

Interactive Minds
Life-Span Perspectives on
the Social Foundation of
Cognition

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Contents

List of contributors	page ix
Acknowledgments	xi
Interactive minds in a life-span perspective: prologue	1
<i>Paul B. Baltes and Ursula M. Staudinger</i>	
Part I General theoretical framework	
1 The evolution of cooperation within and between generations <i>Peter Hammerstein</i>	35
2 Interacting minds in a life-span perspective: a cultural-historical approach to culture and cognitive development <i>Michael Cole</i>	59
3 Essentially social: on the origin of linguistic knowledge in the individual <i>Wolfgang Klein</i>	88
4 Knowledge and the construction of women's development <i>Gisela Labouvie-Vief</i>	109
Part II Research on ontogenetic development	
5 Peer interactive minds: developmental, theoretical, and methodological issues <i>Margarita Azmitia</i>	133
6 Collaborative rules: how are people supposed to work with one another? <i>Jacqueline J. Goodnow</i>	163
7 The lifelong transformation of moral goals through social influence <i>William Damon</i>	198

- Strum, S. C. (1983). Use of females by male olive baboons (*Papio anubis*). *American Journal of Primatology*, 5, 93–109.
- Taborsky, M. (1994). Sneakers, satellites, and helpers: Parasitic and cooperative behavior in fish reproduction. In P. J. B. Slater, J. S. Rosenblatt, C. T. Snowdon, & M. Milinski (Eds.), *Advances in the study of behavior* (Vol. 23, pp. 1–100). San Diego, CA: Academic.
- Thornhill, N. W. (1990). An evolutionary analysis of rules regulating human inbreeding and marriage. *Behavioral and Brain Sciences*, 14, 247–293.
- Thornhill, R. (1980). Rape in *Panorpa* scorpionflies and a general rape hypothesis. *Animal Behaviour*, 28, 52–59.
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology*, 46, 35–57.
- Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man* (pp. 139–179). Chicago: Aldine.
- Trivers, R. L. (1974). Parent–offspring conflict. *American Zoologist*, 14, 249–264.
- Trivers, R. L. (1985). *Social evolution*. Menlo Park, CA: Benjamin-Cummings.
- Tyszka, T. (1983). Contextual multiattribute decision rules. In L. Sjöberg, T. Tyszka, & J. A. Wise (Eds.), *Human decision making* (pp. 243–256). Bodafors: Doxa.
- van Alphen, J. J. M., & Visser, M. E. (1990). Superparasitism as an adaptive strategy. *Annual Review of Entomology*, 35, 59–79.
- van Hooff, J. A. R. A. M., & van Schaik, C. P. (1992). Cooperation in competition: The ecology of primate bonds. In A. H. Harcourt & F. B. de Waal (Eds.), *Coalitions and alliances in humans and other animals* (pp. 357–389). Oxford: Oxford University Press.
- Vincent, A., Ahnesjö, I., Berglund, A., & Rosenqvist, G. (1992). Pipefishes and seahorses: Are they all sex role reversed? *Trends in Ecology and Evolution*, 7, 237–241.
- Vincent, A. J. C. (1990). *Reproductive ecology of seahorses*. Unpublished doctoral dissertation. University of Cambridge.
- Westermarck, E. A. (1891). *The history of human marriage*. London: Macmillan.
- Wilkinson, G. S. (1984). Reciprocal food sharing in the vampire bat. *Nature*, 308, 181–184.
- Wilkinson, P. F., & Shank, C. C. (1977). Rutting-fight mortality among musk oxen on Banks Island, Northwest Territories, Canada. *Animal Behaviour*, 24, 756–758.
- Williams, G. C. (1966). *Adaptation and natural selection*. Princeton, NJ: Princeton University Press.
- Wilson, E. O. (1971). *The insect societies*. Cambridge, MA: Harvard University Press.
- Wilson, E. O. (1975). *Sociobiology: The new synthesis*. Cambridge, MA: Harvard University Press.
- Woolfenden, G. E., & Fitzpatrick, J. W. (1984). *The Florida scrub jay*. Princeton, NJ: Princeton University Press.

2 Interacting minds in a life-span perspective: a cultural-historical approach to culture and cognitive development

Michael Cole

Abstract

This chapter takes as its central premise that as a result of the process of enculturation, human minds come to interact indirectly in/through the cultural medium they share. Following the lead of cultural-historical psychologists representing several national traditions, culture is conceived of as the uniquely human environment consisting of the residue of the activity of prior generations, existing in the present in the form of artifacts, aspects of the physical world that have been transformed by their inclusion in goal-directed human actions. The implications of this view are traced from birth to old age in a manner designed to highlight the affinity between cultural-historical and life-span approaches to cognitive development.

In this chapter I explicate the role of culture in the way that human minds interact over the life span. In doing so, one of my major goals is to explore what I perceive to be close affinities between the cultural-historical approach to development that I have been working with and the contextualist, life-span approach proposed by such scholars as P. B. Baltes (1987), Dixon (1985), Featherman and Lerner (1985), and Labouvie-Vief (1981). I will discuss these affinities in the last section of the chapter after presenting some of the considerations that have led me to identify them.

Cultural-historical ideas about culture and mind

The core premise of the cultural-historical approach to psychology is that there is an intimate connection between the special environment that human beings inhabit and the fundamental, distinguishing qualities of human minds.

The special quality of the human environment is that it is suffused with the behavioral adaptations of prior generations in external form. This premise, which can be found in the writings of cultural-historical psychologists from many national traditions, is captured well by John Dewey (1938, p. 39):

In a word, we live from birth to death in a world of persons and things which is in large measure what it is because of what has been done and transmitted from previous human activities. When this fact is ignored, experience is treated as if it were something which goes on exclusively inside an individual's body and mind. It ought not to be necessary to say that experience does not occur in a vacuum. There are sources outside an individual which give rise to experience.

In their early work on this subject, the Russian cultural-historical psychologists expressed this idea by writing that the special morphology of behavior and mind of the human creatures who inhabit a cultural environment is the ability to mediate their actions through artifacts and to arrange for the rediscovery of these forms of mediation by the next generation (Luria, 1928; Vygotsky, 1929, 1978).

Although the Russian cultural-historical psychologists, like many of their contemporaries (e.g., Bergson, 1911/1983), spoke of mediation through tools, they were thinking not only of hammers and needles, but of signs, symbols, and language. All mediators are double sided; they partake of and constitute the borders between the individual and the social, what is "in the mind" and what the mind is in.

The centrality of mediation to human cognition is relevant to this book's emphasis on interacting minds because the cultural-historical approach to mental actions emphasizes that as a result of the process of enculturation, human minds come to interact *indirectly*, in/through the cultural medium they share. Hence, understanding how the cultural medium structures the interaction of minds is crucial for comprehending the relationship between culture and cognitive development.

My exploration of the application of these ideas to understanding changes in the ways that minds interact over the life span will proceed as follows. First, I will characterize what I understand to be crucial properties of the cultural medium within which human beings develop and minds interact. Next, I will propose a few skeletal principles as guides in thinking about how age-graded differences in the relation of humans to the cultural medium can be expected to shape the nature of interaction. Finally, I will provide a series of examples, generally well known in the literature of child and adult development, that illustrate how culture enters into the process of cognitive change at different stages of the life span.

The nature of the cultural medium

Following Dewey, Bergson, and the Russian cultural-historical psychologists, I conceive of the cultural medium as the uniquely human environment consisting of the entire ensemble of transformations of the physical environment

accumulated by a social group in the course of its historical development. Those transformations exist in the present in the form of artifacts, aspects of the physical environment that have been transformed by their inclusion in goal-directed human activity.¹

Essential to this view of culture is that artifacts are simultaneously ideal (conceptual) and material. At first this idea may strike the reader as absurd because we are used to thinking of artifacts as solid objects and not as embodying ideality. A hammer is a very material object. However, hammers and all other artifacts are ideal in that they embody in coded form the essential constraints on interactions of which they were previously a part and that they mediate in the present. What differentiates a word such as *language* from, say, a table are the forms and the relative prominence of their material and ideal aspects. No word exists apart from its material instantiation (as a configuration of sound waves, hand movements, writing, or neuronal activity), whereas every table embodies an order imposed by thinking human beings. D'Andrade made this point when he wrote that "material culture – tables and chairs, buildings and cities – is the reification of human ideas in a solid medium" (1986, p. 22).

Levels of artifacts

Following Wartofsky (1979), I find it useful to distinguish artifacts with respect to what might be called levels of organization. The first level refers to *primary artifacts* as objects directly used in production (as examples, Wartofsky gives "axes, clubs, needles, bowls"; modern examples include computers, telecommunications networks, and mythical cultural personages). The second level, *secondary artifacts*, consists of representations of both primary artifacts and modes of action using primary artifacts. Wartofsky refers to secondary artifacts as "reflexive embodiments." Secondary artifacts play a central role in memory and communication, preserving and transmitting modes of action. It is at the level of secondary artifacts that we find the most obvious connection with what is discussed as schemas or cultural models in contemporary anthropological approaches to culture and cognition (see later).

