Chapter 19

Culture and Thought

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Throughout the day, people solve many different types of problems. The nature of these problems and the way that people understand and think about them can have enormous consequences for individuals and their well-being. Psychologists have great interest in this process and one thing is increasingly clear—in order to understand human thinking it is necessary to take culture into account (Greenfield, Keller, Fuligni, & Maynard, 2003). This insight is based on research that shows that **culture**, the natural environment or habitat of the human species, is an essential and inextricable part of human psychological experience, including thought.

This chapter describes the relation between culture and thought. It begins with a brief historical account of how culture has been studied in psychological research on human cognition. We then describe how culture becomes part of individual mental functioning. Throughout the chapter, the focus is on both the content and process of **human cognition**. Content includes behaviors and other psychological properties, such as knowledge. Process is about how thinking works and includes mental functions such as attention, perception, reasoning, classification, memory, problem solving, and planning. Culture plays a significant role in determining both the content and the process of human thinking.

To illustrate these ideas, findings from research in the area of **spatial cognition**, the understanding and use of space, are described. Navigating in and using large-scale space effectively are critical to the everyday functioning and the survival of all human beings. The importance of spatial knowledge, along with variations across cultural settings in the environment and the resources available for understanding and using space, make this a rich area to study culture and thought (Dasen & Mishra, 2010). What is clear from this research is that, across cultures, there exists a vast array of solutions for solving spatial problems and they affect how people explore, learn about, and remember the world around them. To help people solve spatial problems, cultures, over the course of human history, have devised various social conventions (e.g., ways of describing space, teaching people about how to understand and use space) and symbolic and material ways of encoding and representing spatial information (e.g., maps, models, compasses, frames of reference). These **cultural tools** are used to solve spatial problems including how people communicate spatial information (e.g., directions), identify locations, orient themselves in space, and find their way around. These cognitive skills and the practices associated with them are highly valued in cultures and, as such, they are shared by community members and passed across generations in the process of **cognitive socialization** (Gauvain & Perez, 2015b).

https://doi.org/10.17885/heiup.470.c6699

19.1 A Brief Historical Look at Psychological Research on Culture and Cognition

Psychologists have been interested in the relation between culture and human cognition for well over a century. At the very beginning of the discipline in the late 1800s, Wilhelm Wundt, a founder of modern psychology, was concerned with how cultural-historical forms, such as language and methods of reasoning, affect cognitive functions (Cole, 1996). At the same time, Wundt and other psychologists were also committed to studying human psychology experimentally, an approach to research that makes it very difficult to study culture. This is because two principal features of the experimental method, random assignment and manipulation, cannot be used—a person cannot be randomly assigned to a culture nor can culture be experimentally manipulated (Whiting, 1976). In short order, the attention of these early researchers landed on topics better suited to experimentation, such as physiological and perceptual psychology. As a result, in the early 20th century, the study of culture and human cognition, at least among psychologists in the U.S. and Europe, declined significantly. Interestingly, at this same time, there was strong interest in Russia where Lev S. Vygotsky and other Activity Theorists were putting forward exciting ideas about culture and cognition, many of which are taken up later in the chapter when the **sociocultural approach** is described (Wertsch, 1985).

By the mid-20th century in American and European psychology, there was renewed interest in culture and cognition. It was fueled, in part, by the "cognitive revolution" occurring in psychology at the time (Bruner, 1957; Neisser, 1967) along with a number of practical concerns that had great societal significance. Of particular importance was the need to understand cognitive variation in human performance on studies that included individuals from different social or cultural backgrounds (Munroe & Gauvain, 2010). Some researchers observed that cognitive performance varied systematically with participants' social class and their experience with Western forms of schooling (e.g., see Cole, Gay, Glick, & Sharp, 1971). Interestingly, at the same time, the research participants, both children and adults, who had performed poorly on conventional laboratory assessments of cognition were observed using impressive cognitive capabilities in their daily lives, including spatial knowledge, reasoning, classification, and linguistic and number systems (e.g., see Gladwin, 1970; Hutchins, 1983; Lancy, 1983; Serpell, 1979). Moreover, these skilled performances resonated closely with the practices and values of the participants' cultural group.

These observations provided understanding that may seem obvious in hindsight, but were at the time quite profound. First, they suggested that human cognitive performance is better when it is assessed on the activities and skills that people practice and are valued in their culture. Second, the more a cognitive assessment deviates from the familiar context in which an individual lives, the poorer the person's cognitive performance will be. Third, because the patterns were similar for children and adults, the connection between culture and cognition exists throughout the lifespan. And, finally, results that demonstrate better cognitive performance in people who live in Western, more industrialized cultures are often based on assessments that favor their experiences. In many cases, they reflect the cultural background and values of the researchers themselves. When taken together, these observations set the stage for a new generation of research on culture and human cognition, one based on the idea that experience in culture is fundamental to the development and expression of human thinking.

