



# What can cognitive neuroscience do for cultural sociology?

Omar Lizardo<sup>1</sup> · Brandon Sepulvado<sup>2</sup> · Dustin S. Stoltz<sup>2</sup> · Marshall A. Taylor<sup>3</sup>

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## Abstract

Can cognitive neuroscience contribute to cultural sociology? We argue that it can, but to profit from such contributions requires developing coherent positions at the level of ontology and coherent epistemological views concerning interfield relations in science. In this paper, we carve out a coherent position that makes sense for cultural sociology based on Sperber's "infra-individualist" and Clark's "extended cognition" arguments. More substantively, we take on three canonical topics in cultural sociology: language, intersubjectivity, and associational links between elements, showing that the cognitive neurosciences can make conceptual and empirical contributions to the thinking of cultural sociologists in these areas. We conclude by outlining the opportunities for further development of work at the intersection of cultural sociology and the cognitive neurosciences.

**Keywords** Neuroscience · Sociology · Mirror neurons · Language · Embodiment · Binding

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✉ Omar Lizardo  
olizardo@soc.ucla.edu

Brandon Sepulvado  
bsepulva@nd.edu

Dustin S. Stoltz  
dstoltz@nd.edu

Marshall A. Taylor  
mtaylor2@nmsu.edu

<sup>1</sup> Department of Sociology, UCLA, 375 Portola Plaza, 264 Haines Hall, Los Angeles, CA 90095-1551, USA

<sup>2</sup> Department of Sociology, University of Notre Dame, Jenkins Nanovic Hall, Notre Dame, IN 46556, USA

<sup>3</sup> Department of Sociology, New Mexico State University, 292B Science Hall, 1290 Frenger Mall, Las Cruces, NM 88003, USA



## Can cultural sociology play with neuroscience?

Rather than being a new issue spurred by recent theoretical (e.g., Damasio 1994, 1999; Edelman 1992) or technological (e.g., fMRI studies) developments, whether there can (or should) be a relationship between sociology and cognitive neuroscience has been central to the definition, demarcation, and development of the sociological project since its inception. This has been especially the case in the French, British, and American disciplinary offshoots given their more explicit commitment to naturalism vis-a-vis their German counterpart (Turner 2007). Most of the founding figures of French and American sociology, as well as the American pragmatists and institutional economists, grappled with issues of relevance to the interface between sociology and cognitive neuroscience (Boudon 2011; Clément 2011).

For instance, throughout their careers, Durkheim and Mauss were interested in the relationship between the social and the cognitive (Ignatow 2012; Lizardo 2009b). Tarde used insights from psychology to understand how beliefs, desires, and practices propagated in society (Turner 2007). Mead developed an account of the origins of significant symbols with a firm grounding in developmental and comparative psychology and Darwinian naturalism (Mead 1922). Veblen grappled with the implausible psychological assumptions of neoclassical economists (Veblen 1898). Using the concept of “the double consciousness,” Du Bois (1897) famously articulated the psychological consequences of “being a problem.” Pareto was interested in the affective (non-logical) influences in human action, and even Weber considered sociology to be predicated upon investigations of actors’ subjective meanings and the assignment thereof to other components of action (Turner and Factor 1994, pp. 48–67).

What is unique to the most recent iteration of the cognitive neuroscience/sociology conversation is that our version of this debate is being spurred by theoretical and empirical developments within a particular subfield in sociology (at least in the U.S.) under the auspices of cultural sociology or cultural theory broadly conceived (Lizardo 2015, 2016b). Within this umbrella, a group of scholars with an explicit interest in culture and cognition studies has tackled fundamental theoretical issues in a way open to integrating neuroscientific insights (Cerulo 2010; Ignatow 2007; Pitts-Taylor 2003; Vaisey 2009).

