Cultural neuroscience and psychopathology: prospects for cultural psychiatry

Suparna Choudhury¹ and Laurence J. Kirmayer^{2,3,*}

¹Max Planck Institute for the History of Science, Berlin, Germany

²Division of Social & Transcultural Psychiatry, McGill University, Montreal, Quebec, Canada

³Culture and Mental Health Research Unit, Jewish General Hospital, Montreal, Quebec, Canada

Abstract

There is a long tradition that seeks to understand the impact of culture on the causes, form, treatment, and outcome of psychiatric disorders. An early, colonialist literature attributed cultural characteristics and variations in psychopathology and behavior to deficiencies in the brains of colonized peoples. Contemporary research in social and cultural neuroscience holds the promise of moving beyond these invidious comparisons to a more sophisticated understanding of cultural variations in brain function relevant to psychiatry. To achieve this, however, we need better models of the nature of psychopathology and of culture itself. Culture is not simply a set of traits or characteristics shared by people with a common geographic, historical, or ethnic background. Current anthropology understands culture as fluid, flexible systems of discourse, institutions, and practices, which individuals actively use for self-fashioning and social positioning. Globalization introduces new cultural dynamics and demands that we rethink culture in relation to a wider domain of evolving identities, knowledge, and practice. Psychopathology is not reducible to brain dysfunction in either its causes, mechanisms, or expression. In addition to neuropsychiatric disorders, the problems that people bring to psychiatrists may result from disorders in cognition, the personal and social meanings of experience, and the dynamics of interpersonal interactions or social systems and institutions. The shifting meanings of culture and psychopathology have implications for efforts to apply cultural neuroscience to psychiatry. We consider how cultural neuroscience can refine use of culture and its role in psychopathology using the example of adolescent aggression as a symptom of conduct disorder.

Keywords

culture; psychiatry; neuroscience; diversity; ethnicity; racism; research methodology

Introduction

Cultural psychiatry is concerned with variations in mental health and illness across diverse societies, communities, and groups. This diversity is a challenge for theories of psychopathology as well as for the provision of effective mental health services and

*Corresponding author: Tel.: 514-340-7549; Fax: 514-340-7503; laurence.kirmayer@mcgill.ca.

interventions. While biology and psychology have assumed a basic universality of human constitution and experience, both fields have generated ample evidence of wide cultural variations among human groups. A parallel body of work demonstrates the diversity of forms of psychopathology and of corresponding methods of coping and healing. In a world facing growing diversity through migration, intermixing, and creative exchanges through mass media, culture has become a key issue in our understanding of mental health and illness. Cultural neuroscience holds the prospect of advancing psychiatric science and practice through models that recognize the essential interactions of culture and biology and that go beyond this dialectic to formulate a cultural biology. At the same time, cultural critique offers a corrective to our current practices by showing some of the social determinants and conceptual limitations of current models that reflect their cultural, historical, and political origins and purposes.

Comprehensive explanatory models for psychopathology require the integration of multiple perspectives including genetics, neurobiology, cognitive mechanisms, and sociocultural frameworks. While scientific research into the etiology of psychiatric disorders, particularly since the “Decade of the Brain,” has channeled most of its efforts to the study of biological explanations, the same studies that document genetic and constitutional bases for psychiatric disorders have provided evidence for the importance of environmental, familial, social, and cultural contexts in the causes and course of psychopathology (Kendler, 2008). Psychiatric researchers have embraced the new methodologies of genomics and neuroimaging as a basis for understanding the causes of psychopathology and devising effective treatments. For example, it has recently been suggested that the identification of the dysfunction of specific brain circuits associated with symptoms of mental disorders can make an important contribution to a new scientifically grounded psychiatric nosology (Hyman, 2007). Methodological advances in neuroimaging and imaging genomics have opened up possibilities for studying the biological bases of individual differences in illness experience and cognition, raising the prospect of developing individually tailored clinical interventions (McGowan et al., 2009; Plomin et al., 2002; Ronald et al., 2005; Rutter et al., 1999). The implication is that the fault lines that define discrete disorders or dimensions of psychopathology can be found in the brain. However, psychopathology is not merely a question of distinctive genetic and neural signatures but of lived experience, developmental histories, dynamic interactions, and cultural contexts (Henningsson and Kirmayer, 2000). The problems that patients bring to clinicians often include social predicaments that require corresponding conceptual frameworks to guide assessment and intervention (Gone and Kirmayer, in press; Kirmayer, 2005).

The rapid growth of neuroimaging approaches to the study of the mind in the last two decades has given rise to new subfields, such as affective and social neuroscience, concerned with mapping mental states, emotions, personality, and dispositions onto the brain. Findings from neuroscience can illuminate the neurobiological correlates of psychopathology and are frequently invoked in theories of autism, schizophrenia, depression, attention deficit hyperactivity disorder (ADHD), and antisocial personality disorder (ASPD). These technologies also provide new ways of distinguishing groups of people based on gender, age, language, and other dimensions of social identity in terms of structural or functional differences in neural processing. Very recently, cognitive neuroscientists have turned to the

subject of cultural difference and have begun to investigate how culture interacts with the neural mechanisms associated with social, emotional, attentional, and perceptual processes. If cultural variations in the symptoms of psychiatric disorders are reflected in structural and functional differences in the brain, then data from cultural neuroscience might be used in diagnostic assessment (Han and Northoff, 2008).

Although, to our knowledge, data from cultural neuroscience have not yet been applied to explaining cultural differences in psychopathology, cultural neuroscience eventually may allow us to address a wide range of questions of interest to psychiatry, including: How can we account for socially and culturally patterned differences in vulnerability to psychiatric disorders? What processes mediate the negative effects of racial discrimination, prejudice, and microaggression on health? How do culturally mediated developmental experiences influence subsequent emotion regulation and expression? How do cultural differences in self-construal interact with mood regulation to modulate vulnerability to depression? How do cultural styles of expressing distress influence symptom experience? How do psychopharmacological agents differentially affect the brains of people with different culturally-based developmental experiences or current life circumstances? How do placebos, psychotherapy, and other psychosocial and symbolic interventions exert their effects on cognition, emotion, physiology, and behavior? (Alarcón et al., 2002; Kirmayer, 2006).

Current approaches in cultural neuroscience however pose a number of potential problems for psychiatry, unless experimental paradigms and conceptual frameworks are developed that attend to the social contexts of the participants in research and the underlying assumptions that guide the design and interpretation of studies (Choudhury et al., 2009). Without attention to these issues including consideration of the changing concepts of culture, efforts to locate cultural differences in the brain risk naturalizing social differences and reifying subtle forms of discrimination.

