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How cultural is ‘cultural neuroscience’? Some comments on an emerging research paradigm

Ruth Denkhaus^{a*} and Mathias Bös^b

^aFriedrich-Alexander-Universität Erlangen-Nürnberg, Fachbereich Theologie, Kochstr. 6, Erlangen D-91054, Germany.

^bPhilipps-Universität Marburg, Institut für Soziologie, Zentrum für Konfliktforschung, Ketzlerbach 11, Marburg D-35032, Germany.

*Corresponding author.

Abstract ‘Cultural neuroscience’ presents itself as a new research paradigm within the neurosciences that takes the mutual constitution of culture, mind and brain seriously. As such, it has already gained considerable attention both among neuroscientists and traditional cultural psychologists. A superficial look at some of the studies published by practitioners in the field, however, might leave one with the impression that cultural neuroscience has more to do with the corroboration of well-established cultural clichés than with the broadening of mind it promises to bring about. In this article, we take a closer look at the emerging field of cultural neuroscience. The first section provides an overview of cultural neuroscience both with respect to the vision put forward by its proponents and to the actual state of research. In the second section, we engage with cultural neuroscience’s parent discipline, cultural psychology, to gain a better understanding of the constructs and paradigms used by cultural neuroscientists. We conclude with three constructive proposals for a ‘truly cultural cultural neuroscience’ that avoids the popular pitfalls of essentialism and reductionism.

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Introduction

In the early weeks of 2010, *Newsweek* featured an article entitled ‘West Brain, East Brain’. Its focus was on ‘cultural neuroscience’, an emerging research paradigm that has already attracted considerable attention within the neuroscience community. The author, *Newsweek*’s well-known science columnist Sharon Begley, used the following example to illustrate the new approach:

A region behind the forehead called the medial prefrontal cortex supposedly represents the self: it is active when we (‘we’ being the Americans in the study) think of our own

identity and traits. But with Chinese volunteers, the results were strikingly different. The ‘me’ circuit hummed not only when they thought whether a particular adjective described themselves, but also when they considered whether it described their *mother*. The Westerners showed no such overlap between self and mom. Depending whether one lives in a culture that views the self as autonomous and unique or as connected to and part of a larger whole, this neural circuit takes on quite different functions. (Begley, 2010)

‘Cultural neuroscience’, Begley goes on to explain, ‘is about discovering such differences’.

Reading through this short article, one may well wonder what cultural neuroscience has to do with its purported object of study. Putting subjects from the United States and China in an MR tomograph and scanning their brains while they are performing a set of specialized tasks is not exactly what most people would regard as a promising way of unpacking the complexities of culture. In fact, the very title of the *Newsweek* article seems to epitomize the dangers associated, by many critics, with a neuroscience approach to basic anthropological phenomena: *essentialism* (in this case, cultural essentialism), biological *reductionism* and the consequent *reification of differences*. Cultural neuroscience, as portrayed by Begley, seems to be a rather questionable enterprise.

The fault, however, lies not just with a simplifying media presentation. The ‘me/mom finding’ referred to in the article is taken from a research paper on the ‘Neural basis of cultural influence on self-representation’ by Chinese psychologist Ying Zhu and colleagues originally published in *NeuroImage* in 2007 (Zhu *et al*, 2007). Although Zhu and his team were not the first to make use of a cross-cultural neuroimaging approach, their study remains one of the most frequently quoted in the nascent field of cultural neuroscience and has already been replicated with modifications by two different groups (Ng *et al*, 2010; Ray *et al*, 2010). In spite of the somewhat colloquial style, both the data and interpretation, in terms of individualism/collectivism, are reported with sufficient accuracy by Begley. Indeed, Zhu and colleagues themselves write even more bluntly about a ‘Western self’ being different from an ‘East Asian self’ (op. cit.: p. 1315), and they use brain images labeled as ‘Chinese’ and ‘Western’, respectively, to illustrate their findings. What, then, should one make of cultural neuroscience? Is there no more to it than the investigation – or construction – of ‘West Brain, East Brain,’ making cultural neuroscience a paradigm example of the ‘neuroscience of difference’ viewed with growing suspicion by critics from various fields? In other words, *how cultural is cultural neuroscience?*

In this article, we take a closer look at the emerging field of cultural neuroscience. More specifically, we will try to answer three questions:

1. What kinds of results yield studies in cultural neuroscience in respect to culture?
2. How is culture conceptualized within cultural neuroscience and cultural psychology?
3. What might be an adequate way to define and use the term culture?

By situating cultural neuroscience at the intersection of different disciplinary traditions, uncovering the intellectual provenance of its theoretical orientation and its current research agenda, and paying attention to critical discussions in the field itself, we hope to provide a more nuanced, and more balanced, assessment of its potential contribution to the study of culture than a cursory look at a selected number of research papers and popular articles might afford. While some of the initial worries about cultural neuroscience may be justified,



others will appear in a new light as soon as one considers the larger context of the experiments that are actually conducted by cultural neuroscientists.

Cultural Neuroscience: An Overview

Cultural neuroscience is one of the most recent arrivals on the ever-expanding scene of human neuroscience. The term seems to have made its first appearance in Shinobu Kitayama and Dov Cohen's 2007 *Handbook of Cultural Psychology*, where it is defined as 'an area of research that investigates cultural variation in psychological, neural and genomic processes as a means of articulating the interrelationship of these processes and their emergent properties' (Chiao and Ambady, 2007, p. 238). Joan Chiao and Naliny Ambady, who have written the chapter in question, describe cultural neuroscience as a 'multilevel analytic approach' that shares with other subfields of neuroscience, most notably social neuroscience, the goal of 'explain[ing] a given phenomenon in terms of an emergent property of interactions between mental and neural events' (loc. cit.). At the same time, cultural neuroscience is 'distinctive in that it focuses squarely on examining psychological and neural processes that may vary across cultural groups in some meaningful way' (loc. cit.). Cultural neuroscience, as Chiao and Ambady (2007, p. 238) envision it, uses concepts and methods from cultural psychology, neuroscience and neurogenetics to study the interaction between different levels, thus broadening 'cultural psychologists' notions of the "mutual constitution" of culture and mind [...] beyond interactions between culture and the mind, to interactions among culture, genes, and the brain'. As the reference to 'genes' makes clear, the more ambitious proponents of cultural neuroscience do not content themselves with the integration of cultural psychology and neuroscience, but favor an 'extended cultural neuroscience approach'¹ comprising three distinct levels of analysis (culture, mind/brain and genes). As the extension of cultural neuroscience to the level of the genome poses extra problems, which we cannot discuss in this article, we will concentrate largely on cultural neuroscience as a discipline combining methods and insights from cultural psychology and neuroscience.