Since that time, two different approaches to studying culture and cognition have been used (Göncü & Gauvain, 2012; Table 19.1). One, the **cross-cultural approach**, focuses on comparisons across cultures, while the other approach, based on the area of research known as **cultural psychology**, concentrates on processes and systems of meaning within cultures. Each of these approaches has strengths and limitations.

For Margaret Mead (1931), a founder of the cross-cultural tradition, this approach is essentially a type of experimental research design, one that investigates how natural variations in culture affect the human experience. Despite this hopeful point of

Table 19.1: Contemporary approaches for studying culture and cognition.

Approach	Method	Purpose
Cross-cultural psychology	Compares individuals across cultural settings	Investigates how natural variation across cultural settings relates to patterns of human cognition and its development
Cultural psychology	Focuses on processes and systems of meaning within a culture	Investigates how values and practices of a culture relate to the expression and development of human cognition in that culture

view, the approach has, in practice, fallen short of this goal. Most significantly, it is prone to biases that favor one cultural group, typically the one similar to the researchers' own background, over other groups. Also, over time, research based on this approach resulted in a number of unsubstantiated assumptions about universality, most often by identifying the performances of Western middle-class participants living in industrialized communities as normative or optimal and applying deficit interpretations to participants whose performances do not match up (e.g., Cole et al., 1971; Rogoff, 2003; Serpell, 2017; Shweder, 1990). Studies of within-nation cultural differences that use this method, such as research conducted in the U.S. when children from low-income communities are compared with their middle-class counterparts, have often been similarly flawed when commonalities between groups are overlooked and differences are interpreted as the deficits of low-income children (Cole, 1996; Rogoff, 2003).

The cultural psychology approach was, in part, developed to address these limitations (Göncü, Tuermer, Jain, & Johnson, 1999; Shweder et al., 1998). It avoids cross-cultural comparisons and takes issue with the use of one culture as the standard or norm in such comparisons. Rather, it views culture as an inherently integrated system of meaning that provides organization and direction for human cognition and learning. In this view, culture is psychologically experienced and takes form in individual thinking and behavior. Research based on this approach has concentrated on how cultural meanings are expressed and communicated in the day-to-day functioning of community members through the customary practices, values, and beliefs of the group (Goodnow, Miller, & Kessel, 1995; Shweder at al., 1998). Children, over the course of development, are socialized into these traditions, values, and practices through their participation in regular events and activities (Rogoff, 2003). Cultural knowledge and ways of thinking are conveyed to young and new community members socially, both through direct social contact (i.e., social interaction) and less socially direct, but nonetheless, social forms of information exchange such as rituals, customs, and shared tools and resources, including technology (Gauvain & Nicolaides, 2015).

Some contemporary researchers working from this approach are called sociocultural or sociohistorical psychologists and they base many of their ideas on the aforementioned insights of Vygotsky and Activity Theorists (Cole, 1996; Vygotsky, 1978). Sociocultural approaches hold the view that human thinking is culturally mediated, that is, it takes place in historically-situated activities that are informed and guided by culture. Culture becomes part of individual psychological experience as people engage in the practices, institutions and tools in settings where the accumulated knowledge of the culture is used and made available to new members. Over the last decades, this view has helped shift attention away from a view of human cognition as a solitary, individual, and internally driven process towards one that sees cognition as emerging from the coordination of inherent human abilities and cultural systems of meaning.

This chapter draws on empirical evidence from both the cross-cultural and within-culture research traditions. As stated, each approach has strengths and they can be used in a complementary way to guide theory and research (Van de Vijver, Hofer, & Chasiotis, 2010). That said, each approach also has limitations. The ultimate goal is to take culture into account by benefitting from the unique insights each approach can offer while avoiding problems associated with their earlier use and interpretation. For instance, cross-cultural research can be useful when researchers do not assign greater value or worth to any cultural pattern or behavior. Focusing on a common point of reference across cultures, such as behaviors related to universal developmental and cognitive tasks (e.g., early dependency on caregivers, spatial navigation; Van de Vijver, et al., 2010), is particularly useful. Careful sampling and data analysis are critical in order to avoid ethnocentrism that reifies any particular way of life.

