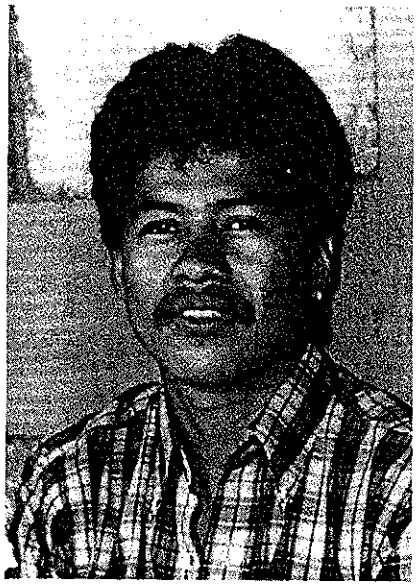
A vast research enterprise in the United States undertook to examine some of Piaget's ideas empirically during the 1960s and into the 1970s. Piaget's own interest in the process of children's intellectual development as a way of understanding how scientific ideas changed over time excluded an interest in cultural variation. However, when scholars began examining Piagetian tasks in other cultures, they found that culture was related to Piagetian concepts in ways that led Piaget to revise his stance on the generality of the formal operational stage and led to interest in understanding the role of familiarity in concrete operational thinking.

People in many cultures did not seem to "reach" the formal operational stage without extensive schooling (Ashton, 1975; Goodnow, 1962; Laurendeau-Bendavid, 1977; Super, 1979). These observations led Piaget (1972) to conclude that achievement of formal operations was tied to people's experience with the specific kind of scientific thinking that this stage focused on (such as in high school science classes) rather than being culture free and domain free. Thus, Piaget backed off on his claim of universal stages to say that this fourth stage was culturally variable, once the cultural research drew attention to the problems of assuming that Piagetian stages were general and context free.

Research on concrete operations around the world yielded more variable findings (Dasen, 1977; Rogoff, 1981). Though in most communities people "conserved" on tests of conservation, the age at which they did so was frequently much later than in Geneva (Greenfield, 1966; Kelly, 1977; Laurendeau-Bendavid, 1977; Okonji, 1971; Page, 1973; Philp & Kelly, 1974; Stevenson, Parker, Wilkinson, Bonnevaux, & Gonzalez, 1978), leading some to infer retardation in development. However, in a number of other studies, there were no differences between schooled and nonschooled populations or there were advantages for people who had not attended school (Armah & Arnold, 1977; Kiminyo, 1977; Nyiti, 1976; Strauss, Ankori, Orpaz, & Stavy, 1977). In at least one study, some forms of schooling led to poorer performance, with children setting aside the everyday activities on which—if unschooled—they could base correct judgments (Goodnow, 1962).

One interpretation of the variable findings in the Piagetian tasks and of the schooling effect itself had to do with familiarity of materials and concepts (Irwin & McLaughlin, 1970; Irwin, Schafer, & Feiden, 1974; Kelly, 1977; Price-Williams, Gordon, & Ramirez, 1969). For example, Greenfield and Childs (1977a) found no differences between schooled and nonschooled groups in relational thought through interviews of Zinacanteco (Mexican) children regarding their own kinship network. Clear developmental trends occurred in both schooled and unschooled children in understanding of kinship terms from one's own perspective (egocentrism), understanding of kinship terms involving reciprocal relations between two of one's siblings (reciprocity), and under-

[1] The role of many other institutions (e.g., religion, economic system, and family) in cognition and development could be explored fruitfully. However, schooling seems to be especially closely related to performance on the cognitive tests that have been used, and these findings draw attention to the often overlooked relations between schooling and cognitive tests. Although schooling is not a homogeneous institution, the research of the 1970s and before that examined the relation between schooling and performance on cognitive tasks seldom considered variations in school practices. The consistency in findings may relate to the fact that in many nations, formal schooling is an institution derived from European–American school practices, with some key commonalities across time and place. Later research has begun to pay more attention to variations in what actually happens in schools, including schooling of indigenous origin (Akinnaso, 1992).



**Pablo Chavajay**
Photo by Salem Magarian.

standing of kinship terms from two points of view even when one is part of it personally (reversibility).

The relations between schooling and Piagetian conservation tasks were uneven, appearing in some studies but not others. Cole (1990) concluded the following from the situational variations in the relation between schooling and performance on concrete operational tasks: "I believe that it is sensible to conclude that concrete operational thinking is not influenced by schooling; what is influenced is subjects' ability to understand the language of testing and the presuppositions of the testing situation itself" (p. 99). In tests of classification, logical thinking, and memory, reviewed in the next sections, the relation with formal schooling was consistent; however, the explanation seems still to lie with an understanding of the common formats and activities of both schooling and the cognitive tests rather than with some sort of general impact on thinking.

### Classification Tasks

A common finding in cross-cultural work was that instead of classifying test items into taxonomic categories (e.g., putting animals in one group, food items in another, and implements in another), which is characteristic of adults in Western nations, adults in many other nations sorted items into functional groups (e.g., putting a hoe with a potato because a hoe is used to dig up a potato). Especially if the individuals did not have much schooling, they would sort things according to their function rather than according to their taxonomic categories (Cole, Gay, Glick, & Sharp, 1971; Hall, 1972; Luria, 1976; Scribner, 1974; Sharp & Cole, 1972; Sharp, Cole, & Lave, 1979). They also were less likely to offer a rationale for their sorting when asked to explain their classification if they had not had much schooling.

As scholars began to look at the history of schooling (see Cole, 1990), they noticed that one of the functions of early schooling and literacy was to sort things according to taxonomic categories. In an account of the uses and historical development of literacy, Goody (1977) argued that writing "is a tool, an amplifier, a facilitating device . . . which encourages reflection upon and the organization of information" (p. 109). Using illustrations from early written records, Goody suggested that making lists is dependent on writing and that comparison, classification, and hierarchical organization of items are greatly facilitated by spatial arrangement of items in a list. He proposed that classifying information by category and remembering lists of items are skills that derive from literacy.

### Logic Tasks

The prototype task for testing logical thinking has been the logical syllogism, like those used during the 1930s by Luria (1976) with Central Asian adults to probe the relation of literacy and schooling to deduction and inference without reliance on direct experience. In the following example, a nonliterate Central Asian peasant did not treat the syllogism as though the premises constituted a logical relation allowing an inference:

> [Syllogism] In the Far North, where there is snow, all bears are white. Novaya Zemlya is in the Far North and there is always snow there. What color are the bears there?
>
> . . . "We always speak only of what we see; we don't talk about what we haven't seen."
>
> [E:] But what do my words imply? The syllogism is repeated.
>
> "Well, it's like this: our tsar isn't like yours, and yours isn't like ours. Your words can be answered only by someone who was there, and if a person wasn't there he can't say anything on the basis of your words."
>
> [E:] . . . But on the basis of my words—in the North, where there is always snow, the bears are white, can you gather what kind of bears there are in Novaya Zemlya?
>
> "If a man was sixty or eighty and had seen a white bear and had told about it, he could be believed, but I've never seen one and hence I can't say. That's my last word. Those who saw can tell, and those who didn't see can't say anything!" (At this point a younger man volunteered, "From your words it means that bears there are white.")
>
> [E:] Well, which of you is right?
>
> "What the cock knows how to do, he does. What I know, I say, and nothing beyond that!" (pp. 108–109)

When asked to make inferences on the basis of the premises of syllogisms, Luria's (1976) literate research participants solved the problems in the desired manner, but many nonliterate participants refused, not accepting that the major premise is a "given" and protesting that they "could only judge what they had seen" or "didn't want to lie." (This pattern has been replicated in other places by Cole, Gay, Glick, and Sharp, 1971; Fobih, 1979; Scribner, 1975, 1977; and Sharp, Cole, and Lave, 1979. For a very interesting contemporary follow-up to this line of work, see Tulviste, 1991.)

In the example, the peasant and the experimenter seem to disagree about the kind of evidence that one should accept as truth. The peasant insisted that truth should be based on first-hand knowledge, or perhaps on

the word of a reliable, experienced person, whereas the experimenter attempted to induce the peasant to play a game involving examination of the truth value of the words alone. The nonliterate peasant argued that he had not personally seen the event so he did not have adequate evidence and implied that he did not think that the experimenter had adequate evidence either. When the young man who had some schooling entered the conversation and made a conclusion on the basis of the unverified premises stated in the problem, the nonliterate man basically said that the younger man had no business jumping to conclusions although if he wanted to that was his own business. The nonliterate man was reasoning quite abstractly regarding what one can use as evidence.

Luria (1976) noted that the nonliterate individuals' reasoning and deduction followed the rules when dealing with immediate practical experience, making excellent judgments and drawing all the implied conclusions. Scribner (1975, 1977) argued that nonliterate peoples' unwillingness to treat syllogisms as logical problems should not be confused with failure to think hypothetically. She quoted a man using the hypothetical mode to explain his reason for not being able to answer the question: "If you know a person, if a question comes up about him, you are able to answer." He reasoned hypothetically about the practical situation in denying the possibility of reasoning hypothetically about information of which he had no experience.

When nonliterate individuals treated a problem as a self-contained logical unit, they showed the same logicality as literate individuals. When Cole et al. (1971) changed the problem format so that the individuals simply evaluated the truth of conclusions stated by the experimenter on the basis of the premises, nonschooled individuals had much less difficulty than when they had to state conclusions on the basis of the premises. This supports the argument that the nonliterate individuals were uncomfortable having to answer questions for which they could not verify the premises. When conclusions were provided by the experimenter, the individuals were willing to consider whether the hypothetical premises and the conclusion fit logically.

Verbal syllogisms represent a specialized language genre, differing from other genres, that becomes easier to handle with practice and with understanding of the specialized form of this kind of problem (Scribner, 1977). In school, people may become familiar with the genre through experience with story problems and other verbal problems in which the answer must be derived from the relationships presented in the problem. They are supposed not to question the truth of the premises but to answer on the basis of the stated "facts." Being willing to reason on the basis of a premise that one cannot verify is characteristic of schooling and literacy.

### Memory Tasks

In the 1960s and 1970s, one of the main kinds of memory tasks that was used was free recall. In free recall and many other memory tests, research participants are presented with lists of unrelated pieces of information (such as words) that may be more fully remembered if they apply a strategy (such as rehearsing, categorizing, or elaborating connections between items) to coordinate the items. Nonschooled people have difficulty with such memory tasks and often do not spontaneously use strategies to organize such lists (Cole et al., 1971; Cole & Scribner, 1977; Scribner, 1974).

The first conclusions from the observations of poor recall and low use of strategies focused on the individuals' memory ability. But evidence from outside this task and the testing room suggested that, in everyday life, the people who were doing poorly on free recall tasks could remember very well in other situations such as remembering where things were or recalling complicated narratives.

The observation that performance on the free recall task and other memory tasks was closely related to the extent of schooling that the participants had experienced became a focus of study (see Rogoff & Mistry's review, 1985). In school, people have special demands and opportunities to develop the use of memory aids appropriate for remembering lists of isolated pieces of information. Facility with tests involving lists of unrelated words may stem from familiarity with lists and the classification systems (e.g., alphabetic or categorical) that lists—products of literacy—promote (Goody, 1977). Furthermore, remembering lists of items unorganized by meaningful schemas may be an unusual experience except in school, where pupils frequently have to use strategies to recall material they have not understood.

Whereas less-schooled individuals may have less practice in organizing isolated bits of information, people from all backgrounds may have similar needs to remember information that is embedded in a structured context and to use strategies that incorporate the existing organization, using meaningful relationships among items as an aid to recall. With contextually organized materials, there seem to be fewer cultural differences in memory performance, as the majority of memory problems for any individual involve material that is organized in a complex and meaningful fashion rather than lists of items that have been stripped of organization. Indeed, few cultural differences appeared in the studies of memory for spatial arrangements or for organized prose that began to appear (Cole & Scribner, 1977; Dube, 1982; Kearins, 1981; Mandler, Scribner, Cole, & DeForest, 1980; Neisser, 1982; Ross & Millsom, 1970).