The development of cultural neuroscience from its birth, around 2005, up to now seems to be equally promising. When Chiao and Ambady published their first programmatic article on cultural neuroscience in 2007, there were no more than a handful of cross-cultural neuroimaging studies that could serve to illustrate the new approach. Within less than 5 years, this situation has markedly changed: 'culture' has become a rather popular subject among neuroscientists. In 2008, *Nature Reviews Neuroscience* featured the first comprehensive review article on 'culture-sensitive neural substrates of human cognition', organized around the subjects of 'perceptual processing', 'attentional modulation', 'language and music', 'number representation and mental calculation', 'emotional processes', 'mental attribution', and 'self-representation and self-awareness' (Han and Northoff, 2008). Other review articles, as well as more theoretically oriented contributions to the emerging field of cultural neuroscience, followed (Zhu and Han, 2008; Ambady and Bharucha, 2009; Chiao, 2009; Roepstorff and Vogeley, 2009; Ames and Fiske, 2010; Chiao *et al*, 2010; Kitayama and Tompson, 2010; Losin *et al*, 2010; Park and Huang, 2010; Zhou and Cacioppo, 2010).

1 The term is the authors' and is used here for convenience only.

Many of them appeared in one of three special issues devoted to cultural neuroscience by *Progress in Brain Research* (2009), *Asian Journal of Social Psychology* (2010) and *Social Cognitive and Affective Neuroscience* (2010), respectively. The *Annual Review in Psychology* has also featured a large-scale review article (Kitayama and Uskul, 2011), and another one has been published in John Capoccio's *Handbook of Social Neuroscience* (Chiao, 2011). Further contributions to the debate are collected in the volume *Culture and Neural Frames of Cognition and Communication* (Han and Pöppel, 2011). On the institutional level, the growing interest in cultural neuroscience is reflected in the foundation of the *Center for Culture, Mind and the Brain* at the University of Michigan and the preparation of the first international summer school on cultural neuroscience.² Given that cultural neuroscience has firmly established its place among the other neuro-disciplines, then, two questions arise: What is the vision behind this new approach, and what kind of empirical research are cultural neuroscientists actually engaged in?

The vision of cultural neuroscience

Cultural neuroscience is a hybrid discipline characterized by the incorporation of neuroscience methods into cultural psychology, just as social neuroscience has grown out of the attempt to incorporate neuroscience methods into social psychology (cf. Cacioppo *et al*, 2000; Ochsner and Lieberman, 2001). Being thus situated between neuroscience and cultural psychology, cultural neuroscience may be considered either in relation to the former or to the latter. Depending on which perspective one chooses, it is bound to appear in a somewhat different light: as *bringing knowledge about culture to bear on the study of the brain*, or as *bringing knowledge about the brain to bear on the study of culture*. In recognizing the importance of culture, neuroscience is not at all unique; there is an increasing use of the concept not only in social sciences but in natural sciences as well (cf. Skrentny, 2008). In what follows, we try to locate cultural neuroscience both within the theoretical landscape of neuroscience and of cultural psychology, describing for each field some of the contributions it is expected to make.

From a neuroscience point of view, cultural neuroscience may first appear as a somewhat specialized subfield of the social, cognitive and affective neurosciences. The theoretical accounts of cultural neuroscience put forward by Joan Chiao, Shinobu Kitayama and others, however, indicate that its proponents think of cultural neuroscience more as a new perspective *within* this field than as a mere addition to it (cf. Chiao and Ambady, 2007; Ambady and Bharucha, 2009; Chiao, 2009; Ames and Fiske, 2010; Kitayama and Park, 2010; Kitayama and Tompson, 2010; Losin *et al*, 2010; Zhou and Cacioppo, 2010). Cultural neuroscience differs from mainstream social, cognitive and affective neuroscience not in the range of psychological phenomena under study, but in its basic understanding of these phenomena. While mainstream social, cognitive and affective neuroscience implicitly or explicitly assumes that basic psychological processes and their neural correlates are universal, cultural neuroscience reckons with the cultural embeddedness, and hence with the particularity, of these processes. Cultural neuroscience thus challenges the universal applicability of findings derived from psychologists' and neuroscientists' preferred research subjects, European-Americans.³

2 See <http://culturalneuroscience.isr.umich.edu/index.html>; <http://culturalneuroscience.isr.umich.edu/home.htm>, (accessed 30 March 2012).

3 For a discussion of this sampling bias, see Arnett (2008) and Chiao (2009).



The study by Zhu and colleagues provides a good example: building on previous research in social neuroscience which had established the significance of the medial prefrontal cortex for self-representation as opposed to the representation of close others (Heatherston *et al*, 2006), Zhu and colleagues showed that while the medial prefrontal cortex may be unique to representations of the individual's self for Westerners, this is not the case for Chinese (Zhu *et al*, 2007). Although the value of these findings in terms of an improved understanding of cultural differences may be contested, it is worth noting that they at least put into question some rather uncritically held assumptions of mainstream neuroscience research: cognitive processes are not simply hard-wired, but may be shaped by cultural contexts.

This observation may be generalized. Cultural neuroscience is unique among the neurosciences for its focus on the brain in context, paying heed, at least in theory, to anthropologist Clifford Geertz' (2000, p. 205) call for an 'abandonment of the notion that the homo sapiens brain is capable of autonomous function, that it can operate effectively, or indeed can operate at all, as an endogenously driven, context-independent system'. In a recent article in *BioSocieties*, social neuroscience has been criticized for its individualist bias (Cromby, 2007). Cultural neuroscience, by contrast, promises to take the socially constituted nature of the human mind and brain seriously. Throughout the literature, one finds assertions that 'humans are a quintessential social organism' (Zhou and Cacioppo, 2010, p. 59), that 'the mammalian brain, in general, and the human brain, in particular, are fundamentally social' (Kitayama and Tompson, 2010, p. 98), that 'human brains are biologically prepared to acquire culture' (Ames and Fiske, 2010, p. 72), that 'the human brain by design needs a massive amount of external input for it to be fully functional' (Kitayama and Tompson, 2010, p. 98) and that 'the brain requires culture' (*loc.cit.*). Cultural neuroscience is described by its proponents as 'an extension of neuroscience in recent years, which takes plasticity seriously' and, moreover, 'examines the type of context that is arguably most important for humans' (Kitayama, 2010). New directions in evolutionary anthropology, such as Robin Dunbar's (1998) social brain hypothesis, the conception of 'bio-cultural co-constructivism' developed by Paul Baltes and colleagues (*cf.* Baltes *et al*, 2006; Li, 2007) and gene-culture co-evolutionary theory more generally (*cf.* Laland *et al*, 2010 for a recent overview), as well as recent discoveries about neuroplasticity and neurogenesis, provide some of the intellectual background on which cultural neuroscience feeds. Shinobu Kitayama and Steve Tompson describe the change in perspective brought about by a cultural neuroscience approach rather succinctly when they characterize the new role assigned to the brain: 'If framed as a constituent element of culture', they claim, 'the brain can no longer be seen as a sole engine that causes unidirectional influences on all other processes. Whereas the brain is a site that accumulates and embodies information stemming from dynamic sociocultural patterns, culture is a rich source of symbolic and behavioural resources that make it possible for the brain to grow and become fully functional' (Kitayama and Tompson, 2010, p. 98).

