

A Bio-Social-Cultural Approach to Early Cognitive Development: Entering the Community of Minds

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Abstract

Important cognitive changes take place during the preschool years in addition to the acquisition of a first language. A bio-social-cultural (BSC) theory is needed to explicate the relation between language and cognition during this period of development. The foundations of the BSC approach in evolutionary and developmental systems theory are noted and applied to the emergence of autobiographical memory and the understanding of one's own and other minds within the general conception of "entering the community of minds" a conceptual framework for the social-cultural components of this approach. The need for further theoretical and empirical research including neurological change during this period is indicated.

COGNITIVE CHANGE IN THE PRESCHOOL YEARS

The years between infancy and school age (2–5, usually referred to as *preschool* or *early childhood*) reveal the most dramatic changes in behavior and cognitive abilities of any in the life span, except for infancy (birth to 2 years). During this time, children acquire their native language and use it for communicative and cognitive purposes. They listen to stories, engage in conversations, play with toys in symbolic scenes, actively jump and run, and, in recent years, spend time playing games on mobile devices. During these years, children also acquire a great deal of conventional knowledge about animals, plants, and other real world domains as well as about fictional worlds; memories for personal past experiences are shared with others; understanding the intentions of others increases; and the sense of self consolidates. The 5-year-old is thus, cognitively as well as physically, quite a different creature from the 2-year-old.

The 5-year-old is on the verge of another cognitive "great leap forward"—the "5–7 shift"—when many cognitive and social systems

seem to produce a more competent and sophisticated child (Sameroff & Haith, 1996). This later period is associated with the onset of formal schooling, across history, and in many different cultures; yet, schooling is not considered to be the cause of the “leap forward.” Rather, it implies that the preschool developments have consolidated, lifting the child to a new level of functioning, ready for new levels of participation in the culture.

Child study experts have long recognized the unique character of the preschool period. The nursery school model for fostering its progress was proposed in the nineteenth century. Today, many support preschool for all young children. What that schooling should consist of, however, is not yet clear. Psychology has not offered a clear view of cognitive development during this period that would guide education, whether preliteracy, play, or something else.

The view here is that developing cultural knowledge is very much what the preschool years are invested in, although not in the straightforward mode of schooling. In this essay, I sketch the outlines of a theoretical approach to the dramatic cognitive developments of this life period for which the implicit goal is “entry into the Community of Minds (CoM).” The CoM designates a cultural context within which people understand and share the contents of their own and other minds. The contents are cultural products and are shared through varying kinds of semiotic representations; of prime importance is the language that the child acquires along the way. The CoM concept has been described in several works in relation to ongoing research (e.g., Nelson, 2005, 2007).

The broader theoretical framework within which early cognitive development can be explicated is that of bio-social-cultural (BSC) interactive systems. The major point here is that developmental change, while individual in nature, involves aspects of each of these general interconnected contexts. The biological component derives from its evolutionary roots, consistent with “evo-devo,” the “new look” in biology (Carroll, 2005). The background for its development is presented in the section titled “Foundational Research” with some specific achievements of early childhood addressed in this framework described in the section titled “Cutting Edge Research” and future trends in the section titled “Key Issues for Fundamental Research.”

This theoretical development and the related research undertaken can be best understood in the context of the alternatives. Much of cognitive developmental research over the past 50 years has been carried out within a general information processing (IP) model of the mind, based on the digital computer. This model is undergoing challenge and change today; however, it still serves as a background for much research. Its disadvantages include its application to the workings of the brain independent of the external environment, and its lack of accommodation for change over time as development requires.

Related in their effects are versions of biological “nativisms” in which the biological system provides the structure of cognition, much of which is available in infancy and subsequently depends solely on individual learning for change over time. A variation in this line is “sociobiology” in which the social conditions and interactions of people are held to be genetically determined. As its label implies, the BSC approach has some allegiances with both of these other views, in terms of the significance of biological and social foundations, but it emphasizes the interconnection and interaction of all three major components throughout development, learning, and life. Understanding the complexities of these interactions in developmental systems terms is bound to be complicated, and nothing approaching a formal model for any particular development yet exists. Such challenges are for the future.