Wartofsky also distinguished a third level, *tertiary artifacts*, that constitutes relatively autonomous "worlds" with their own "rules, conventions, and outcomes." Wartofsky was thinking of tertiary objects connected with perception and art, such as dramatic productions and games, but the category is more generally useful for it corresponds to any activity setting with its own standing rules, conventions, and outcomes – that is, all of the everyday activity settings populated by developing human beings. There is also a kinship between the notion of tertiary artifacts and social institutions, a major source of structuration of human thought and action.

Patterning of artifacts in the cultural medium

The early Russian cultural-historical theorists articulated the principle of artifact-mediated action, but culture is more than a random accumulation of artifacts and associated actions. There is structure in the cultural medium, but the task of specifying how much structure has so far eluded anthropologists.

Some anthropological circles tend to think of culture as a uniform, patterned ensemble of shared beliefs, values, symbols, tools, and so forth that people share in common. This "configurational" approach is greatly influenced by the work of Franz Boas and his students in anthropology (see Bok, 1988, or Stocking, 1968, for excellent summaries of Boas's work), as well as by the cross-cultural psychologists who study "cognitive style" (Berry, 1976).

There is no doubt that culture is patterned, but there is also no doubt that it is far from uniform and that its patterning is experienced in local, face-to-face interactions that are locally constrained and, hence, heterogeneous with respect to "culture as a whole." Consequently, anyone interested in the question of culture and cognition must be concerned with the effective units of culture vis-à-vis mind: They are to be located somewhere between the "perfectly patterned whole" and the "random collection of artifacts."²

In one well-known attempt to characterize the effective units of culture, Geertz proposed that "culture is best seen not as complexes of concrete behavior patterns – customs, usages, traditions, habit clusters – . . . but as a set of control mechanisms – plans, recipes, rules, instructions (what computer engineers call 'programs') – for governing behavior" (1973, p. 44). Significantly (because these mechanisms might seem to be located entirely inside people's heads and therefore might seem entirely ideal), Geertz continues in a manner that links up neatly with the notion of artifact mediation that is central to the cultural-historical approach:

The "control mechanism" view of culture begins with the assumption that human thought is basically both social and public – that its natural habitat is the house yard, the marketplace, and the town square. Thinking consists not of "happenings in the head" (though happenings there and elsewhere are necessary for it to occur) but of traffic in what have been called, by G. H. Mead and others, significant symbols – words for the most part but also gestures, drawings, musical sounds, mechanical devices like clocks. (1973, p. 45)

A complementary notion of structured ensembles within the overall medium of culture is offered by Roy D'Andrade, who suggests the term *cultural schemas* to refer to units that organize entire sets of conceptual-material artifacts. In D'Andrade's terms,

typically such schemas portray simplified worlds, making the appropriateness of the terms that are based on them dependent on the degree to which these schemas fit the actual worlds of the objects being categorized. Such schemas

portray not only the world of physical objects and events, but also more abstract worlds of social interaction, discourse, and even word meaning. (1984, p. 93; original in italics)

D'Andrade (1990) refers to intersubjectively shared cultural schemas as cultural models. Such models are used to interpret and guide action in a wide variety of domains, "including events, institutions, and physical and mental objects" (p. 108).

An especially important class of cultural schemas that has been the object of intense investigation in recent years is that of a "script," an event schema, embodied in narratives, as the basic organizer of both culture and cognition (Bruner, 1986; Nelson, 1981, 1986). Nelson refers to scripts as "generalized event schemas" that serve to specify the people who participate in an event, the social roles that they play, the objects that are used during the event, the sequences of actions required, the goals to be attained, and so on.

Once people have even a crude idea of what the appropriate actions associated with going to a restaurant are, they can enter the flow of the particular event with partial knowledge, which gets enriched in the course of the event itself, facilitating later coordination. "Without shared scripts," Nelson writes, "every social act would need to be negotiated afresh" (1981, p. 109). Nelson also points out that children grow up within events controlled by adults and hence within adult scripts. In this sense, she remarks, "The acquisition of scripts is central to the acquisition of culture" (1981, p. 110).

Jerome Bruner (1990) elaborates on the notion of generalized event representation by extending the analysis of scripts (which apply to relatively short-term, local events) to narratives (which are sequences of scripts with their own structuring resources). If it were not for such narrativized framing, he writes, "We would be lost in a murk of chaotic experience and probably would not have survived as a species in any case" (p. 56).

Putting scripts and schemas in context

It is obvious that scripts and schemas do not float around in a void. The uses to which a table is put, or the meaning of a word, are not invariant in our daily lives. Thought cannot be reduced to its artifactual representation. Rather, uses to which the artifacts are put, their instrumentality, their meaning (none of which can be completely reduced to the other) depend on the context in which they are embedded.

A useful approach to the notion of context for our present purposes is one that sees the level of everyday activity (the kinds of activity mediated by scripts, à la Nelson) as a localized kind of individual/cultural/social medium that mediates between the macro and micro levels of psychological and sociological analysis. Wentworth (1980, p. 92) provides a useful definition of context in this spirit: "The context is the world as realized through interaction and the

most immediate frame of reference for mutually engaged actors. *The context may be thought of as the situation and time bounded arena for human activity. It is a unit of culture.*"

I can summarize my basic points about the cultural medium as follows. Culture's most elementary constituents are artifacts, dual material/ideal mediators that connect/constitute mind and world. In their role as mediators of human action, artifacts are variously configured to serve as resources for constructing joint activity, for coordinating human beings with the world and each other. They do not determine activity; they provide resources for constructing activity. From this perspective, a basic unit of analysis for the study of interacting minds is persons acting in a context – that is, joint, mediated activity (Lektorsky, 1984; Rogoff, 1990; Wertsch, 1985, 1991). Wozniak (1986) and Valsiner (1988) refer to this position as a "co-constructivist" developmental theory.

Under what conditions do interacting minds meet?

If minds interact through culture as systems of artifacts, and if no two people totally share the culture they all draw upon, how is it possible for there *ever* to be a "meeting of minds"? How do they, in Wentworth's terms, come to share the same context?

Emile Durkheim, whose views are similar in many respects to those of the Russian cultural-historical psychologists, put the problem quite distinctly. He provided an "answer-in-principle" that highlights the question of interacting minds in an especially clear fashion:

In fact, if left to themselves, individual consciousnesses are closed to each other; they can communicate only by means of signs which express their internal states. If the communication established between them is to become a real communion, that is to say, a fusion of all particular sentiments into one, common sentiment, the signs expressing them must be themselves fused into one single and unique resultant. . . . It is by uttering the same cry, pronouncing the same word, or performing the same gesture in regard to some object that they become and feel themselves in unison. . . . Individual minds cannot come in contact with each other except by coming out of themselves; but they cannot do this except by movements. (Durkheim, 1915/1965, p. 262)

The key to producing moments of common understanding, communion, and fusion when minds interact, according to Durkheim, is coordination around the products of prior coordinated actions and reactions – for example, coordination through artifacts. To ensure that the necessary degree of coordinated movement occurs, cultures provide for situations called rituals, mediated by symbolic artifacts and arranged in sequences corresponding to scripts and schemas. In rituals, the mind is embodied or materialized in an obvious way, just in case someone did not get the idea. Referring to the necessary properties of coordination, Durkheim declared that "when this homogeneity is once

established and these movements have taken a stereotyped form, they serve to symbolize the corresponding representations" (1915/1965, p. 263). But what about individual minds? Under what conditions can we say that two individual minds have interacted in such a way that one mind can be said to "have met" the other?

Before the time that he encountered Vygotsky and became an advocate of cultural-historical psychology, Alexander Luria proposed a methodology for knowing what another person is thinking that provides an experimental model of the conditions under which two minds can "meet." As described by Luria (1979), he was seeking to provide an objective experimental method that would improve upon the Jungian and Freudian uses of free association as a way of probing the unconscious, preverbal mind. He had little faith that the responses he obtained to his stimulus words were from either the unconscious, the preverbal mind, or the dissembling mind. And he did not know how to tell the difference.

He called the method the "combined motor method." The crux of the method was for the subject to begin by learning to execute two independent motor actions simultaneously in response to a signal (a sound). One action was to push down a button; the other was to hold the other hand perfectly still between two metal plates. This skill took some time to accomplish, but it eventually led to stable button-pushing and stable hand-holding behavior. When stability was achieved, the tone was replaced by someone speaking words. After a bit of perturbation, stability was again achieved. This complex, well-coordinated system of interaction served as the baseline for the manipulation to follow.

Among the words presented as stimuli to push/hold still, the experimenter then placed "forbidden words," words that it was believed the subject would not want to reveal special knowledge about. (In some cases these words were derived from everyday life cases where someone was suspected of hiding something – a crime or a socially undesirable family background; in other cases, the hidden words had been induced by hypnosis, but the experimenter did not know what they were.) Luria's insight was that the experimenter can claim to read the subject's mind if, and only if, the publicly shared activity, whereby the experimenter sets up a system that the subject must coordinate with, is *selectively* disrupted. If a criminal's smoothly organized system of coordinations is disrupted *only* by the word *handkerchief* and a handkerchief played a central role in the crime, we have firm evidence that the investigator and the criminal are sharing the same thought.