Research rooted in cultural psychology can provide depth of understanding about a culture. However, it is important not to adopt a monolithic view of a culture that suggests that all its members adhere to cultural values and practices in the exact same way and to the same extent. There is variation in cognition and behavior both within and across cultures. Individual differences within cultures stem from many sources including age, interests, capabilities, and other aspects of psychological functioning, such as emotionality. These variations provide one of the sources of complexity inherent to culture, which contributes in important ways to the diversity of thinking that can help a culture address new and unexpected challenges (D'Andrade, 1984; Goodnow, 1990).

To summarize, for over a century there has been interest among psychologists in the relation between culture and human cognition. After many years of research, several interesting ideas have taken shape about how to conceptualize and approach this topic. Research has made it clear that cognition has complex and deep connections to the cultural context in which an individual lives. This is because the cultural context provides the social processes, tools, practices, and institutions that support and guide cognition and its development (Gauvain & Perez, 2015a). In considering research on culture and thought, it is also important to understand that cultures are not static. They change over time as people and their environments change. And, lastly, it is worth remembering that human beings may belong to and move between many different cultures, or systems of meanings, at the same time—a phenomenon that is increasingly evident today in the context of widespread globalization.

19.2 Defining the Relation of Culture and Cognition

Human beings learn to think about and solve problems in their everyday lives with the support and guidance of practices and resources that have been developed by their culture over time, continue to be used, and are passed across generations. This type of social learning is called **cumulative cultural evolution** (Boyd & Richardson, 1996). It is the process that enables human beings to create resources and tools that support and extend human activity, including thought processes, and for these resources and tools to be used by subsequent generations in the same or a modified form. These modifications, referred to as the ratchet effect, are maintained by culture and they enable the accumulation of modifications over time. As Tomasello (1999) explains

> "some individual or group of individuals first invented a primitive version of [an] artifact or practice, and then some later user or users made a modification, an 'improvement,' that others then adopted perhaps without change for many generations, at which point some other individual or group of individuals made another modification, which was then learned and used by others, and so on over historical time in what has sometimes been dubbed 'the ratchet effect' [3, p. 5].

As this quotation makes clear, human beings are active agents in this process as they adopt and adapt cultural practices and ways of thinking to meet their current needs (Tomasello, 1999).

Few would dispute the fact that the content of thought varies across cultures. Less clear is what it means to state that processes of cognition, such as

attention and memory, differ across cultures. It is important to understand that this is not the same thing as saying that different groups of human beings possess fundamentally different intellectual functions. Basic intellectual functions are shared across cultures and attest to our integrity as a species. All human beings perceive stimuli, remember things, solve problems, engage in social interaction, develop and use tools to support human activity, are self-aware and so forth. However, social and cultural experiences contribute to the form these processes take in any particular instance or setting. As a result, for any given psychological function there are both commonalities and differences across cultural communities.

Consider an example from color perception. Because all intact human brains have the same visual system and photoreceptors, color perception is, as far as we know, invariant across members of the species and emerges on a similar developmental course in early infancy (Franklin, Piling, & Davies, 2005). However, cultural and linguistic experience determine a number of factors related to color perception and categorization. The number of colors identified by a single color term, how hue is classified, and the valence or preference for certain colors varies across cultures in relation to the words used in the language to denote and categorize colors (Johnson & Hannon, 2015). And, although some languages possess more color terms than others, the sequence in which new terms are added to the language appears to be uniform (Rosch, 1977). Thus, both universal and culturally specific patterns in the perception and classification of color have been found. Such patterns suggest that even in basic cognitive processes such as color perception, we see cultural variations on a common theme.

19.3 Thinking in Niches

One way to trace out the cultural contributions to human thinking is to identify the means by which culture becomes part of an individual's knowledge and thought processes. To describe this process, Gauvain (1995) built on ideas put forth by Super and Harkness (1986) in their conception of the developmental niche. In their approach, Super and Harkness adapted a concept from biological ecology, the ecological niche, to describe in a single framework how social-psychological experience connects directly to culture over the course of human development. Super and Harkness identified three subsystems of the developmental niche: the physical and social settings of development, customs of child care, and the psychology of caregivers.

In extending this idea to describe human cognition and its development, Gauvain (1995) identified three subsystems of culture: (1) conventions for organizing and communicating knowledge, (2) material and symbolic tools that facilitate thinking and problem solving, and (3) cultural practices and social institutions (Table 19.2). Each of these subsystems relies

Table 19.2: Subsystems of culture that contribute to human knowledge and thought processes.