In a study examining memory for spatially organized information, Guatemalan Mayan children performed at least as well as middle-class Salt Lake City children (Rogoff & Waddell, 1982), although children in the Mayan community had the ordinary difficulties with free recall tasks (Kagan, Klein, Finley, Rogoff, & Nolan, 1979). In the contextually organized task, each child watched as a local experimenter placed 20 familiar miniature objects, such as cars, animals, furniture, people, and household items, into a panorama model of a town that contained familiar props, such as a mountain, a lake, a road, houses, and trees. The 20 objects were removed from the pan-

orama and reintegrated into the pool of 80 objects from which they had been drawn, and after a brief delay, the child reconstructed the scene. The Mayan children performed slightly better than the Salt Lake City children, perhaps because the Salt Lake City children often tried to use a strategy (rehearsal) that would work for lists at school but that may get in the way when learning something that is contextually organized.

The conclusion from the memory studies, as with the classification and logic studies, is that researchers cannot just assume, as we did before cross-cultural research, that a cognitive test reveals a general ability across tasks unrelated to people's experience. The cultural studies drew attention to the fact that it matters how researchers ask people to display their memory; if we ask them in a way that resembles what they do in school, of course the people who have more experience with schooling do better. It is a very simple conclusion but one that transformed how researchers think about the generality of cognitive tests and about their relation to people's experience with particular institutions such as schooling.

### Summing Up Cross-Cultural Studies of Cognition

In a 1981 review of research on cognitive skills of schooled versus nonschooled individuals, Rogoff concluded that there appear to be local relationships between school practices and specific cognitive activities (see also Cole, 1990; Wagner & Spratt, 1987). Schooled individuals show a variety of cognitive skills that bear a relationship to the activities of schooling: Schooling seems to foster perceptual skills in the use of graphic conventions to represent depth in two-dimensional stimuli and in analysis of two-dimensional patterns. Schooled people are skilled in deliberately remembering disconnected bits of information and are more likely than nonschooled individuals to spontaneously engage in strategies that organize the unrelated items to be remembered. Schooled individuals are also more likely to organize test objects on a taxonomic basis, putting categorically similar objects together, whereas nonschooled people often use functional arrangements of objects that are used together. Schooled people show greater facility in shifting to alternative dimensions of classification and in explaining the basis of their organization. Schooling appears not to relate to rule learning or to logical thought as long as the individual has understood the problem in the way the experimenter intended. Nonschooled individuals seem to prefer, however, to come to conclusions on the basis of experience rather than by relying on the information in the problem alone.

Interpretation of the schooling differences found in the research of the 1970s and before focused at first on familiarity of materials (and speaking to the research participants in their own language), but soon researchers started paying attention to other aspects of familiarity besides just the materials and the words. Several authors distinguished familiarity with the objects from relations between how the objects are used in the task and how they and the concepts the task probes are routinely used in the culture (Cole, Sharp, & Lave, 1976; Greenfield, 1974; Lave, 1977). Researchers began studying the kinds of activities people did in their own community and how that related to what the researcher was trying to get them to do. This involved noticing people's "everyday cognition" as they make complicated woven patterns, calculate change in the market, skillfully persuade others, or narrate complicated historical accounts (e.g., Greenfield & Childs, 1977b; Saxe, 1988). For example, Serpell (1979) found that children from Zambia and from England, when asked to reproduce patterns, performed well when reproducing the pattern in a familiar medium (modeling with strips of wire for the Zambian children and with paper-and-pencil for the English children) and poorly if the medium were unfamiliar (the reverse). The two groups performed equally well when reproducing the patterns in a medium (clay) that was equally familiar.

Researchers also began noticing the test situation itself. Until that time, cognitive tests were seen as context free, allowing observation of people's cognitive skills in some sort of pure fashion. But as cross-cultural researchers noticed the importance of familiarity in test performance, they began to reflect on the familiarity of the test situation itself and relate it to their research participants' everyday experience.

This self-examination of cognitive psychology's laboratory was encouraged by the overwhelming correlations found between performance on many kinds of tests and people's extent of experience with formal schooling (usually imported from European nations). The relation between schooling and cognitive skills may appear widespread in part because of the historical relationship between tests of intellectual ability and schooling. As Cole et al. (1976) pointed out, Binet's original tests of intelligence were based on school tasks, as his goal was to predict performance in school. So it is not an accident that cognitive measures relate to schooling (see also Tulviste, 1991).

The extent of research using cognitive tests with people in differing cultural communities seems to have dropped off as cultural psychologists began to examine the relation between the assumptions and practices of cognitive tests and the everyday practices of the people they studied. In the 1980s, new directions appeared that involved testing cognitive skills that were seen as representing important skills tied to cultural practices rather than skills that were usually assumed to be general. These included tests of numeracy and literacy (some of which are referred to in the following section), and tests of memory for spatial arrangements and for stories (some of which were mentioned earlier).

We informally examined the idea that there had been a drop-off since 1980 in empirical work that involved giving cognitive tests in varying cultures, in the tradition of the 1960s and 1970s, by carrying out an extensive search using Child Development Abstracts, PsycInfo search services, the Social Science Citation Index and examining journals such as the *Journal of Cross-Cultural Psychology*. From 1980 to 1994 (and most were in the

early 1980s), we found only 18 studies: 3 examining children's mental abilities on intelligence tests, 1 using the Matching Familiar Figures Test, 2 testing free recall and visual memory, 6 examining Piagetian concepts, 3 studying depth perception, and 3 combining several kinds of tests.

Another indicator of a transformation is a change in terminology. Scholars studying cognition in the tradition of the 1960s and 1970s referred to their work as cross-cultural psychology;[2] since then, most researchers in the area of culture and cognition have labeled their direction cultural psychology, in some cases, or sociocultural or sociohistorical research.[3] (In a subsequent section, we follow the trajectories of a number of the researchers who contributed to the cross-cultural work on cognition in the 1970s and before, as it transformed to the present.)

Capping the era of cross-cultural cognitive studies in psychology were several important integrative publications, including the six-volume *Handbook of Cross-Cultural Psychology* (edited by Triandis; see especially Triandis & Heron, 1981, and Triandis & Lonner, 1980), the *Handbook of Cross-Cultural Human Development* (edited by Munroe, Munroe, & Whiting, 1981), and *Cultural Perspectives on Child Development* (edited by Wagner & Stevenson, 1982).

The next section describes the nature of the transition in research and theory on culture and cognition in the 1980s, when the field attended seriously to the findings of the previous decades and sought theoretical frameworks that would be compatible with what had been learned.

## A Time of Transition: Culture and Cognition Research and Theory of the 1980s

At the end of the 1970s and beginning of the 1980s, evidence was mounting that schooling and literacy bear highly specific relations to cognitive test performance. This perspective was supported by research on the relations of specific practices of literacy and numeracy to test performance as well as by research on the social interactional and institutional context of the test situation itself. Simultaneously, the availability of Vygotsky's writings in English (especially Vygotsky, 1978) provided a theoretical perspective that aided researchers in the area of culture and cognition in examining and reformulating the assumption system of the field. In this section, we summarize the blossoming of interest in the practices of literacy and numeracy, the research into the social and institutional context of the test situation, and the influence of Vygotskian theory.

### *Literacy*

Olson (1976) suggested that human intellect cannot be separated from the technologies (e.g., writing, speech, and numerical systems) invented to extend cognitive processes. He argued that people who are literate become skilled in examining statements in isolation for logical meaning (as in logical syllogisms) and that the cognitive changes observed near the onset of schooling (White, 1965) derive from the familiarity with literacy developing at five to seven years of age. Literacy, it was argued, fosters the examination of propositions for their internal logic (Goody & Watt, 1968; Olson, 1976), as written statements may be examined for consistency, and in the case of essayist prose, statements can be treated as though meaning were contained in the text itself, independent of the social context of the writer and reader.

The study of the effects of literacy yielded evidence of very specific cognitive skills. Scribner and Cole (1981) carefully examined the relation between cognitive skills and literacy of varying types, pointing out that most speculations about literacy focus on the genre of essayist text (expository writing). They studied individuals who differed in the type of literacy practiced, with a sample of Vai people from Liberia. The Vai have independently developed a phonetic writing system, widely available throughout the society, consisting of a syllabary of 200 characters with a common core of 20 to 40. Vai script is used for the majority of personal and public needs (such as letter writing) in the villages and is transmitted informally by nonprofessional literates who teach friends and relatives over a period of up to two months. In addition, some Vai individuals are literate in Arabic from their study of religious texts in traditional Qur'anic schools, which emphasize memorizing or reading aloud, often without understanding the language. In addition, some Vai are literate in English from their study in Western-style official schools.

The Vai script has many important uses, but it does not focus on writing essays to examine ideas. Hence Scribner and Cole (1981) predicted that Vai literacy would not have the intellectual consequences that have been suggested to result from school-based literacy. Indeed, they found little difference between individuals literate and not literate in Vai on logical and classification tasks.

In subsequent tasks, Scribner and Cole (1981) carefully related specific cognitive skills to particular aspects of the different systems of literacy. For example, in communication tasks requiring the description of a board game in its absence, Vai literates excelled compared with nonliterates and with Arabic literates. Scribner and Cole expected this relationship because Vai literates frequently write letters—a practice requiring communication to be carried in the text, unsupported by other aspects of con-

[2] There are still active research lines that use the label *cross-cultural*, such as the work published in the *Journal of Cross-Cultural Psychology* and done by members of its parent organization, the International Association of Cross-Cultural Psychology, which focuses especially on social psychological research, and the work of the Society for Cross-Cultural Research, which includes psychological anthropology approaches (see Gielen, 1994). The account here is limited to the direction of work on culture and cognition.

[3] In this article, we use *sociocultural* and *sociohistorical* interchangeably. The terms combine social processes (i.e., between individuals or groups who are in contact with each other) and cultural–historical processes in which practices and tools developed in previous generations remain for (and are transformed by) subsequent generations.

text. Vai literates were also more skilled in comprehending sentences presented syllable-by-syllable at a slow rate; this resembles the necessity in Vai literacy to integrate syllables into meaningful linguistic units (e.g., words), as Vai script is written without word division. Arabic literacy was associated with skill in remembering a string of words in order, with one word added to the list on each trial. This test resembles the method for learning the Qur'an by the Arabic literates.

Scribner and Cole's (1981) results suggest that literacy relates to cognitive skills through specific practices involved in the use of literacy. Different forms of written script (e.g., alphabetic, phonemic, and with or without word divisions) and literate genres (e.g., essayist prose, letters, story problems, lists, and chants) promote specific cognitive skills related to their use.

### Numeracy

Work on people's understanding of numeric operations also revealed similar specificity of relations between particular numerical practices and performance on cognitive tests. Lave (1977) observed that experience with schooling related to Liberian tailors' skill in handling arithmetic problems using the format used in school and that tailoring experience related to skill in solving arithmetic problems of the format used in tailoring; neither schooling nor tailoring provided "general" skill in numeric operations. (See also studies of people's arithmetic activities related to their experience of schooling and of merchant activities, continuing into the 1990s: Carraher, Carraher, & Schliemann, 1985; Ginsburg, Posner, & Russell, 1981; Lancy, 1978; Lave, 1988; Nunes, Schliemann, & Carraher, 1993; Posner, 1982; Saxe, 1988.)

Similarly, Japanese abacus experts show specific but powerful consequences of their skill in the use of the abacus as a tool for mathematical operations. They mentally calculate without an abacus as accurately as with an abacus and often faster (Hatano, 1982; Stigler, Barclay, & Aiello, 1982), imagining problems of many digits on an abacus. Imagining the representation of problems on an abacus apparently facilitates specific skill in remembering: Abacus experts can recall a series of 15 digits either forward or backward. However, their memory span for the Roman alphabet and for fruit names is not different from the usual 7 plus or minus 2 units found for most adults in memory-span tasks. The processes involved in their impressive mental–abacus operations are tailored to the activities in which they were practiced and applied specifically to related activities.

