Culturally Situated Cognitive Competence: A Functional Framework

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Culturally Situated Cognitive Competence: A Functional Framework

In traditional cognitive theory, competence is linked to solving problems or evaluating theories within particular task situations (See Ceci, 1996, for a critique of the approach). The bulk of this work has been acontextual, focusing on mental processes in vivo, disconnected from the settings in which the processes are generally acquired and deployed. In such research, the subject is viewed as a solitary actor who possesses a fixed computational processor, and the role, if any, of culturally updated, continuously revised processing is downplayed.

In this chapter we put forward an account of culture’s role in cognitive development that we believe is comprehensive enough to handle the relevant empirical findings across cultures, and yet specific enough to provide an account of individual differences within a given culture. In our formulation, we posit the dynamic interplay of four factors that shape competence—cultural artifacts, cognitive domains, interpersonal contexts, and individual schemata. We discuss more about the empirical support for each of these factors later.

In the past two decades, researchers have increasingly emphasized the adaptive quality of cognitive competence and its development, and the elicitative role of the sociocultural setting in which such competence is deployed. For cross-cultural researchers, concepts such as self-construal describe not only how information is processed, but also how it is organized, retained, and employed in memory and problem solving. In his seminal treatise on the social construction of remembering, Bartlett (1932) argued that "Social organization gives a persistent framework into which all detailed recall must fit, and it very powerfully influences both the manner and the matter of recall” (p. 296).

Taking a cue from Bartlett and others, modern researchers have embedded context and social rules into their models of cognitive development. Thus, for Gardner (1984), individuals'
Culturally situated cognitive competence

Cognitive competencies are viewed as "skills and modes of thinking requisite for assuming various roles in the technological and economic spheres of their society" (p. 258); for Masten and Coatsworth (1995) competencies are viewed as "a pattern of effective performance in the environment, evaluated from the perspective of development in ecological and cultural context" (p. 724). And Sternberg (2002)'s concept of "successful intelligence" views intelligence as the ability to achieve success in life, emphasizing the pragmatic nature of cognitive competence and how it develops as a result of adaptation of an individual's abilities to the sociocultural environments in which he or she resides.

An emphasis on the adaptability of cognitive competence poses the challenge to rethink the definition and evaluation of cognitive competence in culturally sensitive ways. Many theorists have pointed out cultural variations in conceptions of ability and competence and emphasized the importance of employing ability tests that reflect values within a particular society (Berry, 1976, 1980; Cole, 1996; Goodnow, 2000; Goody, 2001; Sternberg, 2002; Sternberg & Grigorenko, 2001). Berry (1993) proposes a concept of "indigenous cognition," arguing that variations in cognitive competence reflect adaptations to variations in cultural and ecological contexts and therefore are valuable developments in their own right. Sternberg and Grigorenko (2000) further criticize the traditional "theme-park psychology" that relies on research findings from easy-to-study populations, tasks, and contexts to generate theories of human cognition and to direct educational policy. It is thus crucial to take into account contextual diversity when identifying and measuring competencies and skills individuals develop for a successful and responsible life in each society.

To fully understand culturally-situated cognitive competence, however, an important question remains: how does the cultural adaptability of cognitive competence take place? In
other words, what are the mechanisms by which sociocultural factors shape the development of cognitive competence? Recent studies in anthropology, social psychology, cultural psychology, and cross-cultural psychology, as well as other related disciplines, have accumulated evidence of the culture-specific nature of human cognition. People in different cultures have been shown to possess different cognitive competencies unique to their living environments (e.g., Ceci & Roazzi, 1994; Han, Leichtman & Wang, 1998; Kearins, 1981; Nisbett, Peng, Choi, & Norenzayan, 2001). Thus, there is a need to develop a theoretical framework built upon existing cognitive and sociocultural theories to synthesize the burgeoning empirical findings on the development of cognitive competence in a cultural context. Such a framework should be both sensitive to the empirical findings, while simultaneously being able to predict and explain empirical findings in such a manner that is specific and falsifiable.

Elsewhere, we have conceptualized culture as "the system and the process of symbolic mediation – a mode of configuration"(Wang & Brockmeier, 2002, p. 45). Such symbolic mediation manifests itself in social institutions as well as in the actions, thoughts, emotions, beliefs, and moral values of individuals, thereby regulating both intra-personal and inter-personal psychological functions (Bruner, 1990; D'Andrade, 1992; Vaslner, 2000; Vygotsky, 1978). In this chapter, we will explore the various ways in which culture permeates thinking, and examine how sociocultural factors operate as mechanisms for transforming the "universal mind" into many culturally-adaptive mentalities (Shweder, Goodnow, Hatano, LeVine, Markus, & Miller, 1998). We suggest that there are no such things as invariant, core competencies universal to every human child. Instead, cognitive competence is relative to specific cultures, to the particular cognitive spheres or domains valued in a culture, to the social and physical contexts where the
child participates in organized activities, and to the cultural and societal demands as perceived by the child herself.