Cultural Subsystems	Description	Examples
Ways of conveying knowledge	Conventions of language that people use to organize and communicate knowledge	Scripts, schemas, mental representations (e.g., a mental tour), spatial relational terminology
Tools that aid thinking	Material and symbolic methods that are used to support and extend thinking and problem solving	Maps, compass, directions, frames of reference in orienteering, Global Positioning System (GPS)
Cultural practices and social institutions	Formal and informal settings in which people carry out everyday activities and learn about and apply cognitive skills	School, apprenticeships, wayfinding techniques, navigational systems, rituals, daily routines

in important ways on social interaction as a primary means by which culture and cognition become connected to one another. However, each also includes less interpersonally direct, but still fundamentally social processes, that contribute to the acquisition, organization, and use of cognitive functions through the use of historically, or culturally, formulated tools and resources for understanding the world and solving problems. In this section, these three subsystems are described and illustrated with research on spatial cognition.

19.3.1 Conventions for Organizing and Communicating Knowledge

An important aspect of human cognition is organizing and communicating knowledge in understandable ways to others. These skills not only help people structure their knowledge for effective use, they also connect members of a community to one another. Examples are schema and scripts, which are abstract representations that connect pieces of information into an overarching organization (Bobrow & Norman, 1975; Nelson, 1993; Schank & Abelson, 1977). Scripts, for example, include the order or sequence in which actions are expected to happen and how one should behave in a situation (e.g., going to a restaurant). Even infants and toddlers organize their knowledge of routine events, such as bathing, along script-like lines. By the end of the first year, infants use temporal information in recalling events such as Teddy Bear's bath: first put Teddy in the tub, then wash him with a sponge, then dry him with a towel (Bauer et al., 2000). By 20-months of age, if toddlers are told about a familiar event in which the order of actions is violated, they will correct it (e.g., "No, wash Teddy before drying him") or say, "That's so silly." These ways of organizing complex information are valuable to cognitive functioning. They support memory by aiding recall of events and they can be used to plan or guide behaviors to reach a goal, for example, what to do to get ready for school or work in the morning. And, similar to routinized actions or habits, schema and scripts aid learning and problem solving by freeing up mental space for new or challenging activities.

There are a number of examples of organizing and communicating spatial information that reveal culture contributions to this process. Research conducted in Western cultural settings has found that when adults describe spatial information, they tend to use structured narratives that resemble route-like directions that include the temporal and spatial contiguity, or relatedness, of areas in the space, almost as if someone is taking an imagined walk through it or what is called a "mental tour" (Linde & Labov, 1975). From early to middle childhood, children's descriptions of large-scale space come to resemble this type of mental tour (Gauvain & Rogoff, 1989). However, cultural values determine which information is important to include and this information is found in descriptions produced even by young children. For example, the route directions of Iranian preschoolers living in Britain include more vivid and fuller accounts of sites along a route and less directional information than the directions of same age British children living in the same region (Spencer & Darvizeh, 1983). This difference suggests that as early as three years of age, children are beginning to display some of the values of their culture when communicating spatial information to others.

There is also evidence that cultural ways of communicating spatial information affect the process of thinking about space and wayfinding (Peterson, Nadel, Bloom, & Garrett, 1996). In some languages absolute directions are used to describe spatial relations. The Guugu Yimithirr are a case in point. They are an Aboriginal community in eastern Australia and the language these people use to describe spatial relations does not rely on relativistic terms, such as left, right, up, and down (Levinson, 1996). Rather, they describe spatial information in absolute terms in accord with cardinal directions, such as north, south, east, and west. In a series of studies that involved asking speakers of this language to point to out-of-sight locations (called dead reckoning) in the desert and to reproduce the arrangements of objects on table tops in adjacent rooms, Guugu Yimithirr speakers identified and reconstructed spatial information according to the absolute rather than the relative positioning of objects. Thus, even when they were not speaking, they behaved in ways consistent with the communicative conventions in their cul-

ture for describing space. The rapidity and precision with which the participants provided absolute spatial information on these tasks led Levinson to conclude that their spatial encoding reflected an orientation consistent with the linguistic form. Although examples of this sort are rare, similar communicative and cognitive systems have been found in other cultures, such as the Tzeltal Maya (Levinson, 2003) and Tongans in Polynesia (Bennardo, 2014).

19.3.2 Material and Symbolic Tools That Aid Thinking

Material and symbolic tools and resources are developed and used by cultures to guide and support mental activity and, as such, they play a central role in the development and organization of cognitive skill. This view, developed by Vygotsky (1987) and other Activity Theorists (Wertsch, 1981), suggests that tools and symbols mediate the origin and conduct of human activity and, thereby, connect the human mind not only with the world of places and objects but also with other people and their cultural history. Thus, by acquiring and using culturally developed tools for thinking, a person's mental functioning assumes a link to sociohistorical means and understanding transmitted through these tools and symbols. Cole and Griffin (1980) refer to these tools and symbols as **cultural amplifiers**, that is, techniques or technological features provided by a culture that alter the approaches individual cultural members use in solving problems posed by their environment.