In this article, we consider some challenges and possible directions for a cultural neuroscience that may yield useful insights for psychiatry. Cultural neuroscience can add crucial dimensions to the project for a scientific psychiatry by clarifying how specific social and cultural experiences influence the brain in health and illness. To make a useful contribution to psychiatry, however, cultural neuroscience needs careful rethinking of the ways that it conceptualizes both culture and psychopathology. We begin by reviewing some recent findings from “transcultural neuroimaging” studies of various cognitive processes to illustrate some of the dilemmas raised by current studies in cultural neuroscience. Second, by sketching a brief history of cultural psychiatry, we illustrate the risks of reifying culture in the brain and emphasize the need for more nuanced approaches to culture in experimental paradigms. Third, we outline an approach to the role of culture in psychopathology that integrates recent findings from neuroscience and genetics about the bidirectional interactions between brain and environment with the shifting meanings of culture itself in a world increasingly woven together by the forces of globalization. Finally, we use the example of adolescent psychopathology — in particular, the symptom of aggression in conduct disorder (CD) — to explore how cultural neuroscience can clarify the brain’s role in cross-cultural differences in psychopathology by expanding its analysis beyond the individual brain to include social and cultural contexts.

Scanning “culture” and generating identities

Until recently, mainstream psychology held to the view that basic cognitive processes are universal. However, research in psychology during the last decade has demonstrated that attentional, inferential, and learning processes differ markedly among adults in different cultures (Nisbett, 2007; Nisbett and Miyamoto, 2005). This work implies that culture is inscribed in the brain through developmental processes so that individuals approach new tasks or social situations with particular cognitive styles or strategies. These studies also show that while there is considerable individual variation within groups, substantial and consistent between group differences can be identified.

In recent years, a new genre of functional neuroimaging (fMRI) studies has been recasting cultural identity in terms of differential neural activation patterns involved in performance on various tasks, using “culture” as an experimental variable (see Han and Northoff, 2008). This approach conceives of both cognitive functions and cultural differences as processes that can be located in the brain. Current designs for neuroimaging experiments require neat divisions of subjects into discrete groups to produce comparisons, and usually employ simple proxies for culture and ethnicity. For example, one fMRI study comparing Western and East Asian participants found an interaction between cultural group and the level of frontoparietal activity during context-dependent versus context-independent judgment tasks, suggesting that modulation of an attentional network in the brain may parallel findings from social psychological studies that show differential attention to context and stimulus across cultural groups (Hedden et al., 2008). Similarly, distinctions in cortical activation and connectivity between Chinese and English speakers have been demonstrated in tasks tapping reading skills (Qiu et al., 2008), as well as arithmetic (Tang et al., 2006) and musical phrase processing (Nan et al., 2008).

Several recent studies suggest that culture also modulates functional activation of the brain areas involved in social cognition (Chiao et al., in press, 2008; Kobayashi et al., 2007; Molnar-Szakacs et al., 2007; Zhang et al., 2006; Zhu et al., 2007). For example, a comparison between processing of information about self and other in Chinese and Western participants using fMRI demonstrated differential patterns of recruitment of the medial prefrontal cortex (MPFC). For the Chinese, processing of information about self and a closely related other involved similar patterns of activation, while Westerners showed greater difference in pattern of processing for self and other. These differences were attributed to cultural differences in self-representation (Zhu et al., 2007). The differential pattern of neural activation was thought to reflect the distinct cognitive processes associated with an emphasis on greater interpersonal connectedness in Chinese cultures compared with a greater emphasis on the development of the individual self in Western cultures. Similarly, neural activity within the anterior rostral portion of MPFC during processing of self judgments has been shown to predict the degree to which people across cultures construe their sense of self as either individualistic or collectivistic (Chiao et al., 2008).

These fMRI studies indicate that culture shapes not only neural representations of the self, but also the understanding of others in same- or other-culture groups. For example, higher performance on a social cognition task, the “Reading the Mind in the Eyes” task (Baron-

Cohen et al., 2001), was found to be correlated with “culturally tuned” patterns of neural activation in posterior superior temporal sulcus in Japanese and US Caucasian participants when either group was engaged in decoding the mental state of members of same culture versus other cultures in photographic stimuli (Adams et al., 2009).

While these data indicate that neural mechanisms subserving several cognitive processes are modulated by some aspects of culture, important methodological and conceptual questions remain. In their review of transcultural neuroimaging studies, Han and Northoff (2008) raise a number of problems with respect to the interpretation of these neural differences. For example, to what extent are these differences across cultural groups due to differences in task-solving strategies, neuroanatomical structure, or the conceptual meaning of the task? Most experimental tasks are not culture-free but depend on cultural background knowledge, and are interpreted and approached in terms of previous culturally mediated experiences. Thus, apparent cultural differences in neural processing may reflect different ways of responding to the demand characteristics of the setting or preferential use of specific cognitive strategies rather than revealing any fixed characteristics of a group.

The most fundamental issue, however, concerns the very notion of “culture,” which is employed in these experiments to construct distinct experimental groups. In the studies reviewed above, culture is conflated with individual identity, and painted with a broad brush, grouping individuals together as “Chinese,” “Western,” “Caucasian,” and other geographic, ethnic, or racialized labels. These labels have complex histories and current meanings and certainly do not identify homogeneous groups (leaving aside the fact that most studies are conducted with college student subjects who are not representative of the social, economic, and cultural diversity of their societies or ethnic groups). Nevertheless, these fMRI studies compare groups, usually consisting of from 8 to 15 participants, each of whom is taken to represent a particular cultural identity. While the constraints of fMRI as an experimental paradigm are increasingly recognized, the ways in which ethnocultural groups are constructed also demand critical reflection. Unpacking the notions of culture, race and ethnicity is essential to advance cultural neuroscience to avoid reproducing stereotypes in ways that may have profoundly damaging effects in the wider society. Before we discuss a more reflexive approach to culture, we describe how problematic the use of ethnoracial categories can be, using historical examples from colonial psychiatry.

Essentializing culture in the brain

Although culture, in the ecological sense of the humanly constructed environment and its associated way of life, is basic to the experience of everyone everywhere, in psychiatric research and practice, culture is usually conflated with ethnicity, race, and other social categories. These categories are not “natural kinds” found in the world but socially constructed distinctions that mark off groups of people in ways that essentialize their identities and that often serve to justify systems of exploitation and oppression. Indeed, there is an older tradition of such thinking in psychiatry that, to a modern eye, looks plainly racist. Several generations of colonial psychiatrists and their colleagues made claims about the inferior brains of colonized peoples to explain their primitive, childish, and pathological behavior (Kirmayer, 2007b).