To the extent that cultural neuroscience makes good on these rather far-reaching promises, its significance for basic neuroscience should be clear. Up to now, however, cultural neuroscience seems to have attracted more attention among cultural psychologists than among 'traditional' neuroscientists.⁴ Indeed, one of the most remarkable features of cultural neuroscience is the speed with which it has made its inroads into mainstream cultural psychology. A surprising number of leading cultural psychologists have become involved with cultural neuroscience in one way or the other, including Ying-yi Hong, Shinobu

Kitayama, Hazel Rose Markus, David Matsumoto, Richard Nisbett and Daphna Oyserman. Quite obviously, they are convinced that the incorporation of neuroscience methods into cultural psychology will further the goals of their discipline. As we are less concerned here with cultural neuroscience's relevance for general neuroscience and more with its adequacy as a way of studying culture and its place in human life, this side of the matter is of particular relevance for the purpose of this article. What contributions, then, do psychologists expect cultural neuroscience to make to the study of culture and the mind?

Some writers stress what they perceive to be the practical benefits of a cultural neuroscience approach. Chiao (2009, p. 300f.), for example, has claimed that insights from cultural neuroscience may 'inform public policy issues related to cultural diversity and interethnic justice', helping to choose between different interethnic ideologies such as colorblindness and pluralism. Ames and Fiske (2010, p. 79), in turn, have expressed the hope that cultural neuroscience research will lead to improved educational practices, increased mutual understanding across cultures and more effective mental health care for people all across the world (on the issue of health care cf. also Chiao, 2009, p. 301). Other writers put more emphasis on the theoretical gains that can be made by a combination of tools and methods from cultural psychology and neuroscience. A resurging theme here is the idea of '(re-)integration' or 'reconciliation'. Many accounts of cultural neuroscience stress its potential to bridge the gap between the social and natural sciences, thus overcoming 'the unfortunate division of labour between the two types of sciences' (Kitayama and Tompson, 2010, p. 98; cf. Chiao, 2009) and presenting 'a truly integrated image of the human as both biological and cultural' (op. cit.: p. 99; cf. Ambady and Bharucha, 2009).

Apart from such large-scale ideological claims, which are more aptly grouped under the rubric of 'rhetoric' than taken as serious assessments of cultural neuroscience's wider significance, some more specific and more realistic suggestions have been made. Among these, Kitayama and Tompson's (2010, p. 97f.) suggestion that neuroscience measures might make an important contribution to theory building because they are able to tap processes that cannot be accessed with more traditional methods (cf. Zhou and Cacioppo, 2010), deserves closer attention. As we are going to show below (see section 'From culture mapping to process models of cultural influence'), this conception of the aims and benefits of cultural neuroscience is closely interwoven with recent developments in cultural psychology, and may open up more fruitful avenues for research than a mere comparative approach that demonstrates that people are different down to the level of the brain.

Current research in cultural neuroscience⁵

As indicated above, cross-cultural neuroimaging research has expanded rapidly over the last 2 or 3 years. Moreover, although the earliest studies mentioned by Chiao and Ambady and

4 An important exception is John Cacioppo, the Nestor of social neuroscience, who (together with Haotian Zhou) has contributed a major article to the *Asian Journal of Social Psychology's* special issue on cultural neuroscience.

5 The following overview of 30 original research articles (see Appendix) is based on literature quoted in cultural neuroscience articles as relevant research in cultural neuroscience. By using this 'sample strategy', we utilize the demarcation of the discursive field used by the emerging scientific field of cultural neuroscience itself.



others have focused on somewhat specialized topics such as language processing, music processing and number processing (Paulesu *et al*, 2000; Morrison *et al*, 2003; Bolger *et al*, 2005; Nan *et al*, 2006; Tang *et al*, 2006), neuroimaging methods are increasingly used to investigate the neural correlates of well-established cultural differences in basic psychological processes. Topics studied so far include visual processing (Gutchess *et al*, 2006; Goh *et al*, 2007, 2010, 2011; Lewis *et al*, 2008; Lin *et al*, 2008), semantic processing (Gutchess *et al*, 2010), attentional control (Hedden *et al*, 2008), causal attribution (Han *et al*, 2011), mental attribution (Kobayashi *et al*, 2006, 2007), trait inference (Na and Kitayama, 2011), the detection of word-voice incongruities (Ishii *et al*, 2010) and of incongruities between background and foreground objects (Goto *et al*, 2010; Jenkins *et al*, 2010), emotional expression and eye gaze behaviour (Adams *et al*, 2009), empathy (Cheon *et al*, 2011; de Greck *et al*, 2012), dominance and subordination (Freeman *et al*, 2009), and, of course, self-representation (Sui and Han, 2007; Zhu *et al*, 2007; Chiao *et al*, 2009a, b; Sui *et al*, 2009, 2012; Harada *et al*, 2010; Ng *et al*, 2010; Ray *et al*, 2010). Most studies used functional magnetic resonance imaging to detect differences in neural functioning, but the measurement of event-related potentials is also relatively common (Lewis *et al*, 2008; Lin *et al*, 2008; Sui *et al*, 2009, 2012; Goto *et al*, 2010; Ishii *et al*, 2010; Na and Kitayama, 2011). A small number of studies have tried to broaden the scope of cultural neuroscience by relating cultural differences in behaviour to genetic differences (Chiao and Blizinsky, 2010; cf. also Way and Lieberman, 2010) and by investigating personality traits that might mediate cultural differences in neural responses (Aron *et al*, 2010). Cooperations between anthropologists and cultural neuroscientists have been considered by several writers, too (Brown and Seligman, 2009; Domínguez *et al*, 2009, 2010; Choudhury, 2010; Roepstorff *et al*, 2010; Seligman and Brown, 2010), but as yet with few practical results.⁶

The range of psychological processes that have been investigated within a cultural neuroscience framework is thus quite broad. What exactly, however, justifies talk of 'culture' in connection with this kind of research? How is 'culture' conceptualized by the proponents of cultural neuroscience, and how is it operationalized in the laboratory? With a few notable exceptions, the cultural neuroscience literature is almost completely silent on this question. None of the contributors to the *Progress in Brain Research* volume on cultural neuroscience takes any effort to explain, in more than a superficial manner, what he or she means by 'culture'. Joan Chiao (2009, 2010, 2011) regularly speaks of 'values, beliefs and practices', but she never pauses to consider whether this is sufficient as a definition, and how it is related to other definitions in cultural psychology and cultural anthropology.

Even if explicit discussions of the culture concept are almost absent from the cultural neuroscience literature, some inferences may be drawn from the way research is conducted. Cultural neuroscientists are not interested in culture *per se* (for example, as a defining feature of the human life form), but in *cultural differences*, more precisely: in the way neural processes differ among human beings as a consequence of culture. Hence, the independent

6 This is not to say, of course, that anthropologists have not made any valuable contributions to cultural neuroscience (they certainly have – cf. Seligman and Kirmayer, 2008, in addition to the articles listed above). The point is just that few transcultural neuroimaging studies so far have been expressly conducted in cooperation with anthropologists.

variable in the various research designs is always ‘culture’, that is, the comparison groups consist of persons that have been (or are supposed to have been) subject to different cultural influences. This, in turn, is usually secured by one of three major strategies: (i) comparison of research subjects from two or more *countries* (or ethnic groups) that are supposed to differ on a certain cultural dimension (for example, individualism/collectivism), (ii) comparison of research subjects who, according to some established measurement instrument (usually a questionnaire), differ *individually* on the cultural dimension in question and (iii) comparison of research subjects who have been *primed* in one or the other direction.⁷