Material and symbolic tools play an important role in spatial thinking because they extend cognitive capabilities by allowing people to describe and use large-scale space in ways that would not be possible without the tools. That is, these tools not only aid thinking, e.g. by easing navigation and travel, they also transform thinking and behavior. For example, an individual may attend to and remember directions to a location differently depending on whether pencil and paper or GPS technology is at hand. In this way, the availability of tools determines how individuals attend to and store information, in other words, the very cognitive processes that are used in carrying out an activity and in learning about the world.

The mostly widely studied cultural tool of spatial thinking is the map, which functions as both a memory store and a tool for action. Children's skill at devising, understanding, and using maps increases from early to middle childhood (Liben & Downs, 2015). Research shows that preschool children have a basic understanding of what maps represent (e.g., they understand that maps depict locations) and how they can be used (e.g., to find a place in space), but they misunderstand many of the symbolic aspects of maps (e.g., expect that a road shown as red on a map is actually red; Liben, 2009). It is not until middle childhood, when children are formally introduced to maps in school, that they begin to develop a more sophisticated understanding of maps (Uttal, 2005). Full competence at reading and using maps may not be achieved until adolescence or later depending on the opportunities available for developing these skills (Presson, 1987). Some very important or highly specialized maps, such as those representing the location of secret and valuable places (e.g., water sources) that are carved on weapons, rocks and the human body by the Ngatajara people of the Australian desert (Gould, 1969) or maps representing state or national electric grid systems, may be inaccessible to most people in a culture.

How does experience with maps relate to cognition? Research shows that this experience helps people obtain insights about large-scale space that would not otherwise be possible (Liben, 2001). It also suggests that people's ability to use maps not only reflects their particular spatial representational skills, but also the individual's experience and practice with a system of representation or tools available in their culture. Or as Uttal (2005) put it, skill at using maps to navigate in space results from living in a map-immersed culture. Because learning how to understand and use maps is a social and communicative process, people need to be taught what representations in maps stand for and how they can be used. Such skills are highly valued in cultures with these tools. In fact, recent innovations in STEM (Science, Technology, Engineering, and Mathematics) learning include introducing young people in such cultures to map use across a diverse range of

spatial contexts and technologies (Committee on Support for Thinking Spatially, 2006).

Cultural symbol systems, such as numeracy and language, also contribute to spatial thinking. Much of the research that examines language in relation to spatial cognition is centered on testing the idea proposed by Whorf (1956) that language affects the ways in which speakers conceptualize the world and even their nonlinguistic cognitive abilities. Results suggest that variation across languages in the categorization of spatial concepts contributes to cultural variation in spatial understanding. For instance, research conducted by Bowerman and colleagues (e.g., Bowerman & Choi, 2003; Majid, Bowerman, Kita, Haun, & Levinson, 2004) found that culturally specific reading patterns can influence performance on seemingly unrelated tasks. In one study, participants spoke and read either English or Mandarin; English text is written in a left-right pattern, whereas Mandarin text is written vertically. When participants were asked to described how they thought about the future, English readers described the future as occurring in a forward direction and the past in a backward direction while Mandarin readers described the future as occurring in an upward manner and the past in a downward manner.

Research has also found that language is related to cultural differences in preferences for particular frames of reference in describing space. Majid and colleagues (2004) identified three frames of reference: (1) relative, which involves use of the viewers' own perspective (e.g., the spoon is to the right of the fork); (2) absolute, which uses an external framework (e.g., the spoon is to the north of the fork); and (3) intrinsic, which uses the relationship of the items themselves without reference to personal or external coordinates (e.g., the fork is at the nose of the spoon). The frequency of using these frames of reference differs across languages. English speakers are more likely to use relative and intrinsic frames while the aforementioned Guugu Yimithirr speakers from Australia exclusively use absolute frames of reference. Similarly, Haun, Rapold, Janzen, and Levinson (2011) found that Dutch and Namibian elementary school children (≠Akhoe Hai‖om speakers) also differed in their spatial frames of reference. Dutch children were more likely to use relative descriptions, whereas Namibian children were more likely to use absolute descriptions. In addition, when the children were instructed to use their nondominant frame of reference, they had great difficulty in doing so and performed poorly. Thus, spatial cognition and language variability across cultures covary in systematic ways.