Emil Kraepelin (1856–1926), one of the founders of modern psychiatry, undertook a voyage to Java in 1903 to address questions about the universality of psychopathology. He found not only similarities but also differences in the symptoms of patients in Java compared to those in Germany, which he interpreted as evidence of more primitive psychological development of the Javanese (Kraepelin, 1904). In later work, he explained other such social and cultural differences in biological terms as indications of degeneration of the nervous system due to the use of alcohol, syphilis, or heredity (Roelcke, 1997). Ultimately, Kraepelin supported notions of racial hygiene that were appropriated by the Nazi ideology that justified the murder of millions.

The French colonial psychiatrist Antoine Porot (1876–1965), architect of most of the mental health programs in North Africa in the first half of the last century, argued that the native Algerian mind was structurally different from that of the civilized European (Porot, 1918; Keller, 2007). The native was held to have less developed cortical activity and his behavior was therefore driven by activity of the “primitive brain” of the diencephalon. This resulted in behavior that Porot described as more impulsive, childish, suggestible, and dominated by emotion. Such images of North African people rationalized their domination by French colonial institutions. Similarly, the British colonial psychiatrist J.C. Carothers (1903–1989) who worked in East Africa, described Africans as developmentally child-like owing to their under-developed frontal lobes, which resulted in the functional equivalent of a leucotomy (Carothers, 1954; McCulloch, 1995). This accounted for what Carothers assumed to be a low prevalence of depression in Africa and for the relative lack of feelings of guilt among those with depression—an impression that was eventually refuted by epidemiological research (Orley and Wing, 1979).

At the heart of this colonial comparative psychiatry was the use of a racial typology and a hierarchy of people, with Europeans at the top (Lock, 1993). Northern European male norms and values provided implicit standards for normal and abnormal behavior in mental health and illness (Gaines, 1992). These norms could be invoked not as the biological characteristics of a people but as achievements of a uniquely advanced and morally superior civilization and gender. However, attributing cultural difference to the brain made it intrinsic to the physical make-up of people, sidestepping the need to defend a historically contingent hierarchy of values, and ultimately serving explicitly racist ideologies.¹

The views of colonized people as child-like, impulsive, and lacking the reason and restraint characteristic of civilized men were echoed in psychoanalytically inspired writings (Mannoni, 1990), showing that biological theory was not necessary to establish this hierarchy. It is equally possible to rationalize such stereotypes and racist ideologies on the basis of psychological theory (Jahoda, 1999; Lucas and Barrett, 1995; Waldram, 2004). Psychological essentialism is a common cognitive habit and readily leads to the production of stereotypes and the construction of human groups as discrete entities (Bastian and Haslam, 2007). This style of thought works hand in hand with the categorical thinking of

¹Of course, this sort of crude biological essentialism need not serve only racist or colonialist ideas. The Japanese neuropsychologist Tadanobu Tsunoda promoted the idea that Japanese have unique brains owing to the nature of their language (Tsunoda, 1985).

psychiatric nosology so that the “essence” of a group is conflated with the “essence” of a specific form of psychopathology.

Although a growing body of evidence shows how culture shapes the brain, we do not want to revisit these dark chapters in psychiatric history. The slippery slope begins with biologizing social facts like collective identity, and with the focus on a biologically or racially construed “people” in place of the diversity the variety of individuals’ experiences. Common to all of these tendentious uses of biology is a lack of systematic attention to and respect for the power and consequences of social and political arrangements, which not only shape experience and determine how we configure human difference but also influence how we think about and study the brain. Hence, the need for a critical cultural neuroscience that acknowledges the powerful interests and agendas behind the activities of psychiatric research and its clinical applications.

Locating culture in the social world

In much of the work on culture and psychiatry, old and new, there are recurrent confusions about the constructs of culture, ethnicity, race, and biological (phenotypic and genetic) variation. Sorting this out is crucial for thinking clearly about cultural neuroscience and its potential role in psychiatry. While anthropologists have developed rich and multilayered meanings of culture, neuroscientists have tended to reduce culture to discrete categories and components, associating it with group membership, or parsing it into measurable traits. Neuroscience studies have tended to equate culture with nation-state or geographic region, uncritically adopt racial categories, or make comparisons between groups as broad as “Western and Asian.” In this section, we provide a closer reading of the constructions of these concepts and their differences to encourage more careful definitions of “groups” and cultural variables in brain research.

Anthropologists have engaged in a long debate about how best to conceptualize culture (Kuper, 1999). Culture generally includes all of the material and non-tangible aspects of life that a person holds in common with other individuals forming a social group, encompassing social institutions (e.g., family, community, or religion), knowledge (languages, skills, conceptual models and frameworks), attitudes (moral and esthetic values and orientations toward self and others) and practices (child-rearing styles, family interactions, etiquette, daily rituals and routines, as well as special ceremonies for changes in social role or status). Cultures are not, however, static, bounded entities that denote homogeneity and internal cohesion within groups. Rather, cultures are dynamic, permeable, and changeable systems, with internal tensions and contradictions, which individuals actively use for self-fashioning and social positioning. As a result, in the contemporary world, most individuals participate in multiple cultural systems or streams of influence and show ways of thinking, perceiving, and acting derived from these multiple systems depending on their goals, their relationships with others, the social setting, and their social status or position.

Given this dynamic complexity of culture, cultural neuroscience must go beyond using group identity as a proxy to measure specific characteristics relevant to the process of interest. Insights from anthropology can provide alternative approaches to culture that are

more meaningful than ethnic or racial labels, yet also operationalizable and measurable. Focusing attention on identifying measurable domains of culture such as family interaction, gender, religion, diet, or concepts of personhood can free cultural neuroscience to look beyond ethnicities to investigate the particularities of culture within participants' ways of life. The aim is to identify culture-related cognitions, attitudes, and behaviors that correlate with processes relevant to understanding psychopathology.

Most of these culture-related cognitions, attitudes, and behaviors will not be unique to any one culture but shared to varying degrees by people across different racial or ethnic categories. This reflects the individual diversity within any culture, which is increasing in response to the forces of globalization. The mixing of cultures brought about by increased mobility, telecommunications, and mass media has resulted in hybrid identities, and global subcultures stratified not by race or ethnicity but by age, education, occupation, and other types of social status (Hannerz, 1992; Kraidy, 2005; Niezen, 2004). Recognizing the internal diversity of cultural groups and the impact of globalization on cultures that were once relatively isolated should lead to caution in attaching specific traits or characteristics to any individual on the basis of their cultural background or ethnicity. Instead, we need to verify the presence of specific culture-related variables in each individual directly.