Luria was, to be sure, relying on the fact that he was dealing with adults and a set of highly simplified cases over which he had control. This is not the usual situation in real life, where people's behavior is not so finely coordinated. But the essential condition he specified for knowing other minds – selective disruption of ongoing, artifact-mediated, joint activity – remains crucial.

The conditions for minds to interact can now be summarized. The interaction of minds occurs in the medium of culture. That medium is a heterogeneously structured accumulation of the products of past adaptations of the group that have survived into the present as the means by which people interact with each other and the physical world.

In everyday life, as already mentioned, a certain degree of coordination is achieved through shared, scripted activities, their "standing patterns" of acceptable behavior, and norms, all of which are aspects of structure in the medium of culture. Schegloff (1991) and others also emphasize the added importance of the moment-to-moment contingencies of face-to-face interaction in the cultural medium. Minds can be said to interact when two or more people achieve sufficient coordination to allow for the selective disruption of artifact-mediated joint activity.

Changing interactions of minds from birth to old age

For understanding how culture influences the changing ways in which minds interact over the course of the life span, it is essential to keep in mind that human ontogeny is constituted of processes operating simultaneously at the phylogenetic, cultural-historical, and microgenetic (moment-to-moment) levels of structuration. Each of these "genetic domains" (Wertsch, 1985) is characterized by its own scale of temporality, with time generally "moving faster" as we move down the scale.

This heterochrony of the genetic domains constituting human development is, I believe, an important factor in determining how the human mind is created in the cultural medium that sets up a uniquely human relationship between past, present, and future. With the important exception of periods of catastrophic cultural dislocation, changes associated with the individual human life span are rapid compared with changes in the cultural medium. The consequent differences among individuals in relation to the cultural medium associated with different chronological ages, combined with social divisions of labor, are important in shaping how minds interact at different points in the life span.

The interaction of minds at the birth of a child

The need to inquire into the ontogenetic status of the minds that interact is well illustrated when babies first emerge from the womb. When one baby in a group of babies in a nursery begins to cry, other babies are likely to cry, a phenomenon known as "contagious crying" (Martin & Clark, 1987). Such crying is believed to be a primitive precursor of empathy, the sharing of another's feelings. It might be considered a "precultural" form of interaction.

The matter is quite different when the baby is face to face with its parents. In this case, the parents' contributions to the interaction are mediated through culture. Their interpretive processes play a controlling role in the interaction and whether or not it will be said that a meeting of minds has occurred. To parents, a baby is not a "natural," meaningless object. They interpret the infant's properties in terms of existing cultural categories.

When middle-class American mothers are asked to interact with their newborns, they are likely to carry on animated "discussions" as if their babies were really conversing with them (Brazelton, Kozlowski, & Main, 1974). Kaluli (Papua New Guinea) parents, by contrast, assume their babies have no understanding so that attempting to communicate with them is useless (Ochs & Schieffelin, 1984).

A phenomenon observed by British pediatrician Aiden Macfarlane (1977) illustrates cultural mediation of initial parent-child interactions in a manner that provides a kind of model for thinking about how cultural and phylogenetic influences interact in shaping both the baby's characteristics and the process of cultural mediation. To make clear the point of this example, first consider Figure 2.1a, which presents in schematic form five different time scales operating simultaneously at the moment when parents see their newborn for the first time. The vertical ellipse represents the scripted events immediately surrounding birth, which occurs at the point marked by the vertical line.

At the top of the figure is what might be called "geological time," or the history of the earth. The bottom four time lines correspond to the "developmental domains" (Wertsch, 1985) that according to the cultural framework espoused here, simultaneously serve as major constraints for human development. The second line represents phylogenetic time, the history of life on earth, a part of which constitutes the biological history of the newborn individual. The third line represents cultural-historical time, the residue of which is the child's cultural heritage. The fourth line represents ontogeny, the history of a single human being that is the usual object of psychologists' interest. The fifth line represents the moment-to-moment time of lived human experience, the event called "being born" (from the perspective of the child) or "having a baby" (from the perspective of the parents) in this case. Four kinds of genesis are involved: phylogenesis, culturogenesis, ontogenesis, and microgenesis, each "lower" level embedded in the level "above it."

When considering the moment of birth we are reminded that not one but at least *two* ontogenies must be involved; at a minimum one needs a mother and a child interacting in a social context for the process of birth to occur and for development to proceed. These two ontogenies are coordinated in time by the simultaneous structuration provided by phylogeny and cultural history (Figure 2.1b).

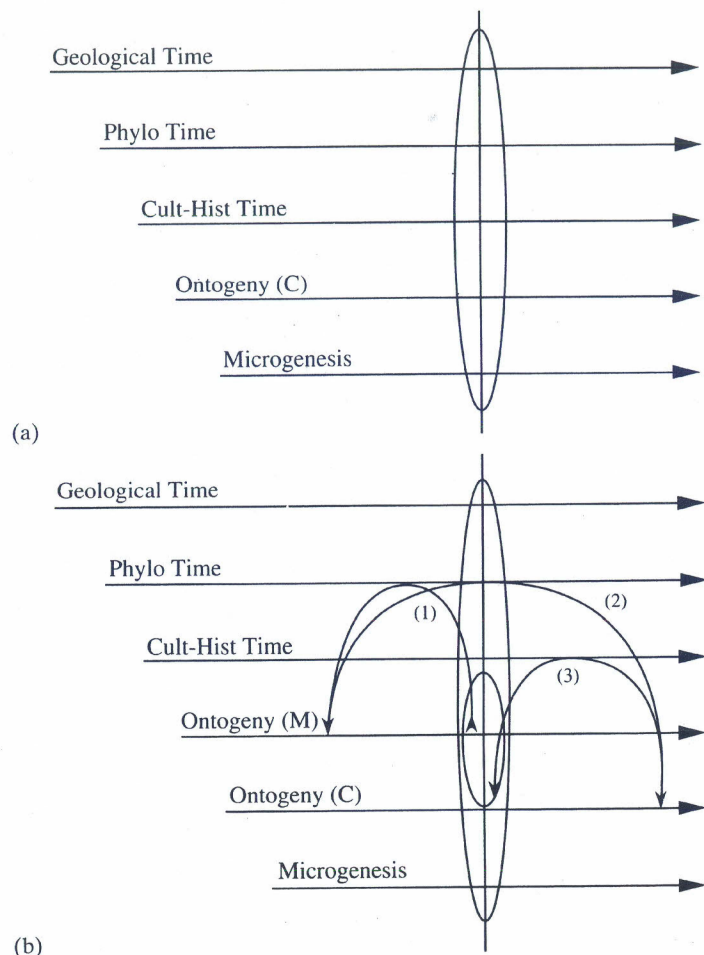


Figure 2.1. (a) The five kinds of time in effect at the moment a child is born (marked by the vertical line). "C" denotes child. (b) How culture is converted from an ideational/conceptual property of the mother into a material/interactional organization of the baby's environment. Note that there are two ontogenies included, the mother's and the baby's. The curved lines depict the sequence of influences: (1) The mother thinks about what she knows about girls from her (past) cultural experience; (2) she projects that knowledge into the child's future (indicated by remarks such as "She will never be a rugby player"); and (3) this ideal/conceptual future is then embodied materially in the way the mother interacts with the child. "M" denotes mother; "C," child.

The behaviors of adults as they first catch sight of their newborn child and categorize the child as male or female reveal the way in which the mother's and child's ontogenies are coordinated under constraints provided by a combination of phylogeny, cultural history, and the mother's ontogenetic experience. The parents almost immediately start to talk about and to the child. Their comments arise in part from phylogenetically determined features (the anatomical differences between males and females) and in part from cultural features they have encountered in their own lives (what they know to be typical of boys and girls in their culture). Typical comments include the invocation of scripted events such as "I shall be worried to death when she's eighteen" or "She can't play rugby" (said of girls) (Macfarlane, 1977). Putting aside our negative response to the sexism in these remarks, we see that adults interpret the phylogenetic-biological characteristics of the child in terms of their own past (cultural) experience. In the experience of English men and women living in the 1950s, it could be considered "common knowledge" that girls do not play rugby and that when they enter adolescence they will be the object of boys' sexual attention, putting them at various kinds of risk. Using this information derived from their cultural past and assuming cultural continuity (e.g., that the world will be very much for their daughter as it has been for them), parents project a probable future for the child.³ This process is depicted in Figure 2.1b by following the arrows: mother seeing the baby → (remembered) cultural *past* of the mother → (imagined) cultural *future* of the baby → adult treatment of the baby in the *present*.

Two features of this system of transformations are essential to understanding the contribution of culture in constituting development. First, and most obviously, cultural mediation introduces a clearly nonlinear element into human interaction; culturally defined *future* circumstances become ontogenetically experienced *current* conditions of the child's experience based on the ontogenetically *past* cultural-historical circumstances of the parent. Second, if less obviously, we see the way in which the parents' (*ideal*) recall of their past and (*ideal*) imagination of their child's future becomes a fundamentally important *material* constraint organizing the child's life experiences in the present, a process illustrating the dual material/ideal nature of all artifacts. This rather abstract, nonlinear process of transformation is what gives rise to the well-known phenomenon that even adults totally ignorant of the real gender of a newborn will treat the baby quite differently depending upon its symbolic/cultural "gender." Adults literally create different material forms of interaction based on conceptions of the world provided by their cultural experience when, for example, they bounce "boy" infants (those wearing blue diapers) and attribute "manly" virtues to them while they treat "girl" infants (those wearing pink diapers) in a gentle manner and attribute beauty and sweet temperaments to them (Rubin, Provezano, & Luria, 1974; see also Labouvie-Vief, Chapter 4, this volume).