The acquisition of language and its use in communication and cognition by almost all children is one of the most obvious changes during the early childhood period. Moreover, language ability is closely related to almost every social and cognitive advance that takes place during childhood. It has been easy to assume a causal connection between language and cognition. In fact, it is notable that both classic developmental theorists Piaget (*Language and Thought*, 1926) and Vygotsky (*Thought and Language*, 1962; *original work*, 1934) produced books on the topic, although with reverse causal arrows. In contemporary work there is more study of children’s language *per se* than of its specific use in cognitive contexts. My work has long been aimed to connect the two; yet the puzzle remains as to how exactly the child’s language becomes, as Vygotsky puts it, “a tool of thought.” Each of the domains to be discussed here provides a context for speculation on this issue.

FOUNDATIONAL RESEARCH

EMERGENCE OF BSC COGNITIVE DEVELOPMENT

By 1990, 30 years after the “cognitive revolution,” some cognitivists began to welcome its revision. Among the first were Varela, Thompson and Rosch (1991) who argued that the *embodiment* of mind in activity made extant “head-driven” cognitive models inapplicable. Clark’s (1997) *Being There* reinforced and went beyond this argument to assert that the then current “top-down” cognitive model was fatally flawed, calling for a revolution in thinking about the role of action in cognition. Oyama (1985) offered an incisive critique of the extremes of sociobiology from a developmental perspective and countered with a constructive view of development through integrated biological and cultural dynamic systems. These and other works prepared for the broader acceptance of a more complex biological foundation for development than that implied in the computer model or in innatist

positions, acknowledging the link between phylogenetic (evolutionary) and ontogenetic (developmental) change (see Jablonka & Lamb, 2005 for recent biological account).

Human infants emerge from a long phylogenetic history, prepared, like other mammals, for development in the expected environment of their species. However, the nature of human environments is diversity: the geographical and ecological settings, as well as the cultural particulars, are unpredictable and largely blind to genetic control. As a result, human infants must be to some extent cognitive generalists, they must become socially attached to knowledgeable care-givers who can guide them into and through whatever environment they are born within and over the course of evolution Humans have developed some generalist capacities for dealing with these uncertainties. Among these are access to specific memory for past experience, social bonding, and mimetic skills.

These attributes appeared in human prehistory before the emergence of language, as documented by Merlin Donald (1991) in his path breaking book *Origins of the Modern Mind*. This work traced the phylogeny of prehuman brain and culture, through the prehistory of oral language and its uses, the invention of writing and its effects, and into the modern world of print, resulting in what Donald called the *modern (hybrid) mind*. Important to this broad conception is the base of *mimesis* that emerged in the prehuman *Homo erectus* period, enabling the recall of memory of prior experience and recreation of actions in imitation of others, as well as social group mimetic practices such as rhythmic and musical activities. Advances in individual and group communication and cooperation provided a plausible platform for the emergence of verbal language.

Equally important was Donald's emphasis on the cultural origins of the emergence of language, and later the development of written forms that provided the platform for the extensive and widespread shared knowledge base that characterizes the modern literate culture and mind. Indeed, the significant role of culture in originally establishing language, as well as providing the possibility of further evolution through semipermanent external representational forms, is a major contribution of Donald's work.

A different but related view of the evolutionary basis of human development was emphasized by the sociobiologist Hrdy (1999), documenting the birth and mothering practices of other primates, as well as humans, the latter through history and in different cultures. The strong social dependence of humankind and its variable cultural solutions is a cornerstone of **BSC** developmental theory.

A developmental analog of Donald's account of linguistic and cognitive evolution is the emergence within an individual lifespan of the varying components of complex culture, language and cognition, its hybrid layers

implied by the phylogenetic history, remaining available for different operations throughout the lifespan. Such a developmental theory in accord with Donald's evolutionary account was proposed by Nelson (1996). The basis of this account in event knowledge (Nelson, 1986), as well as use of mimesis and language—especially in narrative form—were emphasized for different domains in development. For example, mimesis is readily evident in the infant's disposition (unlike that of most other primates) to imitate others and later to engage in symbolic play. The acquisition of spoken language is a prime example of the coordination of a biological base through perceptual and motor biases, social mediation through engagement and modeling, and cultural forms. However, the emergence of literacy is a strictly cultural evolutionary achievement (with dramatic results for restructuring of the brain) requiring for most individuals, specific schooling rather than simply exposure to cultural members and activities

Several emphases of Donald's account appeared to hold particular promise as a basis for a new view in cognitive developmental psychology. Rather than claiming that language was the one independent component of the human species that made the "difference" between humans and other species, he viewed language as an outcome of the prior evolutionary changes in social, cultural, and biological characteristics; he viewed the emergence of spoken language as a beginning point in cognitive change, to be followed by literacy and its cognitive impact, and eventually by printed works available to all. Each of these moves of course resulted from and in cultural change. In other words, the system was dynamic, with change always in prospect. It takes little imagination to presume that the contemporary world of digital social devices may provide another lurch into a different cognitive world.