It appears that the specifics of each practice (whether schooling, tailoring, or candy selling) are inseparable from the cognitive processes of the users of the systems. The research of the late 1970s and early 1980s demonstrated the importance of not assuming generality of ability on the basis of experience with any particular practices. It also drew attention to the roles of values and practices involved in cognitive performances in the test situation as well as outside it.

### Social and Institutional Organization of Cognitive Tests

Goodnow (1976) proposed that many differences among cultural groups in performance of common cognitive tasks may be due largely to varying interpretations of what problem is being solved in the task and to different values defining "proper" methods of solution. For example, speed of solving problems may be seen as either positive or negative; Ugandan villagers associate intelligence with adjectives such as *slow, careful,* and *active,* whereas Ugandan teachers and Westernized groups associate intelligence with the word *speed* (Wober, 1972). In some communities, performing a skill before it is consolidated (as in a test) may be considered an important part of the learning process, but it is regarded as inappropriate in others (Cazden & John, 1971).

The appropriateness of treating a cognitive task as a self-contained intellectual puzzle independent of the social context varies across communities (Goodnow, 1976). Popular conceptions of intelligence held by middle-class groups in the United States differ from those of some other groups in valuing technical intelligence as distinct from social and emotional skills (Lutz & LeVine, 1982). In most Western schools, reliance on a companion for help may be considered cheating, whereas in everyday situations in many cultural settings, not to use a companion's assistance may be regarded as folly or egoism.

The separation of technical from social skill in the middle-class European American view contrasts with judgments of adults from some African groups that define children's intelligence in terms of both capability in specific situations and social responsibility (Serpell, 1977, 1982). Kipsigis (Kenyan) parents interpret intelligence as including responsible participation in family and social life (Super & Harkness, 1983). The Ifaluk of the western Pacific regard intelligence as not only having knowledge of good social behavior but also performing it (Lutz & LeVine, 1982).

Schooling provides experience with particular conversational forms that have been central to cognitive tests. Schooled people are familiar with an interview or a testing situation in which a high-status adult, who already knows the answer to a question, requests information from a lower status person, such as a child (Mehan, 1979). In some cultural settings, however, the appropriate behavior may be to show respect to the questioner or to avoid being made a fool of by giving the obvious answer to a question that must be a trick question whose answer is not the obvious one (otherwise why would a knowledgeable person be asking it?). Irvine (1978) suggested that Wolof peoples' interpretation of an experimenter's purpose in a conservation procedure may conflict with their giving straightforward answers to questions. She reported that it is uncommon, except in schoolroom interrogation, for Wolof people to ask one another questions to which they already know the answers: "Where this kind of questioning does occur it suggests an aggressive challenge, or a riddle with a trick answer" (p. 549).

Values about social relationships may also influence people's response to cognitive questions that would require them to overstep their roles. For example, in contrast to the encouragement of mainstream American children to perform and compete as individuals, children in some communities avoid calling attention to themselves (e.g., in egotistically volunteering an answer) and thereby distinguishing themselves from the group (Philips, 1972; Whiting & Whiting, 1975). Similarly, prescribed relationships between children and adults may lead children to place primacy on appropriate social relations rather than exclusive focus on the cognitive puzzle. In many communities, for instance, the role of children may be to observe and to carry out directives, but not to initiate conversation or talk back to a person of higher status (Blount, 1972; Harkness & Super, 1977; Ward, 1971).

Goodnow (1980) pointed out that values are involved in judgments of the outcomes or endpoints of development, methods of facilitating development, and assessments of progress toward an endpoint. Concerns about assumptions of unique developmental endpoints have become an issue in historical and cross-cultural analyses in which the goals of development may not match the naive or explicit theories of researchers (Buck-Morss, 1975).

Cross-cultural psychology's questioning of the assumptions of generality (of tasks and of people) and observations of how specific cultural and social practices related to cognitive test performance led to interest in tying research more closely to phenomena of obvious importance rather than to artificial situations whose assumed generality was now questioned. In addition, scholars in the area of culture and cognition began examining the assumptions on which cognitive research to date had been based and began reformulating notions of the relation of thinking and sociocultural experience.

A growing theoretical basis for relating people's cognitive activities to their prior experience and to their efforts to act in new situations built on the sociocultural–historical theory of Vygotsky and his colleagues who argued that individual cognitive activity must be understood in terms of the social, cultural, and historical processes of people's activities.

### *Vygotsky's Sociohistorical Theory*

The work of many scholars of culture and cognition was deeply influenced by the sociohistorical theory of Vygotsky and colleagues, which became central with the English publication in 1978 of *Mind in Society* by Cole, John-Steiner, Scribner, and Souberman, and the translations and interpretations by Wertsch (1981, 1985).[4] At the time this work appeared, culture and cognition researchers were struggling to reconceptualize the relation of individuals and society, of cognitive tests and everyday cognition, and of learning in and out of school. Many turned to this theory for guidance in shifting perspectives from the problems of assumed generality of cognitive activity and of cultural and social aspects of cognitive performance.

According to Vygotsky's theory, to understand individual thinking, one needs to understand the social and cultural–historical contexts in which it is used. Researchers cannot just look at individual thinking in a vacuum, as though individual thinking is separate from the kinds of activities in which people engage and the kinds of institutions of which they are a part.

In the next section, we describe the changes visible in the work of many of the scholars who were active in the cross-cultural studies of cognition in the 1970s and before; as their work has evolved to the present, as a way of illustrating the transformations afoot. In general, with the inspiration provided by Vygotsky's work, the perspective has transformed to treat culture and cognition as dynamic processes that cannot be separated and to examine the processes as localized rather than necessarily general.

The investigation of culture and cognition also has expanded to become transdisciplinary, from the earlier efforts in which culture was used as an unanalyzed static independent variable and cognition was treated as a traditional psychological faculty. The subsequent section describes the work of scholars who are contributing to the development of sociocultural–historical research and theory on cognition but whose intellectual roots were not in cross-cultural psychology research on cognition.

Through the interdisciplinary efforts of these lines of researchers and their colleagues, a rather coherent family of sociocultural–historical research programs and theories on cognition is emerging, with associated transformation of research methods and questions (see also Goodnow, 1993). In the final section of the chapter, we provide a brief summary of some of the tenets of this emerging family of sociocultural–historical approaches.

## Tracking Emerging Directions of Work on Culture and Cognition

Many scholars whose work was key in the formation of cross-cultural research on cognition in the 1970s and in the transformation of the 1980s are still actively studying processes of culture and cognition. It is informative to examine the ways that many of them have chosen to invest their energies since that earlier period, because commonalities in their choices reveal aspects of the developing sociocultural approach. The list of individuals whose direction is summarized in the first part of this section is by no means a complete listing of those who were central to the study of cross-cultural psychology of the 1970s or the transition of the 1980s. However, these cases as well as those not detailed here reveal the complementary directions that are being taken in the field as each scholar decides where to place their efforts; the whole is greater than the sum of these parts, but the parts reveal the direction of the field as a whole.

[4] Very active scholarly work continues to examine and extend the insights of Vygotsky, Luria, Leont'ev, and other Soviet scholars such as Bakhtin (see especially Kozulin, 1990; van der Veer & Valsiner, 1991; Wertsch, 1991).

What follows here are brief case studies of the roots and current directions of some scholars whose work was central in the review we provided earlier on cross-cultural research on cognition of the 1970s and the transformation of the 1980s: Cole, Scribner, Lave, Goodnow, Bronfenbrenner, Dasen, Serpell, Greenfield, Stevenson, Stigler, Super and Harkness, Saxe, Rogoff, and Wagner.

In recent years, many of these scholars have become committed to the study of cognition in the context of trying to facilitate theory and practice in everyday lives and institutions, showing a conviction that because the context of one's observations makes a difference in what is learned, it is important to work in contexts that matter. Many have placed greater emphasis on cultural processes in the United States, with a conviction that culture is a process in which all participate, not just those who are overseas. In addition, many have given deep thought to articulating researchers' cultural assumptions and theoretical perspectives for the understanding of cognition and other human processes, helping to transform how social scientists conceive of the phenomena they study and the concepts and methods for understanding them.

Of course, the individuals are not working in isolation, but as part of a larger conversation with each other and with other people who contribute to this direction, from differing roots (summarized in the subsequent part of this section), as well as with scholars who are not part of the emerging sociocultural–historical perspective. It is important to note that along with commonalities of approaches within the transition that we are attempting to describe, there are very important and productive disagreements regarding key ideas that are being argued, not as a way of producing a final homogeneous product but to further the multifaceted understanding of human cognition as a sociocultural–historical process.

Most (though not all) of the scholars whose cases we follow are psychologists by training, as cross-cultural research on cognition of the 1970s was almost fully within the field of psychology. However, the subsequent careers of most of the psychologists have broadened to becoming conversant in the ideas and methods of other social science disciplines, most notably anthropology, sociology, and linguistics. In addition, it is notable that several scholars on the list were trained in interdisciplinary departments. The transdisciplinary nature of the work on culture and cognition is thus clear in the individual careers of the people whose direction is summarized in this section; in the subsequent part of this section, we summarize some other current work on culture and cognition that has emanated from other sources than cross-cultural psychology, to fill out the transdisciplinary endeavor that now characterizes sociocultural scholarship.

### Watch Their Feet: Transformations in the Work of Scholars' Studying of Culture and Cognition Across the Decades

***Michael Cole.*** Cole's early cross-cultural research findings on memory, classification, logic, and mathematics came together with his formative experience studying with Luria and other scholars of the sociohistorical school in the Union of Soviet Socialist Republics (USSR) as he collaborated with Scribner on studies of literacy in Africa and on the preparation of Vygotsky's *Mind in Society* in English. As resources in his research, Cole increasingly turned to study the history, concepts, and methods of anthropology and ethnographic research. Cole's conceptual work of the 1980s and 1990s has focused on advancing theoretical understanding of concepts of sociocultural activity, especially issues of specificity and generality of cognitive activities, the relation of cognitive tests and schooling, and issues of methods and units of analysis (Cole, 1988, 1992a, 1992b; Laboratory of Comparative Human Cognition, 1983). Cole and his colleagues' recent research has focused on examining children's everyday activities in schools and after-school clubs, with emphasis on understanding the interpersonal and mediated ways that cognitive development occurs in cultural institutions (Newman, Griffin, & Cole, 1984, 1989). They have created programs to examine whether the projected changes occur and studied the role of institutions in the maintenance of innovations, focusing especially on electronic communication and computer use as means through which children become skilled in understanding literacy tools and concepts (Nicolopoulou & Cole, 1990).

***Sylvia Scribner.*** Scribner's early work on cross-cultural use of logic, classification, and memory, combined with her lifelong interest and involvement with labor, came together in her work on the uses and consequences of literacy and her collaboration in the preparation of Vygotsky's *Mind in Society.* Her subsequent work involved a continued, close examination of the relation between cognitive tools and institutions such as work and school. Her conceptual contributions since the 1980s have focused on locating cognitive tests as particular formats for the display of knowledge, on explicating activity theory, and on articulating concepts of development and history in sociocultural thinking (Scribner, 1985b, 1990; Scribner & Beach, 1993). She drew attention to the notion that people's strategies in mathematical activities relate to minimizing the effort needed to accomplish a task and examined this idea in her observations of dairy workers as they assembled orders (Scribner, 1984). Her work examines the complex mental processes for action that workers carry out, which may or may not be facilitated by the formalisms taught in school or by those introduced by management to order the workers' process (Scribner, 1984, 1985a). Although Scribner died in 1991, her work still continues to develop through the efforts of her colleagues, with Glick and others continuing her research on factory workers and a book of her unpublished manuscripts due to be published (Tobach, Falmagne, Parlee, Martin, & Kapelman, in press).