In cognitive science, the overall trend has been towards a bridging of the divide traditionally separating *psychological* and *neuroscientific* models of cognitive phenomena (e.g., Clark 1997; Damasio 1999; Edelman 1992; Thagard 2008b). While the former make use of a mentalistic vocabulary of functions, the latter focuses on “mechanistic” or structural explanations aimed at clarifying the *implementation* of mental functions on the “wetware” of the brain (Foster 2018). Today, the interfield of cognitive neuroscience is the trading zone within which psychological research meets neuroscience; the explicit goal is the development of unified theories—in terms of underlying vocabulary, structures, and processes—of the mind-brain, which would supplement, and at some point replace, explanation based on psychological descriptions of cognitive phenomena by grounding these in physical (i.e., realizable) neural mechanisms (Machamer and Sytsma 2007).



This possibility of a unified cognitive neuroscience is not philosophically neutral. Cultural sociologists interested in whether there can be a productive interdisciplinary relationship here—or even considering the possibility that insights from cognitive neuroscience may inform cultural sociology—need to clarify what the relevant philosophical commitments are. As researchers interested in substantive matters, cultural sociologists may be skeptical as to what is gained from bouts of philosophical reflection or from making what are usually implicit commitments more explicit. From our perspective, these reflexive considerations are important because they allow us to find out which positions are compatible with a productive exchange between the two fields (Lizardo 2014), thus making acceptance (or rejection) of the relevant ideas a principled affair. We begin by briefly reviewing the philosophical presuppositions at the basis of the idea that there can be a unified science of the psychological (cognitive) and the neural, and comment on which ontological and epistemic stances in cultural sociology we see as compatible with this project.<sup>1</sup>

### Philosophical stances in the cognitive neuroscience project

The primary philosophical position at the basis of the cognitive-neuroscientific project is the *psychoneural identity hypothesis* (or mind/brain identity theory): This entails that states and processes potentially describable in psychological language are (type) identical to states and processes describable in neural language (Sperber 1987, p. 106). Note that this goes beyond quasi-dualistic talk of pure correlations or “supervenience” relations between the neural and the mental. In this respect, physicalism is the main premise of a unified cognitive neuroscience. This position rests on the claim both mind and brain belong to the same ontological (physical) register. This view, ipso facto, entails a rejection of *dualism*, which is the postulation of a specifically “mental” ontological realm separate from the physical. Methodologically, this position disallows any form of explanation of mental phenomena that has to rely on “spooky” processes or entities lacking an ultimate (even if yet to be specified) grounding on physical mechanisms.

For some cultural sociologists, allegiance to physicalism may sound stronger than it is, as it may bring to mind the specter of *materialism*—an anti-culturalist position which the field has fought hard to vanquish (e.g., Alexander 1992b, 2005). Modern physicalism has little to do with the naïve forms of materialism claiming to make cultural explanation superfluous. Instead, a modern physicalist stance is perfectly compatible with a consideration of a robust role for emergent socio-cultural processes in interaction with cognitive and neuroscientific mechanisms (McCauley and Bechtel 2001).

The only commitment required by physicalism is allegiance to some form of *naturalism* (Sperber 1996, pp. 4–6). In other words, explanations in the physical, biological, cognitive, and social sciences should strive to be co-extensive and draw on the same underlying ontology (Ignatow 2014). This stance prevents making

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<sup>1</sup> For related but different attempts see Ignatow (2014) and Pitts-Taylor (2014).



explanatory recourse to entities and processes lacking a plausible grounding on the phenomena described in the natural sciences. In this respect, naturalism is incompatible with the claim that “the sciences of culture” or the “human sciences” deal with entities having no counterpart in the natural or physical world or that are not realizable by natural physical entities (Kaidesoja 2013, pp. 138–77).

One thing that naturalism and physicalism do *not* entail is *reductionism*; this is the a priori mandate to substitute talk of the properties of one set of entities (e.g., individuals) with talk about the properties of some other set entities (e.g., organizations, neighborhoods) located at a level of analysis presumed to be explanatorily privileged (e.g., the social-structural) (DiTomaso 1982). As it relates to this paper, this would entail the erroneous claim that we must describe socio-cultural properties and phenomena exclusively via the detailed properties and interactions of their “lowest” level realizers (e.g., individuals, brains, or neurons). A key roadblock for coherent dialogue along the sociology/neuroscience boundary seems to be the outdated presumption that neuroscience and related disciplines are committed to this kind of bottom-up reductionism (e.g., Duster 2006; Sawyer 2002, pp. 228–29). In sociology, this view is likely a holdover from the “Parsons Pact” (Stoltz 2018, pp. 64–66) with adjacent disciplines (e.g., Parsons 1991, pp. 153–164). But this view is mistaken as a description of the actual commitments and scientific practices of cognitive neuroscientists (Meloni 2014).