All three strategies have originally been developed by cultural psychologists⁸ and adapted to the requirements of fMRI studies and ERP studies by cultural neuroscientists. As can be easily seen, there are different assumptions about culture behind the three strategies,⁹ both with regard to the questions (i) which social forms are especially conducive to the development of a common culture and (ii) how are individuals shaped by their cultural surroundings? The *first strategy* assumes that culture is first and foremost *national culture* or *ethnic culture*.¹⁰ It assumes, moreover, that people usually adopt the values, beliefs and practices¹¹ characteristic of the nation or ethnic group they belong to and that, as a consequence, people from different nations or ethnic groups will on average display different values, beliefs and practices.¹² As the differences are statistical, this is perfectly compatible both with a considerable degree of individual variation among people from one country and with a considerable overlap between people from different countries. Still, the notion of culture at work here is obviously a rather conservative one: ‘cultures’ are individuated geographically or geopolitically, people are thought to belong exclusively (or primarily) to one culture, and cultural influences are thought of as *long-term influences* that shape the thoughts and habits of people over the course of many years. The *second strategy* may seem on first sight to rely on a more flexible, less static conception of culture; in particular, it seems to do more justice

7 For the first strategy, see Adams *et al* (2009); Adams *et al* (2010); Aron *et al* (2010); Cheon *et al* (2011); Chiao *et al* (2009b); de Greck *et al* (2012); Freeman *et al* (2009); Goh *et al* (2007, 2010, 2011); Goto *et al* (2010); Gutchess *et al* (2006, 2010); Hedden *et al* (2008); Han *et al* (2011); Jenkins *et al* (2010); Kobayashi *et al* (2006, 2007); Lewis *et al* (2008); Na and Kitayama (2011); Sui *et al* (2009); Zhu *et al* (2007); for the second strategy see Ishii *et al* (2010); Ray *et al* (2010); for the third strategy, see Chiao *et al* (2009a); Harada *et al* (2010); Lin *et al* (2008); Ng *et al* (2010); Sui and Han (2007); Sui *et al* (2012). (Note, however, that Adams *et al*, 2009 does not really fit our description above as the comparison was really between participants (both American and Japanese) who watched *own*-culture faces and participants (both American and Japanese) who watched *other*-culture faces, not between participants from different cultural backgrounds. The same holds true in principle for Adams *et al* (2010), but here some elements of intercultural comparison were included.)

8 Cf. Oyserman *et al* (2002).

9 The connection between views of culture and preferred methodologies is also stressed by Dov Cohen (2007, p. 205), although his analysis of the connection is slightly different from ours.

10 Critical discussion of the concept of ethnicity that is at work here would require a separate article. For the purpose of this article, we use the term as it is used in the literature we are reviewing, without any commitment to its viability.

11 Not every researcher talks about ‘values, beliefs and practices’, of course; we will use Chiao’s trichotomy here as a convenient shorthand for the aspects of culture cultural psychologists and cultural neuroscientists purport to study.

12 Provided, of course, they have been living in the country in question for a sufficiently long time, or share their daily life with other members of their ethnic group (there is no ambiguity in the literature concerning the essentially *social* transmission of cultural values, beliefs and practices).



to individual differences. In fact, however, this advantage is bought at a price that renders it problematic for the intended purpose, for the variable 'culture' is not just operationalized in a different way, it heavily relies on the idea that culture is accurately measured by norms or ideas that people express in questionnaires. Here the danger is that culture is reduced to ideas in the head of individuals. The *third strategy*, which is also the most recent one, relies on a popular method from social cognition research: research subjects are exposed to stimuli that are supposed to activate certain networks of knowledge (here: cultural knowledge) before they fulfill the experiment-specific task. The guiding assumption is that priming can serve as an experimental analog of cultural context by influencing the subjects' behaviour in either of two or more pre-defined directions. According to Yin-yi Hong, one of the pioneers of priming studies in cultural psychology, 'the causal potential of culture resides in the activation and cognitive accessibility of the networks of shared knowledge in a cultural group' (Hong, 2009, p. 7; cf. Hong *et al*, 2000; Hong and Chiu, 2001). Individuals, in turn, are not just 'passive recipients of their cultural environment'; instead, they 'flexibly shift their responses and use culture as a cognitive resource for grasping their experiences' (op.cit.: p. 9). With regard to the second question (how are individuals shaped by their cultural surroundings?), priming studies obviously differ from studies that compare subjects from different countries in that they conceptualize culture as something that can and has to be made salient in a certain context. With regard to the first question (which social entities have culture?), the answer is less clear-cut, not least because there are two different types of priming studies. The first type, developed by Hong *et al* (2000), uses so-called 'cultural icons' to activate culture-specific knowledge.¹³ As these icons turn out to be national symbols such as the American flag or the Chinese dragon, however, the implicit equation of 'culture' with 'national culture' or 'ethnic culture' characteristic of country comparison studies is effectively maintained. Cultural icon priming conceptualizes the relation between an individual and his or her surrounding culture in a more flexible manner than conventional studies, but it does not challenge the general assumption that, on the *social* level, it is nations or ethnic groups that should serve as the natural units for the study of culture. The second type of priming studies, mainly associated with Daphna Oyserman and her colleagues (cf. Oyserman and Lee, 2007, 2008; Oyserman and Sorensen, 2009), is different in this respect.¹⁴ Instead of relying on cultural icons, these studies directly try to prime certain cultural dimensions such as individualism/collectivism with the help of specific tasks (for example, the 'pronoun circling task', which requires subjects to circle either the pronoun 'I' or the pronoun 'we' in a short story). Here the link between nation and culture is severed, but the question whether the priming procedure has any similarity to real-life cultural influences becomes even more acute.

As to the nations/ethnic groups that have actually been studied by the methods described so far, even stronger presuppositions about the distribution of cultural patterns come to the fore. So far, cultural neuroscience has focussed mainly on East–West differences, with research subjects usually coming from East Asian countries such as China, Japan, Hong Kong or Singapore, on one hand, and from the United States, on the other. Even more striking is

13 For an example from cultural neuroscience, see Ng *et al* (2010).

14 These types of priming studies seem to be more popular among cultural neuroscientists than the first one (see Chiao *et al*, 2009a; Harada *et al*, 2010; Lin *et al*, 2008; Sui and Han, 2007).

the almost exclusive reliance on a highly limited number of basic constructs: Two-thirds of the studies we found relate their findings to country-level or individual-level differences in ‘individualism’ (or independence) and ‘collectivism’ (or interdependence).¹⁵ A second pair of constructs frequently referred to in the cultural neuroscience literature is ‘holistic’ versus ‘analytic’ cognition,¹⁶ but as cognitive style is treated by most writers as a consequence of social orientation (that is, individualism/collectivism), this is not really an independent dimension. Taken together, ‘individualism/collectivism’, ‘independence/interdependence’ and ‘analytic/holistic cognition’ were used as explanatory constructs by four out of five of the cultural neuroscience studies we reviewed for this article.¹⁷ What Adam B. Cohen (2009, p. 194) has recently observed about cultural psychology seems to be equally true – or even more so – for cultural neuroscience: ‘A person reading these literatures could be excused for concluding that there is a very small number of cultural identities (North American vs East or Southeast Asian), that vary principally on the dimensions of individualism-collectivism or independent-interdependent self-construal’.