***Jean Lave.*** Lave entered the discussion on culture and cognition in the 1970s with a background as an anthropologist and helped to reshape the conception of cognition as a sociocultural process. Her observations of the specificity of Liberian tailors' use of school-based and of tailoring-based mathematics led her and others to ex-

amine schooling and apprenticeship as sociocultural learning contexts and tests as activities fitting in their own cultural and institutional contexts. Lave's (1988) later work on everyday mathematics examined how people's use of mathematical concepts in grocery shopping and planning meals demonstrated different assumptions about what makes sense to do than in school math. Lave's conceptual contributions since the 1980s have also focused on developing a theoretical account of how people's learning is an aspect of their participation in the activities of their community of practice. She has been influential in the development of notions of situated cognition and critical psychology and along with Wenger (1991) has made important arguments about the nature of learning as a function of "legitimate peripheral participation" in sociocultural activities as people become members of communities of practice, building on the characteristics of learning and its arrangements in apprenticeship situations.

***Jacqueline Goodnow.*** In her early cross-cultural work on Piagetian concepts, Goodnow drew attention to the cultural values that are often implicit in tests and to the idea that cognitive development involves learning the community's definition of being intelligent. She proposed that people learn the "cognitive values" that define not only what we should learn or think about but also what we may ignore or should not think about—areas of "acceptable ignorance or incompetence" (Goodnow, 1990, in press). To build alternative ways of describing "culture" and the processes that cognitive development involves, she has turned to exploring the "internalization" of one generation's viewpoints by another (e.g., Grusec & Goodnow, 1994) and to analyses of cultural practices (Goodnow, Miller, & Kessel, 1995). Her empirical research focuses on household divisions of labor as an everyday activity through which a community's definitions of relationships are learned and transformed (Goodnow & Bowes, 1994).

***Urie Bronfenbrenner.*** Bronfenbrenner was influenced by his own "two worlds of childhood," his inspiration in Lewinian theory and Soviet psychology and his cross-cultural research to draw attention to the role of context in child development. In 1979, he laid out an ecological perspective that stressed examination of the interaction of a changing organism in a changing environment comprised of the person's immediate settings as well as the social and cultural contexts of relations between different settings such as home, school, and the workplace. He has been interested in specifying the properties or conditions of the social and physical environments that foster and undermine cognitive growth, stressing the process of cognitive development in people's "ecological niches." His work has increasingly reflected his concern with how rapid social, political, and economic changes impact children's development and with responsible contributions to social policy (Bronfenbrenner, 1989, 1990, 1993): "Beginning in the early 1980's, I became so concerned about the state of our own American culture that I, in essence, made that the focus of most of my theoretical, empirical, and applied work during the past decade and a half" (U. Bronfenbrenner, personal communication, February 1994).

***Pierre Dasen.*** Dasen has contributed important work to the cross-cultural study of Piagetian concepts (Dasen, 1977). Prompted by contextual cultural differences in performance on Piagetian tasks, he became interested in examining the performance–competence distinction, intrigued especially by the fact that Inuit children with whom he worked transformed from nonconserving to conserving within a few trials. With John Berry, he examined the ecocultural contexts of spatial and quantitative skills, questioning the Piagetian "structure d'ensemble" (domain consistency). In the early 1980s, he began focusing on understanding children's daily lives and the relation to cognition and indigenous concepts of intelligence (Segall, Dasen, Berry, & Poortinga, 1990). His current research focuses on issues of the education of migrant children in Geneva and (with anthropologist Jurg Wassman) on understanding classification and spatial concepts starting from indigenous conceptual systems in everyday activities such as cooking and navigating in several nations.

***Robert Serpell.*** Serpell's thoughtful book on culture and cognition in 1976 and other early work helped bring attention to variations in concepts of intelligence in different communities (Serpell, 1974). As a naturalized citizen of Zambia, he focused on the implications of psychological research on educational policymaking in Zambia and examined the nature and role of European-derived formal schooling in rural communities of Africa (Serpell, 1993). He analyzed how historical philosophical changes relate to societal changes and diffusion of particular models of schooling and learning in Europe, the United States, Japan, and Africa (Serpell, in press). In his recent research, Serpell assumes a "situated theory" perspective, proposing an interdisciplinary approach to the study of development to enhance educational practices within specific communities (which now focuses on minority populations in the United States, with Serpell's move to Maryland; Serpell & Boykin, in press).

***Patricia Greenfield.*** Greenfield, from her early work on conservation, proceeded to study cognitive processes occurring in indigenous activities, such as conceptual systems in kinship classification and pattern inference and learning in weaving (Greenfield & Childs, 1977a, 1977b). She began to study verbal and nonverbal communication in early language development as well as in instructional situations with older children (Greenfield, 1984b) and examined the cognitive implications of different modes of representation such as electronic media (video games, computers, radio, and television), which she defines as symbolic culture (Greenfield, 1984a). Most recently, she has become interested in historical processes of development, studying how processes of pattern development and teaching and learning have changed over decades in a Mexican weaving community and relating cultural history to evolutionary biological history (Greenfield, 1991). Her edited volume (Greenfield &

Cocking, 1994) focuses on the ancestral roots of immigrant and minority socialization values and practices; she argues that cultural history is a key to integrating cultural diversity in development in American society.

***Harold Stevenson.*** Stevenson reported that his comparative research in different nations "totally transformed my life" (H. Stevenson, personal communication, January 1994) from the laboratory learning research of his early career, leading him to assume a more contextual approach to the study of children's learning. Following a study focusing on the relation of schooling and cognitive test performance in Peru (Stevenson et al., 1978), he has devoted his work to examining how and why Japanese, Chinese, and American children differ in their understanding of mathematics (Stevenson, 1992; Stevenson, Lee, Chen, & Stigler, 1990; Stevenson, Stigler, Lucker, & Lee, 1987). His work examines family, school, and national differences in attitudes and practices regarding the learning and teaching of mathematics and other subjects.

***Jim Stigler.*** Stigler (1984) contributed a key study of the specificity of effects of a cognitive tool (the abacus) in performance on cognitive tests. His subsequent research has focused on examining children's mathematics achievement in elementary school settings in Japan, Taiwan, and the United States (Stigler, Lee, & Stevenson, 1987, 1990), examining differences in the structure of schooling, curricula, and classroom time allocation as well as the role of teachers, the attitudes and beliefs of parents, and the involvement of children and parents in schoolwork. Stigler advocates the idea of a "new discipline" of cultural psychology, combining approaches from anthropology, psychology, linguistics, history, and philosophy so that researchers can understand how cultures design their institutions and how these institutions meet individuals' needs and promote their future goals.

***Charles Super and Sara Harkness.*** Super and Harkness focused their early cross-cultural work on cognitive development in childhood and infancy. Super (1981) noted the specificity of achievement of infant milestones and their relation to cultural values and practices. They extended the concept of "developmental niche" as a theoretical perspective for examining cultural influences on children's development (Super & Harkness, 1986), discussing the physical and social settings in which children live, the customs of child care and child rearing, and the psychology of caregivers. Their recent research includes investigation of parental perceptions and ethnotheories of children's intelligence, behavior, and personality (Harkness & Super, 1992). They are concerned with relating cognitive development to health and educational policies, including the importance of food supplementation and maternal education in children's development in varying communities (Guldan et al., 1993).

***Geoffrey Saxe.*** Saxe began his cross-cultural work in an Eskimo community in 1969, trying to reconcile his observations of everyday life and performance on tests of moral reasoning (Saxe, in press). He turned to an examination of number concepts in several cultural settings, which contributed to the 1980s transition phase in research on culture and cognition by relating people's development of number concepts to their cultural systems and their everyday practices (Saxe, 1981, 1988, 1991). Later work has concerned in situ analyses of cognition as it takes form in cultural practices. Saxe's current work articulates a framework for analyzing cognitive development in practice and applies it to the analysis of children's developing understandings in games and in traditional and reform-minded classrooms in the United States (Saxe, 1992; Saxe, Gearhart, Note, & Paduano, 1993).

***Barbara Rogoff.*** Rogoff moved from efforts to identify cultural and social influences on memory development to a concern with how cognitive processes are integrated with rather than a product of sociocultural activities (Rogoff, 1982, 1992). Her conceptual work has focused on articulating a participation theory of development as a sociocultural process (Rogoff, 1990, 1995, in press; Rogoff, Baker-Sennett, Lacasa, & Goldsmith, 1995). Her recent research focuses on cultural models of teaching and learning observable as toddlers and caregivers from differing cultural communities collaborate on everyday tasks (Rogoff, Mistry, Göncü, & Mosier, 1993) and as elementary students, parents, and teachers collaborate in an innovative U.S. school (Rogoff, 1994).

***Dan Wagner.*** Wagner moved from examining how schooling and especially literacy related to memory test performance to a commitment to understanding the development of literacy for children and adults in the United States and abroad. His edited volume with Stevenson (1982) was published at the transition from research on cross-cultural performance on tests to examination of how cognition is culturally based. As head of the International Literacy Institute co-sponsored by UNESCO, Wagner has become especially interested in unifying practical implications of literacy research with policymaking around the world relating to enhancing people's living conditions (Wagner, 1993). He pointed out that in his 1993 book, "you will note that my work on the 'cognitive consequences' of schooling is now relegated to an appendix, where I bring up much more to the fore issues in the applied research and policy development as tied to empirical research in cognitive and educational development" (D. Wagner, personal communication, February 1994).

To summarize briefly, many of the scholars who have been involved in the study of culture and cognition from the 1970s have made a transformation from applying tests in different cultures to examine the "influence" of culture on cognition and turned to developing both theory and practice, building on the notion that cognitive development is intrinsically a cultural–historical process.

Their efforts in this direction have been inspired by increasing communication across disciplines to develop theory, methods, and practices that can do justice to cognitive development as a cultural process. In the next part of this section, we provide a brief introduction to some of the other scholars collaborating in this endeavor—many of them are from other disciplines than psychology

and some are from psychology but entered the endeavor in other ways than the cross-cultural study of cognition.

### Who Else Is Part of the Conversation About Culture and Cognition in the 1990s?

As the work on culture and cognition stemming from cross-cultural psychology has become increasingly transdisciplinary in approach, the work of a number of other scholars from different disciplines (including psychology, but especially anthropology, sociology, and education) has also become central to the developing theoretical and methodological approach and has contributed empirical findings. In addition, the direction has come to include work on U.S. minorities and nonminority children.

A major line of research and theory derives from sociolinguistics and anthropology, with the aim of studying how people's thinking and language development occur as they engage with other people in socially and culturally organized (and developing) activities. For example, variations in communicative and literate practices in preschoolers' homes in middle-class and working-class African American and European American families seem to relate to the children's ease in fitting with the expected communicative and literate practices of schools (Heath, 1983). In other communities, communication practices within families differ markedly from those expected in middle-class European American homes, where adults see it as their instructional job to simplify their talk and support children's talk in the interest of promoting cognitive and language development; instead, children often hold major responsibility for adjusting to adult conversation and activities (Ochs, 1988; Schieffelin, 1991; Watson-Gegeo & Gegeo, 1986).

Other research on communicative routines and cognitive practices in everyday lives in varying communities is adding to researchers' understanding of cognitive development, especially by attending to the family and institutional contexts and community practices of thinking and development (Berland, 1982; Cook-Gumperz, Corsaro, & Streeck, 1986; Duranti & Goodwin, 1992; Eckert, 1988; Goodwin, 1990; Heath, 1989a, 1991; Hendry, 1986; Henze, 1992; Hutchins, 1991; Lein & Brenneis, 1978; Miller, 1982).