The symbols and tools that cultures devise and use to represent and support thinking are not static. They change over time and may do so in a rather sweeping fashion. Recently, there have been a number of major changes in the tools people use to imagine, communicate about, and experience large-scale or geo-space, including geographic information systems (GIS), global positioning systems (GPS), and geo-visualization tools (GeoVis). Downs (2014) describes these changes as revolutionary because of their potential to affect the development and use of spatial cognition along with people's understanding of and relation to the world as a whole. The extent of the impact is, as of yet, unknown. What is known is that people are adopting these technologies at a rapid pace and their use is both widespread and regular. People use handheld spatial navigation devices on a daily basis for moving around the world in vehicles and on foot. Even people living in geographically isolated communities in the Majority World use these tools, accessed mainly on mobile or cell phones (Mpogole, Usanga, & Tedre, 2008). Although most people in remote regions report purchasing these phones for social and emergency contact, the phones are also used to help people carry out activities that are spatial in nature. For instance, they help rural villagers living in very spread-out regions make decisions important for their livelihood, such as where to find clean water for livestock and household use.

Downs (2014) identifies some potential downsides to adopting these technologies that warrant more attention from researchers. For instance, he asks, how do people evaluate the quality and utility of the spatial information provided by these technologies? Do people monitor their activities as they rely on this information to be certain it is helpful or correct? Downs is also concerned about dependency. These tools, without question, can afford greater ease and flexibility for people when traveling, es-

pecially in distant or unfamiliar places. Yet users may become dependent on them, which may, in turn, lead to an abandonment of more traditional methods of thinking about and using space. These changes would, inevitably, reduce the likelihood that traditional methods of spatial thinking and representation are transmitted across generations.

Taken together, this research supports the view that symbolic and material tools devised and used by a culture are integrated with the development and use of spatial thinking skills. These cultural tools alter how individuals solve spatial problems, and as a result, they transform spatial cognition. However, their contribution to spatial thinking is complex and provides both opportunities and constraints. Tools, such as maps, and symbolic systems, including language, can provide ways of solving spatial problems that would not be possible without these resources. However, at the same time, these tools constrain spatial problem solving and what people know about space. For instance, people's understanding of the geography of London is more reflective of the spatial layout depicted in the map of the city's underground subway system than it is of the city itself (Roberts, 2005). Here we are reminded of our earlier discussion about how to interpret an individual's success or failure when asked to solve a problem or do a cognitive task. The body of research just described demonstrates that when a person is asked to solve a spatial problem that is integrated with a cultural tool, symbolic or material, the person's performance will reflect not only the individual's inherent cognitive skills, but also their experience with the symbols and tools of their culture.

19.3.3 Cultural Practices and Institutions

Culture provides institutions and other formal and informal social settings and arrangements, including rituals and routines, that facilitate and guide human thinking (Goodnow et al., 1995). Formal institutions are designed to train people in the valued skills and practices of their culture. School, for instance, promotes and supports the development of particular approaches and methods that are valued in the culture, such as literacy and numeracy (Serpell & Hatano, 1997). The relation between schooling and cognitive development is well known. What is important for present purposes is how experience in school includes practice and skill development in culturally-valued areas and that these experiences carry over into everyday thinking. For instance, schooling contributes to the development of spatial thinking through the skills that are emphasized and practiced there. The types of measurement and precision promoted in schools is evident in the degree of accuracy seen or expected in people's everyday distance estimation, model replication, and map use in cultures that value these skills. This degree of precision is less common in spatial representations and memory among people living in some other cultural communities, even though these individuals exhibit high levels of spatial skill (Gauvain, 1998). Other highly skilled ways of characterizing space may emphasize configurational information (where places are relative to one another) or information about changing landscape conditions (due to seasonal or other types of climatic factors) that can alter the texture and dimension of a terrain and affect travel time or safety.

Culture may also influence spatial memory and use through more formalized traditional practices for exploring and traversing large-scale space. Traditional Puluwat seafarers in Micronesia have developed a navigational system that does not rely on modern instruments. Rather, these navigators learn a complex set of principles to guide their travels (Gladwin, 1971; Hutchins, 1983). Some of this information is directly observed, such as wave patterns, and other parts are inferred, such as the sidereal (star) compass. The sidereal compass is an abstract mental reference system of 32 star paths that defines the courses or routes of travel among islands. This huge memorization task is eased by the use of cultural myths as mnemonics or memory aids (Hage, 1978). The remarkable skill of traditional Puluwat navigators relies on knowing many star paths that define courses of travel among islands. Similar to most knowledge of familiar local space, star paths are not fixed map routes or action sequences, rather they are a reservoir of possible action plans for solving spatial navigational problems. Locomotion, either real or imagined, provides information about landmarks

and actual or potential routes, as well as immediate cues (e.g., direction, winds, tides, currents, bird patterns) that are used to update and adjust spatial orientation and route finding in real time.