We here propose a functional framework to examine cognitive competence as a result of the impact of cultural artifacts (e.g., tools, language), cognitive domains, interpersonal contexts, and individual schemata. We highlight the cultural functionality and adaptability of cognitive competence and argue that the development of any cognitive competence is a result of the dynamic interplay among the four aspects of cultural influences in creating competent members of each human society (See Figure 1 for a schematic illustration of this view). In elaborating this framework, we draw on existing theories and empirical findings from anthropology and psychology. Our goal here is not exhaustive but illustrative--by examining some extant theories and data we envision this framework as an initial step towards a grand synthesis that requires the participation and collaboration of theorists and researchers from diverse disciplines. Importantly, we hope that the framework we put forward here goes beyond those that have been the object of criticisms by recent commentators for lack of specification of the “ill-defined outside world” (Oyama, 1998, p. 11).

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*Cultually situated cognitive competence*

Competence and culturally-constructed artifacts

Culturally-constructed artifacts constitute human life and influence human action through their roles as symbols, tools, and beliefs. For example, the most mundane forms of signs and symbols are such things as street signs, telephone dials, price tags, clocks, product labels, recipes, and patterns for dress making (Heath, 1983). In addition, cultural artifacts comprise material tools and forms of technology such as computers, cell phones, and electronic day planners, as well as symbolic systems like language, numeracy, and other representational
Culturally situated cognitive competence

systems such as proverbs, metaphors, and folk models of thinking that are familiar to individuals in a given culture (D'Andrade, 1987; Lakoff & Johnson, 1980; White, 1987). Finally, cultural artifacts include shared values, beliefs, and practices, as well as the material and symbolic orders of the overarching cultural system (including law, education, religion, philosophy, literature and the arts). As we show below, these tools, symbols, and beliefs affect cognitive competence by enhancing, mediating, and transforming the forms of thinking and communication available to members of a particular cultural community.

We concur with some contemporary researchers who view cognition not as a private matter confined to the individual's mind or brain, but rather, conceive of thinking (including reasoning, problem-solving, memory, or self-representation) as a sociocultural practice carried out through the shared system of cultural artifacts (e.g., Ceci, 1996; Holland & Quinn, 1987; Resnick, Levine, & Teasley, 1991; Sternberg, 2002; Wang & Brockmeier, 2002; Wertsch, 1991). Thus, an important aspect of cognitive growth is children's learning to use cultural tools and signs that mediate both higher mental functions and the practical goals of daily life (Gauvain, 2001; Rogoff, 1990; Vygotsky, 1978). By actively engaging in everyday activities, regardless of whether this means using computers or abacuses or counting one's fingers, children gradually incorporate culturally constructed artifacts into their own repertoire of thinking and further develop culture-specific cognitive competencies. In this way, cultural artifacts indeed become inherent parts of human cognition.

Vygotsky (1978) argued that tools of intellectual adaptation are available in each culture to help children develop adaptive thinking and problem-solving strategies. Children's interactions with real tools, like computers, provide tangible objects that facilitate learning. From symbolic tools, like language, children learn a means of communicating, expressing ideas, thinking
Critically, and transmitting and receiving the intellectual wealth of the society. For Vygotsky, such interactions take place at two different levels: the institutional and the interpersonal levels of social contexts. At the institutional level, cultural history provides organizations and tools useful to cognitive activity through institutions such as schools. Institutional interaction gives children broad behavioral and societal norms to guide their lives. The interpersonal level has a more direct influence on the child’s mental functioning: more capable members of the culture, such as adults and older peers, guide the child, providing knowledge and support necessary for the child’s intellectual growth. Through the organization of these interactional experiences embedded in a cultural backdrop, children’s mental development occurs.

While agreeing with the important mediating role played by societal institutions and more competent partners, we suggest that the effects of cultural artifacts may be more pervasive and less organized. They are, in fact, the way individuals live their lives and the mode used to perform even the most rudimentary forms of "cognitive tasks" like thinking, speaking, and counting. This view of the overarching impact of cultural artifacts coincides with the anthropological concept -- the immediacy of culture. Super and Harkness (1999) recently discussed in depth the paramount importance of this concept in psychological research. They posited that the immediacy of culture "not only better reflects the phenomenological experience of daily life but also brings the cultural environment into reach for the empirical scientist" (p. 282).

Cross-linguistic studies provide perhaps the most convincing evidence for the inherentness of cultural artifacts, including language and human cognition. For example, Elgin (2000) compared the sentence "I was riding a horse" in English and its closest translation in Navajo, "The horse and I were moving about." While the English version illustrates a subject-
Culturally situated cognitive competence

object relation between the rider and the ridee, the Navajo version expresses an equal relationship between two parties engaging in a joint endeavor of riding. Although we do not go so far as to argue for a radical version of linguistic determinism (Sapir, 1964/1941; Whorf, 1956), we here suggest that the different ways of formulating object relations in languages can influence how people perceive and process the information conveyed, which further shapes their cognition.