Schooling is an institution that is central to peoples' understanding of cognitive development that is receiving increasing interdisciplinary study in the effort to understand the dynamic processes and organization of thinking and learning. A number of scholars have observed that the tasks and performances that are taken as indexes of cognitive development cannot be understood without attention to the practices of school, which themselves must be studied in terms of being developing community activities (Akinnaso, 1992; Cazden, Cox, Dickerson, Steinberg, & Stone, 1979; Cazden, John, & Hymes, 1972; Dewey, 1916; Erickson & Mohatt, 1982; Mehan, 1979; Michaels & Cazden, 1986; Paradise, 1991; Peak, 1991; Tharp & Gallimore, 1988).

Further conceptual and empirical contributions to sociocultural theory and cultural psychology have come from the work of scholars whose work originated from other sources than cross-cultural cognitive psychology, including anthropology, linguistics, and other psychological traditions (e.g., Bruner, 1990; D'Andrade, 1990; D'Andrade & Strauss, 1992; Engeström, 1990; Holland & Quinn, 1987; John-Steiner, 1985; Shweder, 1991; Valsiner, 1987, 1994; Wertsch, 1991). Two new multidisciplinary, international journals provide a forum for sociocultural research: *Mind, Culture, and Activity: An International Journal* (formerly *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition*) began in 1994 under the editorship of Cole, Engeström, and Star, and *Culture & Psychology* began in 1995 under the editorship of Valsiner.

In addition, research with U.S. minorities is beginning to weave together with sociocultural–historical research, from its separate roots. For many years, researchers focused on comparing the behavior and skills of minority children with mainstream children without taking into consideration the cultural contexts in which these groups develop. This approach involved "deficit model" assumptions that mainstream skills and upbringing are normal and that variations observed with minorities are aberrations that produce deficits (Hilliard & Vaughn-Scott, 1982; Howard & Scott, 1981; Ogbu, 1990). In recent years, however, both minority and nonminority researchers have focused on understanding cognitive development of minority children as a sociocultural process inextricable from cultural and historical aspects of children's lives (Au & Kawakami, 1991; Boykin, 1986; Hakuta & Garcia, 1989; Heath, 1989b; Laosa, 1981, Laosa & Henderson, 1991; Miller-Jones, 1989; Moll, 1990).

As can be seen from our account, sociocultural research and theory has transformed from work examining foreign children and adults in European American psychological tasks to work that places greater emphasis on understanding development of children and adults of any community (our own, our neighbors, and distant places) as inherently involving cultural processes to be studied as they occur in the activities and practices of each community. The transformation leads psychologists and other social scientists to need to speak to each other and to use the methods and ideas stemming from various disciplines to advance the understanding of culture and cognition beyond the disciplines to address the classic question of how people learn and think.

In the final section of this article, we provide a very brief abstract of some key commonalities of the research and theoretical perspectives represented by the people whose work we have summarized in this section and others contributing to the sociocultural perspective. For more complete accounts of the emerging views, we refer you to the writings cited throughout this section and the next. We perceive the emerging sociocultural–historial approaches as involving the commonalities summarized in the next section as well as very important and productive differences.

## An Abstract of Sociocultural Research and Theoretical Perspectives

The complex of related but heterogeneous proposals for sociocultural theory that are emerging from discourse across disciplines and cultural and historical communities represents a general agreement revolving around a view of processes of individual development as they constitute and are constituted by interpersonal and cultural–historical activities and practices. The stance of sociocultural approaches to cognitive development is that the intellectual development of children is inherently involved with their participation in sociocultural activities. In this section, we provide an overview of what we see as key common ground in a variety of emerging sociocultural approaches to cognition and development (key among them, Cole, 1990; Heath, 1983; John-Steiner, 1985; Laboratory of Comparative Human Cognition, 1983; Lave & Wenger, 1991; Ochs, 1988; Rogoff, 1990; Schieffelin, 1991; Valsiner, 1987; Wertsch, 1991).

Sociocultural perspectives assert that individual cognitive developmental processes are inherently involved with the actual activities in which children engage with others in cultural practices and institutions and that variation is inherent to human functioning. Children discern the relations ('transfer') between genres of activity across contexts as they, together with others, participate in and contribute to bringing about those activities. Analysis focuses on cognitive processes rather than on characteristics of individuals. Generalities are sought in terms of the nature of the processes as people participate in and constitute activities rather than simply assuming context-free generality in thinking or seeking generality in separated characteristics of the person or the task. Individuals are conceived as contributing participants in activities, constituting the activities with others through their developing roles. Each generation makes use of the intellectual traditions and tools provided by previous generations and simultaneously transforms them in their use.

Traditional approaches to understanding individual and sociocultural processes dissected them apart and settled them within the boundaries of disciplines, making it difficult to address questions of sociocultural and individual development in an integrated manner. For psychology, the awareness that individual functioning had something to do with culture led to studies adding cultural factors as influences (in the form of independent variables) on what was assumed to be basic individual functioning (often examined with tests yielding dependent variables). For anthropology and sociology, there has been a surprisingly small effort devoted to understanding child development in sociocultural institutions and practices. Presently, scholars in psychology, anthropology, sociology, and linguistics are seeking ways to overcome the limitations of concepts derived from the dichotomy between the individual and society.

The sociocultural approach inspired by Vygotsky and Leont'ev provides many sociocultural scholars with a common language and perspective, particularly in the concept of "activity" and the emphasis on integrating levels of analysis. In addition, there are a number of other converging perspectives that enter the discourse to form the conceptual basis of sociocultural research. The works of G. H. Mead and of Dewey, for example, contribute to the sociocultural approach, as do more recent writings from sociolinguistics, sociology, psychology, and anthropology. The concept of *activity* has developed in interdisciplinary literatures in the areas of sociocultural psychology, pragmatics, ethnography of speaking, practice theory, and other theoretical enterprises.

In the next paragraphs, we summarize several central assumptions that are held in common across sociocultural approaches to child development deriving from the different disciplines. They have to do with the use of *activity* or *event* as the unit of analysis to examine human functioning in socioculturally organized endeavors; the analysis of process and of development; the integrated analysis of individual, interpersonal, and community processes; the study of variation and similarity; the use of methods of study as tools in the service of research; and the cultural and historical embeddedness of the inquiry itself.

### *Unit of Analysis*

The activity or event is a unit of analysis that focuses on people engaged in sociocultural endeavors with other people, working with and extending cultural tools and practices inherited from previous generations. As individuals and groups of people develop through their shared involvement, they also contribute to transforming the cultural tools, practices, and institutions of the activities in which they engage. Sociocultural activities, involving people in shared endeavors with cultural history and organization, are used as the unit of analysis that attempts to preserve the inner workings of phenomena rather than separating an event into elements—for example, isolating individual from environment—that no longer function as does the living unit (Cole, 1985; Leont'ev, 1981; Wertsch, 1985; Zinchenko, 1985).

### *Process and Development*

To understand the purpose and structure of human phenomena, it is essential to examine their development and the processes by which people organize their efforts and practices. Analysis of sociocultural activities involves examination of the active and dynamic contributions from individuals, their social partners, and historical traditions and materials and their transformations as people engage in shared endeavors. As Scribner (1985b) pointed out, Vygotsky's analysis of the interrelated roles of the individual and the social world includes individual and environment together in successively broader time frames from momentary learning, to individual life-course development, to generations in a society, to species history (respectively, microgenetic, ontogenetic, sociocultural, and phylogenetic development). Development over the life course takes place within developmental processes occurring over both the course of cultural history and of phylogenetic history. These levels of analysis of develop-

ment are inseparable: The efforts of individuals constitute cultural practices that further organize individuals' development, and similarly, human biological development cannot be separated from the cultural institutions and practices that characterize humanity.

### Relation of Individual and Social and Cultural Levels of Organization

Inherent to sociocultural approaches is a premise that individual, social, and cultural levels are inseparable. Analysis may focus primarily on one but not without reference to the others as if they can exist in isolation. This notion differs from approaches that seek the impact of culture on the individual in which each is conceived as separate (termed *interactional* approaches by Rogoff, 1982). Within sociocultural approaches, the aim is to understand the developmental processes involved in activities involving individual, interpersonal, and community/cultural processes.

The relation between "activities" and learning or development can be conceived in several ways. E. Ochs (personal communication, 1989) distinguished between two views of learning: In the first, learning is seen as *structured* by activities that relate to local economic, political, and other ideological systems that organize learning and cognition across activity contexts. In the second, learning is understood as *constituting* activities—cognitive efforts not only underlie and are constrained by local activities and ideological systems, but such work also builds these activities and systems. Similarly, Rogoff (1995) suggested that individuals develop as they participate (either face-to-face or distally) with others in shared endeavors that both constitute and are derived from community traditions. Rogoff suggested that the examination of individual, interpersonal, and community/cultural developmental processes involves analyzing differing planes of observation, with any one plane being the topic of focus but with the others necessarily observed in the background.

### Variation and Similarity

Variation in the direction and course of individual development in differing communities must be studied to understand development, as development is not considered to occur independent of actual communities and their practices. The challenge for understanding development is to see how people make connections across activities with practices that are related under some circumstances rather than to assume that the processes are inherently general or automatically general within domains. The sociocultural approach does not assume generality (across communities, across individuals within communities, or across practices carried out by the same people) but seeks to understand both similarities and variations according to the processes involved as people participate in cultural practices. The question of how peoples' efforts in one activity relate to those in another is an empirical question that requires examination of the nature of the activities (in terms of individual, social, and cultural aspects of the activity). Likewise, the findings cannot be assumed to generalize (or to be specific either) to children of another cultural community than that observed.

### Methods of Study as Tools Serving Inquiry

An important aspect of the sociohistorical approach to understanding scholarly inquiry itself is an examination of the methods that are used in analyzing phenomena (see Kindermann & Valsiner, 1989; Valsiner, 1986). Within each discipline, certain methods have been taken to define the discipline itself, with expertise with the approach being part of the rite of passage for novices to enter the discipline (e.g., statistics classes for psychologists and fieldwork for anthropologists).

Along with the sociocultural approach's interest in learning from the scholarly work across the disciplines is a respect for fitting methodological tools to questions. This involves putting the question first, and then looking for ways to study it, rather than limiting what is studied to the phenomena that can be analyzed exclusively with the methodological tools of a particular discipline. Depending on the question, then, researchers from a sociocultural approach choose among or combine methodological tools that have previously been regarded as within the domain of particular disciplines. Sociocultural research emphasizes both qualitative approaches to understanding the meaning of events from a perspective that fits the practices of the community being studied and quantitative approaches that can be useful in describing patterns that appear across cases or settings.[5]

### Cultural–Historical Nature of the Research Endeavor Itself

The questions and methods of understanding developmental processes are themselves culturally and historically situated (see Bronfenbrenner, Kessel, Kessen, & White, 1986, for several views on this phenomenon). Researchers can gain an understanding of the research endeavor and of the phenomena studied by examining their own roles in the inquiry and those of the institutions in which the inquiry occurs.

This is a challenging endeavor, as people are notably unaware of the institutions in which they themselves act. Berger and Luckmann (1966) speculated that habitual relations between people become institutionalized as expected and accepted rules and approaches that humans come to regard as external to their functioning. Shotter (1978) explained,

For the structure of human exchanges, there are precise foundations to be discovered in the *institutions* we establish between

[5] See Chapter 3 of Rogoff, Mistry, Göncü, and Mosier (1993) for a discussion and exemplar of combining qualitative and quantitative approaches for the systematic analysis of patterns, making use of ethnographic description, graphing, and descriptive statistics in the analysis of how toddlers and their caregivers from four communities communicate in the context of everyday problems such as operating novel objects and getting toddlers' arms through sleeves.

ourselves and others; institutions which implicate us in one another's activity in such a way that, what we have done together in the past, *commits* us to going on in a certain way in the future. . . . The members of an institution need not necessarily have been its originators; they may be second, third, fourth, etc. generation members, having "inherited" the institution from their forebears. And this is a most important point, for although there may be an intentional structure to institutional activities, practitioners of institutional forms need have no awareness at all of the reason for its structure—for them, it is just "the-way-things-are-done." The reasons for the institution having one form rather than another are buried in its *history*. (p. 70)

These processes are as applicable to the practice of research in universities as they are to any other institutionalized traditions involving particular technologies, practices, and values.