Macfarlane's example also motivates the special emphasis placed on the social origins of higher psychological functions by cultural-historical psychologists (Cole, 1988; Rogoff, 1990; Valsiner, 1988; Vygotsky, 1987; Wertsch, 1985). As the example demonstrates, human nature is social in a sense different from the sociability of other species. Only a culture-using human being can "reach into" the cultural past, project it into the (ideal/conceptual) future, and then "carry" that future "back" into the present to create the sociocultural environment of the newcomer.⁴

Generalizing the lessons of the first meeting

These examples may strike the reader as only tangentially related to the question of interacting minds. After all, the child has virtually no knowledge of the culture into which he or she is born, and it might also be claimed that the neonate is essentially "mindless." However, I want to argue that these first meetings already suggest important factors that we must consider as we trace the ways in which minds interact in the decades of human life to come. For one thing, the earliest forms of postnatal human interaction orient us to the fact that in talking about the ways that minds interact, we must take account of the ontogenetic status of the interactants. The newborn is both biologically immature and culturally naive. How the infant mind interacts with others will depend crucially on who those others are, their degree of enculturation, and the particular cultural beliefs they acquire. By the same token, at the other end of the life span, the mind of a 90-year-old, with an enormous store of cultural knowledge, will interact very differently with another 90-year-old than with a 50-year-old or a 5-month-old. Some of these differences will result from diverse relationships to the cultural medium, others to biological properties of the individuals, still others to their social roles and attendant power relationships of the interactants vis-à-vis each other, which in turn are intertwined with culture.

Early in life, when children are physically immature and have yet to accumulate a cultural-historical past, when their lives, as we say, "lie before them," it is the more powerful adults who structure children's experience in terms of their expectations for their future. (Recall Nelson's observation that children grow up inside of adult scripts.) Assuming the 70-year life span of many people living in industrialized countries in the late twentieth century, biological maturation and cultural appropriation proceed more or less "hand in glove" until individuals reach their late twenties or early thirties. Then the directionality of phylogenetic and cultural-historical factors contributing to development begins to separate; culturally organized experience continues to accumulate while the biological substrate of mind begins to weaken, requiring reorganization of mental life (P. B. Baltes, 1987). The social roles that one plays and the

contexts in which they are played may expand or begin to contract, depending on one's place in the social order (Sørensen, Weinert, & Sherrod, 1986).

Because the ways in which the process of interacting minds changes across the life span will depend on the interplay of all of these factors, it is obviously impossible to provide a comprehensive account of the processes at work. However, it is possible to illustrate the way in which they operate in a series of examples taken from different ages.

Getting on a schedule

In the earliest weeks after birth, children and caretakers must become coordinated in such a manner that the adults are able to provide enough resources to accommodate the newcomers. Children must be drawn into society, just as they must engage their caretakers and draw into themselves the cultural resources accumulated by society if they are to continue to develop. In this process, there is an intricate interplay between the initial characteristics of children and the sociocultural environment into which they are born. This initial synchronization becomes the "carrier wave" for the neonate mind to begin interacting with surrounding minds.

One obvious component of this process of coordination involves getting the baby to sleep on a schedule that meshes with the adult activity cycle. Another component is feeding, which must be coordinated with the sleep cycle. There are wide cultural differences in how these coordinations are achieved (Super & Harkness, 1982). Among children in the United States, where most people live by the clock and infants are encouraged to sleep through the night as soon as possible, there is a marked shift toward the adult day-night cycle a few weeks after birth. There is also pressure for meals to be scheduled at the convenience of adults. By contrast, Kipsigis (Kenyan) infants, who sleep with their mothers and spend their days strapped to their mothers' backs, spend much of the day napping while their mothers go about their work. At night, they may be found snoozing on their mothers' backs while they are dancing or conversing with their neighbors, and feeding takes place more or less on demand. In each case, children rather quickly adjust to the adult schedule.

For my present purposes, such cultural differences are unimportant. What is important is that in each case the meshing of the sleep and feeding cycles with the daily rhythms of adult life increases the overall coordination between infants and their caretakers, making a "meeting of minds" through selective discoordination possible.

The major signal of serious discoordination is, of course, crying. Cries carry a small amount of differential information. Adults from many cultures can distinguish between a hunger cry and a cry induced by a painful stimulus. However, in order to assess the source of the infant's distress in a more fine-

grained fashion, the caretaker must have a detailed knowledge about the baby's regular daily rhythm.

A new kind of meeting? The emergence of social smiling

Between the ages of 2½ and 3 months, several different lines of development, which have been proceeding more or less independently, converge around the phenomenon of social smiling (Emde, Gaensbauer, & Harmon, 1976). The development of this seemingly simple behavior illustrates the intricate way in which different lines of development must relate to each other for a transition to a qualitatively new level of development to occur.⁵ Maturation of the visual system enables a new level of visual acuity and a new ability to analyze the visual field. Babies can focus their eyes on, and direct their smiles to, people. Their smiles, which until this time have borne no contingent relationship to others, now come under the control of the social behavior of their parents. As a consequence, smiling, to this point a seemingly unrelated behavior, is transformed. With the advent of social smiling, there is a new form of interaction among minds.

This contrast is quite apparent to the adult participants. Before the advent of social smiling, one encounters descriptions such as the following: "I don't think there is interaction . . . They are like in a little cage surrounded by glass and you are acting all around them but there is not interaction" (Robson & Moss, 1970, pp. 979–980). After the advent of social smiling, the following behaviors emerge:

His eyes locked on to hers, and together they held motionless. . . . This silent and almost motionless instant continued to hang until the mother suddenly shattered it by saying "Hey!" and simultaneously opening her eyes wider. . . . Almost instantly the baby's eyes widened. His head tilted up. His smile broadened. (Stern, 1977, p. 3)

At this point the "culture" part of the mechanism by which minds interact is still carried entirely by the adult. It is manifested in the way that the adult interprets the baby's behavior. Note that the transformation from reflex to social smiling takes place only if there is proper feedback from the infant's caretakers. Without appropriate feedback, as occurs in the case of some blind children, social smiling does not develop. (See Cole & Cole, 1992, pp. 170ff for additional discussion of this point.)

From primary to secondary intersubjectivity

Colin Trevarthan (1980) refers to the kind of coordinated turn taking and emotional sharing illustrated in the preceding example as *primary intersubjectivity*. As part of a new biosocial-behavioral reorganization of life between the ages of 6 and 9 months, babies become considerably more mobile.

They can move away from the immediate presence of watchful adults, so they can no longer rely on the adults to help them complete their actions and to rescue them from their mistakes in the same manner as before.

Both babies and caretakers must accommodate the uncertainties of their increasing separation as babies begin to move about on their own. Caretakers arrange the environment so that babies are likely to encounter no harm, and they keep a watchful eye (or ear) open for something amiss. Babies anticipate trouble, too. They keep an eye on their caretakers' responses to the things they do, becoming openly wary of strange events and people because they are not sure what unfamiliar adults will do.

At about this same time, they begin to interact with others in a new and more complex way that Trevarthan calls *secondary intersubjectivity*, the hallmark of which is that the infant and the caregiver can now share understandings and emotions that refer beyond themselves to objects and other people. An interesting indicator of this ability at 6 to 9 months is the interaction of minds called *social referencing*, when babies check their mother's reactions to an uncertain event or an unfamiliar person and respond in terms of her emotional evaluation as evidenced by her facial expression (Campos & Stenberg, 1981).

An indication of secondary subjectivity that is crucial for the ability to interact with another mind through an artifact manifests itself within a short time in the form of pointing. When 12-month-olds see a remote-controlled car roll past, they point at it and then look to see how the mother reacts to it. Within a few months they look at the mother to see if she is looking at the car (e.g., to see whether they and the mother have noticed this unusual event in common) and *then* point to it. Here we see the earliest evidence of joint mediated activity; the car is now mediating the child's interactions with the mother (Butterworth, 1991).

The emergence of language

Thus far the role of culture in cognitive development has been a relatively "external" one. Children find themselves in an environment that is organized according to the cultural patterns of their social group, embodied in scripted activities with which they have become coordinated. The beginnings of language, however, bring about a fundamental reorganization of children's minds and their relations to their sociocultural environment. Before the advent of language, if children can be said to understand their actions, that understanding is implicit (Karmiloff-Smith, 1992). Beginning with the appearance of early words, and accelerating rapidly between (very roughly) 18 and 30 months of age, children manifest a new mode of behavior, mediation through artifacts in the material form of patterns of sound (or motions of the hands, in the case of the deaf).⁶

According to the cultural-historical contention, the advent of language has profound effects on both the nature of mind and the ways in which minds can interact. Before the advent of language, children could be said to be “in culture”; with the appropriation of language, culture ceases to be external to the children and becomes a part of their basic psychological processes, reorganizing them in the process. Vygotsky and his colleagues referred to all sorts of conventional signs, language, counting systems, mnemonic techniques, charts, maps, drawings, and the like as “psychological tools.” As such, they manifest the basic property of all tools: “By being included in the process of behavior, the psychological tool alters the entire flow and structure of mental functions” (Vygotsky, 1981, p. 137).