Other institutions of culture, such as rituals and routines, also play important roles in cultural learning. By definition, rituals and routines entail unchanging and prescribed patterns or sequences of actions that are deemed important in the culture (Goodnow et al., 1995). These action sequences are displayed on a regular and predictable basis, and as such, children have ample opportunity to learn about them via observational and participatory means. Children also learn about their cultural significance, often in the context of family life, which enhances motivation to learn about them and carry them out (Fiese, 2006). Even early in life, children have a role in cultural rituals and routines and their role changes with development, typically in the direction of increased expectations of independent performance and responsibility (Rogoff, 2003).

Do cultural practices affect the development of spatial thinking skills? In a study comparing the spatial skills of Australian Aboriginal children reared in the desert and European Australian children reared in the city, Kearins (1981) found that the Aboriginal children performed far better on all the spatial location tasks presented to them. This result echoes the consistent finding that increased experience in an environment enhances memory for space and aids spatial orientation (Liben & Christensen, 2010). Cultures differ in the opportunity children have to explore space during everyday routine activities, which has consequences for spatial thinking and its development. For example, research conducted in the Logoli community in Kenya found a relation between the distance children played from their village and their skill on spatial tasks (Munroe & Munroe, 1971). Children's directed distance from home, that is travel undertaken while engaging in an activity away from the home area (e.g., herding, running errands to neighboring villages, weeding crops in the field) and not free-time distance from home (e.g., playing in non-adult defined or directed activities) was the important contributor to spatial skill on several tasks (Munroe, Munroe, & Brasher, 1985).

Less formal social institutions and social settings also influence spatial thinking. In cultures where verbal explanation is highly valued, cultural practices reflect this value in the form of oral narratives and storytelling. These practices assume much importance and are part of everyday experience and cognitive exchange that children have with older children and adults (Heath, 1983). For example, research shows that children are introduced to and learn about cultural ways of conceptualizing and representing space and how to use these representational forms by interacting with their caregivers. Szechter and Liben (2004) found that mothers' use of spatial language during picture book reading with 3- to 5-year-old children predicted children's success on a spatial task that involved spatial-graphic representations (i.e., understanding of graphically depicted distance). Adults also guide children in exploring new environments and they help children learn spatial routes of travel (Spencer & Blades, 2006).

Researchers have also studied how variation in cultural practice, such as access to aerial views of the earth, relate to how individuals come to understand and solve spatial problems (Blaut, McCleary, & Blaut, 1970, Spencer & Blades, 2006). Hund, Schmettow and Noordzij (2012) discuss two wayfinding strategies or perspectives: (1) route perspectives, or first-person mental tours, that provide information such as left and right turns and landmark descriptions; and (2) survey perspectives, or third-person perspectives that involve considering the entire travel space at once (e.g., aerial views) and use cardinal directions (e.g., north, south), precise distances, and specific locations. The researchers found that participants from the Midwestern United States tended to use a survey perspective whereas participants from the Netherlands tended to use a route perspective. In explanation, the researchers considered the ecological factors of the two regions. Whereas the Midwestern United States is characterized by grid-like property boundaries, the Netherlands uses more natural features to define boundaries. Thus, spatial frame of reference is shaped by the confluence of experience in the environment and cultural conventions that have been developed over time for describing a space. These conventions take

time to learn and this learning relies on guidance and support from others in the community.

Finally, although directional information in language may seem clear, research indicates that it is not possible to know which directional framework a person is using from the literal meaning of a directional term. Frake (1980) describes how one needs to understand cultural practices to interpret absolute directions (e.g., north, south, east west) and contingent directions (e.g., left-right, forward-behind). For instance, in traditional navigation in Southeast Asia, 'south' is often used to refer to 'seaward' rather than 'landward', not to true south. If this seems puzzling, consider a more familiar example. California has a jagged coastline and the Pacific Ocean is in many places actually to the north or south. Nonetheless, the ocean is conventionally described as being to the west. In both examples, the terms 'south' and 'west' are not veridical, or true, descriptions of the world, but rather concepts or ideas for referring the world within a particular cultural frame of reference or practice. In order to know what directional framework a person is using, even when using terms that seem unequivocal in spatial information, it is necessary to know the cultural context for using and interpreting this information. Stated more generally, to understand human spatial thinking it is necessary to attend to the cultural practices people use to guide their exploration, memory and communication about large-scale space.