In sum, then, our review of current research in cultural neuroscience confirms that the study by Zhu *et al* (2007) mentioned in the introduction is far from exceptional, but can be taken as representing the ‘mainstream’ of cultural neuroscience as a newly emerging field of research (with the important qualification that the majority of writers avoid blunt talk of a ‘Western self’ and an ‘Eastern self’, expressing themselves much more cautiously).¹⁸ Given these results, one might be tempted to argue that cultural neuroscience’s main problem is its one-sided research focus, ignoring the ‘many forms of culture’ that Cohen has rightly drawn attention to (*op.cit.*). One might also deplore the tendency to equate, or at least not to properly distinguish, culture, nationality and ethnicity, and the lack of reflection on cultural neuroscience’s possible role in reproducing well-established cultural clichés. And one might point to the unfortunate history of contrasting ‘Eastern’ and ‘Western’ mentalities which has come to be denounced as a form of ‘orientalism’ (or ‘occidentalism’, as far as the reverse pattern is concerned), or express worries about new forms of identity politics.

We share these concerns, and are broadly sympathetic with criticisms of cultural neuroscience from anthropology and the social sciences along the lines suggested above.¹⁹ In this

15 Aron *et al* (2010); Chiao *et al* (2009a,b); de Greck *et al* (2012); Goh *et al* (2010); Goto *et al* (2010); Gutchess *et al* (2006, 2010); Harada *et al* (2010); Hedden *et al* (2008); Ishii *et al* (2010); Lewis *et al* (2008); Lin *et al* (2008); Na and Kitayama (2011); Ng *et al* (2010); Ray *et al* (2010); Sui and Han (2007); Sui *et al* (2009, 2012); Zhu *et al* (2007). The two pairs of constructs (individualism/collectivism and independence/interdependence) actually have different origins and slightly different meanings (the first being mainly associated with research conducted by Geert Hofstede, Harry Triandis and others, the second going back to Hazel Rose Markus and Shinobu Kitayama), but as most cultural psychologists tend to use them interchangeably, we put this complication aside here (cf. Hofstede, 1980; Markus and Kitayama, 1991; Triandis, 1995).

16 Aron *et al* (2010); Goh *et al* (2007, 2010, 2011); Goto *et al* (2010); Jenkins *et al* (2010); Lewis *et al* (2008). For analytic and holistic cognition more generally, see Nisbett (2003); Nisbett *et al* (2001).

17 Exceptions were Adams *et al* (2009, 2010); Freeman *et al* (2009); Han *et al* (2011); Kobayashi *et al* (2006, 2007). The bias is noted and discussed by cultural neuroscientists themselves (cf. Kitayama, 2010; Kitayama and Uskul, 2011).

18 Interestingly, the research design by Zhu and colleagues is also the only one so far that has been adapted to fit the requirements of all of the three basic strategies for cultural comparison described above: Zhu and colleagues relied on the first strategy, Ray and colleagues (2010) on the second, Ng and colleagues (2010) on the third.



article, however, we want to adopt a slightly different approach. As we have stressed above, cultural neuroscience has developed out of cultural psychology, and has inherited the theories, methods and research priorities of its parent discipline. To understand cultural neuroscience's peculiarities, and arrive at a nuanced assessment of its advantages and disadvantages as a way of studying culture, a closer look at debates and developments in cultural psychology is indispensable. This strategy lends itself to a critical discussion of cultural neuroscience all the more as the latter is heavily indebted to a very particular, but highly influential branch of research in cultural psychology initiated more or less by a single article: Markus and Kitayama's (1991) 'Culture and the self: Implications for cognition, emotion and motivation'. In the following section, we are going to trace how Markus' and Kitayama's thesis of an 'independent' Western self-construal and an 'interdependent' Eastern self-construal has inspired and shaped subsequent debates within cultural psychology and, eventually, cultural neuroscience. Our main focus will again be on the way 'culture' is conceptualized by the writers in question, and how they have responded to challenges concerning the adequacy of their approach. As we hope to demonstrate, many of the criticisms that might be levelled against cultural neuroscience have already been addressed within cultural psychology, rendering cultural psychology-cum-neuroscience well equipped to deal with these problems.

Culture between Anthropology, Psychology and Neuroscience

'Independence' and 'interdependence' as core constructs in cultural psychology

The notions of 'interdependent self-construal' and 'independent self-construal' have originally been introduced by Markus and Kitayama in an attempt to account for a variety of empirically established psychological differences between people from Western and East Asian cultural backgrounds. Their argument in 'Culture and the self' is based on the general assumption that people from different cultures 'may hold strikingly divergent construals of the self, others and the interdependence between the two', and that such construals 'can influence, and in many cases determine, the very nature of individual experience' (Markus and Kitayama, 1991, p. 224). Building on earlier research by Markus and others, they conceptualize these construals of self and other as 'part of a repertoire of self-relevant schemata used to evaluate, organize and regulate one's experience and action' (Markus and Kitayama, 1991, p. 229) or, for short, as part of a person's self-system (op.cit.: p. 230). The terms 'independence' and 'interdependence' are used by Markus and Kitayama to draw attention to a particular variation in self-construals across cultures which they hypothesized to be highly relevant for the organization of many self-relevant processes: the degree to which people 'see themselves as *separate* from others or as *connected* with others' (op.cit.: p. 226). According to Markus and Kitayama, construals of the self as either independent or interdependent are tied to implicit, normative tasks that cultures

19 Cf. Choudhury *et al* (2009); Roepstorff (2011); Roepstorff and Vogeley (2009). There is also the more general problem, noted by many critics of the 'neuro-hype', that neuroscientists tend to suppose the ontological primacy of the brain. As neurological reductionism is not peculiar to cultural neuroscience, however, and might even be less common there than in other neuro-disciplines (cultural neuroscientists love to talk about the 'mutual constitution' of culture, mind and brain, thus committing themselves, at least verbally, to an anti-reductionist agenda), we do not pursue this issue further in this article.

hold for what people should be doing in their lives (op.cit.: p. 224). In some cultures, the normative imperative is to become independent of others, that is, to be unique, express oneself, realize one's own internal attributes, promote one's own goals and be direct (say what's on your mind) (op.cit.: p. 230). In other cultures, the normative imperative is to maintain interdependence with others, that is, to fit in, occupy one's proper place, engage in appropriate actions, promote others' goals and be indirect (read other's minds) (loc.cit.). Within this model of the relation between culture and the mind, a person's self-construal is the part of his or her psychological system that 'mediates' between culture and the person's experience and behaviour. As there is no culture-independent self, but only a host of culturally conditioned self-schemata, and since these self-schemata or self-construals shape cognition, emotion and motivation, many of the most basic psychological processes may be expected to display culture-specific variations.