Before the flowering of language, one can trace the development of thinking and the development of language as more or less separate threads. There is, in Vygotsky’s phrase, a “pre-linguistic” phase in the development of thought and a “pre-intellectual” phase in the development of language (babbling, cooing, etc.). The unique characteristic of human development, he maintained, is that these two lines of development become interwoven, as a result of which “thinking becomes verbal and speech intellectual” (Vygotsky, 1987, p. 112).⁷

Many manifestations of the changes in cognition accompany the acquisition of language-mediated behavior. One is *symbolic play*, whereby objects and events are treated in an “as if” manner in which the conventional meanings are held in suspension and manipulated. Before the advent of language, interactions among peers are generally transitory and fleeting. But 3-year-olds can coordinate with one another using a variety of primary and secondary artifacts, embedded within the tertiary artifact called “pretending to have a tea party.” At the same time, children acquire the ability to think about other people’s mental states, or beliefs, as indicated in tasks where children must understand that others may entertain a false belief (Astington, 1993).

Despite their differences, each of these cases is symptomatic of the new way in which minds can interact once children’s actions are mediated through the artifactual system of language. The strings of artifacts (words) that children exchange with others mean that interactions are no longer restricted to the here and now. They have the power to invoke objects and events remote in time and space; the cultural past and future enter into present interactions in a new, and uniquely human, way.

Interacting minds in middle childhood

Among the many phenomena that I might choose to illustrate the special character of how culture and cognition construct each other in middle childhood, I have chosen a phenomenon first highlighted by Piaget: the fact that during middle childhood children spend significant amounts of time in age-graded games without direct adult supervision.

I take the crux of the issue to be the following. In infancy and early childhood, by virtue of the fact that parents, grandparents, or older siblings are present in the settings where children find themselves, discoordination and conflicts in their interactions with age-mates are repaired by the concrete intervention of society. What changes occur so that children can regulate their interpersonal interactions without direct adult intervention? Piaget’s well-known answer was that children came to be able to govern their behavior by social rules, for which the prototype was to be found in rule-based games (Piaget, 1965).

Rule-based games are a model of society for children in two closely related respects, Piaget argued. First, “Games with rules are social institutions in that they remain the same as they are transmitted from one generation to the next and they are independent of the will of the individuals who participate in them” (Piaget & Inhelder, 1969, p. 119). Like other social institutions – language, for example – games provide an already existing structure of rules about how to behave in specific social circumstances.

Second, like all social institutions, rule-based games can exist only if people agree to mediate their behavior through them. To play a game such as hopscotch or baseball, children must learn to subordinate their desires and behavior to a socially agreed-upon system. In Piaget’s view, it is through the give and take of negotiating plans, settling disagreements, making and enforcing rules, and keeping and breaking promises that children come to develop an understanding that social rules provide a structure that makes possible *cooperation* with others (Piaget, 1965).

Piaget’s characterization of games as social institutions has all the properties we have come to expect of cultural artifacts; they make possible the interaction of people in coordinated systems of activity. “It seems obvious,” Piaget wrote,

that individual operations of intelligence and operations making for exchange in cognitive cooperations are one and the same thing, “the general conditions of actions” to which we have continually referred being an interindividual as well as intraindividual coordinator. (Piaget, 1967, p. 360)

From a cultural-historical perspective, rule-based games are tertiary artifacts of a new order. They do not directly model everyday events, but rather create qualitatively new, non-everyday events, within which minds (and bodies) interact. Subsequently, everyday events will come to be interpreted in terms of, and mediated by, these non-everyday artifacts.

There are certainly other attainments of middle childhood that would lead us to assume that minds begin to be able to interact with each other in new ways. For example, insofar as children attend school and acquire the ability to read and write, interaction through print, which breaks the boundaries of the here and now, becomes possible. It is also in middle childhood that children come to be trusted with complex chores, indicating that their parents can trust

them to “behave themselves” (or at least hold them accountable if they do not).

Adolescence

Common to both cultural-historical and Piagetian theory is the belief that the transition from childhood to adulthood corresponding to the stage of adolescence in modern industrialized societies entails the acquisition of a new mode of thought.⁸ According to Inhelder and Piaget, this new mode of thought is the ability to think in terms of formal operations. They contrast concrete and formal operations in the following way:

Although concrete operations consist of organized systems (classifications, serial ordering, correspondences, etc.), [children in the concrete operational stage] proceed from one partial link to the next in step-by-step fashion, without relating each partial link to all the others. Formal operations differ in that all of the possible combinations are considered in each case. Consequently, each partial link is grouped in relation to the whole; in other words, reasoning moves continually as a function of a “structured whole.” (Inhelder & Piaget, 1958, p. 16)

Inhelder and Piaget speculated that an essential social condition promoting the development of formal operations was the fact that the transition from childhood to adulthood entails a shift in the responsibility that people have for seeing that activities go well. No longer can individuals rely on more capable others to see that things are done right; they must see to it themselves.

Vygotsky ascribes the underlying change in thinking associated with the transition to adulthood to a shift from “thinking in complexes” to “thinking mediated by genuine concepts.” In terms reminiscent of Inhelder and Piaget, he wrote, “What distinguishes the construction of the complex [from ‘genuine concepts’] is that it is based on connections among the individual elements that constitute it as opposed to abstract logical connections” (Vygotsky, 1987, p. 136).

A great deal of contemporary evidence indicates that formal operational thinking, or thinking in true concepts, is relatively rarely encountered, even in societies that explicitly seek to teach their use (Cole & Cole, 1992, chap. 16). This evidence caused Piaget (1972) to conclude that while all normal people attain formal operations, “they reach this stage in different areas according to their aptitudes and their professional specializations (advanced studies or different types of apprenticeship for the various trades): the way in which these formal structures are used, however, is not necessarily the same in all cases” (p. 10). In other words, a lawyer might think in a formal manner about legal cases, but not when sorting the laundry, or a baseball manager might employ formal operational thinking to choose his batting lineup, but fail to do so in the combination-of-chemicals task.

I find the “density of knowledge plus new responsibilities” explanation of the conditions that promote the appearance of formal operations quite congenial. According to this view, different societies arrange for their young people to gain deep knowledge in a restricted number of domains; no one is an expert at doing everything. When deep knowledge is associated with responsibility for action, it creates the cultural conditions that promote the kind of systematicity embodied in formal operational tasks. Such thinking appears to be, by and large, specific to the activities where the proper conditions hold.

The most promising suggestion I have seen for a universal domain in which people achieve something akin to formal operations comes from Erik Erikson’s (1968) ideas about identity formation, which hinge on a new way of thinking about the self in relationship to society. Erikson believed that adolescents face the task of incorporating their new sexual drives and the social demands placed on them into a fully integrated and healthy personality. He called this integrated state “identity,” which he defined as “a sense of personal sameness and historical continuity” (Erikson, 1968, p. 17).

What makes Erikson’s ideas germane to this discussion is that he saw adolescent identity formation as involving more than the individual personality. To forge a secure sense of self, adolescents must resolve their identities in both the individual and the social spheres or, as Erikson (1968) put it, establish “the identity of these two identities” (p. 22). He explained the thought processes involved in the following passage:

In psychological terms, identity formation employs a process of simultaneous reflection and observation, a process taking place on all levels of mental functioning, by which the individual judges himself in the light of what he perceives to be the way in which others judge him in comparison to themselves and to a typology significant to them; while he judges their way of judging him in the light of how he perceives himself in comparison to them and to types that have become relevant to him. (pp. 22–23)

Although Erikson’s description of the kind of thinking required to achieve an integrated sense of identity may seem unnecessarily convoluted, this passage is worth careful study because it corresponds closely to Piaget’s descriptions of formal operational thinking.

Erikson’s core idea is that adolescents engage in an identity-forming process that depends on (1) how they judge others, (2) how others judge them, (3) how they judge the judgment processes of others, and (4) their ability to keep in mind social categories (“typologies”) available in the culture when making judgments about other people.

Note that it is not enough to take only one or two of these elements into account – say, how you judge others using social categories of importance to you. Rather, you must simultaneously consider both your own and other people’s judgments, plus the perspective of society (embodied in the linguistic categories used to formulate the judgments). It is this latter quality that clearly

implicates culture in the way that formal operations change the nature of the way that minds interact. Not any form of systematicity will do; rather, it is systematicity in terms of culturally shared categories that is the crucial factor.

As a consequence of the ability to think systematically about the self in relation to others and cultural categories, a new way in which minds can interact emerges, one based entirely on talk outside the context of action – talk mediated by social norms and conventions.

The reorganization of mental life in adulthood

The affinity between cultural-historical and life-span approaches to mind first impressed me when the publishers of *The Development of Children* (Cole & Cole, 1992) asked us to include a brief chapter on adulthood and aging. I noted that those theorists who thought of development in largely biological terms, or in terms of cognitive universals, did not see development as a lifelong process, but those who believed culture to be important in development proposed developmental stages following adolescence.