Another example comes from the number-naming systems in English and Chinese. Compared to English, Chinese language has a more systematic number-naming system. After the first ten digits, which needs to be memorized as in English, the Chinese system follows a base-ten logic such that 11 is named "ten one," and 12 named "ten two," and so on. The two languages then become similar after 20, both using the base-ten logic. K. Miller and colleagues (Miller, Smith, Zhu, & Zhang, 1995) found that by age 4, Chinese children began to show an advantage in counting over US children. This advantage became even larger at age 5, with only 48% of the US children but 74% of the Chinese in their samples being able to count to 20. Notably, children in the two cultures did not differ in other aspects of mathematical competence such as to count small sets or to solve simple numerical problems, which rules out the explanation of innate difference in intelligence. Other studies have shown that the English number-naming system presents obstacles to children's early use of carrying, borrowing, and addition strategies (e.g., Fuson & Kwon, 1992; Siegler, 1987), and by the time of school entry Chinese children are able to use more sophisticated strategies than their US peers (Geary, Fan, & Bow-Thomas, 1992). Divergent educational systems and upbringings in the two cultures further magnify the early difference in counting skills associated with different number-naming systems of languages, which leads to greater mathematical competence in Chinese than in US schoolchildren and
young adults (Geary, Bow-Thomas, Liu, & Siegler, 1996; Geary, Salthouse, Chen, & Fan, 1996; Stevenson & Lee, 1990; Stigler, & Perry, 1990). Thus, cultural artifacts do not always facilitate cognitive growth but sometimes hinder it.

These examples tell us that cultural tool, beliefs, symbols, and other artifacts are not always located in a macro context (Bronfenbrenner & Morris, 1998) or at a distal level (Vygotsky, 1978). Their effects on cognitive development do not necessarily depend on the "go-betweens" of schools, parents, and other socialization agents, whose scaffolding, although effective, can be constrained by the characteristics of particular artifacts. Undoubtedly, societal institutions and more competent members of the culture are important mediators of many "higher level" social-cultural-historical forces. Nevertheless, children are often directly exposed to these forces and influenced by them through simple imitation or implicit learning, which sometimes can be even more powerful than formal instructions in behavior and cognition (e.g., Chiu, Morris, Hong, & Menon, 2000; Nosek, Banaji, & Greenwald, 2002; Ross, 1989). Such cultural learning is functional for individuals' adaptation to their environment as it makes the acquisition of cultural heritage more pervasive. Cultural artifacts functions in every moment, place, and aspect of human life. They define developmental pathways, provide opportunities and constraints for cognitive growth, and make direct and immediate impact on children's cognitive competence along culturally desired lines.

**Competence and culturally-defined domains**

Humans' dynamic cultural environments define specific cognitive domains that, in turn, make demands on children's intellectual growth. Domains are conceived by cognitive psychologists as sets of representations sustaining specific areas of knowledge. Thus, they are specific to culture (Gardner, 1984; Mistry & Rogoff, 1985). Even for those domains that seem to
exist universally and carry the same labels across cultures, such as math, arts, and literature, the representations of knowledge can be based on drastically different cultural artifacts and modes of thinking. To some extent, then, these domains do not refer to the same cognitive spheres from one culture to another.

Although cognitive theorists place a great emphasis on the domain specificity of cognitive development (Ceci, 1996), domain has been cast in terms of semantic representations which have rarely been viewed in the context of culture. Gardner (1984) proposed a preliminary framework that divides culture into a number of discrete domains, broadly characterized as the realms of the physical world (natural objects, living matter), the world of man-made artifacts (tools, art works, language), and the social world (people in one's immediate and distal contexts). He argued that although these realms can be found in every human culture, marked cultural variations exist in the ways in which they are defined and evaluated and in the forms of knowledge associated with each. For example, Western culture has traditionally valued greatly explicit knowledge about the physical world, with the educational system focusing on physical and natural sciences. In contrast, in cultures like Japan or India, explicit knowledge about the social world is valued much more and is the source of far more energy or effort than is knowledge about the physical world, especially when the latter is cast in a scientific form.

Hence, the manner in which cognitive domains are defined, constituted, and valued in a particular culture has profound consequences on the development of competence. On the other hand, the three realms or general domains of cognition outlined by Gardner (1984) are in fact inseparable aspects of culture and human life. For example, there is not a purely physical world without any man-made artifacts, and people create and use these artifacts. Thus, it is an oversimplification to divide the universe of knowledge into these overlapping domains and then
contrast different cultures regarding how much value is placed upon each. This approach can easily lead to pitfalls such as viewing Asian and other non-Western societies as less advanced in their science and technology than the West, because their cultures do not value the explicit knowledge of the physical world.

We suggest that cognitive domains specific to each culture be defined and analyzed in a more fine-grained and sensitive manner, really "putting culture in the middle" of the analysis (Cole, 1996). One way to achieve this goal is to look from the bottom up. Instead of judging whether a culture values a particular domain, we can consider the function and adaptability of domain-specific competencies in assisting individuals to perform effectively in their culture. As empirical findings have shown, cognitive domains arise in response to the demands of the physical and social environments in which children grow up, which in turn facilitate the development of relevant cognitive competencies. For example, Australian aboriginal children of the desert regions develop extraordinary visual spatial memory (Kearins, 1981); the unschooled young street vendors in Brazil are capable of solving complicated math problems in their head (Ceci & Roazzi, 1994; Carraher, Carraher, & Schliemann, 1985); and New Zealand Maori adults remember their childhood from a much earlier age (32.6 months) than do Europeans (42.9 months) and Asians (57.8 months) due to their cultural emphasis on the past and oral tradition (MacDonald, Uesiliana, & Hayne, 2000). In each case, and many others like them, the physical and social challenges confronting individuals recruit different skills that become honed to different levels of expertise. Although one can never definitively rule out the possibility that in some of these examples there are inborn differences in potentials (e.g., for spatial memory), there is no evidence that this is so, and there is in fact every suspicion that the cultures facilitate some cognitive attainments while rendering others difficult or even impossible. For example, even in
studies that have shown significant differences in the content of recollections from one culture to another, there appear to be no objective differences in the underlying memory capacities of the groups (Han, Leichtman, & Wang, 1998).