As our brief summary should have made clear, the concepts of independence and interdependence were never meant by Markus and Kitayama to stand for fixed personality traits, but for cognitive schemata that people acquire by engaging with their respective cultural contexts. Still, the central notion of culture itself was not defined or even discussed in their 1991 article. The authors' exclusive focus on Japan and the United States as paradigm examples of Eastern and Western cultural contexts may have further tempted careless readers to conclude that Japanese are 'just like this' (that is, interdependent) and Americans 'just like that' (that is, independent).²⁰ In the years to follow, Markus and Kitayama have not only elaborated upon their original ideas, but also tried to clarify and defend them against misunderstandings and criticism (cf. Adams and Markus, 2001; Kitayama, 2002; Markus and Kitayama, 2003a, 2010; Kitayama *et al.*, 2007; Markus and Hamedani, 2007). One may even go so far as to claim that the main significance of their ideas lies in the more general debates about culture and psychology to which they have given rise. In the course of these debates, progress has been achieved with respect to at least two important issues: the concept of culture and the aims of cultural psychology.

'Essentializing, dichotomizing, homogenizing and orientaling'?

When Markus and Kitayama (2003a, p. 282) were asked to reflect on the origin and development of their work on culture and the self, they referred to the many critics who had accused them – as they put it – 'of multiple and repeated acts of essentializing, dichotomizing, homogenizing and orientaling'. They did not give any examples to substantiate this claim, but browsing through some of the more recent publications on independence and interdependence, and on cultural psychology more general, one can easily recognize the traces of the debates that Markus and Kitayama have been alluding to. Indeed, a widespread, although somewhat belated awareness of the difficulties of culture theorizing seems to have taken hold of the field at the turn of the millennium. The crisis of the culture concept in anthropology, described rather eloquently by Richard Shweder (2001), has also left its mark upon cultural psychology. The focus of (self-)criticism has been slightly different, however. While anthropologists, in the wake of the 'writing culture' debate, have mainly worried

20 Markus and Kitayama (1991, p. 225) have stressed that the interdependent view is not only characteristic of Asian cultures, but of African, Latin American and many Southern European cultures as well, but they have hardly ever paid attention to these cultural contexts in their own work.



about the problem of ethnographic representation (cf. Clifford and Marcus, 1986), cultural psychologists have discussed the potential fallacies of culture research in terms of 'essentialism', or even reduced them to the familiar issue of 'stereotyping' (cf. Hermans and Kempen, 1998; Matsumoto, 1999; Adams and Markus, 2001, 2004; Hermans, 2001; Matsumoto and Jones, 2008).

It would be too much here to rehearse these debates in detail, but a short look at some of the ways in which Markus and Kitayama have defended their approach may be helpful for dealing with similar issues in cultural neuroscience. Hazel Rose Markus, in particular, has taken care to show that the notion of culture which their research is based on satisfies the demands on a 'conception of culture suitable for a social psychology of culture' (Adams and Markus, 2004). In their introductory chapter to the *Handbook of Cultural Psychology*, Markus and Hamedani (2007, p. 11) identify the failure to articulate a definition of 'culture' or 'the sociocultural' that fits the idea of mutual constitution as one of the formidable stumbling blocks on the road to a sociocultural psychology. 'Without specific definitions', they complain, 'most observers, laypersons and social scientists alike have gravitated towards the simple and widely distributed idea of culture as a collection of traits that define particular groups or collections of people. The commonsense idea reflected here is that a group is like a big person, and that "culture" is the group's "personality" or "character"' (loc.cit.). Drawing on two former articles by Glenn Adams and Hazel Rose Markus, the authors claim that the tendency to equate 'culture' with 'group' is the consequence of an *entity conception of culture* (loc.cit; cf. Adams and Markus, 2001, 2004; Kitayama, 2002). According to Adams and Markus (2001, p. 286), an entity conception of culture is evident in phrases like 'members of culture X' as well as in the practice of using 'culture' synonymously with 'society', 'nation' or 'ethnicity' and it promotes a 'static, essentializing, stereotype-prone account of cultural difference'. As a less reifying alternative, they propose a conception of *culture as patterns* (loc.cit.; cf. also Adams and Markus, 2004; Markus and Hamedani, 2007). More precisely, culture is defined as *patterns of representations, actions and artefacts that are distributed or spread by social interaction* (Markus and Hamedani, 2007, p. 11; cf. Markus and Kitayama, 2010, p. 422). 'With this definition', Markus and Kitayama (2010, p. 422) write, 'the emphasis in the study of culture and self is not on studying culture as collections of people – the Japanese, the Americans, the Whites, the Latinos – but is instead on how psychological processes may be implicitly and explicitly shaped by the worlds, contexts, or sociocultural systems that people inhabit'.²¹

By making the concept of 'pattern' central to their definition of culture, Adams and Markus place themselves in a venerable tradition. Within the US–American context they are working in, the study of culture has traditionally been seen as falling into the competence of anthropologists. Anthropologists, in turn, though they have never been able to agree on a single definition of culture, have tended to give a privileged place to a now-classical proposal by A. L. Kroeber and Clyde Kluckhohn. Culture, they maintain, 'consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artefacts; the essential core of

21 Similar attempts to salvage the culture concept by discarding unwelcome connotations such as boundedness, homogeneity, coherence and stability, thus effectively blocking the transformation of culture into a 'thing' or an 'essence', can be found among anthropologists, too (cf. Brumann, 1999).

culture consists of traditional (that is, historically derived and selected) ideas and especially their attached values' (Kroeber and Kluckhohn, 1952, p. 357). Richard Shweder (2001, p. 3152), one of the founding fathers of modern cultural psychology²², has referred to the Kroeber-Kluckhohn view as 'the "standard view" of culture in North American anthropology'. Adams' and Markus' definition of culture, which is presented as an abbreviated version of the Kroeber-Kluckhohn one, thus reflects the anthropological mainstream of the second half of the twentieth century. More interestingly, however, it is also well in touch with more recent developments in anthropology and the social sciences more generally. With its explicit reference to symbols, the Kroeber-Kluckhohn definition may be said to have anticipated Clifford Geertz' (1973, p. 89) semiotic conception of culture as 'historically transmitted pattern of meanings embodied in symbols, a system of inherited conceptions expressed in symbolic form by means of which men communicate, perpetuate, and develop their knowledge about and attitudes towards life'. According to Geertz' famous formulation, 'man is an animal suspended in webs of significance he himself has spun', with culture being those webs, and the analysis of culture 'not an experimental science in search of law but an interpretive one in search of meaning' (op.cit.: p. 5). Geertz' meaning-centred conception of culture has been highly influential not only within anthropology, but within the social sciences and humanities more generally. It has strongly been advocated by Shweder (2007) as a model for cultural psychology (cf. Shweder and LeVine, 1984), and emphatically embraced by cultural psychologists such as Michael Cole (1996) and Joan G. Miller (1984, 1999, 2002). Markus and her colleagues, too, insist on the relevance of 'meaning making' as a 'basic process' (Markus and Hamedani, 2007, p. 8; cf. also Adams and Markus, 2004), expressing their allegiance to the reorientation initiated by Geertz. Surprising as it might seem on first sight, the constructs of 'independence' and 'interdependence', which dominate research in cultural neuroscience, have their origins in intellectual developments which are closely connected to the so-called 'interpretive turn' in the social sciences and humanities. Research on 'independence' and 'interdependence' may be seen as an attempt to draw the consequences of a meaning-based conception of culture for the understanding of basic psychological processes.²³ Although it is largely conducted with traditional experimental methods, using quantitative or semi-quantitative designs (thus fitting Geertz' description of an 'experimental science in search of law' much better than that of an 'interpretive science in search of meaning'), its focus is on the way in which basic interpretive schemata – schemata that people use to make sense of their most elementary experiences – influence cognition, emotion and motivation.²⁴

Turning back to the definition of culture proposed by Adams and Markus, we may note that it is not only well attuned to the requirements of interdisciplinary discussions, but also has a number of other distinct advantages: Because it allows one to think of cultural involvement as engagement with cultural patterns, rather than as membership in a cultural

22 'Cultural psychology', in the sense in which the term is used here, is distinguished by its proponents both from 'cross-cultural psychology' with its search for hidden universals and from 'indigenous psychology' (cf. Greenfield, 2000).

