Studying the Effects of Culture by Integrating Neuroscientific With Ethnographic Approaches

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To cite this article: Mary Helen Immordino-Yang (2013): Studying the Effects of Culture by Integrating Neuroscientific With Ethnographic Approaches, Psychological Inquiry: An International Journal for the Advancement of Psychological Theory, 24:1, 42-46

To link to this article: http://dx.doi.org/10.1080/1047840X.2013.770278
In reading Chiao et al.’s review, I found myself continually returning to a central, nagging question: What do cultural differences in brain functioning mean for the ways individuals experience the world? As Chiao et al. point out, questions about how individuals make meaning of their lives, how they organize their social relationships and identity, and how they subjectively perceive information have been at the heart of inquiry since the dawn of humanity. Cultural neuroscience offers an exciting opportunity to explore these issues by bringing modern genetic, neuroimaging and psychophysiological evidence to inform old questions about the richness of human variation. Yet, although fascinating, the interpretation of the findings is often times not obvious. For instance, as Chiao et al. (this issue) point out, the majority of neuroimaging studies demonstrating cultural differences in emotion and self-processing find these differences in the absence of detectable differences at the behavioral level. So, then, is there or is there not a meaningful difference between the cultural groups? Do individuals from these groups actually experience emotion and self differently, in any way that matters for the real social world?

One way to begin to address these questions is to appeal to one of the fundamental disciplines giving rise to cultural neuroscience, anthropology, and in particular to borrow a basic method, ethnography. Ethnographic approaches have not traditionally been brought together with neuroscientific approaches, but doing so may help to solve the nagging question posed at the beginning of this article. In particular, these approaches can afford information about individuals’ reasoning, experiences, and natural behavior that can then be correlated with the same individuals’ neurobiological functioning, providing a link between the acculturated mind and the acculturated brain. Cultural neuroscience, with its roots in anthropology and cultural psychology and its branches gathering biological evidence, is in a perfect position to develop this interdisciplinary method. This approach could enrich the interpretation of purely biological or behavioral evidence by helping to uncover relationships between reasoning, feelings, and meaning making, on one hand, and neurobiological mechanisms, on the other.

Extending the Study of Social Emotion Beyond Automatic Processing

Social emotions make up one arena in which it is important to investigate whether and how neurobiological processing differences may correspond to real-life differences in the meaning individuals make of the social world. Social emotions range from basic, relatively automatic responses, like empathic reactions to another’s physical pain or fearful reactions to an out-group member’s face, to complex responses to others’ mental states, like admiration for another’s virtuous accomplishments in the face of difficult obstacles or compassion for another’s psychological pain in the face of loss or exclusion. Although basic, automatic responses to here-and-now social stimuli serve as a critical entry point into sociality, complex emotions like admiration for virtue and compassion move the responder beyond the here and now to consider the broader picture of a person’s quality of mind, given a cumulative set of social circumstances and inferences about that person’s perspective and beliefs. As such, these emotions play important roles in interpersonal relationships, motivation, and morality as well as in the construction of self and identity. Questions about whether and how culture impacts these emotions are therefore highly pertinent for understanding cultural variability in how individuals experience the social world.

Although cultural neuroscientists have made headway in studying social emotions that rely on relatively automatic responses, almost no neurobiological work examines how cultural variability in automatic emotional responses informs or shapes the abstract, conscious deliberations that lead to complex and nuanced social emotions like admiration for virtue, gratitude, moral indignation, or compassion. How do acculturated patterns of neural, psychophysiological, and behavioral responses give rise to complex emotional feelings, feelings of the sort that transform context-specific emotional responses into experiences that seem meaningful for one’s broader life and purpose?

This question is impossible to study without adequate measures of individuals’ subjective experiences, and brings us back around to the problem posed at the beginning of this commentary: Subtle effects of
culture have been discovered in the neurobiological correlates of automatic emotional responding, but generally these effects exist in the absence of measurable behavioral differences. By studying how cultural effects in automatic neurobiological mechanisms may correspond to differences in the meaning individuals make of the social world and self, we can begin to sort out which cultural effects impact individuals’ experience in a meaningful way and which may amount to different but equivalent mechanisms for accomplishing the same behavior. Of course, these categorizations must also allow for a certain amount of fluidity, as a low-level neurobiological difference that has no behavioral effect in most contexts may begin to influence behavior or experience under certain conditions. Nonetheless, aligning measures of automatic neurobiological functioning with measures of abstract meaning making and experience should provide a richer view of the human bio-sociocultural landscape by laying a bridge from low-level, automatic to high-level, reflective processing—an important goal for cultural neuroscience.