Contemporary with these accounts, Michael Tomasello (1999) presented a strong biocultural perspective on human cognitive development based on his studies of children's language acquisition and the comparison of ape and human cognition and behavior. He emphasized the unique quality of cultural learning and the intricate process of advancing and maintaining cultural and cognitive change over generations. By 2000, the cultural nature of human learning and development was a familiar theme in developmental psychology.

Of course, "culture" (like "biology") is a very broad term, covering a great deal of the world around us. Thus the simple statement that children develop or learn in culture is hardly an informative or even contested claim. A link is needed between the biological individual, and what it means to "learn" or to learn in culture. Social agents who bear culture and share it (or impose it) on the young through a variety of means, implicit and explicit, provide the obvious link. The use of language as a communicative and cognitive tool is a natural medium for cultural exchange. However, the social bearing of

culture for infants begins long before language is available to the child, and many media besides the verbal also convey the contents and meanings of culture. Indeed, all of the interactions of parents and infants reflect the specifics of the cultural world they inhabit. The point here is that social and cultural embeddedness is indeed a part of the biologically determined beginnings of human life.

A general foundation with wide influence for reconsidering mental development is “dynamic systems theory,” an ongoing revolution in science and social science. In developmental psychology, Oyama’s (1985) work introduced the developmental systems approach, but it was Thelen and Smith’s (1994) book that brought developmental systems theory to general attention in the cognitive development field. This approach (assumed in BSC theory) emphasizes the interactions of multiple systems of actions, perceptions, internal processes, and communication that are involved in a child’s encounters in the world and that necessarily interact in developing new cognitive operations and structures. [See Oyama, Griffiths, & Gray (2001) for further perspective on the biological systems of development.]

CUTTING EDGE RESEARCH

ENTERING THE COMMUNITY OF MINDS

This section highlights two areas of early cognitive development, indicating a major developmental change involved in becoming a member of the adult “CoM.” Autobiographical memory emerges from social and cultural experience in this period as a fundamentally different kind of memory, whereas theory of mind (ToM) involves a fundamentally different view of the motivations of people and their actions.

In recent years the recognition of aspects of mind “outside the head” has accelerated beyond the “embodiment” of Varela *et al.* (1991). They have appeared under a variety of mind labels (“embodied,” “ecological,” “emulation,” “extended,” “open,” and “shared”) of which “the enactive mind” (Glenberg, Witt, & Metcalfe, 2013) appears to have become generic. These proposals are consistent with the broader base for BSC developmental thinking, incorporating the necessity of taking interactions with people as well as the material world into the assumptions of how the mind works. In addition, these proposals, by problematizing the concept of mind, have made questionable the assumption of an innate concept of mind in the minds of children. The idea of the “CoM” rests on the assumption that as children come to recognize the minds of others, and with that, their own minds (Bogdan, 2010), they also enter into a community where what is in

the mind of self and others is part of a cultural mode of being. Development of memory and ToM are both critically involved in this movement.

Autobiographical Memory. Memory is a basic biological component of the cognitive system operations of the brain. In prior eras of child study, memory was rarely considered central to understanding cognitive development. It was long taken for granted that infants and young children had no or very poor memory. That view has changed dramatically, as documented in Bauer (2007) and in the recent *Handbook of Children's Memory* (Bauer & Fivush, 2013) whose authors review the enormous body of literature on infant and child memory that has accumulated over the past decades.