The converse of this point is that cultural change may be rapid, making it hard to explain how cultural legacies persist in producing cognitive differences (Caporael, 2001). However, within an individual’s lifetime there may be physical and social challenges that shape peculiar cognitive profiles that may not exist to that same culture a generation later. A dramatic example of this phenomenon is the massive change in IQ performance over a few generations in many nations (e.g., Flynn, 1998). For example, if IQ norms were held constant, IQ scores would have risen for the past 70 years at an almost constant rate, and the results would be truly astounding:

It would be difficult to defend any estimate that the mean IQ of Britons in 1892 was above 60. Therefore, at a minimum, 84% had an IQ below 75. (Flynn, 1998, p. 20)

Moreover, the existence, importance, and meaning of particular cognitive domains can be further linked to a culture’s intellectual history and how it conceives of the goal of intellectual growth. In Chinese culture there is a long tradition, originating from Confucian teachings that emphasizes a life-long pursuit of self-perfection, that encourages individuals to improve intellectually through continuous active learning and practice. Those who commit themselves to this process are regarded as "Jun-zi", i.e., moral persons (Tu, 1979). Learning is therefore no longer a merely academic matter or personal enjoyment, but carries important moral purposes for the Chinese and is often referred to as the “great learning” in order to differentiate from the purely academic learning of school subjects (Li, 2001). Consonant with this cultural belief, learning-related cognitive domains in Chinese culture seem to bear different meanings than those in the West. To use art as an example: Art for the Chinese entails aesthetic beauty and moral
goodness, an effective means of achieving self-perfection and therefore becoming a Jun-zi. As a result, in China art learning and education each focus on basic skills, control, precision, and performance, which, unlike in the West where art is valued as a form of active self-expression and determination, precede any encouragement of creativity (Gardner, 1989). It is a striking example of how cultures differ in the way they foster and shape cognitions.

Thus, cognitive domains are deeply rooted in the physical, social, and intellectual milieu of the culture. The existence of particular domains, and the importance and intrinsic meanings they entail, are in service of individuals' participation in culturally-organized activities in their societies. The functions of individual competencies in particular cognitive domains elucidate how and why these domains develop and become embellished in a given culture. Further, they provide insight into questions about how individuals identify, evaluate, test, and further facilitate their own cognitive growth in these important spheres of cultural knowledge.

**Competence and culturally-embedded contexts**

Compared with the first two cultural mechanisms for the development of cognitive competence, the importance of interpersonal contexts has been greatly emphasized by developmental, cognitive, and cultural psychologists (e.g., Bronfenbrenner, 1979; Cole, 1996; Gardner, 1984; Gauvain, 2001; Rogoff, 1990; Vygostky, 1978). Children interact with more competent members of their society and gradually acquire techniques, literacy, cultural beliefs and customs, religious doctrines, and other culturally-valued knowledge and skills that enable them to later become competent members themselves. And this process occurs regardless of whether through formal instruction at school or informal learning during free play. This is perhaps the most important channel through which culture deliberately imparts cultural knowledge from one generation to the next to ensure its continuity.
Vygotsky's (1978) sociocultural theory of human development gives a systematic account of the process and mechanism involved in the face-to-face interactions between the child and more capable partners. He contends that development takes place when the child internalizes culturally-valued skills, knowledge, and concepts into his or her own mental framework, a process that initiates between the child and the partner (e.g., parents, teachers, older siblings) and leads to higher mental functions in the child. Children thus acquire tools of intellectual adaptation through their interactions with more competent members of the society, within a Zone of Proximal Development (ZPD), and eventually learn to use cultural tools, signs, and artifacts to guide their thinking and action. Rogoff (1990) elaborated upon this early theoretical framework, regarding adult-guided participation as a forum of "apprenticeships in thinking" that “provide the beginner with access to both overt aspects of the skill and the more hidden inner processes of thought” (p.40). Rogoff and other contemporary theorists (Gauvain, 2001, Goodnow, 2000; Rogoff; 1998; Valsiner, 2000) further maintain that children are more than just passive participants in these interactions with adults. Rather, they actively make use of opportunities presented to them and try out newly acquired skills, strategies, and cognitive tools. In addition, during joint activities, adults often adjust their levels of guidance contingent on a child's independent contribution to the task. Through this scaffolding process, children learn to eventually perform the task without help.