**Embodied Brains, Social Minds**

In considering how cultural differences in automatic social processing may contribute to cultural differences in complex social emotions and meaning making, one promising place to begin is with the effects of cultural values and norms for emotional behavior and arousal. When we see another person malevolently bullied, for instance, we quickly become aroused—our heart and respiration rates increase as we focus our attention on making sense of the situation and deciding how to respond. In turn, we may also become aware of our racing heart and quickening, shallow breath—a process that has been termed the feeling of our emotion, and that has been related to somatosensory and self-related activation in the brain (Damasio, 1999; Haidt & Morris, 2009; Immordino-Yang, McColl, Damasio, & Damasio, 2009). As this example demonstrates, emotions fundamentally involve the induction of bodily physiological changes (Levenson, 1992), and the key brain systems involved in sensing and regulating the body are also the neural platforms on which emotions are felt (Craig, 2009; Damasio & Carvalho, 2013; Harrison, Gray, Gianaros, & Critchley, 2010). But how does the feeling of embodied psychophysiological reactions evolve into a tableau of complex social emotions—in this case, compassion and indignation—and what might be the role of culture in shaping this process?

Cultural and individual differences in bodily arousal during social emotional processing have been well documented, but whether these differences impact how individuals experience complex emotions is less well understood. East–West cultural differences in values around emotion-related arousal and expressiveness (Tsai, 2007) have been found to relate to group-level differences in abilities to consciously perceive visceral sensations like heartbeats, which in turn have been shown to predict individuals’ reliance on visceral sensations versus the social context when sorting out one’s reaction to an arousing social encounter (Ma-Kellams, Blascovich, & McCall, 2012). Other studies show that even among Westerners, individuals show substantial variability in sensitivity to embodied sensations (Critchley, 2004) and in the extent to which embodied sensations figure in conscious emotional experiences (Barrett, Quigley, Bliss-Moreau, & Aronson, 2004; Dunn et al., 2010); both of these measures have been shown in turn to covary with neural measures in somatosensory cortices (Craig, 2002; Saxbe, Yang, Borofsky, & Immordino-Yang, 2012). It is likely that some of this variability relates to learned modes of conceptualizing the feeling of emotions (Barrett, 2006), a suggestion that holds implications for how interindividual variation in body sensation—a basic, automatic process—may translate into cultural differences in how complex emotions are processed and felt.

In the next section, I explore early evidence for this idea and discuss implications for cultural neuroscientific explorations of social processing.

**Studying Cultural Variability in the Neurobiological Correlates of Social Processing Using Naturalistic Interviews About Feelings**

In an effort to move toward combining qualitative methods with neurobiological methods (Immordino-Yang, 2010), in a series of experiments conducted in Beijing and Los Angeles, Immordino-Yang and colleagues engaged participants in a 2-hr videotaped interview about a series of true, compelling social stories meant to induce varieties of admiration and compassion (Immordino-Yang et al., 2009; Immordino-Yang, Yang, & Damasio, 2013). The experimenter recounted each story and revealed video materials depicting the story protagonist discussing his or her situation and other relevant information about the setting and circumstances. She finished by prompting with the question, “How does this person’s story make you feel?” or “你对这个人的故事有什么感受?” Following this interview, participants were moved to the fMRI scanner, where they saw the crux of each story they had discussed in the interview presented again in a shortened format, followed by a gray screen in which the participants were asked to reflect on the story. Participants reported via button press the strength of their current emotional reaction as BOLD, and psychophysiological data (electrocardiogram and galvanic skin response) were recorded.

Interestingly, we found evidence for cultural differences in the prominence of embodied sensations during
the interview and that these differences corresponded to differences in the recruitment of somatosensory cortices during the feeling of complex emotional feelings in the fMRI scanner. All participants reported feeling strong emotions during the experiment, and there were no differences in the strength or frequency of reported emotions between the cultural groups. Yet, although about two thirds of American participants spontaneously mentioned embodied sensations in describing their feelings, none of the Chinese participants did. For example, after hearing a story meant to induce compassion, one European American responded,

I’m not very good at verbalizing emotions. But ... um ... I can almost feel the physical sensations. It’s like there’s a balloon or something just under my sternum, inflating and moving up and out. Which, I don’t know, is my sign of something really touching.