23 In recent years, Markus and Kitayama (2003b) have developed a second pair of constructs closely related to their original one: that of 'disjoint' versus 'conjoint' agency.

24 This is not to say, of course, that the concepts of 'independence' and 'interdependence' are not frequently used in an essentializing fashion by researchers working with a less sophisticated theoretical framework. As we have tried to show in the section "Independence" and "interdependence" as core constructs in cultural psychology', though, this is not how they were originally intended.



group, it is more hospitable to the idea of multicultural identities (cf. Adams and Markus, 2001, p. 287ff.). Moreover, a conception of culture as 'patterns of representations, actions and artefacts' stresses the fact that culture is not just in the 'head' of people. It shifts the conceptual locus of culture 'from the interior of a person to the often-implicit patterns that exist simultaneously in people and in the world with which they necessarily engage in the course of any behaviour' (Markus and Hamedani, 2007, p. 11; cf. Markus and Kitayama, 2010, p. 422) – a clarification that is of particular importance for a brain-centred discipline such as cultural neuroscience. Finally, the contention that culture is 'distributed or spread by social interaction' may serve as a useful reminder of the fact that particular cultural patterns are bound to travel wherever social interaction occurs, and hence to cross all kind of boundaries. This point, even if it is not expressly noted by Markus and her colleagues, may be of particular significance when it comes to the difficult issue of cultural identity, especially in relation to national identity and ethnic identity.

From culture mapping to process models of cultural influence

The charge of essentialism has not only led to clarifications of the culture concept, it has also contributed to a development within cultural psychology that, as we are going to argue, is of particular interest for cultural neuroscience. Attempting to dissociate themselves from a static, essentialist conception of culture, cultural psychologists have increasingly turned their attention to the dynamic side of culture, that is, to the *processes* by which culture shapes the mind and vice versa. Processes, however, call for explanations. And indeed, cultural psychology seems to have adopted a more systematic, theoretical stance in recent years. This shift in emphasis is neatly captured by the subtitle of a recent essay by Yin-yi Hong (2009), 'Moving from describing culture to explaining culture', and is also evident in calls for a new stage of cross-cultural research (Heine and Norenzayan, 2006; Matsumoto and Yoo, 2006) and in an increasing focus on the question of *how* culture matters (cf. Oyserman and Sorensen, 2009). Kitayama and Imada's (2010, p. 189) contention that 'what is required is a more elaborate process model connecting culture to psychology, and vice versa' links the 'how' question to the need for developing *models*, a subject that is again echoed by several authors (cf. Oyserman and Lee, 2007; Oyserman and Sorensen, 2009).

The call for models that try to capture the 'how' of cultural influence has already given rise to a number of different proposals such as Kitayama and colleagues' 'cultural task analysis' (Kitayama *et al*, 2009; Kitayama and Imada, 2010), Yin-yi Hong and colleagues' 'dynamic constructivist approach' (cf. Hong *et al*, 2000; Hong, 2009) and Daphna Oyserman and colleagues' 'situated cognition model' (cf. Oyserman and Lee, 2007; Oyserman and Sorensen, 2009; Oyserman, 2011). Each of these models has been developed on the basis of empirical research that has made use of one of the three strategies for cultural comparison described above.²⁵ Given the fact that certain assumptions about the way culture and the mind interact are already implicit in the strategies themselves, this is not particularly surprising. By making these assumptions explicit, however, they may be tested and, if necessary, revised. Competition between different models, moreover, automatically exerts some pressure in the direction of increased conceptual and methodological refinement. As far as we can judge, the

25 Kitayama and colleagues tend to work with refined versions of the first and second strategies, whereas both Hong and Oyserman and their respective research teams make use of priming techniques (as explained above).

benefits of these efforts are already discernable in a more reflective, self-conscious way of culture theorizing in cultural psychology.²⁶ What is of particular interest within our present context, however, is the fact that the ‘how’ question cannot be answered without reference to the brain. One does not need to subscribe to the questionable claim that what’s going on at the neural level is more ‘real’ or more ‘fundamental’ than what’s going on at the mental level in order to see that the former needs to be included in any comprehensive explanation of processes and mechanisms by which culture shapes cognition, emotion and motivation. In this way, the recent shift of emphasis in cultural psychology from results (that is, differences in psychological functioning) to processes may not only serve as an antidote to the reification of cultural differences, but establish a natural point of contact between cultural psychology and neuroscience. If neuroscience measures should indeed prove to be ‘indispensable for theory building’, as Kitayama and Tompson (2010, p. 97ff.) maintain, this is most likely to happen in a context where ‘theory building’ is actually going on.

The Culture of Cultural Neuroscience and Three Proposals for a ‘Truly Cultural Cultural Neuroscience’

Our excursion into the field of cultural psychology has already provided at least a partial answer to the question, ‘how cultural is cultural neuroscience?’ As should have become clear, we are convinced that there are opportunities for cultural neuroscience beyond ‘West Brain, East Brain’ constructions – and below overblown aims such as ‘merging the natural and social sciences’.

In this last section, we are going to summarize and complement our observations in the form of some proposals which – if heeded by all practitioners of cultural neuroscience – would do much to disperse the worries given voice to in the introduction and render cultural neuroscience truly deserving of its name.

The culture of ‘cultural neuroscience’

At the beginning of the article, we asked what kinds of results yield studies in cultural neuroscience in respect to culture? In respect to these results, one of the main contentions was the reification of cultural differences epitomized in the predominantly used differences between people of the West and people of the East. The *Newsweek* article cited at the beginning argued that way, assuming that cultural neuroscience aims to demonstrate that cultural differences which are well established in behavioural experiments are even more ‘fundamental’ because of their neural correlates. The more sophisticated theoretical interpretations in the field, however, argue exactly the other way round in that these neural correlates of cultural processes prove the flexibility of the organization of the brain as a result of the different cultural environment. From this perspective, cultural neuroscience can contribute to knowledge of the ways in which culture influences emotion, cognition and behaviour. Kitayama’s cultural task analysis, for example, can be seen here as a case in point. In addition, the studies of Oyserman and Lee show how culture can be conceptualized as a flexible framing process of individual behaviour and perceptions.