Instead, physicalism is compatible with both emergence and the postulation of phenomena at multiple nested levels. In neuroscience, these may include multiple brain systems acting in concert to produce a given experience or behavior, brain-behavior-environment “loops” accounting for some kinds of cognitive performance in an “extended cognition” framework (Clark 1997). In this last respect, cognitive neuroscientists routinely make explanatory recourse to “extracranial” processes and mechanisms including the body and its effectors, other persons, artifacts, and material and social “scaffoldings” provided in context for the realization and execution of complex sociocognitive tasks (Clark 1997; Lizardo and Strand 2010; Wood et al. 2018). These last include tasks that may require the distributed cooperation of multiple cognitive systems acting in concert (Hutchins 1995, pp. 225–228). In this respect, a lot of the phenomena of interest to both cognitive neuroscientists and cultural sociologists may be thought to partake of what Wilson (2004b, p. 989) has referred to as *wide realization*: Namely, the idea that a complex interplay of both brain-bound and extracranial processes contribute to generate the core socio-cultural phenomena, in particular, those dependent on social interaction, material artifacts, and the intersubjective coupling of multiple agents.

## The relevance of cognitive neuroscience for cultural sociology

### Interfield dependencies

We allude to these philosophical issues as a way to signal that any answer to whether cognitive neuroscience is relevant for cultural sociology entails taking coherent positions at the level of ontology and concerning the proper set of relations between



different scientific fields (Thagard 2008a, p. 7–8). This requirement harks back to fundamental issues regarding the relationship between sociology and adjacent disciplines such as psychology, issues that have plagued the field since its inception (Durkheim 1982; Parsons 1937).

For instance, any consideration of the relevance of cognitive neuroscience for cultural sociology would be moot if the analyst holds the “autonomist” position that sociology is independent from any “lower-level” analysis corresponding to individuals, persons, interaction, or minds (Black 2000). Instead, for the conversation to begin, the analyst must presuppose *interdependence* (or intersection) between cultural sociology and cognitive neuroscience (Cerulo 2010; Patterson 2014). Whether this interdependence is asymmetrical (with insights flowing from one discipline to the other) or symmetrical (with sociological work informing research on cognition and vice versa) is an important consideration but not as relevant as the first.

Our view is research and theory in cultural sociology depends on the results from cognitive neuroscience, but only in a moderately strong way. In principle (and in practice) it is possible to be an expert in cultural sociology while paying no regard to fundamental principles regarding how cognitive phenomena are realized in the brain. However, our contention is that even when claiming to research or theorize at a purely cultural level of analysis, scholars cannot get very far without making minimal assumptions about how human agents end up having ideas about the world or developing categories, memories, habits, frames, narratives, or worldviews (Bloch 2012; DiMaggio 1997; Strauss and Quinn 1997). If not overtly invited, cognitive assumptions will always sneak in through the back door (Foster 2018). Where even minimal reference to cognitive processes and constructs is pervasive in cultural sociology, then there is the possibility for a link to cognitive-neuroscientific theory.

### Novel conceptual distinctions

Whether or not this link we exploit is the analyst’s choice, our only point is that *better* cultural theory would result if the underlying cognitive-neuroscientific assumptions made by the theory are both explicit and are the ones that are most empirically plausible or have received the most support (Patterson 2014). Besides, by delving into the relevant neuroscientific literature, cultural analysts may also come across new constructs, processes, assumptions, and mechanisms they would not have thought of from the armchair (Summers-Effler 2004).