Upon hearing the stories of individuals who remained dedicated to helping needy others despite difficult obstacles and personal sacrifices, meant to induce admiration for virtue, one African American woman responded,

I notice the same thing like during ... spiritual experiences. When I did used to attend church, like when I feel really close to God, like in the moment I feel the same charge, or something resonates with you a lot, or if you think something’s beautiful or, you know ... or if you are in awe of something ... sort of like tingly? Maybe like the little hairs raise on your body.

By contrast, Chinese participants seemed more to focus on analyzing the implications of the situation in a less body-oriented, more direct and other-focused manner. For example, in responding to a compassion-inducing story about a young musician who is burned in a fire and can no longer live outside of the hospital, one young woman in Beijing explained, “I think that all her expectations for the future are gone. The sudden loss makes her very disappointed, so she can’t handle it. It’s miserable. It’s a pity. I feel bad for her.”

In relation to the recruitment of somatosensory cortices, we found that in cortices that represent the musculoskeletal body in space (i.e., the arms and legs), such as superior lateral parietal regions, the Americans groups showed activation when feeling emotions while the Chinese group did not (see Figure 1). What is more, among American participants, individual differences in affective language use during the interview predicted individual differences in activation of these same cortices during the subsequent fMRI scan, despite that individuals who used more affective language did not report feeling more strongly than individuals who used more cognitive language to describe their feelings (Saxbe et al., 2012; see Figure 2). In the anterior insula, a region associated with visceral interoception and with processing of emotional feelings, a more nuanced pattern emerged in the data. Although Americans and Chinese participants showed the same amount of activation during the self-reported feeling of strong emotions, cultural group differences emerged in the trial-by-trial correlations between the neural activations and the participants’ reports. These differences appeared to be related to individual differences in participants’ spontaneous emotional expressivity during the interview, and to persist even after controlling for contributions of emotion-related cardiac arousal to the insula.

Figure 1. Images depicting a BOLD contrast of data collected when individuals were presented with admiration-inducing social stories and reported that they were feeling strongly emotional in response, compared to data collected when individuals were presented with less extraordinary social stories and reported that they did not feel particularly emotional in response. Note. Data in Panel A are from 13 American young adult participants in Los Angeles; data in Panel B are from 14 Chinese young adult participants in Beijing. Images are thresholded at $p < .001$, with a $10$ voxel cluster threshold. Note that although the patterns of activation are substantially similar, the American group shows activation in the lateral parietal somatosensory cortices (marked with a green arrow) and lateral frontal motor planning cortices (marked with blue arrow), which the Chinese group does not show (color figure available online).
activation (Immordino-Yang et al., 2013). The results suggest an intriguing and surprising conclusion: that cultural influences on how emotions are expressed in social situations may not impact the strength of feelings individuals experience but instead may impact the neural process by which individuals become aware of and assess their feelings. Current work is investigating how more in-depth, ethnographic interviews about individuals’ experiences, personality, and history may contribute to explaining these patterns, and how these acculturated patterns may develop in adolescence.

Building the Bridge: Toward a Cultural Neuroscientific Account of Social Experience

Returning to Chiao et al.’s review, it is clear that any satisfactory account of human cultural variability needs eventually to bridge the gap between the acculturated brain and the acculturated mind, so that we can understand what neurobiological differences in automatic functioning may mean for human experience in the social world. Many bold strides have been made toward understanding each bank on which the bridge is anchored, and a rich history of ethnographic approaches, including qualitative interviews and other means of eliciting and documenting natural social behavior and emotions, exist. Now the challenge will be to develop bridges that align neurobiological measures with psychocultural ones, adapting qualitative methods for studying meaning making to a laboratory setting, or perhaps developing methods for working with participants in their daily settings before bringing them to the lab for the neurobiological phases of the study. These methods will certainly not provide the richness of ethnographic data collected by field anthropologists, but they may make a substantial contribution toward formulating a neuroscientific account of meaningful variation in the social world.

Note

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References