In humans, one kind of memory, autobiographical, retains some personal episodes for a lifetime. Adults' memories of this kind typically date from about 3.5 to 6 years of age. The beginnings of this capacity establish a sense of the past self and project the self into the future, providing a new perspective of time. The lack of memories from the earliest 3 years of life (termed infantile or childhood amnesia) has long-fascinated theorists, including Freud and William James. On the basis of studies first reported in the nineteenth century with many recent replications, the age of earliest memory is very reliable (although variable—very few memories appear from 1 or 2 years in some adults, whereas others have no memories until 6, 7, or 8 years). It is now clear that infants have memory for faces, actions, events and objects, memories that may persist for many months, even in a few cases for a year or more during the first three years of life. Knowing language terms for items in the remembered experience enhances memories during this period, extending their range. However, these early memories rarely persist into later years of childhood, much less into adulthood. The question of interest has been: what causes the failure of these memories to persist into later life? What enables their retention?

Robyn Fivush and I addressed this question in light of the social and cultural basis for memory development in the preschool years (Nelson & Fivush, 2004). Results from studies of parents and their 3- and 4-year-old children talking together about their experiences of past events indicated that the way that parents engage the child in talk about the past event affects how long the memory persists. Parents who elaborate the child's own contributions have a positive effect on the child's retaining a memory of that event in the future. Moreover, children whose parents elaborated their memory talk recalled more memories overall years later. These children appeared to establish a durable "past self" at an early age, reflecting the influence of the social environment that encourages this orientation (Fivush & Haden, 2003).

Memory talk reflects not only social practices but cultural values. Cross-cultural research by Wang (2013) and others has found variations in age of onset and contents of autobiographical memory through different cultural emphases on self and social relationships. Wang has also found that emphases on personal and family relationships or on individual achievements vary in autobiographical memory (as in other areas) across different cultures. The development of a *new kind of memory*, autobiographical memory, turns out to be simultaneously self-oriented, socially established, and culturally influenced (Nelson, 2003a, p. 13; 2003b, p. 15; 2013). A dual self and social-cultural foundation for autobiographical memory is an important component of the progress of children toward the specific cultural “community of minds.”

Other Minds. For the past 25 years “theory of mind” has been a focal topic in cognitive development, and in philosophy. From the outset a strong claim for the innate constitution of a unique human disposition to “read others’ minds” has been assumed necessary to explain adults’ assumptions about the actions and motivations of others in the social world. For much of that time the ability to engage this unique “folk theory” was thought to emerge at 4 years when children attained the ability to understand others’ capacity for false (as well as true) beliefs (Baron-Cohen, Tager-Flusberg & Cohen, 2000). More recently, ToM has been attributed to 1-year-old infants backing a strong claim for its innate origin. That some ability to anticipate and interpret others’ attention, emotion, and goals appears in late infancy and is necessary for interpreting intentions of others in language and action is accepted by most developmentalists. However, there is a strong case that this understanding of others’ intentions in direct face-to-face interactions is not the broad “false belief” understanding that is under test in the ToM tasks for 4-year-olds.

A reasonable hypothesis is that in the course of their evolution of mimetic skills and their social applications, humans may have acquired sophisticated readings of those they interact with. However, as Hutto (2008) points out, understanding false belief is really about “third person theory of mind,” and not about on the spot interpretation of facial expression, body movement, and so on. ToM tasks are typically verbal and involve the interpretation of the knowledge, beliefs, and intentions of third person actors. In these cases, the child must construct a representation of a person’s thinking and belief states, on the basis of incomplete evidence from situational or story context.

The BSC developmental account begins in infancy when the infant experiences social-cultural situations where certain dispositions (smiling, cooing, following eyes, tracking tonal voice patterns) are met responsively by the social world revealing social and cultural meaning. As Bogdan

(1997) suggested, this implies a two-system solution of the ToM problem, with person-to-person interpretation available by the end of infancy and the more cognitively complex third-person interpretation emerging only after experience with interactions around complex situations of competing interests. A two-system solution to ToM is consistent with other views as well (e.g., Apperly, 2011; Tomasello, 2008). In addition, narratives (stories, memory talk) that incorporate beliefs aid the child in coming to understand the mechanisms of intentions, events, and outcomes, as well as the temporality of these components (Nelson, 2003a, p. 13; 2003b, p. 15; Nelson *et al.*, 2002). Hutto's (2008) explicitly narrative solution to the understanding of false belief and the contents of other minds argues that certain cultural narratives (e.g., Aesop's Fables) can lead the child, in discussions with adults, to the understanding of how different actors conflict and resolve their arguments. Bogdan (2010) argues further that it is only after experience with the language of the mind, especially as adults speak about what is in their own minds that children can begin to interpret the other as "having" a mind, and reciprocally coming to understand that they have minds as well.