Freud, in good Darwinian style, believed that development ceases after adolescence because once young people reach the genital stage and complete the process of sexual reproduction, they have fulfilled their fundamental biological role – to ensure the continuation of the species. To be sure, adults must care for their offspring until they are sufficiently mature to repeat the cycle, but Freud did not attribute any particular developmental significance *for the parents* to the activities of parenting.

In Piagetian theory, formal operations are the logical end point of development because they provide a comprehensive logical apparatus that allows a person to maintain a state of cognitive equilibrium. Piaget (1967) recognized that pure logic is an insufficient basis for mature action, pointing out that some of the less attractive aspects of teenage behavior result from adolescents' new discovery of the power of logic, which leads them to act "as though the world should submit itself to idealistic schemes rather than systems of reality" (p. 64). Experience brings about a more realistic balance between the adolescent's newfound powers of systematic thinking and the messiness of life. "Just as experience reconciles formal thought with the reality of things," Piaget wrote, "so does effective and enduring work, undertaken in concrete and well-defined situations, cure dreams" (1967, pp. 68–69).

However, this coming to terms with reality did not imply *developmental* change for Piaget; in his view, there existed no stage of thought beyond formal operations. At best, he believed, changes after adolescence represent a process of consolidation and an increase in judgment about how to employ one's – fundamentally unchanged – cognitive resources.

By contrast, Erikson's theory, in which culture plays an important role, assumes that just as childhood development proceeds through the resolution

of conflicts associated with the "main tasks" of each age period, so too adulthood development is propelled by the need to resolve crises associated with each of its main tasks. Like many recent students of adult development, Erikson sees an important transition period in the late thirties, when, if they are healthy, people achieve the stage of *generativity*. This is a time when people begin to reconsider their life paths and, in George Vaillant's (1977) terms, to take "responsibility for the growth, leadership, and well-being of one's fellow creatures, not just raising crops or young children" (p. 202).

In recent years there have been a number of efforts to elaborate life-span approaches in order to extend and refine theories such as those proposed by Piaget and Erikson, by documenting the changes in modes of thought that are likely to take place in adulthood. A dominant concern of those building on Piagetian theory is to demonstrate the emergence of a new set of cognitive abilities that grow out of (or in parallel with) formal operations (Alexander & Langer, 1990; Fischer, Kenny, & Pipp, 1990). One way to interpret these continuing changes is that people in their twenties and thirties develop the ability to relate one abstract system to another and, eventually, to think about entire systems of abstract relations (Fischer et al., 1990). While I do not doubt that such higher-order formal systems thinking is possible under some cultural circumstances, especially if one has pencil and paper in hand, I do doubt the general significance of such elaborations on the basic logic of creating hierarchies of logical closed systems outside the realm of science.

I find more congenial suggestions put forward by scholars such as Kegan (1982) and Labouvie-Vief (1992; see also Chapter 4, this volume), who argue, in the spirit of Piaget's remarks quoted earlier, that, as people grow older, they can think not only within abstract systems, but about them. This thinking about, *contra* Piaget, does lead to qualitative changes in thought processes. In Labouvie-Vief's view, for example, adults

move away from the earlier hierarchical model and establish a way of thinking in which the two poles of mental functioning are seen as interactive and as dialectically related. As a result of the process, such categories as objective and subjective, self and other or self and society, and mind and body are no longer in dualistic opposition. Instead, the individual understands that each mutually affects the other, mutually defining and deepening each other. (1994, pp. 206–207)

In Labouvie-Vief's view, a particularly important result of this new form of thinking is that the reintegration of logic and emotion and, with them, aspects of the self associated with traditionally oppositional gender roles, becomes possible. This reintegration creates the foundations of a lifelong developmental process that she associates with Erikson's notions of generativity in adulthood.

An important factor contributing to the kinds of reorganization of thinking discussed by Labouvie-Vief and others is that in adulthood one begins to re-

view old events from a new generational perspective. A simple example transpired in my family while I was in the process of writing this chapter. A middle-aged friend of my wife's told her about the extreme stress she felt because her 35-year-old daughter's husband had left her and her early preteenage children for a younger woman. Her grandchildren refused to talk to their father even when forced to spend time with him in accordance with the separation agreement. The father was initiating legal steps to gain custody of the children in the hope of regaining their love. My wife's friend said that she was simply sick with the pain she felt for her daughter and her grandchildren.

My wife, herself a grandmother now, reflected on how angry she used to get when her mother expressed similar emotions with regard to events in either her or her sister's life. Viewed from the perspective of a daughter, a mother's expression of pain ("I am so upset that your husband is unemployed I can hardly sleep") is easily interpreted as coercion and disapproval. Experiencing the same event from the other side of the generational divide provides a wholly different way of thinking about such matters.

Coming from a cultural-historical perspective, I too believe that lifelong development is the expected pattern. In my own thinking I have linked this difference to the basic principles on which a cultural-historical approach rests: the need and ability of human beings to live in an environment suffused with the accumulated artifacts of past generations. The key point was made by Labouvie-Vief:

Whether or not aging is adaptive, therefore, cannot be judged at a level of simple biological reductionism. Even though aging does bring a reduction in biological resilience, aging organisms may have evolved new structures that increase the coping efficiency of the population as a whole. (1981, p. 215)

The gain-loss dynamic: developmental trade-offs in old age

As Labouvie-Vief (1981) points out, the child developmentalist suffers from the fact that, in the early years of life, development seems to be a matter of "conjunctive, cumulative continuity." The child grows larger, has more elaborated brain circuitry, inhabits a broader range of contexts, acquires more knowledge, engages in more complex forms of social interaction, and so on. With the intertwined threads of development all flowing in the same direction, ferreting out their distinctive contributions is made extremely difficult. This circumstance is one of the major motivations for comparative work, where biological abnormalities and cultural differences (e.g., whether or not children start school at the age of 7 years) provide an opportunity partially to unravel the tangled web of development.

Although the data are not unequivocal, the growth of biological capacities to the age of approximately 30 and their subsequently slow decline appear to follow the course of change described metaphorically by many psychologists

over the years: From birth through puberty and a few years more, the tide of life rises, sometimes with a rush, sometimes with a smooth, imperceptible advance along the beach. At some vaguely definable time, the high-water mark is reached, and the tide slowly retreats (Katchadourian, 1987). A similar story appears adequate to describe those intellectual capacities referred to as "fluid" and believed to depend heavily on biological factors (Horn & Donaldson, 1980). This pattern of rise and decline can also be seen in the social domain: Infants begin life confined entirely to contexts where they can be watched over and protected by parents; the range of contexts where the growing person can act as an independent agent grows steadily into middle age; then the contexts for independent action begin to shrink, until life ends as it began, with the elderly person dependent on others and capable of acting only within a restricted range of contexts.

On the other hand, as Paul Baltes has pointed out, aspects of intellectual and social change suggest both the qualitative rearrangement of psychological processes and discontinuities in experience. Qualitatively new forms of thinking arise from the fact that "crystallized," "pragmatic" abilities increase while "fluid," "mechanical" abilities decrease, requiring people to reorganize their thinking to maintain their effectiveness as they grow older (P. Baltes, 1987, 1993). This changing balance among mental resources interacts with the social discontinuities in an individual's life, such as retirement or the loss of a spouse, that bring about dramatic changes in the contexts of a person's everyday activities.

When we take into consideration the complex psychological trade-offs entailed by changes in the biological, cognitive, and social domains, the picture of adulthood as a period of stability followed by a gradual decline often fails to correspond to a particular individual's actual experience of psychological change. Instead of a general feeling of gradual decline, what emerges from studies of adult development is an intricate, shifting mosaic in which gradual change and predictable experiences are mixed with sudden, unexpected events – new insights, conceptual reintegrations – and triumphs mixed with disappointments, loss of power, and decline. Even as one's physical powers decrease, the accumulated experiences of a lifetime, the "crystallized" and "pragmatic" aspects of cognition, provide adults with resources for dealing with life that are completely beyond the reach of the young. This same, changing dynamic has an inevitable impact on the ways in which minds interact, making more difficult the coordination necessary for knowing what other people are thinking.

With respect to people roughly one's own age, the longer one lives, the rarer it is to meet other people who share knowledge of one's past, including the cultural artifacts that have coordinated the interactions of one's mind with others. This situation is exacerbated in modern-day nursing homes, in which people are exposed to strangers for whom their past is only a story. In these

conditions, it is perfectly understandable that people would bring treasured objects with them "to make a sparse environment richer, not only in meaning but also in the proportion of the encapsulated environment that could respond to them" (Lawton, 1990, p. 640).

The difficulties of interacting with younger minds are of a related kind. Elderly people think in terms of a long time span in which the trajectory of various kinds of events is well mapped. Assuming cultural continuity (which individuals always assume, whatever the reality), this stable vision of the flow of life from the past also gives them an unusual grasp of the "future" of the younger people with whom they interact. The younger person, of course, cannot see this "future." In an important sense, then, the old and young live in different worlds, rendering difficult, if not impossible, the meeting of minds.