Summary

1. Culture is an organized social unit in which members of the group share values, beliefs, and understandings about the world, participate in common practices, and transmit information and ways of living across generations.
2. Culture influences both the content and processes of human thought.
3. Cultural contributions to human thinking exist in many forms including communication, material and symbolic tools, and formal and informal practices and institutions.
4. As people participate in social interaction and other forms of social experience, the shared understandings and behaviors of the culture become part of the person's own thoughts and actions.
5. Human spatial understanding is vital to everyday functioning and culture informs both our knowledge of space and how we use space to carry out activities.
6. Culture influences spatial thinking by providing methods that support exploration and memory of space, including communicative conventions such as route descriptions, material and symbolic tools such as maps and frames of reference, and traditional practices for conducting activities in space such as navigational routines.

Review Questions

1. How is culture a psychological process?
2. How does the study of cognitive psychology benefit from taking culture into account?
3. What are the benefits of passing on cultural ways of thinking and acting across generations in cumulative cultural evolution? What, if any, downsides might there be?
4. Why is understanding large-scale space important to everyday functioning?
5. Do you think some large-scale spaces are more difficult to understand than others? If so, what makes them more difficult to understand?
6. In his 2014 essay on the relation of new geo-spatial technologies and human cognition, Downs claims that this cultural change will re-define the self and our relationship to the world. What do you think he means by this?

Hot Topic: What will spatial cognition be like in the future?

Mary Gauvain

Globalization is a pervasive force that is increasing connections across societies and cultures and rapidly transforming people and places around the world. A principal feature of globalization is integration of technology and other resources typically encountered in industrialized settings. These societal-level changes are significant for human cognition because they affect, on a daily basis, the work people do, the way children are cared for and educated, and the nature and strength of links between the community and the world beyond it. Thus, both inside and outside the home these changing conditions of life expose people to new and recurrent modes of acting, interacting, and learning that have direct relevance to psychological functioning.

Research shows that cultural tools contribute in meaningful ways to spatial thinking. Thus, a reasonable question to ask is what might spatial cognition be like in the future? One of the major changes taking place today are technologies that help people imagine, learn about, and explore large-scale space. Many of these changes are due to changing map technologies (e.g., geographic information system, or GIS; Global Positioning System, or GPS) and their impact on society is widespread and occurring at a rapid pace (Downs, 2014). These types of changes are not only affecting adults in communities, children also learn to use them. In fact, they may be the primary or only way many children today are learning to navigate in space. If this is true, these tools will introduce a new mode of thinking about and using space in the community going forward. The fact that these tools did not originate in many of the cultures adopting them is also an important part of this story. Furthermore, the rapid pace at which these technologies are being adopted may be destabilizing. Research has found that rapid, widespread change in a community can produce a breakdown of traditional cultural systems, difficulties for individuals in adjusting to the changes, and in some instances an increase in individual pathologies (Bodley, 1982; Munroe & Munroe, 1980).

Geospatial technologies connect people to the world beyond the community in many new and exciting and, also, unknown ways. Unlike earlier tools for navigation that often emerged from

within the community itself, and therefore were shaped to local needs and values, community members are not involved in the creation of the geo-technology information that is used to guide their spatial activities. As Downs explains, "While users have options, the shape of the world is set by hardware and software designers. To the extent that we accept default settings of devices as given, our experience of the world is dictated by others (p. 9)." Thus, in using the default settings on these devices, there are benefits, but there are also tradeoffs for human spatial thinking. Research is needed on societal-level changes that result from the adoption and use of technologies to support spatial activity and how these changes may affect spatial thinking in the future.

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Glossary

cognitive socialization The process by which parents and others ensure that a child's way of understanding and operating on the world conforms to those appropriate in and valued by the culture. 363

cross-cultural approach A research method that focuses on comparisons across cultures. 364

cultural amplifiers Techniques or technological features provided by a culture that alter the approaches individual cultural members use in solving problems posed by their environment. 369

cultural psychology An approach to studying psychology that concentrates on processes and systems of meaning within cultures. 364

cultural tools Symbols or objects provided by culture, such as literacy and technology, that support thinking and regulate interactions between the individual and the world. 363

culture Organized social unit in which members of the group share values, beliefs, and understandings about the world, participate in common practices, and transmit information and ways of living across generations. 363

cumulative cultural evolution Process whereby human beings create resources and tools that support and extend human activity, including thought processes, and for these resources and tools to be used by subsequent generations in the same or a modified form. 366

human cognition The mental activity through which human beings acquire and process knowledge. 363

sociocultural approach An approach that sees development as emerging from children's interactions with more skilled people and the institutions and tools provided by their culture. 364

spatial cognition Thinking that involves processing, remembering, and using visual information about the world in terms of spatial features such as orientation, relationships, and location. 363