The development of autobiographical memory and the emergence of an awareness of mind in self and others are two major cognitive shifts during the preschool period, but certainly not the only ones. The self-consciousness involved in the realization of "one's own mind" (Bogdan, 2010) is also involved in the realization of the meaning of some notable abstract concepts such as those involved in temporality. Again, the sharing of narratives, of self and of fictional characters is a major source of attaining knowledge of this kind, with guidance from adults and peers. The capacity for acquiring nonpersonal cultural knowledge, for example, the complex knowledge about ancient Dinosaurs that fascinates many young children or the intricacies of chess and other (simpler) games, reveals an emerging ability to use external representations (illustrations, chessmen and board) in combination with internal representations to carry out increasingly complex cognitive operations.

It is notable that the major advances in the preschool period involve interaction with external representations, including but not limited to symbolic language, and that a critical central development is the tracking of *knowledge source* (Roberts and Blades, 2000) that is involved. This points out to a major change in cognition associated with language acquisition but not confined to it: the shift from all learning dependent on self-exploration to the acquisition of new knowledge through the medium of others' representations (in language, pictures, play, etc.). In turn, this suggests a major shift from simple "embodied learning" to "shared knowing" and its reciprocal state of "self-conscious knowing."

KEY ISSUES FOR FUTURE RESEARCH

BRAIN, MIND, LANGUAGE AND ACTION WITH SOCIAL OTHERS IN CULTURE

The initial impulse of the “new look” in cognitive development in the wake of Donald’s (1991) work assumed that language was the moving force in cognition (Nelson, 1996). This fit with Vygotsky’s proposal of thinking as “inner speech.” This assumption was reflected in the expectation that facility with language would explain the onset of autobiographical memory; yet, I found that a child with very advanced language at 2 years remembered nothing of her life before 4 years of age. Similarly, a conference on “Why Language Matters to Theory of Mind” (Astington & Baird, 2005) considered this assumption at length but came forth with no agreement on the answers.

The problem lies in presuming that the internal possession of “a language” somehow affects thought. Rather, we need to switch attention to how language is used in both interactive learning and in reflection on the message. For example, the use of language by mother and child in memory talk affects how autobiographical memory is initiated. Similarly, how language is used in narratives affects how theory of mind, or attention to what’s in the minds of others, develops at age 4. It is the interface that language enables among the cultural components, the social exchange, and the individual thinker that is significant. This perspective leads to the suggestion that the future resides in research that focuses on language in context concerned with matters that are of critical interest to young children: for example, the passage of time, life, death, and birth. It also suggests that educators of young children focus on the interactive context as well as the messages that are to be received. Questions from children, their play, and peer talk may all inform us of the focus of children’s interests and concerns. Better understanding of the processes of reflection, representation, and knowledge generation may follow.

An important fact to keep in mind is that learning in the preschool years begins with retaining and organizing self-experience, and that this kind of self-learning continues throughout life. Learning from interactions with others in the form of statements in language or through other media is a secondary achievement that needs to be investigated as the unique process that it is. On the face of it, learning from own experience (perceptual observation, action on the world, imitation) requires self-activity directed by self-interest. Learning from accounts of others requires relating to and translating others’ words, expressions, or presentations into concepts and memories stored in one’s own cognitive systems, together with active induction or imagination and integration into one’s own background knowledge. The details of this process remain unexplored—taken for granted—at present. Vygotsky addressed this issue in terms of “scaffolding” but often the learning is not

scaffolded except through the learner's own background of knowledge. This is a rich topic for future exploration.

An obvious area for future exploration on this topic is the neurocognition of early childhood. Although much has been learned in recent years about areas of the brain involved in cognitive activities, there is still little insight into developments in critical areas of the brain throughout the early childhood period. Given the dramatic changes taking place, neurocognitive exploration should be incorporated into specific research areas investigating change over time.

Finally, any theoretical perspective on cultural learning must take account of the ongoing cultural changes around us, especially the use by children of all ages of digital systems and devices. Given Donald's hypothesis of changes in the organization of brain and mind over the periods that involved the emergence of language, of writing, and printed works, one would expect related changes in the ways that minds work to be emerging among significant portions of the population even during the early childhood period. What those changes are is a fascinating matter for future exploration.

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