This was equally true earlier in life, of course, where the meeting of minds was simply papered over by the overpowering ability of adults to define the reality of the children whose lives they were arranging. But with the aged we have reversed perspectives of seeing development from the point of the older, not the younger, individual. This perspective reveals a contradiction in the way that minds interact during old age, namely, that the cognitively more knowledgeable person is now the socially and biologically less competent person, whose dependence is the source of myriad and complex interpersonal uncertainties (M. Baltes & Wahl, 1992).

At the same time, the aged confront their own futures with no more certainty than the young, a fact that speaks to the similarity of the developmental processes at all ages. This point was made by the novelist Milan Kundera (1988), who expresses it far better than I could:

We leave childhood without knowing what youth is, we marry without knowing what it is to be married, and even when we enter old age, we don't know what it is we're headed for: the old are innocent children of their old age. In that sense, man's world is a planet of inexperience. (p. 100)

Culture in development: toward a synthetic view

I have pursued two goals in this chapter. The first was to sketch ways in which the interaction of phylogenetic and cultural-historical contributions to ontogeny shape the ways whereby minds can be said to interact over the life span. In doing so, I have sought to illustrate how principles of development evident early in ontogenesis retain their relevance into adulthood and old age. My second goal has been to suggest that the cultural-historical approach I have sketched here, which heretofore has been applied primarily to childhood, fits well with life-span approaches to development such as that promoted by Paul Baltes. Thinking of culture as history in the present, both views assert that "the processes of individual development are governed both by principles of

ontogenesis and by factors associated with the concurrent process of biocultural change" (Baltes, 1987, p. 619).

As Paul Baltes (1987) emphasizes, such an approach is inherently interdisciplinary, requiring analysis not only at the psychological but also at the cultural and social levels. In this regard, I find encouraging the affinities between the cultural-historical approach I have been espousing and the life-span/life-course treatments of development in the work of sociologists such as Buchmann (1989) and Kohli (1986). Kohli (1986, p. 272) speaks of the life course as a social institution.

It socializes in two ways: It regulates the movement of individuals through their life in terms of career pathways and age strata, and it regulates their biographically relevant actions by structuring their perspectives for movement through life. It has thus a double impact: on the social positions in their sequential organization, as well as on the symbolic horizons within which individuals conceive of themselves (and of others) and plan their actions. In other words, *it has a material as well as a symbolic aspect.* (Emphasis added)

The affinity between this view and my earlier discussion of the ways in which artifacts are organized in terms of cultural models and scripts is made even clearer by Buchmann (1989), whose monograph on the entry into adulthood is titled *The Script of Life in Modern Society*.

These kinds of affinities give me hope that a synthetic, truly life-span approach to human development that treats human beings as phylogenetically evolved creatures interacting in the medium of culture is within our grasp.

Notes

- 1 To quote the Russian epistemologist Evald Ilyenkov, "The world of things created by man for man, and, therefore, things whose forms are reified forms of human activity . . . is the condition for the existence of consciousness" (1977, p. 94).
- 2 Another important source of heterogeneity with respect to the cultural medium is that it is heterogeneously distributed across any population. This point has been emphasized by Ted Schwartz (1978, 1990), who explores the way in which knowledge is distributed differentially across persons, generations, occupations, classes, religions, institutions, and so on. Schwartz argues that culture is necessarily a distributed phenomenon insofar as it is brought to bear, and acquired, in everyday interactions among people, no two of whom share all of the culture of the group to which they belong.
- 3 Writing about the special temporal quality of culturally mediated human thought, White remarks that "this world of ideas comes to have a continuity and a permanence that the external world of the senses can never have. It is not made up of the present only, but of a past and a future as well. Temporally, it is not a succession of disconnected episodes, but a continuum extending in both directions, from infinity to infinity" (1942, p. 372).
- 4 This analysis also shows how culture contributes to both continuity and discontinuity in individual development. In thinking about their babies' futures, these parents are assuming that the "way things have always been is the way things will always be," a purely artificial form of continuity that allows people to "project" the past into the future, thereby creating a stable interpretive framework that is one of the important elements of psychological continuity.

This assumption, of course, is wrong whenever there are conditions of cultural change following the birth of the child. As but a single example, in the 1950s, American parents who

assumed that their daughter would not be a soccer player at the age of 16 would have been correct. But in 1990, a great many American girls play soccer. In addition, as life-span developmental psychologists emphasize, unique historical events (a war, a depression) may provoke great discontinuity in development (Featherman & Lerner, 1985).

- 5 As a way of dealing with the resulting complexities of tracking the dynamic system of development over time, in prior publications I have sought to provide a framework that understands developmental change as the emergent synthesis of several major "factors" or "aspects" of human life interacting over time (Cole, 1992; Cole & Cole, 1992). The heuristic device I have adopted is to analyze developmental change in terms of the social, biological, and cultural factors that give rise to a sequence of qualitative rearrangements in the organization of experience and behavior that Emde and his colleagues referred to as a "bio-behavioral shift" (Emde et al., 1976). Cole and Cole (1992) expanded on this idea, referring to "bio-social-behavioral shifts" because, as the work of Emde et al. showed, every biobehavioral shift involves changes in the relations of individuals to their social world.
- 6 According to Piaget, the flowering of language during this period is the consequence of a reorganization of mind in which children become capable of representing the world, i.e., of representing it to themselves mentally. Current evidence (see Karmiloff-Smith, 1992, for a review) indicates that children are capable of nonpropositional, analogue forms of representation considerably earlier. In Karmiloff-Smith's terms, it is the *redescription* of these early forms of representation into language that concerns me here.
- 7 In his descriptions of the qualitative transformations in mind brought about by the acquisition of language, Vygotsky displays his affinity to contextualist worldviews, as described by Pepper (1942). In Pepper's terms, the fusion of phylogeny and cultural history brought about by the acquisition of language is an emergent, qualitatively distinct, new form of mind in relation to (interwoven with) the world.
- 8 According to my reading of the evidence, adolescence as a recognized, distinctive life stage exists under social conditions where there is a marked gap between the biological capacity for sexual reproduction and changes in social status associated with the capacity for cultural reproduction (Whiting, Burbank, & Ratner, 1986). In societies characterized by relatively simple technological means of production, where biological maturity occurs relatively late by the standards of modern industrial societies, there may be no commonly acknowledged stage of development equivalent to adolescence. Similarly, there may be some such stage recognized for one part of a society and not for others, associated with such factors as gender (adolescence appeared to be a strictly male phenomenon in ancient Greece) and social class (Modell & Goodman, 1990).

References

- Alexander, C., & Langer, E. (Eds.). (1990). *Higher stages of human development: Perspectives on adult growth*. New York: Oxford University Press.
- Astington, J. (1993). *The child's discovery of the mind*. Cambridge, MA: Harvard University Press.
- Baltes, M. M., & Wahl, H. W. (1992). The behavior system of dependency in the elderly: Interactions with the social environment. In M. Ory, R. P. Abeles, & L. Lipman (Eds.), *Aging, health, and behavior* (pp. 83-106). Beverly Hills, CA: Sage.
- Baltes, P. B. (1987). Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline. *Developmental Psychology*, 23, 611-626.
- Baltes, P. B. (1993). The aging mind: Potential and limits. *Gerontologist*, 33, 580-594.
- Bergson, H. (1911/1983). *Creative evolution*. New York: Henry Holt.
- Berry, J. (1976). *Ecology and cultural style*. New York: Sage-Halstead.
- Bok, P. (1988). *Rethinking psychological anthropology*. New York: W. H. Freeman.
- Brazelton, T. B., Koslowski, B., & Main, M. (1974). The origin of reciprocity: The early mother-infant interaction. In M. Lewis & L. Rosenblum (Eds.), *The effect of the infant on its caregiver* (pp. 49-76). New York: Wiley.