Extending these theories, we propose here that the effects of face-to-face interactions on cognitive competence can be further understood from a functional perspective that focuses on the culture-specific characteristics of interpersonal contexts, such as the persons involved, the dynamic relations between them, the purpose of the interaction, and the immediate and long-term outcomes of it. We believe that cognitive competence and its development are specific to
particular contexts and subject to situational constrains, which, in turn, reflect and further constitute the meaning system of the culture (Light & Butterworth, 1992). Thus, the form or style of interactions employed by adults within particular contexts is consonant with the socialization goals of the community in order to facilitate the development of culturally functional qualities in the child. Eventually, children acquire specific and general understanding of the meaning and utility of their culture's material and symbolic tools (physical devices, maps, plans) involved in problem-solving, and, more importantly, they learn from more competent partners culturally-adaptive ways of thinking (Gauvain, 2001, Goodnow, 2000; Rogoff, 1990, 1998; Valsiner, 2000).

Cross-cultural data help to illustrate our point. Consider language socialization as an example. Traditionally, academic studies on family linguistic interactions have focused on the outcomes of vocabulary skills and IQ in children while paying little, if any, attention to possible differences in the functional purpose of such interactions across cultures (see Small, 2001, for a critique of this approach). The amount of time mothers spend with children and the quantity of their utterances directed towards children are considered crucial for language and cognitive development (Hart & Risley, 1995). However, parents in other cultures may not see helping children develop linguistic skills as the paramount goal of child-rearing. In a longitudinal study, Levine and colleagues (Levine, Dixon, Levine, Richman, Leiderman, Keefer, & Brazelton, 1994) observed Gusii and Bostonian mother-infant interactions over a period of 27 months. Strikingly, Bostonian mothers communicated with their infants twice as much as Gusii mothers, who were less verbally responsive to their children’s vocalizations and rarely attempted to elicit a vocal response from or carry on a sustained verbal exchange with their young children. Strikingly, Gusii mothers would call an articulate child "a talker," which was considered a criticism rather than a praise in their culture.
It appears that Gusii mothers, unlike their American counterparts, are not preoccupied with engaging in language interactions with their children to teach them words, phrases, or sentences. Instead, they often limit their utterances to “commands and warnings” to the child. The Gusii believe that children learn language through their social environment and therefore do not require much deliberate teaching. As Levine and colleagues (1994) described, “Normal social interaction in domestic settings is verbally restrained, with a slow conversational pace, a strong reliance on conventional routines and indirect speech, and a tendency to put responsibility for comprehension on the hearer rather than the speaker” (p. 216). Thus, the interaction style employed by Gusii mothers is instrumental in reinforcing safety and compliance in their children, whereas that of American mothers is intended to facilitate their children's linguistic and cognitive competence. The different maternal interaction styles further reflect divergent cultural beliefs about language learning and teaching.

Some researchers (e.g., Miller & Hoogstra, 1992; Nelson, 1996; Ochs, 1993) further claim that language discourse helps children construct the system of interpretations, gain knowledge about self and others, and apprehend cultural meanings. Studies on family narrative interactions in different cultures have yielded fruitful results (e.g., Miller, Fung, & Mintz, 1996; Miller, Wiley, Fung, & Liang, 1997; Mullen & Yi, 1995; Wang, Leichtman, & Davies, 2000). For example, in a recent study, Wang (2001a) asked Euro-American and Chinese mothers to discuss with their 3-year-olds at home four recent events in which they both participated and during which the child experienced happiness, sadness, fear or anger. American mothers tended to use an “emotion-explaining” style, talking frequently about the situational causes of feeling states and providing elaborate explanations as to why and how an emotional reaction occurred. In contrast, Chinese mothers often employed an “emotion-criticizing” style,
where they initiated little discussion with their children about the antecedents of emotions and often gave moral judgements about the incorrectness of children's (negative) emotional experience or behavior. Wang argues that the American mother-child conversations facilitate the development of children's emotion understanding, consistent with the socialization goal in their culture that regards emotion as a valuable means of self-expression and individuality. In contrast, the Chinese mother-child conversations put social constraints on children's emotions and commit children to behavioral standards rather than helping them develop emotion knowledge. This conversational style echoes the Chinese cultural emphasis on psychological discipline, and the view of emotion as potentially disruptive to social relations (Bond, 1991; Hsu, 1953; Kitayama & Markus, 1994). Intriguingly, children at age 3 seemed to have already internalized their mothers’ styles in discussing the shared emotional past. Wang (2001a) found that American children themselves talked frequently about the causes of emotions while Chinese children often gave spontaneous comments on social rules and discipline.

These different styles of family discourse about emotion may have long-term consequences on children's emotion knowledge. To test this hypothesis, Wang (in press) had 154 Euro-American and Chinese children interviewed individually at school. Children were presented 20 short stories with a protagonist of their age, gender, and ethnicity, and were asked to identify the feeling states of the protagonist by choosing among faces showing happy, sad, scared, or angry emotions. Children's mothers and a second group of adults read the same stories and judged the protagonist's emotions in the same fashion. Based on the proportion of concordant judgments between children and adults in each culture, findings showed that American children had a better grasp of emotion knowledge and made more rapid progress in such knowledge than did their Chinese peers.
Together, these cross-cultural data indicate that family discourse, in particular, and adult-child interaction, in general, serve different functions across cultures. The frequency, style, and content of the interactions are shaped by cultural beliefs about the particular topic of focus (e.g., language, emotional understanding), by parents' own beliefs about the topic and their child-rearing goals, by the dynamic relation between parents (or other socialization agents) and children (e.g., hierarchical or equal), and by the active role played by children themselves in developing valuable qualities specific to their cultures. These findings point to the importance of taking into account the functional characteristics of culturally-embedded interpersonal contexts when we evaluate their effects on children's cognitive growth.

