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Editorial

At the frontier of cultural neuroscience: Introduction to the special issue

Cultural neuroscience is a new, interdisciplinary field bridging cultural psychology, neurosciences and neurogenetics that explains how the neurobiological processes, such as genetic expression and brain function, give rise to cultural values, practices and beliefs as well as how culture shapes neurobiological processes across macro- and micro-time scales. Although the formal study of cultural neuroscience has only recently emerged in the past decade, the question of how culture and biology mutually constitute each other has long been a source of philosophical and scientific curiosity, dating as far back as the 7th century. Nevertheless, the theoretical and empirical tools necessary to make progress in these outstanding questions has only recently become available, providing an unprecedented opportunity for scientists to make novel discoveries concerning the universality and diversity in the dynamic interplay of genes, brain and behavior.

There are several events over the past few years that have marked the evolution of cultural neuroscience as a growing field with the foundation to inspire a new generation of researchers dedicated to understanding culture-biology interactions. Notable cultural psychologists have demonstrated a growing interest in understanding how biology may give rise to cultural processes and vice versa by including the topic in the Handbook of Cultural Psychology and several symposia on cultural neuroscience at international cultural psychology meetings, such as Society for Personality and Social Psychology, the Association for Psychological Science and the International Association for Cross-Cultural Psychology. A handful of smaller research workshop meetings held at Harvard University, University of Michigan, Hokkaido University, Northwestern University, the Center for Advanced Study in the Behavioral Sciences at Stanford University and Peking University between 2002 and 2010 also have played key roles in shaping the agenda for cultural neuroscience research. Cultural scientists trained in anthropology have showed similar interest by hosting a symposium on neuroanthropology at the American Anthropological Association meeting and a stand-alone conference on neuroanthropology at the University of Notre Dame in 2009. Neuroscientists have also demonstrated increasing interest in incorporating cultural theory in the investigation of mind-brain mappings as demonstrated by strong attendance at symposia on cultural neuroscience at the international Organization of Human Brain Mapping meeting-related presentations at the Cognitive Neuroscience Society meeting as well as inclusion of the topic in the Handbook of Social Neuroscience. The relevance of cultural neuroscience research to population mental health has become acknowledged with focus on the topic of culture and the brain at the 2009 World Congress of Cultural Psychiatry conference held in Norcia, Italy as well as inclusion of the topic at a recent NIMH Workshop on Reducing Mental Health Disparities. In 2009, a volume of review articles in *Progress on Brain Research* dedicated to the topic of cultural neuroscience was published. This special issue in *Social Cognitive and Affective Neuroscience* as well as a special issue being published this June in *Asian Journal of Social Psychology* further demonstrate the growing global interest and viability of cultural neuroscience as a once and future discipline.

The articles in this special issue on Cultural Neuroscience in *Social Cognitive and Affective Neuroscience* offer a sample of the cutting-edge discoveries being made at the frontier of cultural neuroscience. The special issue begins with a handful of conceptual articles that provide an interdisciplinary perspective on the historical and theoretical contexts shaping cultural and brain sciences. First, Kitayama and Park (this issue) provide a historical perspective of where cultural psychology has come from and what neuroscience may offer cultural psychology in the future. Anthropologists, Seligman, Brown and Dominguez-Duque and colleagues (this issue), deepen this historical context by offering a perspective from neuroanthropology, discussing what kinds of anthropological theories and ethnographic observations may prove fruitful for understanding fundamental relations between brain, body and behavior. Losin and colleagues (this issue) then sharpen the discussion by offering a cogent review of what kinds of theoretical and methodological approaches current cultural neuroscience studies have taken and an analysis of strengths and weaknesses for each approach. Choudhury, Whitehead, Wilson, Mason and Morris (this issue) round out the theoretical discussion by offering unique perspectives from developmental, cognitive

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and social psychology, respectively, and in particular, what a cultural neuroscience approach may offer these branches of psychology and vice versa.

One of the most promising frontiers in cultural neuroscience currently is investigating the relation between culture and genes. Three distinct empirical approaches to this problem are represented in this special issue. Kim and colleagues (this issue) adopt a cross-cultural behavioral genetics approach to studying the effect of culture on relation between the serotonin receptor polymorphism (5-HTR1A) and locus of attention. In a similar vein, Eisenberg and colleagues (this issue) report on the relation between assortative human pair-bonding for partner ancestry and allelic variation of the dopamine receptor D4 (DRD4) gene. Nikolaidis and Gray (this issue) provide a comprehensive, international meta-analysis of the relation between the ADHD and the DRD4 exon III 7-repeat polymorphism, including for the first time empirical evidence from the Middle East. Finally, Way and Lieberman (this issue) examine the global association between allelic frequencies of several genes associated with social sensitivity and cultural values of individualism–collectivism across nations. Together, these articles provide an intriguing glimpse into how evolution may operate on at least two levels: cultural and genetic, and more generally, point to the important theoretical role that culture–gene co-evolution will play in future cultural neuroscience research.

The use of neuroimaging and event-related potential techniques to study the effects of culture on the spatial and temporal features of neural response to perceptual, cognitive, social and emotional tasks are already major topics within cultural neuroscience. Early perceptual processing regions within the ventral visual cortex, such as the fusiform face area (Goh *et al.*, this issue) and lateral occipital complex (Jenkins *et al.*, this issue), but not the parahippocampal cortex (Goh *et al.*, this issue), show cultural variation in response to faces and complex visual scenes, respectively. Electrophysiological evidence by Goto and colleagues as well as Ishii and colleagues (this issue) corroborate these neuroimaging by further demonstrating that Asians and interdependent individuals, respectively, show greater N400 negativity to incongruent relative to congruent stimuli, relative to Westerners and independent individuals. Gutchess and colleagues (this issue) report that during categorization, East Asians recruit regions within the frontal–parietal network, whereas Westerners recruit temporal lobe and cingulate cortex to a greater extent. Several studies show the importance of cultural (Ray *et al.*, this issue) and religious values (Wu *et al.*, this issue; Han *et al.,* this issue) on neural processing of the self within the medial prefrontal cortex, a region associated with self-relevant processing and social cognition. Additionally, the human amygdala shows heightened response during own-culture fear perception (Adams *et al.*, this issue), but not facial qualities that predict voting behavior (O'Rule *et al.*, in press), suggesting both universality and cultural specificity in amygdala response to socialemotional stimuli.

For as many rich and nuanced questions the current articles in this special issue address, there are many more research topics that are likely to be of great importance in understanding the mutual influence of culture and biology that have yet to be explored. Socioeconomic status, for instance, is a powerful societal construct that affects many aspects of psychology, health and behavior, yet its influence on brain and behavior is still poorly understood. Relatedly, numerous cultural psychological studies have shown the robust influence of living in urban versus rural environments on how people think and perceive the world, yet, no studies to date have examined quality and quantity of exposure to urban and rural environments in neural processing. Additionally, immigrants who are undergoing the process of acculturation provide a rich context with which to ask how cultural change affects neurobiology and vice versa. Finally, longitudinal studies that examine cultural and biological change across different developmental time windows will provide important insight into how, when and why culture and biology mutually influence each other.

In sum, we are now able to study how cultural values, practices and beliefs shape, and are shaped by the mind, brain and genes across multiple timescales in ways never previously imagined. The nature and scope of questions that can be studied in cultural neuroscience is virtually endless and the current articles of this special issue demonstrate the promise and viability of this emerging area of interdisciplinary science.

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