- Bruner, J. S. (1986). *Actual minds, possible worlds*. Cambridge, MA: Harvard University Press.
- Bruner, J. S. (1990). *Acts of meaning*. Cambridge, MA: Harvard University Press.
- Buchmann, M. (1989). *The script of life in modern society*. Chicago: University of Chicago Press.
- Butterworth, G. (1991). The ontogeny and phylogeny of joint visual attention. In A. Whitten (Ed.), *Natural theories of mind* (pp. 223-232). Oxford: Blackwell.
- Campos, J. J., & Stenberg, C. R. (1981). Perception, appraisal, and emotion: The onset of social referencing. In M. E. Lamb & L. R. Sherrod (Eds.), *Infant social cognition: Empirical and social considerations* (pp. 273-314). Hillsdale, NJ: Erlbaum.
- Cole, M. (1988). Cross-cultural research in the socio-historical tradition. *Human Development*, 31, 137-151.
- Cole, M. (1992). Context and modularity. In L. T. Winegar & J. Valsiner (Eds.), *Children's development in social context* (pp. 5-32). Hillsdale, NJ: Erlbaum.
- Cole, M., & Cole, S. (1992). *The development of children* (2nd ed.). New York: Scientific American Books.
- D'Andrade, R. (1984). Cultural meaning systems. In R. A. Shweder & R. A. LeVine (Eds.), *Culture theory: Essays on mind, self, and emotion* (pp. 88-132). New York: Cambridge University Press.
- D'Andrade, R. (1986). Three scientific world views and the covering law model. In D. Fiske & R. A. Shweder (Eds.), *Meta-theory in the social sciences* (pp. 19-41). Chicago: University of Chicago Press.
- D'Andrade, R. (1990). Some propositions about relations between culture and human cognition. In J. W. Stigler, R. A. Shweder, & G. Herdt (Eds.), *Cultural psychology: Essays on comparative human development* (pp. 65-129). New York: Cambridge University Press.
- Dewey, J. (1938). *Experience and education*. New York: Macmillan.
- Dixon, R. (1985). Contextualism and life-span developmental psychology. In R. L. Rosnow & M. Georgoudi (Eds.), *Contextualism and understanding in behavior science* (pp. 125-144). New York: Praeger.
- Durkheim, E. (1915/1965). *The elementary forms of religious experience*. New York: Free Press.
- Emde, R. N., Gaensbauer, T. J., & Harmon, R. J. (1976). *Emotional expression in infancy: A behavioral study. Psychological Issues Monograph Series, 10* (1, Serial No. 37). New York: International Universities Press.
- Erikson, E. H. (1968). *Identity: Youth and crisis*. New York: Norton.
- Featherman, D. L., & Lerner, R. M. (1985). Ontogenesis and sociogenesis: Problematics for theory and research about development and socialization across the lifespan. *American Sociological Review*, 50, 659-676.
- Fischer, K., W., Kenny, S. L., & Pipp, S. L. (1990). How cognitive processes and environmental conditions organize discontinuities in the development of abstractions. In C. Alexander & E. Langer (Eds.), *Higher stages of human development: Perspectives on adult growth* (pp. 162-190). New York: Oxford University Press.
- Geertz, C. (1973). *The interpretation of cultures*. New York: Basic.
- Horn, J. L., & Donaldson, G. (1980). Cognitive development in adulthood. In O. G. Brim & J. Kagan (Eds.), *Constancy and change in human development* (pp. 445-529). Cambridge, MA: Harvard University Press.
- Ilyenkov, E. V. (1977). The problem of the ideal. In *Philosophy in the USSR: Problems of dialectical materialism* (pp. 71-99). Moscow: Progress.
- Inhelder, B., & Piaget, J. (1958). *The growth of logical thinking from childhood to adolescence*. New York: Basic.
- Karmiloff-Smith, A. (1992). *Beyond modularity: A developmental perspective on cognitive science*. Cambridge, MA: MIT Press.
- Katchadourian, H. (1987). *Fifty: Midlife in perspective*. New York: Freeman.
- Kegan, R. (1982). *The emerging self: Problem and process in human development*. Cambridge, MA: Harvard University Press.

- Kohli, M. (1986). Social organization and subjective construction of the life course. In A. B. Sørensen, F. E. Weinert, & L. R. Sherrod (Eds.), *Human development and the life course: Multidisciplinary perspectives* (pp. 271–292). Hillsdale, NJ: Erlbaum.
- Kundera, M. (1988). *The art of the novel*. New York: Grove.
- Labouvie-Vief, G. (1981). Proactive and reactive aspects of constructivism: Growth and aging in life-span perspective. In R. M. Lerner & N. A. Busch-Rossnagel (Eds.), *Individuals as producers of their development: A life-span perspective* (pp. 197–230). New York: Academic.
- Labouvie-Vief, G. (1992). A neo-Piagetian perspective on adult cognitive development. In R. J. Sternberg & C. A. Berg (Eds.), *Intellectual development* (pp. 197–228). New York: Cambridge University Press.
- Labouvie-Vief, G. (1994). *Psyche and eros: Mind and gender in the life course*. New York: Cambridge University Press.
- Lawton, M. P. (1990). Residential environment and self-directedness among older people. *American Psychologist*, 45, 638–640.
- Lektorsky, V. A. (1984). *Subject, object, cognition*. Moscow: Progress.
- Luria, A. R. (1928). The problem of the cultural development of the child. *Journal of Genetic Psychology*, 35, 493–506.
- Luria, A. R. (1979). *The making of mind*. Cambridge, MA: Harvard University Press.
- Macfarlane, A. (1977). *The psychology of childbirth*. Cambridge, MA: Harvard University Press.
- Martin, G. B., & Clark, R. D. (1987). Distress crying in neonates: Species and peer specificity. *Developmental Psychology*, 18, 3–9.
- Modell, J., & Goodman, M. (1990). Historical perspectives. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 93–132). Cambridge, MA: Harvard University Press.
- Nelson, K. (1981). Social cognition in a script framework. In J. H. Flavell & L. Ross (Eds.), *Social cognitive development* (pp. 97–118). Cambridge: Cambridge University Press.
- Nelson, K. (1986). *Event knowledge: Structure and function in development*. Hillsdale, NJ: Erlbaum.
- Ochs, E., & Schieffelin, B. (1984). Language acquisition and socialization: Three developmental stories and their implications. In R. A. Shweder & R. A. Levine (Eds.), *Culture theory* (pp. 276–320). Cambridge: Cambridge University Press.
- Pepper, S. (1942). *World hypotheses*. Berkeley: University of California Press.
- Piaget, J. (1965). *The moral judgment of the child*. New York: Free Press. (Original work published 1932)
- Piaget, J. (1967). *Biology and knowledge*. Chicago: University of Chicago Press.
- Piaget, J. (1972). Intellectual evolution from adolescence to adulthood. *Human Development*, 15, 1–12.
- Piaget, J., & Inhelder, B. (1969). *The psychology of the child*. New York: Basic.
- Robson, K. S., & Moss, H. A. (1970). Patterns and determinants of maternal attachment. *Journal of Pediatrics*, 77, 976–985.
- Rogoff, B. (1990). *Apprenticeship in learning*. New York: Cambridge University Press.
- Rubin, J. Z., Provezano, F. J., & Luria, Z. (1974). The eye of the beholder: Parents' view on sex of newborns. *American Journal of Orthopsychiatry*, 44, 512–519.
- Schegloff, E. A. (1991). Conversation analysis and socially shared cognition. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Socially shared cognition* (pp. 150–171). Washington, DC: American Psychological Association.
- Schwartz, T. (1978). The size and shape of a culture. In F. Barth (Ed.), *Scale and social organization* (pp. 215–252). Oslo: Universitetsforlaget.
- Schwartz, T. (1990). The structure of national cultures. In P. Funke (Ed.), *Understanding the USA: A cross-cultural perspective* (pp. 110–149). Tübingen: Gunter Narr Verlag.
- Sørensen, A., Weinert, F. E., & Sherrod, L. R. (Eds.). (1986). *Human development and the life course: Multidisciplinary perspectives*. Hillsdale, NJ: Erlbaum.
- Stern, D. (1977). *The first relationship*. Cambridge, MA: Harvard University Press.

- Stocking, G. (1968). *Race, culture, and evolution*. New York: Free Press.
- Super, C. M., & Harkness, S. (1982). The infant's niche in rural Kenya and metropolitan America. In L. L. Adler (Ed.), *Cross-cultural research at issue* (pp. 47–55). New York: Academic.
- Trevarthan, C. (1980). The foundations of intersubjectivity: Development of interpersonal and cooperative understanding in infants. In D. Olson (Ed.), *The social foundations of language and thought* (pp. 316–342). Norton: New York.
- Vaillant, G. (1977). *Adaptation to life*. Boston: Little, Brown.
- Valsiner, J. (1988). Ontogeny of co-construction of culture within socially organized environmental settings. In J. Valsiner (Ed.), *Child development within culturally structured environments: Vol. 2. Social co-construction and environmental guidance in development* (pp. 283–297). Norwood, NJ: Ablex.
- Vygotsky, L. S. (1929). The problem of the cultural development of the child. *Journal of Genetic Psychology*, 36, 415–434.
- Vygotsky, L. S. (1978). *Mind in Society*. Cambridge, MA: Harvard University Press. (Original work published 1930)
- Vygotsky, L. S. (1981). The development of higher forms of attention in children. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology* (pp. 189–240). Armonk, NY: Sharpe.
- Vygotsky, L. S. (1987). Thinking and speech. In R. W. Rieber & A. S. Carton (Eds.), *The collected works of L. S. Vygotsky: Vol. 1. Problems of general psychology* (N. Minick, Trans.) (pp. 39–285). New York: Plenum. (Original work published 1934)
- Wartofsky, M. (1979). *Models*. Dordrecht: D. Reidel.
- Wentworth, W. M. (1980). *Context and understanding*. New York: Elsevier.
- 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, L. (1942). On the use of tools by primates. *Journal of Comparative Psychology*, 38, 432–435.
- Whiting, J. W. M., Burbank, V. K., & Ratner, M. S. (1986). The duration of maidenhood. In J. B. Lancaster and B. A. Hamburg (Eds.), *School age pregnancy and parenthood* (pp. 273–302). Hawthorne, NY: Aldine de Gruyter.
- Wozniak, R. H. (1986). Notes toward a co-constructive theory of the emotion-cognition relationship. In D. J. Bearison & H. Zimiles (Eds.), *Thought and emotion: Developmental perspectives* (pp. 39–64). Hillsdale, NJ: Erlbaum.