For instance, while philosophers had made distinctions between “knowing how” and “knowing that” base on conceptual analysis (e.g., Ryle 2002 [1949], pp. 25–61), it took research in the psychology and neurobiology of memory to discover that the latter category further segmented into semantic and episodic forms of knowledge, and that “how” (procedural) memory was actually a subcategory of a more inclusive form (e.g., including priming, and conditioning memory) called “nondeclarative” (Squire 2004). Thus, what had been treated as a unitary “natural kind” in the conceptual analysis tradition turned out to be a set of analytically distinct, causally heterogeneous set of entities and processes (Michaelian 2011). Cognitive Social Scientists, in their turn, have used insights from this new strand of research on memory



systems to shed light on and theorize the statics and dynamics of such prototypical cultural phenomena as religious movements, ritual, and cults (Whitehouse 2004).

In the same way, projectivity, or the ability of persons to “travel forward” in time into the future and generate plans, postulate hypothetical future scenarios, and simulate alternative courses of action has been central to theorizing in cultural sociology since Schutz (Emirbayer and Mische 1998; Tavory and Eliasoph 2013). What theorists could not have predicted from the armchair is that episodic memory (travel backward in our life timeline) and projectivity (travel forward) are actually two sub-categories of a more general “hypothetical imagining” ability subserved by the same neural circuits and sharing fundamental properties inclusive of those that allow for counterfactual reasoning more generally; if one is disrupted, so are the other ones (Suddendorf 2013). Thus, cognitive neuroscience suggests sociologists should deal with what otherwise would have been treated as “analytically distinct” processes requiring separate bodies of theory, using a single conceptual language.

Several other concepts in cultural theory, including “action,” “symbol,” “imagination,” and even the notion of “category” may be subject to a radical rethinking due to discoveries in the cognitive neurosciences (Blouw et al. 2015). We believe a cognitive neuroscientifically *informed* cultural theory is thus better and potentially more insightful and generative than one that makes unstated assumptions, or whose assumptions are wrong, outdated, or misleading.

### Settling “meta-theoretical” debates: infra-individualism

Another way cultural sociology can benefit from a deep engagement with cognitive neuroscience is that thorny “meta-theoretical” debates in cultural sociology can be replaced by more theoretically productive substantive debates capable of empirical adjudication or even conceptual transcendence (e.g., Turner 2001). For instance, during the 1980s and 1990s, a “fundamental” problem in social theory was that of the “micro–macro” link (Alexander et al. 1987). The issue concerned the relationship between levels of description with the lower level usually being thought of as composed of unitary individuals. As analysts have thought seriously about the link between cognitive neuroscience and social science (including cultural sociology), it has become clear that the issue is no longer one separating individualism and holism. Instead, as Sperber (1997, p. 123) has cogently argued, the main issue is whether the black box of the individual shall be cracked open so that processes that occur *below the level* of the individual (e.g., in terms of phenomenological time-scale) are admitted as necessary for the job of explanation.

Sperber-style “infra-individual” processes are now commonly accepted in cognitive psychology and neuroscience. Only recently have cultural analysts thought about how they fit into traditional social science theory and research (Shepherd 2011; Srivastava and Banaji 2011; Vaisey 2009). For instance, when presented (subliminally) with pictures of faces with males of dark skin, and then asked to add a letter to complete the sequence “GU\_” so it forms a word, undergraduate U.S. subjects are statistically more likely to select “N” than “M.” The infra-individual process explaining this effect is that of “spreading activation” from representations of black males to representations of weapons as mediated by stereotypical associations



between black males and violence in the U.S. (Kunda and Thagard 1996, p. 285). “Spreading activation” is a psychological description of a cognitive process, but one that can be given a mechanistic implementation in the form of interconnected neural systems tuned by experience (Lakoff 2009; Thagard 2008a).