The same methodology that identifies differences between cultural groups can capture some of the individual variation within a cultural group. This is well illustrated by a recent fMRI study investigating the neural basis of individualist versus collectivist self-concepts, which compared neural activation patterns of Japanese and American participants in a self-description task. As expected, individualistic and collectivistic self-concepts were related to different patterns of brain activation; however, modes of self-construal were not well predicted by ethnic affiliation (Chiao et al., in press). While activity in all participants in MPFC was modulated as a function of self-construal style, the Japanese and American groups could not be distinguished by neural representations of collectivist and individualist self-construal, respectively. In fact, a comparable number of individuals in each group endorsed collectivist and individualist concepts of self. Focusing on ethnicity alone would have yielded no difference, while measuring the cultural orientation revealed a strong correlation between modes of self-construal and pattern of brain activation. Clearly, categories such as ethnic affiliation may group together people who do not all share important cultural variables, and divide people who share much. Moreover, the same study demonstrated that priming bicultural individuals with either individualistic or collectivistic values predicted the activation of MPFC and posterior cingulate cortex, suggesting that these neural representations of self-concept are not entirely fixed traits or characteristics of individuals but dynamic cognitive strategies influenced by set and context (Chiao et al., in press). This study illustrates the value for experimental studies of unpacking cultural identity to measure cognitive mediators of cultural difference and of manipulating instructions, social expectations, or social context to clarify the interaction of cultural background with individual differences and performance.

Concepts and categories of culture, race, and ethnicity depend on social and historical context. In the United States, for example, ethnic, geographic, racial, and linguistic distinctions that reflect the complex history of migration were simplified and consolidated in

census categories that created five ethnoracial blocs: African American, American Indian and Alaska Native, Asian American and Pacific Islander, Hispanic, and White (Hollinger, 1995). The vast majority of psychiatric research in the United States on “culture” as well as training materials and clinical guidelines in mental health has used these categories which however politically important they have come to be, thoroughly confound and conflate geographic origin, language, ethnicity, racial ideology, and cultural difference.

Racial categories are constructed on the basis of differences (often but not necessarily visual differences) that are made salient by being socially marked and distinguished. Racial distinctions are built on the propensity we have to form categories of humans that constitute in-groups and out-groups, but many characteristics can be attached to this division of people into *us* and *them*, which then appears natural or given (Cosmides et al., 2003; Hirschfeld, 1996). These categories lend themselves to elaborating a racial ideology that rationalizes and legitimates regimes of domination, violence and exploitation (Fredrickson, 2002). While we may be biologically prepared to make such categorical distinctions, the specific differences we mark, the attributions we make, and their consequences are all socially determined.

Similar arguments can be made about our notions of ethnicity (Banks, 1996; Modood, 2007; Phillips, 2007). Like race, ethnicity is always defined vis-à-vis others who are viewed as different and used to define who does and does not belong to an “in-group” or an “out-group.” However, while race tends to be ascribed to a group by others and viewed as an intrinsic, biological characteristic, ethnicity is more often self-ascribed, and defined in terms of shared origins, history, and traditions. As such, ethnicity may have more explicit links to conscious agency, choice, and self-fashioning but it remains a short segue from ethnic identity as belonging to a group or community with a shared history to essentialized notions of ethnicity as “blood,” lineage, and purity. The same essentializing can occur with religious identity.

Attempts to ground racial concepts in biology founder on the low correlation between the social markers of racial difference and any underlying genetic basis for phenotypic differences. There are circumstances in which knowing the person’s racial identity (whether self-ascribed or attached to them by the institutions of a dominant society or group) may be useful clinically for calculating the likelihood of specific patterns of illness behavior, help-seeking, the presence and course of particular disorders, and treatment responses (e.g., Braun et al., 2007; Malat and Hamilton, 2006; Smedley et al., 2003). However, race is useful mainly as a marker of potential exposure to racism and discrimination, which have direct effects on health as well as access to health services (Le Cook et al., 2009; Noh et al., 2007). All of these effects depend on the social meanings of race for a specific population in a particular cultural context at a particular moment in time. New migration, intermarriage, phenotypic changes, and new social conventions of labeling can change the meaning of a racial category and its correlation with other biological or psychological variables. The boundaries of a racial group are given not by biology (although recent attempts to apply cladistics to the concept of race try to show otherwise) but by social conventions that have a cultural and political history and geography (Gannett, 2004).

In addition to the difficulty of coherently and consistently defining race in biological terms, there is evidence that racial, ethnic, and other categories have limited capacity to predict the sort of bodily or physiological differences important to explain individual behavior and psychopathology. Visible or invisible phenotypic or genetic differences may or may not have any correlates with physiological systems that have behavioral consequences. For example, being blond or blue-eyed may be associated with an increased tendency for behavioral inhibition and shyness and hence greater risk for developing social phobia or anxiety (Moehler et al., 2006; Rosenberg and Kagan, 1989). Thus, there may be specific circumstances in which observable traits or characteristics that are associated with ethnoracial categories provide clues to vulnerability to a particular form of psychopathology. But the tendency to generalize from the correlates of phenotypic traits to racial or ethnic categories goes far beyond what might be empirically and statistically justified.

The search for correlates between membership in an ethnoracial group and psychological or psychopathological characteristics is problematic for many reasons: (i) it tends to ignore variation within the group; (ii) it may misinterpret context-dependent states as intrinsic traits; (iii) it overstates the generalizability or real-life significance of the correlations found in controlled experimental circumstances terms for behavioral outcomes in real-life situations; (iv) it ignores other mediating or moderating social factors that interact with the identified trait or state to give rise to the behavioral outcomes of interest; and (v) most fundamentally, it contributes to reifying socially constructed categories that may themselves be causes of discrimination and disadvantage. While it might be argued that these limitations are not relevant to an experimental program aimed at isolating specific causal mechanisms, research that ignores the socially constructed nature of racial and ethnic groups runs the risk of mistaking correlations with ethnicity that are contingent on social context for evidence of intrinsic characteristics.