*Competence and the culturally-framed mind*

The last cultural mechanism we propose here is the culturally-framed mind. Here we refer to the cognitive models, schemata, or mental frames that are functional in a culture and operational in its individuals. Culture provides its individuals with meaningful scripts or ways of organizing knowledge about themselves and the world around them, which in turn have powerful effects on the way people sample, process, and retain information from the environment. We analyze this mechanism at two different levels: the cultural level, i.e., the formation and development of different modes of cognition across cultures; and the individual level, i.e., the roles of individuals who come to conform to or refuse the culturally-predominant ways of thinking. Examining the culturally-framed mind is therefore critical for our understanding of both individual and cultural diversities in cognitive functioning.

Cross-cultural studies have identified marked differences in cognitive characteristics between Western and Asian peoples (See Fiske et al, 1998 for a review). Westerners tend to base their thinking and reasoning on the internal attributes of a person or object. They often analyze
individual components in isolation and succession, decontextualize a behavior from its environment, and make dispositional judgments. In contrast, Asians tend to embed their thinking and reasoning in a situational context. They often focus on relations between objects or events, and ascribe the antecedent of a behavior to the interaction between a person or an object and the environment. These different orientations in thinking are evident in studies of self knowledge (Cousins, 1989; Rhee, Uleman, Lee, & Roman, 1995; Trafimow, Triandis, & Goto, 1991), descriptions of other people (Shweder & Bourne, 1984), memory (Wang & Leichtman, 2000), and causal attribution and reasoning (Morris, Nisbett, & Peng, 1995). They have been identified even among children. For example, in a study requiring school-age children to group two out of three objects together and to state the reason for their choices, Chiu (1972) found that American children employed a predominantly inferential and analytic style of categorization and reasoning, identifying object similarities based on inferred characteristics of the stimuli (e.g., “these are things to cut”) or on manifest objective attributes (e.g., “they both are holding a gun”). In contrast, Chinese children tended to use a relational-contextual style of reasoning and to identify similarities on the basis of functional or thematic interdependence between the elements in a grouping (e.g., “the mother takes care of the baby”). Such differences have implications for cognitive assessments, in as much as the major IQ tests reward taxonomic sorting (e.g., both made of metal) over thematic sorting.

Nisbett and colleagues (Ji, Peng, & Nisbett, 2000; Nisbett, Peng, Choi, & Norenzayan, 2001) characterize the mode of thinking among Asians as holistic and dialectical, whereas that of Westerners is seen as analytic and logical. They argue that the cultural differences in the most "basic" cognitive processes stem from a long history of markedly different social systems between the East and the West. Developmental psychologists (e.g., Chiu, 1972; Wang &
Culturally situated cognitive competence

Leichtman, 2000) have emphasized the effects of early socialization on the formation of different cognitive styles. In Western cultures that value and encourage independence, autonomy, and spontaneity, children become attuned to the components of objects and the extended attributes through their active exploration of the environment. In contrast, in Asian cultures that emphasize discipline and mutual dependence, children learn early to see the world as a network of relationships and to try to find their right place in their immediate social environment. This leads to a tendency to perceive objects in the environment in terms of mutual dependence or relationships. Notably, and as we have already discussed, there exist marked differences in ways of thinking within Asian and Western cultures (e.g., Conway, Wang, Hanyu, & Haque, 2002; Nakamura, 1964; Wang, Leichtman, & White, 1998), which tend to be understudied and merit more research.

Cultural self-construal, a representational model of the self that integrates the framework of the culture and pervasively affects cognitive and other psychological processes, has attracted a great deal of research interests in the past decades. Markus and Kitayama (1991) claim that "These (cultural) construals of self and other are conceptualized as part of a repertoire of self-relevant schemata used to evaluate, organize, and regulate one's experience and action" (p. 229). Empirical data from psychology and anthropology have shown that many Western cultures, particularly North American culture, emphasize self-expression, individual uniqueness, and personal sufficiency. Individuals tend to develop an independently-oriented self-construal that is conceived of as well-bounded, distinct, and separate from others or social context. In contrast, in many cultures such as East Asia, group solidarity, interpersonal harmony, and personal humility are highly valued. Individuals tend to develop an interdependently-oriented self-construal and view themselves as connected to others within a relational network. The different cultural self-
Culturally situated cognitive competence have important consequences on cognitive functioning such as attention, problem-solving, causal attribution, social judgement, and creativity (for reviews, see Fiske et al., 1998; Kagitcibasi, 1996; Markus & Kitayama, 1991; Triandis, 1989).