Infra-individual processes are also relevant to a variety of core phenomena studied by sociologists and may themselves be modulated via top-down constraints imposed by contexts and institutions (Lizardo and Strand 2010; Shepherd 2011; Stoltz and Taylor 2017; Wood et al. 2018). For instance, cultural sociologists usually pitch such commonplace constructs as “habitus” at the infra-individual level (Bourdieu 1990; Mukerji 2014); and qualify them as having both cognitive, and presumably neurocognitive, foundations (Downey 2014; Lizardo 2009a; Potter et al. 2013). In this respect, infra-individualism emerges as an appealing option in that, by “dissolving” the individual, unlocks the potential to theorize the “collective-social” at a level *below* the person; as suspected by Levi-Strauss (1966), the infra-individual level may represent the royal road to the collective unconscious that Durkheim was after.

In what follows, we use three case studies to show the theoretical benefits of taking an infra-individualist, extended cognition approach to cultural phenomena grounded in cognitive neuroscience.

### Three case studies

First, we critically consider the propriety of the conceptualization of linguistic symbols as “amodal” carriers of meaning motivating the metaphor of culture-as-code. We present an alternative “modal” conceptualization of linguistic symbols and categorization, built from neurally motivated understandings of cognition as grounded in the body. This approach allows us to propose a new way to think of the link between language, culture and collective categories (Ignatow 2007).

Second, we review recent advances in the study of “mirror neurons” providing a neurocognitive motivation for a rethinking of the fundamental basis of intersubjectivity (Bloch 2015). We show that there is no need to assume a deliberate, language-mediated, conscious exchange based on reflective meanings as the primary route to intersubjective agreement as is typical in the social phenomenology tradition that has been influential in cultural sociology (Heiskala 2011). These insights have both substantive and methodological implications.

Finally, we tie together two strands of inquiry, one from neuroscience and one from cultural sociology, dealing with the fundamental question of how discrete elements become associated as to be considered a single element in experience. This mechanism underlies such disparate phenomena as how the cognitive meaning of symbols comes to be “bound” to the external markers that serve as their “signifiers” (de Saussure 1964; Peirce 1974). This mechanism also helps to account for how certain social categories come to be linked to socially relevant affective and relational dimensions expressive of moral (good/bad) or hierarchical (powerful/not powerful) status (Douglas 2002). The resulting analysis provides a novel and useful take on classical issues.



## Opening the linguistic black box

Cultural sociologists often rely on a “linguistic” metaphor to conceive of how cultural systems can be systematically structured while allowing for individual creativity in practice (Biernacki 2000; Sewell 2005). Some go further and see external linguistic symbols as a model for cultural processes in general, suggesting social action should be read as text (Alexander 2003, pp. 21–22; Ricoeur 1973). In this respect, these analysts draw from a venerated tradition in cultural theory. For instance, both Parsons and Geertz transitioned from describing culture as a “system” toward a linguistic metaphor in the late 1960s (Lizardo 2016b). Other analysts consider language as a primary means of (cognitively) “constructing” social reality (e.g., Berger and Luckmann 1966). This conceptualization is common to classical functionalist, phenomenological, and interpretivist schools of cultural theory (Lizardo 2016a). Recent work in cognitive neuroscience, however, suggests that we may have to rethink the dominant version of the linguistic metaphor as well as the role of language in cognition in fundamental ways.

Drawing on Saussure and his (mis)interpreters, the classical model holds that the relationship between a linguistic symbol (signifier) and that which is symbolized (signified) is of an arbitrary nature. At the extreme, the relationship between the signifier and signified is presumed to be entirely incidental to the internal organization of the system via sequential and substitutive relations between otherwise meaningless symbols. This tendency comes out most clearly in Giddens (1979), who draws inspiration from the distinction between *langue* and *parole* to conceptualize the distinction between the structural and practical “moments” of social systems (respectively). Meaning and signification are generated in the structure of concatenation, substitution, and (usually binary) opposition encoded in *langue*.

Following Ignatow (2007) we refer to this as an “amodal” conception of how meaning is produced in language and, by extension, culture (see also Shore 1996, pp. 356–58). This neo-Saussurean model of language is “amodal” because the theory presumes sensory inputs from the “modalities” (bodily senses) are not relevant for the constitution of linguistic meaning. Nor is the acquisition, storing, and implementation of linguistic (or other cultural) knowledge, in specifiable neural structures of relevance to the theory. We argue both the description of language as a disembodied sign system structured exclusively by segmental and contrastive oppositions and the corollary position that the realization of linguistic knowledge in body and brain is not consequential for the operation of language, are not consistent with how these phenomena are characterized in contemporary neuroscience. Therefore the metaphorical extension of this linguistic analogy to other aspects of social life, such as culture, action, or “structure” may be equally problematic.