Of course, to say that categories are socially constructed does not mean they have no impact on our lives. There are many ways in which social construals of race and ethnic identity can feed back into individuals' experience of self and the ways that others treat them (Wade, 2004) and these experiences may, in turn, have profound effects on psychopathology. Tracing the genealogy of constructs of race, ethnicity, or religious identity does not make these categories any less potent. The vocabulary of race and racism remains important not only because it is the most succinct way to refer to an area of social problems but also because social context configures experience in such a way that the separate processes that might be teased apart by observational or experiment studies — for example, the impact of discrimination and “microaggression” on blood pressure, or of poverty on maternal child-rearing strategies — are not truly separate events in the real world but come to us already configured and interacting in ways that reflect systemic patterns of social adversity or structural violence. Hence, the interest of medical anthropologists in the concept of “social suffering” (Kleinman et al., 1997) as a supplement to the medical focus on individual suffering — not because social suffering names any discrete entity or even a specific type of situation, but precisely because it draws attention to the social level of organization, in which a variety of material, interpersonal, and environmental circumstances may routinely co-occur and complicate or compound each others' effects over time.

Culture and psychopathology

In parallel with the changing concepts of culture, cultural psychiatry has reframed notions of the role of culture in psychopathology. Early forays in cultural psychiatry were much concerned with the phenomena that appeared unique to specific cultural groups, resulting in lists of “culture-bound” syndromes (CBS). DSM-IV incorporated about 25 of these into Appendix I, which was originally intended to serve simply as a glossary of terms that appear elsewhere in the text but which has had the inadvertent effect of reifying these syndromes. This is especially unfortunate because, with hindsight, many of the CBS listed are neither syndromes nor culture-bound. Most of the classic CBS are better understood as either folk illness labels and explanations (like “*susto*,” a term applied in many Central or South American cultures to illnesses or afflictions attributed to a fright) or as *cultural idioms of distress* (like “*nervios*,” a commonly used expression to refer to nonspecific stress and distress). Then too, many of these symptoms, syndromes, idioms, or explanations are not strictly bound to one culture but found in cognate forms in many different cultures and social settings, not just because of cultural diffusion but because the syndrome results from similar conceptual models, social practices, or embodied experiences (Kirmayer, 2007a; Kirmayer and Bhugra, 2009).

Consistent with the emphasis on CBS, early work in cultural psychiatry made a distinction between *pathogenic* factors (that may cause or contribute to psychopathology) and *pathoplastic* factors (that shape the expression or course of a psychopathological process). Behind this distinction is the assumption that forms of psychopathology can be classified according to underlying causes and mechanisms and that the subsequent symptomatic expression and ways of coping are incidental to this basic core. This scheme over-simplifies the potential relationships between social or cultural factors and psychopathology.

Table 1, drawing from Fiske (2009), summarizes some of the many ways in which culture may influence psychopathology, which may occur across the lifespan from earliest development, through the biological and social changes associated with important life transitions, to the adaptations of old age. The trajectories of psychopathology may involve long arcs of causation in which hereditary and early development create certain vulnerabilities, while later exposure to stressful circumstances associated with social status, migration, or cultural change contributes to overtaxing the individual’s capacity for adaptation, leading to illness. Indeed, since it appears that most types of psychopathology do not involve a single causal factor or event, but rather an interaction between multiple factors over time resulting in vicious cycles of symptom exacerbation, the distinctions between cause symptomatology, and course may be difficult to make (Kirmayer and Bhugra, 2009).

Further, to the extent that cultural modes of interpreting and coping with symptoms may contribute directly to pathology, the distinction between pathogenesis and pathoplasticity breaks down. A clear example is provided by the work of Hinton et al. (2007) identifying culture-specific modes of panic disorder among Southeast Asian refugees seen at a mental health clinic in the United States. Some of these patients suffer from panic attacks created by catastrophic thinking triggered by sensations of dizziness from orthostatic hypotension, twisting the neck, or a perceived change in body temperature. While the vicious circle of

bodily sensation, cognition and emotion characteristic of panic disorder can be recognized in all of these cases, the loop depends on specific cultural interpretations of sensations; without these culture-specific attributions, there would be no vicious circle and no panic attack. So the cultural explanation and attribution are an essential part of the causal mechanism (Kirmayer and Blake, 2009).

There is evidence that culturally mediated social factors may contribute to the onset, course, and outcome of major psychiatric disorders. As one of the most severe forms of psychopathology, schizophrenia tends to be viewed as a biological disorder. Indeed, after a period of interest in the importance of social factors in the causes, course, and outcome of schizophrenia, there has been a decline of research on social factors in schizophrenia in North America (Jarvis, 2007, 2008). This de-emphasis of social determinants has gone hand in hand with a search for genetic causes. However, the same studies that show significant heritability of psychotic disorders also demonstrate the importance of environmental factors, most of which are shaped or determined by culture (Kendler, 2008). At the same time, other lines of research provide more direct evidence for profound social effects in the causes and course of schizophrenia. There is substantial evidence, for example, that “black” (Afro-Caribbean and others) immigrants to the United Kingdom and other countries experience elevated rates of schizophrenia and this effect persists or even worsens in the second generation (Cantor-Graae, 2007; Cantor-Graae and Selton, 2005; Coid et al., 2008). Social factors related to racial discrimination remain the most likely explanation for this increased prevalence (Morgan et al., 2008).

Recent work suggesting that schizophrenia might be associated with the epigenetic modulation of multiple systems, while emphasizing another site where biological “accidents” can result in pathology (Mill et al., 2008; Petronis, 2004), also provides justification for looking more closely at exposure to social adversity as a potential determinant of the causes and course of psychosis (Robert, 2000). This research points to a more refined way of thinking about the interactions between the brain and the social environment — interactions that are strongly determined by cultural processes. Epigenetics breaks down the distinction between nature and nurture by showing the ways in which developmental experiences change the regulatory genome. Culture then can exert lasting influences at any stage of development by changes in gene regulation and neural processing, as well as through family interaction and social circumstances across the lifespan.

Culture and developmental psychopathology: the example of conduct disorder (CD) and aggression in adolescence

Some of the most powerful of effects of culture may be exerted through variations in child rearing that shape development. The prolonged plasticity of the brain from infancy through adolescence and young adulthood is precisely what allows the person to acquire and embody cultural knowledge (Wexler, 2006). Developmental cultural neuroscience is still at an early stage (Pfeifer et al., 2009; Ray, 2009) and understanding the interactions between cultural factors and specific trajectories in cognitive development is particularly challenging. In this section, we use the example of adolescent aggression, a feature of CD, which is the most

commonly diagnosed childhood psychiatric disorder (Scott, 2007; Wakefield et al., 2002), to examine some of the conceptual challenges involved in bringing the current logic of cultural neuroscience to the study of psychiatric disorders. In particular, given that the prevalence of CD differs across environments, we suggest that cultural neuroscience should explore cultural explanations of aggression, as well as cultural critiques of the diagnostic classifications and practices that deem it to be deviant.