Efforts by scholars to understand the cultural–historical nature of academic institutions and activities are aided by the discourse across disciplines, nations, and historical time periods that are inherent to the sociocultural approach and by the aims of this line of work to understand individual functioning as it is constituted by and comprises social and cultural/community processes. The observations researchers make of others' endeavors in their cultural institutions facilitate our awareness of how our own endeavors, including experiments in academic laboratories as well as practices in schools and any other settings, build on and are within the traditions and goals of the institutions involved.

In summary, we have traced the early cross-cultural work on cognition through a transition from looking at culture as an independent variable affecting cognition to regarding cognitive processes as inherently cultural. Scholarly work on culture and cognition in the 1990s focuses on questions of how participation by individuals in certain cultural practices relates to participation in others, how cognition involves communication in the context of institutional and cultural practices, how learning involves transformations not only of skills but of identity, how development involves creation of new forms as well as use of given forms, and how communities and individuals manage diverse practices across overlapping or separate institutions and communities. The emerging sociocultural perspective, stemming largely from the work on culture and cognition, appears to hold promise for insights in broad questions of development and cognition.

## REFERENCES


Akinnaso, F. N. (1992). Schooling, language, and knowledge in literate and nonliterate societies. *Comparative Studies in Society and History, 34,* 68–109.

Armah, K., & Arnold, M. (1977). *Acquisition of conservation in Ghanaian children.* Paper presented at the meeting of the Society for Research in Child Development, New Orleans, LA.

Ashton, P. T. (1975). Cross-cultural Piagetian research: An experimental perspective. *Harvard Educational Review, 45,* 475–506.

Au, K. H., & Kawakami, A. J. (1991). Culture and ownership: Schooling of minority students. *Childhood Education, 67,* 280–284.

Berger, P. L., & Luckmann, T. (1966). *The social construction of reality.* New York: Doubleday.

Berland, J. C. (1982). *No five fingers are alike: Cognitive amplifiers in social context.* Cambridge, MA: Harvard University Press.

Blount, B. G. (1972). Parental speech and language acquisition: Some Luo and Samoan examples. *Anthropological Linguistics, 14,* 119–130.

Boykin, A. W. (1986). The triple quandary and the schooling of Afro-American children. In U. Neisser (Ed.), *The school achievement of minority children* (pp. 57–92). Hillsdale, NJ: Erlbaum.

Bronfenbrenner, U. (1979). *The ecology of human development.* Cambridge, MA: Harvard University Press.

Bronfenbrenner, U. (1989). Discovering what families do. In D. G. Blankenhorn, S. Bayme, & J. B. Elshtain (Eds.), *Rebuilding the nest: A new commitment to the American family* (pp. 27–38). Milwaukee, WI: Family Service America.

Bronfenbrenner, U. (1990). Who cares for children? *Research and Clinical Center for Child Development, 12,* 27–40.

Bronfenbrenner, U. (1993). The ecology of cognitive development: Research models and fugitive findings. In R. H. Wozniak & K. W. Fischer (Eds.), *Development in context: Acting and thinking in specific environments* (The Jean Piaget Symposium Series, pp. 3–44). Hillsdale, NJ: Erlbaum.

Bronfenbrenner, U., Kessel, F., Kessen, W., & White, S. (1986). Toward a critical social history of developmental psychology. *American Psychologist, 41,* 1218–1230.

Bruner, J. S. (1990). Culture and human development: A new look. *Human Development, 33,* 344–355.

Buck-Morss, J. (1975). Socio-economic bias in Piaget's theory and its implications for cross-cultural studies. *Human Development, 18,* 35–49.

Carraher, T. N., Carraher, D. W., & Schliemann, A. D. (1985). Mathematics in the streets and in schools. *British Journal of Developmental Psychology, 3,* 21–29.

Cazden, C., Cox, M., Dickerson, D., Steinberg, Z., & Stone, C. (1979). "You all gonna hafta listen": Peer teaching in a primary classroom. In W. Collins (Ed.), *Minnesota Symposia on Child Psychology* (Vol. 12, pp. 183–231). Hillsdale, NJ: Erlbaum.

Cazden, C. B., & John, V. P. (1971). Learning in American Indian children. In M. L. Wax, S. Diamond, & F. O. Gearing (Eds.), *Anthropological perspectives on education* (pp. 252–272). New York: Basic Books.

Cazden, C. B., John, V. P., & Hymes, D. (Eds.). (1972). *Functions of language in the classroom.* New York: Teachers College Press.

Cole, M. (1985). The zone of proximal development: Where culture and cognition create each other. In J. V. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives* (pp. 146–161). Cambridge, England: Cambridge University Press.

Cole, M. (1988). Cross-cultural research in the sociohistorical tradition. *Human Development, 31,* 137–152.

Cole, M. (1990). Cognitive development and formal schooling: The evidence from cross-cultural research. In L. C. Moll (Ed.), *Vygotsky and education* (pp. 89–110). Cambridge, England: Cambridge University Press.

Cole, M. (1992a). Culture and cognitive development: From cross-cultural comparisons to model systems of cultural mediation. In A. F. Healy, S. M. Kosslyn, & R. M. Shiffrin (Eds.), *Essays in honor of William K. Estes* (pp. 279–305). Hillsdale, NJ: Erlbaum.

Cole, M. (1992b). Culture in development. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental psychology: An advanced textbook* (3rd ed., pp. 731–789). Hillsdale, NJ: Erlbaum.

Cole, M., Gay, J., Glick, J. A., & Sharp, D. W. (1971). *The cultural context of learning and thinking.* New York: Basic Books.

Cole, M., & Scribner, S. (1977). Crosscultural studies of memory and cognition. In R. V. Kail, Jr., & J. W. Hagen (Eds.), *Perspectives on the development of memory and cognition* (pp. 239–271). Hillsdale, NJ: Erlbaum.

Cole, M., Sharp, D. W., & Lave, C. (1976). The cognitive consequences of education. *Urban Review, 9,* 218–233.

Cook-Gumperz, J., Corsaro, W. A., & Streeck, J. (Eds.). (1986). *Children's worlds and children's language.* Berlin: Mouton de Gruyter.

D'Andrade, R. (1990). Some propositions about the relations between culture and human cognition. In J. W. Stigler, R. A. Shweder, & G.

Herdt (Eds.), *Cultural psychology* (pp. 65–129). New York: Cambridge University Press.
D'Andrade, R. G., & Strauss, C. (1992). *Cultural models and human motives.* Cambridge, England: Cambridge University Press.
Dasen, P. R. (Ed.). (1977). *Piagetian psychology: Cross-cultural contributions.* New York: Gardner Press.
Dewey, J. (1916). *Democracy and education.* New York: Macmillan.
Dube, E. F. (1982). Literacy, cultural familiarity, and "intelligence" as determinants of story recall. In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 274–292). San Francisco: Freeman.
Duranti, A., & Goodwin, C. (1992). *Rethinking context: Language as an interactive phenomenon.* New York: Cambridge University Press.
Eckert, P. (1988). Adolescent social structure and the spread of linguistic change. *Language in Society, 17,* 183–207.
Engeström, Y. (1990). *Learning, working and imagining.* Helsinki: Orienta-Konsultit Oy.
Erickson, F., & Mohatt, G. (1982). Cultural organization of participation structures in two classrooms of Indian students. In G. Spindler (Ed.), *Doing the ethnography of schooling* (pp. 132–174). New York: Holt, Rinehart & Winston.
Fobih, D. K. (1979). *The influence of different educational experiences on classificatory and verbal reasoning behavior of children in Ghana.* Unpublished doctoral dissertation, University of Alberta, Canada.
Gielen, U. P. (1994). American mainstream psychology and its relationship to international and cross-cultural psychology. In A. L. Comunian & U. P. Gielen (Eds.), *Advancing psychology and its applications: International perspectives* (pp. 26–40). Milan, Italy: FrancoAngeli.
Ginsburg, H. P., Posner, J. K., & Russell, R. L. (1981). The development of mental addition as a function of schooling and culture. *Journal of Cross-Cultural Psychology, 12,* 163–178.
Goodnow, J. J. (1962). A test of milieu effects with some of Piaget's tasks. *Psychological Monographs, 76*(36, Whole No. 555).
Goodnow, J. J. (1976). The nature of intelligent behavior: Questions raised by cross-cultural studies. In L. B. Resnick (Ed.), *The nature of intelligence.* Hillsdale, NJ: Erlbaum.
Goodnow, J. J. (1980). Everyday concepts of intelligence and its development. In N. Warren (Ed.), *Studies in cross-cultural psychology* (Vol. 2, pp. 191–219). London: Academic Press.
Goodnow, J. J. (1990). The socialization of cognition: What's involved? In J. W. Stigler, R. A. Shweder, & G. Herdt (Eds.), *Cultural psychology* (pp. 259–286). Cambridge, England: Cambridge University Press.
Goodnow, J. J. (1993). Direction of post-Vygotskian research. In E. A. Forman, N. Minick, & C. A. Stone (Eds.), *Contexts for learning: Sociocultural dynamics in children's development* (pp. 369–381). New York: Oxford University Press.
Goodnow, J. J. (in press). Acceptable ignorance, negotiable disagreement: An alternate view of learning. In D. Olson & N. Torrance (Eds.), *Handbook of education and human development.* Oxford, England: Blackwell.
Goodnow, J. J., & Bowes, J. M. (1994). *Men, women, and household work.* Sydney/New York: Oxford University Press.
Goodnow, J. J., Miller, P., & Kessel, F. (Eds.). (1995). *Cultural practices as contexts for development.* San Francisco: Jossey-Bass.
Goodwin, M. H. (1990). *He-said–she-said: Talk as social organization among black children.* Bloomington: Indiana University Press.
Goody, J. (1977). *The domestication of the savage mind.* Cambridge, England: Cambridge University Press.
Goody, J., & Watt, I. (1968). The consequences of literacy. In J. R. Goody (Ed.), *Literacy in traditional societies.* Cambridge, England: Cambridge University Press.
Greenfield, P. M. (1966). On culture and conservation. In J. S. Bruner, R. R. Olver, & P. M. Greenfield (Eds.), *Studies in cognitive growth* (pp. 225–256). New York: Wiley.
Greenfield, P. M. (1974). Comparing dimensional categorization in natural and artificial contexts: A developmental study among the Zinacantecos of Mexico. *Journal of Social Psychology, 93,* 157–171.
Greenfield, P. M. (1984a). *Mind and media: The effects of television, video games, and computers.* Cambridge, MA: Harvard University Press.
Greenfield, P. M. (1984b). A theory of the teacher in the learning activities of everyday life. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 117–138). Cambridge, MA: Harvard University Press.
Greenfield, P. M. (1991). Language, tools, and brain: The ontogeny and phylogeny of hierarchically organized sequential behavior. *Behavioral and Brain Sciences, 14,* 531–595.
Greenfield, P. M., & Childs, C. P. (1977a). Understanding sibling concepts: A developmental study of kin terms in Zinacantan. In P. R. Dasen (Ed.), *Piagetian psychology: Cross-cultural contributions* (pp. 335–358). New York: Gardner.
Greenfield, P. M., & Childs, C. P. (1977b). Weaving, color terms and pattern representation: Cultural influences and cognitive development among the Zinacantecos of Southern Mexico. *Inter-American Journal of Psychology, 11,* 23–48.
Greenfield, P. M., & Cocking, R. R. (1994). *Cross-cultural roots of minority child development.* Hillsdale, NJ: Erlbaum.
Grusec, J. E., & Goodnow, J. J. (1994). Impact of parental discipline methods on the child's internalization of values: A reconceptualization of current points of view. *Developmental Psychology, 30,* 4–19.
Guldan, G. S., Zeitlin, M. F., Beiser, A. S., Super, C. M., et al. (1993). Maternal education and child feeding practices in rural Bangladesh. *Social Science and Medicine, 36,* 925–935.
Hakuta, K., & Garcia, E. E. (1989). Bilingualism and education. *American Psychologist, 44,* 374–379.
Hall, J. W. (1972). Verbal behavior as a function of amount of schooling. *American Journal of Psychology, 85,* 277–289.
Harkness, S., & Super, C. M. (1977). Why African children are so hard to test. In L. L. Adler (Ed.), Issues in cross-cultural research. *Annals of the New York Academy of Sciences, 285,* 326–331.
Harkness, S., & Super, C. M. (1992). Parental ethnotheories in action. In I. E. Sigel, A. V. McGillicuddy-DeLisi, & J. J. Goodnow (Eds.), *Parental belief systems* (2nd ed., pp. 373–391). Hillsdale, NJ: Erlbaum.
Hatano, G. (1982). Cognitive consequences of practice in culture specific procedural skills. *Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 4,* 15–17.
Heath, S. B. (1983). *Ways with words: Language, life, and work in communities and classrooms.* Cambridge, England: Cambridge University Press.
Heath, S. B. (1989a). The learner as cultural member. In M. L. Rice & R. L. Schiefelbusch (Eds.), *The teachability of language* (pp. 333–350). Baltimore: Paul H. Brookes.
Heath, S. B. (1989b). Oral and literate traditions among Black Americans living in poverty. *American Psychologist, 44,* 367–373.
Heath, S. B. (1991). "It's about winning!" The language of knowledge in baseball. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 101–124). Washington, DC: American Psychological Association.
Hendry, J. (1986). *Becoming Japanese: The world of the pre-school child.* Honolulu: University of Hawaii Press.
Henze, R. C. (1992). *Informal teaching and learning: A study of everyday cognition in a Greek community.* Hillsdale, NJ: Erlbaum.
Hilliard, A. G., III, & Vaughn-Scott, M. (1982). The quest for the "minority" child. In S. G. Moore & C. R. Cooper (Eds.), *The young child: Reviews of research* (Vol. 3, pp. 175–189). Washington, DC: National Association for the Education of Young Children.
Holland, D., & Quinn, N. (Eds.). (1987). *Cultural models in language and thought.* Cambridge, England: Cambridge University Press.
Howard, A., & Scott, R. A. (1981). The study of minority groups in complex societies. In R. H. Munroe, R. L. Munroe, & B. B. Whiting (Eds.), *Handbook of cross-cultural human development* (pp. 113–152). New York: Garland Press.
Hutchins, E. (1991). The social organization of distributed cognition. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 283–307). Washington, DC: American Psychological Association.
Irvine, J. T. (1978). Wolof 'magical thinking': Culture and conservation revisited. *Journal of Cross-Cultural Psychology, 9,* 300–310.
Irwin, M. H., & McLaughlin, D. H. (1970). Ability and preference in category sorting by Mano school children and adults. *Journal of Social Psychology, 82,* 15–24.