26 Cf. again the articles quoted above.



Our second question focuses especially on the point of how culture is conceptualized within cultural neuroscience and cultural psychology? The problematic conceptualization of culture in cultural neuroscience, in social sciences called 'groupism', sees culture as 'something a group has'. Here, the *prima facie* equalization of culture with a nation, an ethnic group or the new invented continental groups, bears the pitfall of interpreting cultural differences as based on biologically determined group membership; a line of reasoning dangerously close to racism. In this case as well, more enlightened research in cultural neuroscience and cultural psychology argues that the constitution of a group is a cultural phenomenon in itself. By introducing culture as a pattern or meaning structure that controls the perception of the actor, cultural neuroscience recognizes the phenomenon of groupism as something an actor constructs in a given situation. The aim of cultural neuroscience is not – or at least should not be – to describe 'the neural basis of group culture' but to depict how culturally constructed groups structure emotion and cognition and behaviour as well as their neural correlates.

Three proposals for a truly cultural 'cultural neuroscience'

These thoughts lead to the question, what might be a good way to define and use the term culture? From our point of view, three proposals can be made to strengthen the cultural within the project of 'cultural neuroscience'.

First, researchers should avoid giving the impression that cultural neuroscience is about exploring cultural differences in neural functioning *as such*. Differences in neural pathways that can be related to culturally conditioned differences in behaviour may be the most tangible result of cultural neuroimaging studies, especially as they can be neatly visualized in the form of brain pictures. Still, taken in themselves, they are of little value, at least if the aim is to gain a better understanding of culture. The problem here is not so much that cultural differences are not a legitimate subject of research in themselves. The point is rather that the study of these differences in cultural patterns or meaning structures requires more holistic, for example, ethnographic methods, together with a keen awareness of the potential pitfalls of ethnographic representation, if it is to amount to something more than mere stereotyping. Experimental disciplines such as psychology and neuroscience, by contrast, need to break down the complexities of real-world phenomena until they are ready to be studied in the laboratory. Hence, whatever behavioural differences cultural neuroscientists may succeed in tracing to the brain will *inevitably* seem rather crude. Cultural neuroscientists would be well advised to acknowledge the limits inherent in their method and to put as little emphasis on the descriptive (as opposed to the explanatory) aspect of their work as possible.²⁷ Instead, they should concentrate on what may be seen as the greatest strength of their approach: the ability to study the mechanisms and processes by which culture, mind and brain interact. In our view, data from cross-cultural neuroimaging might be most profitably used (to paraphrase Kitayama and Imada's remark about cultural psychology) for the

27 This way of describing the contrast is obviously inspired by the well-known idea that the province of the humanities (or *Geisteswissenschaften*) is 'understanding', while the province of the sciences is 'explanation'. In other words, the 'division of labour' between the disciplines referred to by Kitayama and Tompson (2010, p. 98) is methodological, and nothing that needs to be 'overcome' (cf. loc.cit.). Both approaches – the descriptive-hermeneutical and the explanatory – have their distinct advantages as well as their limits.

construction of process models connecting culture to the brain and vice versa. On the basis of these models, new hypotheses could be formulated and tested by further empirical research, thus leading to a refinement of the original models and so on.²⁸ In this way, cultural neuroscience might provide new insights into cultural learning processes (in the broadest sense of the word), that is, into the modes of acquisition of interpretative schemata such as ‘independence’ and ‘interdependence’.

Second, as we have already emphasized in the previous section, models inevitably rely on simplifications. Still, to avoid questionable *oversimplifications*, some minimal standards for the conceptualization of culture should be observed. These include the need (i) to avoid confusions between ‘culture’, ‘ethnicity’ and ‘nationality’, (ii) to leave conceptual space for phenomena of multiculturalism and hybridity and (iii) to pay attention to the material and social side of culture. As we have argued above, Markus’ definition of culture as ‘patterns of representations, actions, and artefacts that are distributed or spread by social interaction’ (Markus and Hamedani, 2007, p. 11) is helpful with respect to all of these issues. Taking the conception of culture as patterns seriously would require researchers to reflect more consciously upon their sampling strategy, and to justify their criterion with reference to the cultural pattern in question and to its likely distribution, instead of just comparing people from different countries or ethnic groups. It would also remind them that cultural identities are complex: People may engage with various cultural patterns in the course of their life, and originally distinct cultural patterns may be combined in various ways. Finally, the reference to ‘actions and artefacts’ emphasizes the fact that culture is not just ‘in the head’, but ‘in the world’ as well – a fact that neuroscientists and cognitive psychologists easily lose sight of.²⁹

Third, cultural psychologists, and cultural neuroscientists in their wake, tend to assume that ‘culture is to men what water is to fish’, that is, they expect people to be shaped by their cultural contexts even if they are completely unaware of these processes themselves. Cultural patterns, however, do not always remain imperceptible to those who engage with them. To the extent that they become explicit, they will inevitably interact with processes of identity formation. This may have the paradoxical consequence that, even if the actual trajectories for the dissemination of cultural values, beliefs and practices are highly complex and defy the boundaries of nations or ethnic groups, people may still conceive of their own cultural identity primarily in terms of membership in an established cultural group. Culture, in other words, may become ‘essentialized’ and ‘homogenized’ by cultural agents themselves who carve up the social space into discrete cultural groups and categorize people accordingly. Rituals and symbols that make a collective’s presumed cultural affiliation salient may further contribute to the solidifying of cultural identities. In the end, ‘Chinese culture’ and ‘American culture’ may exist just because people believe them to exist and because, as a famous sociological theorem has it, ‘[i]f men define situations as real, they are real in their consequences’.³⁰ For cultural psychology and cultural neuroscience, this means that the study of the mutual constitution of culture and the mind, or of culture, mind, brain and

28 A first step in this direction has already been taken with the development of the ‘neuro-culture interaction model’ by Kitayama and colleagues (Kitayama and Park, 2010; Kitayama and Tompson, 2010; Kitayama and Uskul, 2011).

29 A well-known expert on social cognition, in an article about cultural neuroscience, has even claimed that culture is ‘stored in people’s brains’ (Ames and Fiske, 2010, p. 72).



genes, has always to be supplemented by the study of social identity processes. Within cultural psychology, the need to follow this dual track is increasingly acknowledged (cf. Hong *et al*, 2007; Markus and Hamedani, 2007, p. 29f.; Hong, 2009, p. 18). In our mind, cultural neuroscience, too, would benefit by broadening its focus of research to include questions of identity formation that are traditionally dealt with by social psychologists.

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About the Authors

Ruth Denkhaus is a Research Assistant at the Chair of Theological Ethics at Friedrich-Alexander Universität Erlangen-Nürnberg and a former member of the German Research Foundation's graduate program 'Bioethics'. She was involved in the research project 'Cultural Neuroscience: Neural processes, social interaction and societal conflicts' from 2009 to 2010.

Mathias Bös is a Professor of Applied Sociology at the University of Marburg. He was a Research Assistant and Lecturer at the Universities of Frankfurt and Heidelberg. He has been a member of the research project 'Cultural Neuroscience: Neural processes, social interaction and societal conflicts' in Marburg, since 2009.

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30 Thomas and Thomas (1928, p. 572). Adams and Markus (2001, p. 291) draw attention to the same fact when they argue that 'the reification of culture into group entities is often not illusory but is present in the structure of worlds that individuals inherit'.

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Appendix

Original Research Papers Included in our Overview of 'Current Research in Cultural Neuroscience'

- Adams Jr, R.B. *et al* (2009) Cross-cultural reading the mind in the eyes: An fMRI investigation. *Journal of Cognitive Neuroscience* 22(1): 97–108.
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