The study of the adolescent brain is currently a burgeoning field in cognitive neuroscience. MRI studies have demonstrated that anatomical maturation of the brain is much more pronounced and prolonged than previously thought, particularly in parts of the brain that have been associated with executive functions and social cognition such as prefrontal, parietal, and superior temporal cortex (Blakemore and Choudhury, 2006; Gogtay et al., 2006; Paus, 2005). The adolescent brain has also been of increased interest to researchers looking to neuroscience to shed light on biological explanations for the onset of psychiatric disorders at this stage of the lifespan (Cody and Hynd, 1999; Nelson et al., 2005; Pine and Freedman, 2009; Steinberg, 2008). There is increasing interest in the possibility that the maturational processes of the brain themselves may be of causal significance for certain forms of psychopathology. For example, Paus and colleagues suggest that developmental events during the maturation of frontotemporal pathways may help account for the onset during adolescence of many cases of schizophrenia (Paus et al., 2008).

Perhaps owing to increased attention to youth aggression, violence, and risk at the level of public health policy in the United States of America and United Kingdom (Viding and Frith, 2006; Soriano et al., 2004), biological approaches to the study of aggression have recently multiplied. Among these efforts, neuroscientists are using structural and functional MRI to explore the role of atypical neurodevelopment in antisocial behavior, in particular, aggression, seen in adolescence (Boes et al., 2008; Decety et al., 2009; Herpertz et al., 2008; Paus, 2005; Stadler et al., 2007; Sterzer et al., 2007). Aggression is one of the primary diagnostic features of CD, the most commonly diagnosed psychiatric disorder among children, with a prevalence reported to be around 5% in urban populations in the United States of America and the United Kingdom (Kazdin, 1995; Rutter et al., 1975). Along with the renewed interest in biological approaches, social and cultural factors are recognized as key issues for understanding and intervening in youth aggression.

How can cultural neuroscience investigate the role of culture in aggression and CD, without reducing aggression simply to a vulnerability detectable in the individual brain, that may be found more frequently in certain groups? From the start, brain and culture must not be considered as separate during ontogenic development. The concepts of bio-cultural co-constructivism capture this essential insight by insisting that the brain and culture are mutually dependent systems; both are in continuous and reciprocal interaction, simultaneously shaping and constraining each other and co-constructing developmental outcomes and potentials. This co-production is made possible through the prolonged (though limited) endogenous and exogenous plasticity at the levels of genes, neurons and their networks, cognition, and behavior, as well as social and cultural contexts (Baltes et al., 2006). Understanding the mechanisms of interaction across these levels is crucial if cultural neuroscience is to advance our understanding of developmental psychopathology.

Mapping aggression in the adolescent brain: neurobiology of conduct disorder

Aggression, defined clinically as disruptive and destructive behavior that causes harm to other people or animals, can take many forms, have many meanings, and occur for multiple reasons. Several lines of research have explored the biological basis of aggression, and have suggested that aggressive behavior is associated with individual differences in neuroendocrine and neurotransmitter system (Pihl and Benkelfat, 2005; Van Goozen, 2005) as well as inheritance of callous-unemotional traits (Viding et al., 2007), differences in cortisol levels in response to stress (Fairchild et al., 2008), and cognitive differences in impulse control and attention (Séguin and Zelazo, 2005; White et al., 1993). Recent neuroimaging studies have investigated the role of the brain in mediating these individual differences. Studies indicate differences between aggressive adolescents and controls, in terms of the functional activation of amygdala, striatum, and prefrontal cortex (Decety et al., 2009; Herpertz et al., 2008), volumetric structure in anterior cingulate (Boes et al., 2008), insula and amygdala (Sterzer et al., 2007), and structural and functional connectivity of frontal and temporal brain areas (Decety et al., 2009; Paus, 2005).

Although studies differ in their precise findings, neuroimaging results suggest a disruption in the circuitry of emotion regulation in aggressive adolescents. For example, in a recent fMRI study, Decety et al. (2009) found that when diagnosed aggressive adolescents observed others in pain, they activated neural systems linked to empathy, recruited the reward system to a greater extent, and displayed hypoactivity in amygdala, which suggested diminished ability to regulate their resulting emotion. Despite the interest of this work, there are many links in the conceptual chain from identifying putative neural correlates of aggressivity to the tasks of understanding, diagnosing, and intervening in adolescent CD.

The role of culture in conduct disorder

Most studies investigating the neurobiological manifestations of aggression in adolescents with CD, including the work cited above, have been done in Europe and North America using European or Euro-American participants. Examining a psychiatric disorder across cultures, however, demands a valid and reliable measure of the disorder than can be applied to different populations living in disparate contexts. Recent cross-cultural and cross-national studies reveal large variations in reported prevalence both within and between countries, as well as a dramatic increase in reporting of externalizing behaviors in the United States of America in recent years, and very high rates of comorbidity of CD with other “disruptive” disorders such as attention deficit hyperactivity disorder (ADHD) (Chen et al., 1998; Lewis et al., 1984; Wakefield et al., 2002; Richters and Cicchetti, 1993). For example, prevalence rates of CD have been reported to differ between adolescents of different immigrant communities in the host countries of Canada and in the United States of America (Bird, 1996; Chen et al., 1998; Rousseau et al., 2008; Shaffer and Steiner, 2006; Smokowski and Bacallao, 2006).

Like most psychiatric disorders, there are no biomarkers for CD and the diagnosis cannot be made or verified with a laboratory test. In the absence of such a test, cultural differences in rates of diagnosis and the diverse social contexts of misconduct pose challenges for brain research on CD. Interpreting cross-cultural differences is complex, and if the identification

of cognitive or neural correlates is to play a role in understanding CD, then cultural neuroscience must pay close attention to the sociocultural context of the individual and of the diagnostic process itself.

Some critics have argued that the current approach to the diagnosis of CD which, like that of most psychiatric disorders, focuses on manifest behaviors such as aggression and lacks clear exclusion criteria, obscures other treatable symptoms and syndromes; this critique has raised doubts about the validity and usefulness of the CD diagnosis in any setting (Lewis et al., 1984; Richters and Cicchetti, 1993; Quay, 1987). Isolating aggressive behavior as a feature of CD provides a useful way to approach the question of cultural differences at the level of the brain using cognitive or neuroimaging methods. Given the challenges to cross-cultural validity of diagnostic categories as well as the heterogeneity and multifactorial origins of psychiatric disorders, it may be useful to adopt a symptom-based approach to design studies that unpack the diagnosis and examine the cultural contingencies of particular neurophysiological, neuroanatomical, cognitive, or neuropsychological dimensions (Helzer et al., 2008). This dimensional approach is useful for understanding how environmental contexts interact with gene-brain-cognition-behavior pathways in the development of childhood disorders (Knapp and Mastergeorge, 2009; Viding and Frith, 2006). While specific behaviors, biological markers, or endophenotypes (Gottesman and Gould, 2003) can be helpful in defining homogeneous groups within the symptom criteria, there are particular challenges to this approach in developmental psychopathology and cognitive neuroscience. The anatomical and functional changes in the brain during development, as well as the changing nature of psychopathologies, mean that it is difficult to interpret endophenotypes across development, for example, to identify the neurocognitive reflections of aggression at different age points (Viding and Blakemore, 2007).