Cultural models of cognition, including cultural self-construal, describe not only how information is perceived and processed, but also how it is organized, retained, and eventually recollected. As we noted in the introduction, Bartlett (1932) claimed that remembering is a constructive process where both the manner and the matter of recall are predominantly determined by social-cultural influences. One particularly interesting area of current cross-cultural research concerns what Merlin Donald (1991) terms "Episodic competence." Studies examining memories of episodic events, especially those related to personal experiences (i.e., autobiographical memory) in both children and adults have revealed intriguing cultural differences. Autobiographical memories of Euro-American adults tend to be lengthy, detailed, emotionally elaborate, focusing on one’s own roles, predilections, and opinions. In contrast, memories of Asians (Koreans and Chinese) are often brief and centered on collective activities, significant others, and daily routines. Compared with their Korean and Chinese peers, American preschoolers also tend to provide more elaborate, more specific, and more self-focused autobiographical accounts (Han, Leichtman & Wang, 1998; Mullen, 1994; Wang, 2001b; Wang & Leichtman, 2000).

From a functional perspective, personal memories of discrete, one-moment-in-time events with specific details and elaboration and with the individual cast as the central character (e.g., "the time I won the spelling bee competition") are particularly important for people with an independent self-construal. Such memories help to differentiate the self from others and thereby reaffirm the self as an autonomous entity. In contrast, memories of “scripted” events with a
Culturally situated cognitive competence

salient social orientation (e.g., “family dinners”) are important for people with an interdependent self-construal, because these memories help to engage individuals in ongoing relationships and thereby reinforce the self as a relational entity (Wang, 2001b). Thus, cultural construal of the self appears to play not just a role in the formation of culture-specific genres of autobiographical memory, but the determining role. The extent to which the meaning of selfhood in a given culture is tied to the unique attributes of the individual, versus being a result of the dominant social stratification, and the extent to which an individual focuses on his own versus others' thoughts, feelings, and personal roles in an event, are likely to affect the content, structure, and accessibility of memory for that event over the long term (Mullen, 1994; Pillemer, 1998; Röttger-Rössler, 1993; Wang, 2001b; Wang et al., 1998).

The effects of cultural self-construal tend to be selective on particular memory processes, however. For example, Conway and colleagues (2002) observed highly similar lifespan memory retrieval curves in their Japan, Bangladesh, England, China, and US samples: the offset of childhood amnesia and the reminiscence bump were the same across cultures - although the US sample showed a greater number of childhood memories than any other group. However, content analysis of memory descriptions found that memories from the Asian groups had an interdependent self focus, whereas the memory content of the Western groups showed an independent self focus, a pattern of findings consistent with other recent cross-cultural studies of memory content. Other research has also shown that although preschoolers in US and Asian cultures remembered markedly different memory information from life events as well as from fictional stories, objective memory performance was equally accurate across cultures (Han et al., 1998; Wang & Leichtman, 2000). These differential cultural effects on the content, accessibility,
and lifespan distribution of autobiographical memory suggest a complex relation between the self, memory, and culture.

Cognitive models or schemata promoted by a culture may not affect every individual in that culture to the same extent or in the same fashion. After all, it is through specific individual minds and within particular situational and task contexts that culture-specific modes of thought come into play. Thus, there exist at the individual level, individual to individual, context to context, and situation to situation variations in ways of thinking. Some variations may be deviant from the predominant cognitive models in a culture, but nevertheless their existence may be functional for the individual in performing cognitive tasks within particular contexts or situations. Indeed, variations can entail flexibility in cognitive functioning that may be particularly adaptive in fast-changing modern societies.

Individual differences in their internalization and application of culturally promoted cognitive models are less emphasized in cultural studies that mostly focus on between-group differences. Two theoretical approaches, however, require special attention here. The first is developed by cognitive anthropologists. For example, D'Andrade (1992) argues that individuals do not act mechanically according to cultural expectations. Instead, they acquire culturally formed models or cognitive schemas through early personal-social experiences, and these models or schemas, in turn, influence their cognition, motivation, and action unwittingly. To some extent, "different individuals internalize different parts of the same culture in different ways" (D'Andrade, 1992, p. 41). Other theorists have emphasized that children are active agents in participating in specific activities, interacting with specific individuals, and selecting specific means for solving problems (Rogoff; 1998; Shweder et al., 1998; Valsiner, 2000). Individuals thus create their own experiences in the developmental niche they share with others in their
Culturally situated cognitive competence

The individualized enculturational processes give rise to both commonality and diversity among individuals within a single culture. The interaction between individual agency and cultural belief system further contributes both to the transformation of the culture and to the development of the individual.