Irwin, M. H., Schafer, G. N., & Feiden, C. P. (1974). Emic and unfamiliar category sorting of Mano farmers and U.S. undergraduates. *Journal of Cross-Cultural Psychology, 5,* 407–423.

John-Steiner, V. (1985). *Notebooks of the mind: Explorations of thinking.* Albuquerque: University of New Mexico Press.

Kagan, J., Klein, R. E., Finley, G. E., Rogoff, B., & Nolan, E. (1979). A cross-cultural study of cognitive development. *Monographs of the Society for Research in Child Development, 44*(5, Serial No. 180).

Kearins, J. M. (1981). Visual spatial memory in Australian aboriginal children of desert regions. *Cognitive Psychology, 13,* 434–460.

Kelly, M. (1977). Papua New Guinea and Piaget—An eight-year study. In P. R. Dasen (Ed.), *Piagetian psychology: Cross-cultural contributions* (pp. 169–202). New York: Gardner Press.

Kiminyo, D. M. (1977). A cross-cultural study of the development of conservation of mass, weight, and volume among Kamba children. In P. R. Dasen (Ed.), *Piagetian psychology: Cross-cultural contributions* (pp. 64–88). New York: Gardner Press.

Kindermann, T., & Valsiner, J. (1989). Research strategies in culture-inclusive developmental psychology. In J. Valsiner (Ed.), *Child development in cultural context* (pp. 13–50). Toronto, Canada: Hogrefe & Huber.

Kozulin, A. (1990). *Vygotsky's psychology.* Cambridge, MA: Harvard University Press.

Laboratory of Comparative Human Cognition. (1983). Culture and cognitive development. In P. H. Mussen (Series Ed.) & W. Kessen (Vol. Ed.), *Handbook of child psychology: Vol. 1. History, theory, and methods* (4th ed., pp. 295–356). New York: Wiley.

Lancy, D. F. (Ed.). (1978). The indigenous mathematics project. *Journal of Education, 14* (Special Issue).

Laosa, L. M. (1981). Maternal behavior: Sociocultural diversity in modes of family interaction. In R. W. Henderson (Ed.), *Parent–child interaction: Theory, research, and prospects* (pp. 125–167). New York: Academic Press.

Laosa, L. M., & Henderson, R. W. (1991). Cognitive socialization and competence: The academic development of Chicanos. In R. R. Valencia (Ed.), *Chicano school failure and success: Research and policy agendas for the 1990s* (pp. 164–199).New York: Falmer.

Laurendeau-Bendavid, M. (1977). Culture, schooling, and cognitive development: A comparative study of children in French Canada and Rwanda. In P. R. Dasen (Ed.), *Piagetian psychology: Cross-cultural contributions* (pp. 123–168). New York: Gardner Press.

Lave, J. (1977). Tailor-made experiments and evaluating the intellectual consequences of apprenticeship training. *The Quarterly Newsletter of the Institute for Comparative Human Development, 1,* 1–3.

Lave, J. (1988). *Cognition in practice: Mind, mathematics and culture in everyday life.* Cambridge, England: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, England: Cambridge University Press.

Lein, L., & Brenneis, D. (1978). Children's disputes in three speech communities. *Language in Society, 7,* 299–323.

Leont'ev, A. N. (1981). The problem of activity in psychology. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology* (pp. 37–71). Armonk, NY: Sharpe.

Luria, A. R. (1976). *Cognitive development: Its cultural and social foundations.* Cambridge, MA: Harvard University Press.

Lutz, C., & LeVine, R. A. (1982). Culture and intelligence in infancy: An ethnopsychological view. In M. Lewis (Ed.), *Origins of intelligence: Infancy and early childhood* (pp. 1–28). New York: Plenum Press.

Mandler, J. M., Scribner, S., Cole, M., & DeForest, M. (1980). Cross-cultural invariance in story recall. *Child Development, 51,* 19–26.

Mehan, H. (1979). *Learning lessons: Social organization in the classroom.* Cambridge, MA: Harvard University Press.

Michaels, S., & Cazden, C. (1986). Teacher/child collaboration as oral preparation for literacy. In B. B. Schieffelin & P. Gilmore (Eds.), *The acquisition of literacy: Ethnographic perspectives* (pp. 132–154). Norwood, NJ: Ablex.

Miller, P. (1982). *Amy, Wendy, and Beth: Learning language in South Baltimore.* Austin: University of Texas Press.

Miller-Jones, D. (1989). Culture and testing. *American Psychologist, 44,* 360–366.

Moll, L. C. (Ed.). (1990). *Vygotsky and education: Instructional implications and applications of sociohistorical psychology.* Cambridge, England: Cambridge University Press.

Munroe, R. H., Munroe, R. L., & Whiting, B. B. (Eds.). (1981). *Handbook of cross-cultural human development.* New York: Garland.

Neisser, U. (Ed.). (1982). *Memory observed: Remembering in natural contexts.* San Francisco: Freeman.

Newman, D., Griffin, P., & Cole, M. (1984). Social constraints in laboratory and classroom tasks. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 172–193). Cambridge, MA: Harvard University Press.

Newman, D., Griffin, P., & Cole, M. (1989). *The construction zone: Working for cognitive change in school.* Cambridge, England: Cambridge University Press.

Nicolopoulou, A., & Cole, M. (1990, May). *Activating the zoped: Activity systems and development.* Paper presented at the International Congress for Research on Activity Theory, Lahti, Finland.

Nunes, T., Schliemann, A. D., & Carraher, D. W. (1993). *Street mathematics and school mathematics.* Cambridge, England: Cambridge University Press.

Nyiti, R. M. (1976). The development of conservation in the Meru children of Tanzania. *Child Development, 47,* 1122–1129.

Ochs, E. (1988). *Culture and language development: Language acquisition and language socialization in a Samoan village.* Cambridge, England: Cambridge University Press.

Ogbu, J. U. (1990). Cultural models, identity and literacy. In J. W. Stigler, R. A. Shweder, & G. Herdt (Eds.), *Cultural psychology* (pp. 520–541). Cambridge, England: Cambridge University Press.

Okonji, M. O. (1971). The effects of familiarity on classification. *Journal of Cross-Cultural Psychology, 2,* 39–49.

Olson, D. R. (1976). Culture, technology, and intellect. In L. B. Resnick (Ed.), *The nature of intelligence.* Hillsdale, NJ: Erlbaum.

Page, H. W. (1973). Concepts of length and distance in a study of Zulu youths. *Journal of Social Psychology, 90,* 9–16.

Paradise, R. (1991). El conocimiento cultural en el aula: Niños indígenas y su orientación hacia la observación. [Cultural knowledge in the classroom: Indigenous children and their orientation toward observation]. *Infancia y Aprendizaje, 55,* 73–85.

Peak, L. (1991). *Learning to go to school in Japan: The transition from home to preschool life.* Berkeley: University of California Press.

Philips, S. U. (1972). Participant structure and communicative competence: Warm Springs children in community and classroom. In C. B. Cazden, V. P. John, & D. Hymes (Eds.), *Functions of language in the classroom* (pp. 370–394). New York: Teachers College Press.

Philp, H., & Kelly, M. (1974). Product and process in cognitive development: Some comparative data on the performance of school age children in different cultures. *British Journal of Educational Psychology, 44,* 248–265.

Piaget, J. (1972). Intellectual evolution from adolescence to adulthood. *Human Development, 15,* 1–12.

Posner, J. K. (1982). The development of mathematical knowledge in two West African societies. *Child Development, 53,* 200–208.

Price-Williams, D. R., Gordon, W., & Ramirez, M., III. (1969). Skill and conservation: A study of pottery-making children. *Developmental Psychology, 1,* 769.

Rogoff, B. (1981). Schooling and the development of cognitive skills. In H. C. Triandis & A. Heron (Eds.), *Handbook of cross-cultural psychology* (Vol. 4, pp. 233–294). Rockleigh, NJ: Allyn & Bacon.

Rogoff, B. (1982). Integrating context and cognitive development. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psychology* (Vol. 2, pp. 125–170). Hillsdale, NJ: Erlbaum.

Rogoff, B. (1990). *Apprenticeship in thinking.* New York: Oxford University Press.

Rogoff, B. (1992). Three ways to relate person and culture: Thoughts sparked by Valsiner's review of *Apprenticeship in thinking. Human Development, 35,* 316–320.

Rogoff, B. (1994). Developing understanding of the idea of communities of learners. *Mind, Culture, and Activity, 1,* 209–229.

Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. In J. V. Wertsch, P. del Rio, & A. Alvarez (Eds.), *Sociocultural studies of mind* (139–164). Cambridge, England: Cambridge University Press.

Rogoff, B. (in press). Developmental transitions in children's participation in sociocultural activities. In A. Sameroff & M. Haith (Eds.), *Reason and responsibility: The passage through childhood.* Chicago: University of Chicago Press.