At the same time, several researchers have developed a cultural critique of current psychiatric classifications that diagnose particular forms of conduct among children and adolescents as pathologically “antisocial.” It has been suggested, for example, that CD is a product of Western cultures, which serves social and cultural purposes by biologizing socially undesirable behavior through medical research and managing the risk of such behavior through medical control (Conrad, 2005; Timimi, 2002). Critics of the CD diagnostic category emphasize the need for a cultural perspective on constructions of childhood, deviant behavior, and child-rearing practices to avoid shifting the focus of explanations and interventions from social context to individual biology exclusively.

The meanings and contexts of aggressive behavior

Both epigenetic and cultural approaches point to the need for a closer examination of the lived experience and cultural worlds of adolescents—that is, the particularities of the local environments (including family dynamics, expected roles, peer groups, socioeconomic status, experiences of racism, and discrimination) that are the context of aggression—to better understand aggressive “disorders.” Cross-cultural research on CD highlights the importance of investigating the similarities and differences across cultures in values of independence, interdependence, compliance, or aggression in childhood and adolescence, as well as the specific social contexts of misconduct (Chen et al., 1998; Shaffer and Steiner,

2006; Smokowski and Bacallao, 2006). The determination that aggression or other behavior is socially transgressive or psychopathological depends on the economic, political, and cultural systems in which it occurs and through which it is interpreted as a problem for clinical attention.

Ethnographic research has shown that in some small-scale societies, adolescent boys are exposed to aggressiveness around puberty and their own expressions of aggression can be socially approved (Herdt and Leavitt, 1998; Rosaldo, 1980). In other societies, adolescent aggression among boys seems to be rare (Broch, 1990). It has been suggested that higher levels of aggression are seen in industrial contexts in which there is greater socioeconomic complexity and inequality associated with the competitiveness and economic disparities of capitalist development (Fabrega and Miller, 1995). However, aggression can play an important role in adolescents' ecological adaptation in such settings and may be highly socialized (Sharff, 1998). In these industrialized, urban settings, certain disadvantaged groups seem to be at higher risk of a CD diagnosis. Given the various meanings of aggression, a question for cultural neuroscience, then, is whether socially sanctioned and socially prohibited forms of aggression are mediated by differential neurocognitive mechanisms. Differences in aggressive behavior in different contexts may reflect cultural modulation of affect both during early development and through cognitive strategies used by adolescents to amplify or reduce anger or other specific emotions (Hollan, 1988; Hollan and Wellenkamp, 1994).

Our discussion to this point has considered culture in terms of the lived experience and ways of life of adolescents, which may include aspects of social institutions, as well as individuals' knowledge, attitudes, and practices. However, as mentioned earlier, socially constructed categories of ethnic or group identity may also be important and relate to aggression. In the United States, for example, the epidemiology of youth violence finds that "African-Americans and Latinos are over-represented among both offenders and victims of violence" (Soriano et al., 2004). This research on adolescents belonging to minority ethnic communities demonstrates that the development of aggressive behaviors cannot be viewed as simply individual psychological dysfunction but rather must be seen as a response to a number of specific environmental stressors. For example, using their case study of Latino adolescents in the United States of America, Shaffer and Steiner (2006) emphasize the importance of addressing the cultural identity of the individual, going beyond the category of "Hispanic" to consider the degree of acculturation or acculturative stress, and examining the relationship between the stress involved in acculturation and the behavioral criteria of CD. They stress that a comprehensive approach to understanding aggression and CD in adolescents requires the development of conceptual and methodological tools to study the complex interplay between ethnicity, the experience of migration, urbanization, acculturation, family dynamics, socioeconomic status and inequality, racism, and government policy. Stressors such as racism, intergenerational, and parental conflict can adversely affect identity formation, a primary aspect of normal adolescent development.

Drawing normative conclusions about cross-cultural differences based on differences in functional activity in the brains of groups of adolescents from different ethnic backgrounds therefore may be conceptually misleading and methodologically flawed, and by diverting

attention from historical and social contextual issues, it may have important social and political consequences (Connors and Singh, 2009; Johnson et al., 2002). Rather than studying the impact of culture on the brain in aggression by categorizing groups on the basis of ethnic identity, cultural neuroscience might use more meaningful distinction such as measures of perceived racism, quality of relationships with parents, or particular beliefs or attitudes could be correlated with performance on emotion processing tasks and measures of aggression to investigate the neurocognitive mechanisms that mediate associations between particular stressors and aggression. A similar approach has been taken in developmental cognitive neuroscience to investigate the relationship between socioeconomic status in the United States and executive function abilities and disparities (Hackman and Farah, 2009).

Coming of age in a globalizing world

Historical constructions of the nature of normal adolescence, cultural meanings of aggression, the ongoing medicalization of youth deviance and aggression, and the technologies of psychiatric epidemiology and diagnosis all play a role in current approaches to CD and the explanatory role of the brain in adolescent behavioral development (Choudhury, in press; McKinney, 2008). Larger societal changes have constructed adolescence as a time of turmoil and obscured the ways in which society itself has diminished the opportunities to take on meaningful roles and responsibilities that might channel youthful energy and aggression in socially constructive ways. The normal aggression of youth is met with aggressive marketing as part of the machinery of consumer capitalism. When successful, this creates docile consumers; when matched by economic disparities and injustices, it produces angry and disaffected youth suffering from a sense of anomie. Beyond this general problem of the appropriate expression of the expanding energies and possibilities of youth, there are a host of specific geopolitical problems related to migration, urbanization, and globalization that serve to accentuate inequalities and aggravate social pathology and attendant psychopathology. Psychiatric diagnostic constructs and interpretations of behavior have global currency and are increasingly exported and introduced into diverse social and cultural settings. Globalization has also transformed the life-worlds of adolescents in many societies, introducing new technologies of communication and corresponding forms of identity and community. Far from being distractions from the development of a cultural neuroscience of psychopathology, we believe neuroscientists must engage with these sociopolitical changes to formulate relevant research questions and meaningfully interpret their results.