The second theoretical framework is developed by social psychologists, with their methodology being influenced by cognitive research (Hong, Morris, Chiu, & Benet-Martinez, 2000; Libby & Eibach, 2002; Ross, Xun, & Wilson, 2002; Trafimow et al., 1991). For example, Hong, Chiu and colleagues (2000) suggest that individuals may develop different, and sometime contrasting, cultural mental frames due to the growing globalization and intercultural exchanges in the modern era. The activation of and shifting between these mental frames are subject to specific situational requirements put forth by particular psychosocial orientations, such as autonomy versus interconnectedness. As a result, cultural knowledge is utilized by individuals to serve their motivational and epistemic, in additional to cognitive, needs, specific to contexts or situations.¹

Consistent with this theoretical claim, research has shown that, depending on particular contexts, situations, or incidental cues, some cultural beliefs may become more accessible to some individuals than others, which in turn differentially shape individuals’ reasoning, attribution, and even self-perception (Chiu et al., 2000; Hong et al., 2000; Ross et al., 2002; Trafimow et al., 1991). In a recent study, Ross and colleagues (2002) examined the cultural frame adopted by bilingual Chinese-born Canadians in reporting self-related information. These researchers found that compared with participants who completed the tasks in English, those

¹ "Although individuals may differ in what mechanisms they apply to a given task or situation, the potential set of mental mechanisms underlying intelligence is claimed to be the same across all individuals, social classes, and cultural groups." (Sternberg, 1986, pp. 23-24)
assigned to the Chinese-language group reported more self-descriptions of group memberships and social relations, had lower self-esteem scores, and showed more agreement with Chinese values such as “Modesty leads to success, pride leads to failure.” It appears that self-knowledge varied as a function of the relative accessibility of different cultural beliefs induced by language.

Thus, cultural effects on cognitive competence are ultimately achieved and expressed by the culturally-framed mind of individuals who may vary in other relevant experiences. A culture's centuries of religious, philosophical, and political traditions and its preferences in child-rearing practices lead to particular modes of cognition that are functional for most of its individuals in solving problems and making judgments in everyday life. On the other hand, individuals play an active role in selecting, modifying, and disputing one cognitive model or another from the "public pool" they share with other members of the culture. Some individuals may even adopt models that contradict their culture’s value system but are functional in particular situations or for solving particular problems. It is through the dynamic interplay between culture and individuals that human cognition eventually comes into shape.

A functional framework of cognitive competence: Conclusion

The foregoing analysis suggests that models of competence crafted on the basis of data collected without respect to cultural context are unable to account for the dramatic differences observed—even between individuals with no underlying capacity differences. To recap our argument, individuals carry out everyday cognitive activities in which culturally constructed artifacts operate as both the mediating tools and the objects of action. Through formal and informal instructions as well as implicit learning, individuals gradually internalize their culture’s artifacts into their own thinking and behavior. A culture's intellectual history and social and geographical environments define and further give meaning and importance to particular
cognitive domains, some of which may be unique to this culture. Individuals develop competencies in these domains that are functional in terms of their adaptation to the social and intellectual lives in their society. Interpersonal contexts are embedded in the larger cultural milieu and serve culture-specific functions. Children acquire culturally-promoted values, skills, and ways of thinking through actively interacting with more competent members of their society in culturally-favored fashions. And finally, individuals selectively adopt existing cognitive models of their culture to interpret meanings, solve problems, and understand themselves. We presented both theoretical and empirical support for the view that the culturally framed mind enables the co-existence of individual diversity and shared values in the modes of thinking and communication within each society.

The functional framework we outlined here focuses on the adaptability of cognitive competence and its development in the cultural context. Culture is not viewed as a static whole existing metaphysically far away from the developing child and straightjacketing all members into the identical modes of cognizing. Instead, culture operates as a dynamic system and process of overarching influences that have both direct and mediated impact on cognitive growth. This framework further emphasizes a bottom-up approach to understanding the cultural specificity of cognitive competence. Rather than considering whether a culture values particular cognitive domains, particular styles of adult-child interaction, or particular ways of thinking, we ask what kinds of skills, qualities, and competencies individuals in this culture need to develop in order to function effectively in their daily lives. This approach, in turn, can help us identify culture-specific domains, interaction patterns, and cognitive models. In addition, our framework construes both group and individual differences in cognitive functioning, emphasizing the active
culturally situated cognitive competence 27

roles played by individuals in constructing, selecting, and adopting values, skills, and folk theories available to them.

Furthermore, a functional perspective to cognitive competence has important implications for ability testing and evaluation. This framework does not view cognitive competence as a set of fixed components operating in varied social-cultural contexts. Instead, cognitive competence is conceived of as emerging from and further situated within culture-specific contexts as a result of individuals' adaptation to particular demands imposed by such contexts. Competence and context are thus an integrated whole in our theorization as well as a proper unit of analysis. Testing and evaluation of cognitive competence should therefore not only reflect values within a particular society, but also consider the interrelatedness between cognitive functioning and specific contextual constraints.

In conclusion, the four aspects of cultural influences (i.e., cultural artifacts, cognitive domains, interpersonal contexts, and individual schemata) are not seen as located at different levels or layers in the child's developmental context (Bronfenbrenner & Morris, 1998), or viewed as isolable subsystems of the child's developmental niche (Super & Harkness, 1994). Instead, we envision them as embodied in each other and permeating every aspect of the child's daily life. It is through their dynamic interactions that the cultural adaptability of cognitive competence takes place, as reflected in the child's increasingly effective participation in his or her community of practice, in changes in the relationships between the child and significant others, and in child's gradual assuming of an individual identity sanctioned by his or her culture.
Culturally situated cognitive competence

References


Culturally situated cognitive competence


Figure 1. The dynamic system of culturally situated cognitive competence