Rogoff, B., Baker-Sennett, J., Lacasa, P., & Goldsmith, D. (1995). Development through participation in sociocultural activity. In J. Goodnow, P. Miller, & F. Kessel (Eds.), *Cultural practices as contexts for development* (pp. 45–65). San Francisco: Jossey-Bass.

Rogoff, B., & Mistry, J. J. (1985). Memory development in cultural context. In M. Pressley & C. Brainerd (Eds.), *Cognitive learning and memory in children* (pp. 117–142). New York: Springer-Verlag.

Rogoff, B., Mistry, J. J., Göncü, A., & Mosier, C. (1993). Guided participation in cultural activity by toddlers and caregivers. *Monographs of the Society for Research in Child Development, 58*(7, Serial No. 236).

Rogoff, B., & Waddell, K. J. (1982). Memory for information organized in a scene by children from two cultures. *Child Development, 53,* 1224–1228.

Ross, B. M., & Millsom, C. (1970). Repeated memory of oral prose in Ghana and New York. *International Journal of Psychology, 5,* 173–181.

Saxe, G. B. (1981). Body parts as numerals: A developmental analysis of numeration among the Oksapmin in Papua New Guinea. *Child Development, 52,* 306–316.

Saxe, G. B. (1988). The mathematics of street vendors. *Child Development, 59,* 1415–1425.

Saxe, G. B. (1991). *Culture and cognitive development: Studies in mathematical understanding.* Hillsdale, NJ: Erlbaum.

Saxe, G. B. (1992). Studying children's learning in context: Problems and prospects. *Journal of the Learning Sciences, 2,* 215–234.

Saxe, G. B. (in press). Studying cognition in sociocultural context: A practice-based approach. In A. Colby & R. Jessor (Eds.), *Ethnographic approaches to the study of human development.*

Saxe, G. B., Gearhart, M., Note, M., & Paduano, P. (1993). Peer interaction and the development of mathematical understandings: A new framework for research and educational practice. In H. Daniels (Ed.), *Charting the agenda: Vygotskian perspectives* (pp. 107–144). London: Routledge.

Schieffelin, B. B. (1991). *The give and take of everyday life: Language socialization of Kaluli children.* Cambridge, England: Cambridge University Press.

Scribner, S. (1974). Developmental aspects of categorized recall in a West African society. *Cognitive Psychology, 6,* 475–494.

Scribner, S. (1975). Recall of classical syllogisms: A cross-cultural investigation of error on logical problems. In R. J. Falmagne (Ed.), *Reasoning: Representation and process in children and adults* (pp. 153–173). New York: Wiley.

Scribner, S. (1977). Modes of thinking and ways of speaking: Culture and logic reconsidered. In P. N. Johnson-Laird & P. C. Wason (Eds.), *Thinking* (pp. 483–500). Cambridge, England: Cambridge University Press.

Scribner, S. (1984). Studying working intelligence. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 9–40). Cambridge, MA: Harvard University Press.

Scribner, S. (1985a). Knowledge at work. *Anthropology and Education Quarterly, 16,* 199–206.

Scribner, S. (1985b). Vygotsky's uses of history. In J. V. Wertsch (Ed.), *Culture, communication, and cognition: Vygotskian perspectives* (pp. 119–145). Cambridge, England: Cambridge University Press.

Scribner, S. (1990). A sociocultural approach to the study of mind. In G. Greenberg & E. Tobach (Eds.), *Theories of the evolution of knowing. The T. C. Schneirla Conference Series* (Vol. 4, pp. 107–120). Hillsdale, NJ: Erlbaum.

Scribner, S., & Beach, K. (1993). An activity theory approach to memory. *Applied Cognitive Psychology, 7,* 185–190.

Scribner, S., & Cole, M. (1981). *The psychology of literacy.* Cambridge, MA: Harvard University Press.

Segall, M. H., Dasen, P. R., Berry, J. W., & Poortinga, Y. H. (1990). *Human behavior in global perspective. An introduction to cross-cultural psychology.* Boston: Allyn & Bacon.

Serpell, R. (1974). Aspects of intelligence in a developing country. *African Social Research, 17,* 578–596.

Serpell, R. (1976). *Culture's influence on behaviour.* London: Methuen.

Serpell, R. (1977). Strategies for investigating intelligence in its cultural context. *The Quarterly Newsletter of the Institute for Comparative Human Development, 1,* 11–15.

Serpell, R. (1979). How specific are perceptual skills? A cross-cultural study of pattern reproduction. *British Journal of Psychology, 70,* 365–380.

Serpell, R. (1982). Measures of perception, skills and intelligence. In W. W. Hartup (Ed.), *Review of child development research* (Vol. 6, pp. 392–440). Chicago: University of Chicago Press.

Serpell, R. (1993). *The significance of schooling: Life-journeys in an African society.* Cambridge, England: Cambridge University Press.

Serpell, R. (in press). Situated theory as a bridge between psychology, history, and educational practices. In L. Martin, K. Nelson, & E. Tobach (Eds.), *Cultural psychology and activity theory: Essays in memory of Sylvia Scribner.* New York: Cambridge University Press.

Serpell, R., & Boykin, A. W. (in press). Cultural dimensions of thinking and problem-solving. In R. J. Sternberg (Ed.), *Handbook of perception and cognition: Thinking and problem-solving* (Vol. 12). New York: Academic Press.

Sharp, D., & Cole, M. (1972). Patterns of responding in the word associations of West African children. *Child Development, 43,* 55–65.

Sharp, D., Cole, M., & Lave, J. (1979). Education and cognitive development: The evidence from experimental research. *Monographs of the Society for Research in Child Development, 44*(1–2, Serial No. 178).

Shotter, J. (1978). The cultural context of communication studies: Theoretical and methodological issues. In A. Lock (Ed.), *Action, gesture, and symbol: The emergence of language* (pp. 43–78). London: Academic Press.

Shweder, R. (1991). *Thinking through cultures: Expeditions in cultural psychology.* Cambridge, MA: Harvard University Press.

Stevenson, H. W. (1992). Learning from Asian schools. *Scientific American, 267,* 70–76.

Stevenson, H. W., Lee, S.-Y., Chen, C., Stigler, J. W., Hsu, C. C., & Kitamura, S. (1990). Contexts of achievement: A study of American, Chinese, and Japanese children. *Monographs of the Society for Research in Child Development, 55*(1–2, Serial No. 221).

Stevenson, H. W., Parker, T., Wilkinson, A., Bonnevaux, B., & Gonzalez, M. (1978). Schooling, environment, and cognitive development: A cross-cultural study. *Monographs of the Society for Research in Child Development, 43*(3, Serial No. 175).

Stevenson, H. W., Stigler, J. W., Lucker, G. W., Lee, S., et al. (1987). Classroom behavior and achievement of Japanese, Chinese, and American children. In R. Glaser (Ed.), *Advances in instructional psychology* (Vol. 3, pp. 153–191). Hillsdale, NJ: Erlbaum.

Stigler, J. W. (1984). "Mental abacus": The effect of abacus training on Chinese children's mental calculation. *Cognitive Psychology, 16,* 145–176.

Stigler, J. W., Barclay, C., & Aiello, P. (1982). Motor and mental abacus skill: A preliminary look at an expert. *Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 4,* 12–14.

Stigler, J. W., Lee, S.-Y., & Stevenson, H. W. (1987). Mathematics classrooms in Japan, Taiwan, and the United States. *Child Development, 58,* 1272–1285.

Stigler, J. W., Lee, S., & Stevenson, H. W. (1990). *Mathematical knowledge of Japanese, Chinese, and American elementary-school children.* Reston, VA: National Council of Teachers of Mathematics.

Strauss, S., Ankori, M., Orpaz, N., & Stavy, R. (1977). Schooling effects on the development of proportional reasoning. In Y. H. Poortinga (Ed.), *Basic problems in cross-cultural psychology* (pp. 128–137). Amsterdam: Swets.

Super, C. M. (1979). *A cultural perspective on theories of cognitive development.* Paper presented at the meeting of the Society for Research in Child Development, San Francisco.

Super, C. M. (1981). Behavioral development in infancy. In R. H. Munroe, R. L. Munroe, & B. B. Whiting (Eds.), *Handbook of cross-cultural human development* (pp. 181–270). New York: Garland.

Super, C. M., & Harkness, S. (1983). *Looking across at growing up: The cultural expression of cognitive development in middle childhood.* Unpublished manuscript, Harvard University.

Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization of the interface of child and culture. *International Journal of Behavioral Development, 9,* 545–569.

Tharp, R. G., & Gallimore, R. (1988). *Rousing minds to life: Teaching, learning, and schooling in social context.* Cambridge, England: Cambridge University Press.

Tobach, E., Falmagne, R. J., Parlee, M., Martin, L., & Kapelman, A. S. (Eds.). (in press). *Mind and social practice: Selected papers of Sylvia Scribner.* New York: Cambridge University Press.

Triandis, H. C., & Heron, A. (Eds.). (1981). *Developmental psychology* (Vol. 4: *Handbook of cross-cultural psychology*). Boston: Allyn & Bacon.

Triandis, H. C., & Lonner, W. (Eds.). (1980). *Basic processes* (Vol. 3: *Handbook of cross-cultural psychology*). Boston: Allyn & Bacon.

Tulviste, P. (1991). *The cultural–historical development of verbal thinking.* Commack, NY: Nova Science Publishers.

Valsiner, J. (Ed.). (1986). *The individual subject and scientific psychology.* New York: Plenum Press.

Valsiner, J. (1987). *Culture and the development of children's action.* Chichester: Wiley.

Valsiner, J. (1994). *Comparative-cultural and constructivist perspectives.* Norwood, NJ: Ablex.

van der Veer, R., & Valsiner, J. (1991). *Understanding Vygotsky.* Oxford, England: Blackwell.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Wagner, D. A. (1993). *Literacy, culture and development: Becoming literate in Morocco.* New York: Cambridge University Press.

Wagner, D. A., & Spratt, J. E. (1987). Cognitive consequences of contrasting pedagogies: The effects of Quranic preschooling in Morocco. *Child Development, 58,* 1207–1219.

Wagner, D. A., & Stevenson, H. W. (Eds.). (1982). *Cultural perspectives on child development.* San Francisco: Freeman.

Ward, M. C. (1971). *Them children: A study in language learning.* New York: Holt, Rinehart & Winston.

Watson-Gegeo, K. A., & Gegeo, D. W. (1986). The social world of Kwara'ae children: Acquisition of language and values. In J. Cook-Gumperz, W. Corsaro, & J. Streeck (Eds.), *Children's worlds and children's language* (pp. 109–127). The Hague, The Netherlands: Mouton.

Wertsch, J. V. (Ed.). (1981). *The concept of activity in Soviet psychology.* Armonk, NY: Sharpe.

Wertsch, J. V. (1985). *Vygotsky and the social formation of mind.* Cambridge, MA: Harvard University Press.

Wertsch, J. V. (1991). *Voices of the mind.* Cambridge, MA: Harvard University Press.

White, S. H. (1965). Evidence for a hierarchical arrangement of learning processes. In L. P. Lipsitt & C. C. Spiker (Eds.), *Advances in child development and behavior* (Vol. 2, pp. 187–220). New York: Academic Press.

Whiting, B. B., & Whiting, J. W. M. (1975). *Children of six cultures: A psycho-cultural analysis.* Cambridge, MA: Harvard University Press.

Wober, M. (1972). Culture and the concept of intelligence: A case in Uganda. *Journal of Cross-Cultural Psychology, 3,* 327–328.

Zinchenko, V. P. (1985). Vygotsky's ideas about units for the analysis of mind. In J. V. Wertsch (Ed.), *Culture, communication and cognition: Vygotskian perspectives* (pp. 94–118). Cambridge, MA: Harvard University Press.