Conclusion

We have tried to show how the application of cultural neuroscience to psychopathology depends crucially on how we understand culture. Culture is not just a matter of cognitive content or processes, and it cannot be captured through an epidemiology of representations. Cultural systems reside both in the individual and in the social institutions, routines, and practices — both local and global — in which each individual participates. These systems give rise to ethnic and cultural identities but also to ways of life that cut across recognized ethnocultural categories. Despite the promise of cultural neuroscience for psychiatry, there

are reasons to be concerned about locating culture in the brain because this may serve to reify these identities and obscure their social origins.

We have used the case of adolescent aggression, a feature of CD, to examine some of the conceptual challenges involved in developing a cultural neuroscience that can inform psychiatric explanations and interventions. We suggest that cultural neuroscience must grapple not only with the cultural factors involved in the onset, course, and outcome of disorders and their unequal distribution in the population but also with the cultural and historical embedding of psychiatric nosology itself. If cultural neuroscience is to contribute to mental health theory and practice, experimental designs require careful conceptualization of both culture and psychopathology. Rather than uncritically accepting the received categories as applicable across cultures, a more effective methodological strategy to demonstrate the impact of culture on psychopathology would begin by decomposing discrete diagnostic categories into functional systems, dimensions, and underlying processes. Similarly, constructing meaningful “cultural groups” for comparison depends on identifying the dimensions of culture relevant to a specific form of psychopathology. These dimensions can be measured independently of individuals’ cultural identities or affiliations. This will allow the researcher to identify correlations between cultural dimensions, psychopathological processes, and behavioral outcomes, which is also useful for designing interventions and evaluating their efficacy. For example, the systems underlying aggressive behavior are likely to be tuned through social or environmental interactions over the course of development. Future research may shed light on how interventions including educational approaches, remedial parenting, rites of initiation, social mentoring programs, involvement in certain cultural practices, or other forms of cultural identification and engagement can influence developmental pathways to reduce the likelihood of aggressive behavior or conduct disorder (Blakemore and Frith, 2007; Smokowski and Bacallao, 2006).

Beyond the strategy of unpacking culture and psychopathology into their underlying dimensions relevant to specific functional systems and behavioral outcomes, there is a need for a critical perspective on the received categories used to diagnose psychopathology and assign individuals to specific cultural groups. Clinical assessment must be mindful of the ways in which psychopathology, symptom experience, and diagnostic systems are shaped by social and cultural contexts and embedded in cultural systems of meaning. Scientific inquiry also requires critical reflection about the origins of the categories we use.

Recently, there has been much emphasis in neuroscience and genetics on the interactions between the brain and environment. Research on epigenetics has begun to reveal how interactions of the genome with the environment over the course of development lead to structural changes in the methylation patterns of DNA that regulate cellular function. These changes may be lasting, so that experience remodels the functional genome. There is compelling evidence, for example, that early parenting experiences alter the regulation of stress response systems for the life of the organism (Fish et al., 2004; Meaney and Szyf, 2005; Weaver et al., 2004). This work challenges the facile divide of nature and nurture. If cultural neuroscience is to advance, it must develop new conceptual models that capture the interactions of brain and environment central to developmental and social processes. The tenacious divide between nature and nurture has served to maintain a division of labour

between the disciplines and widened the gulf between those who study the brain and those concerned with the (physical, social, political) environment “outside” the person.

Biology itself, however, demonstrates that brain and environment form an interacting system. Cultural factors structure the distribution of genes in a population, their modulation over the course of neurodevelopment, and the functioning of the brain in social contexts across the lifespan. The same studies that demonstrate the role of genetic and constitutional factors in psychopathology also show the wide influence of social and environmental factors, pointing toward the importance of culture in understanding psychopathology. The advances of cultural neuroscience will allow us to sharpen our questions about the impact of culture on the causes, course, and outcome of psychiatric disorders.

Cultural influences on psychopathology are not only inscribed in the brain over the course of development, but also reside in social practices that create situations that are challenging for specific groups or individuals. A hierarchical systems view would argue that certain interactional and meaning-centered aspects of culture that reside in social institutions and practices can never be fully captured by neuroscience (Henningesen and Kirmayer, 2000). There will always remain a need for other conceptual vocabularies, constructs, and methodologies to understand these emergent levels of organization (Kirmayer et al., 2007). Cultural neuroscience can be most fruitfully developed through ongoing dialogue with the social sciences that illuminate these fundamental constituent levels of human experience.

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Table 1**Cultural influences on psychopathology and healing**

Biocultural systems	Cultural variations in system	Effects on psychopathology	Modes of coping, adaptation, and healing
Attachment	Development of secure base	Difficulties with attachment and separation	Relationship and social supports
Attention	Development of attentional systems (Posner and Rothbart, 2007); regulation of modes of attention by cognitive strategies, social cues, and contexts	Disorders of attention; dissociative disorders (Seligman and Kirmayer, 2008); symptoms and behaviors exacerbation by attention: anxiety, tension-related somatic symptoms, movement disorders (Tourette's) (Raz et al., 2007)	Meditation (Tang et al., 2007); trance and hypnosis (Raz, 2008); placebo effects (Raz, 2008)
Perceptual processing	Context dependence/independence (Nisbett and Miyamoto, 2005)	Disorders of perceptual processing	Perceptual training
Attributions of causality	Dispositional biases related to concepts of personhood (Nisbett, 2003)	Attributional problems; vulnerability to depression and anxiety; somatized clinical presentations	Reattribution therapy
Emotion regulation	Styles of emotional expression	Psychophysiological consequences of emotion suppression or amplification	Expressive and cathartic therapies
Language	Differences in first and second language acquisition	Association of language and idioms with memory and emotion	Evocative use of metaphoric language; suggestive effects of images and instructions
Self-representations	Cultural concepts of personhood (Zhu et al., 2007)	Types of insult and injury to self; modes of narrating distress	Insight and narration (Kirmayer, 2007c)
Social interaction	Sources of interpersonal stress and social support; empathy	Difficulties in interpersonal interaction (relational disorders) (Beach, 2006); conflict with familiar (in-group) and unfamiliar (out-group); impact of racism and discrimination (through microaggression, rejection, and social marginalization) (Eisenberger et al., 2003; Krill and Platek, 2009; Richeson and Shelton, 2003)	Interpersonal support
Symbolic interaction	Classical conditioning; laws of sympathetic magic	Conditioned emotional responses (PTSD, phobias)	Healing amulets, talismans, and ritual actions (Kirmayer, 2007a)