## The embodiment of language

Recent advances in cognitive neuroscience suggest that linguistic and cultural knowledge is “embodied” in a fundamental sense (Gallese and Lakoff 2005; Johnson





and Lakoff 2002; Kovecses 2006; Lakoff and Johnson 1999). In this regard, they are contributing to a long tradition in anthropology, phenomenology, and even sociology, which stresses the necessarily—“always, already”—embodied base of both pragmatic and symbolic processes (Bourdieu 1990; Cassirer 1957, pp. 205–261; Crossley 1995; Engman and Cranford 2016; Hertz 2013[1960]; Merleau-Ponty 1962, 1968; Schwartz 1981; Wacquant 2004)

In this *modal* conception, words and phrases serve as contextual pointers to concepts, but they are not themselves concepts. Rather, concepts are dynamically built-up from elements recruited from the modal systems of perception, action, and emotion used to interact with the world (Evans 2009; Gallese and Lakoff 2005). Concepts and categories, rather than being singular “tokens,” are best understood as made up of a panoply of context-sensitive infra-individual processes recruited for specific typification tasks in context (Barsalou 2003b). A key discovery here is the structural overlap between systems used for “online” action (including speaking) and systems used for “offline” thinking at the neural level. Persons rely on the same neural structures that they use to *do things* to *imagine things*; imagining is “grounded” in the doing (Anderson 2014; Barsalou 2003b; Glenberg and Kaschak 2002; Johnson and Lakoff 2002; Lakoff 2009).

The implications of the modal conception of linguistic meaning for cultural sociology are important. Acts of linguistic categorization are not just products of arbitrary convention, precariously maintained by social consensus. Instead, cultural categories are grounded in non-arbitrary resources, based on people’s ability to extract the correlational structure of experience from continued, pragmatic, embodied engagement with the material affordances of the environment (Bloch 2012; Bourdieu 1990; Wood et al. 2018). We illustrate the implications of this overall claim in two domains: (1) how people represent and categorize objects, and (2) how people recruit modal representations obtained from concrete experiences to reason metaphorically about abstract concepts.

In a review of functional neuroimaging research on object perception, Martin (2007) finds perceived properties of objects are stored in sensorimotor systems active during the time of exposure. During conversations, when objects are referenced but not present, the same sensorimotor traces are activated to “represent” these objects for both speaker and recipient (see also Lakoff 2009). This tenet is contrary to amodal theories of language, which presume that “we can begin to speak of language only when vocal expressions have become capable of detachment from the immediate ‘here and now’” (Berger and Luckmann 1966, p. 51). Instead, comprehension of words happens via similar neural mechanisms as those involved in the comprehension and execution of other “indexical” signifying actions such as gestures. This postulate is also true for “speech sound” as an object, as there is evidence the act of auditory comprehension incorporates the same “motor representations of the articulatory gestures that would be necessary to produce these speech sounds” (Willems and Hagoort 2007, p. 279).

These findings are taken one step further with the motor theory of speech perception: not only does speech perception recruit motor systems, but this is a requisite for speech comprehension. Because of this integration of language and action, researchers find sign languages recruit cortical structures in deaf signers that are



functionally equivalent to those that subserve spoken language in hearing persons (Willems and Hagoort 2007, p. 286). The finding that variability at the linguistic surface is grounded in shared semantic concepts holds in fMRI studies of bilingual individuals. For instance, one study concludes that “it is possible to identify which word [the bilingual participants] are thinking about using the semantic neural representation elicited by words in either language” (Buchweitz et al. 2012, p. 286; see also De Grauwe et al. 2014). Therefore it is misleading for sociologists to speak of language as a disembodied, abstract structure, or of different languages as constructing entirely discrete worlds based on pure relations of signification (e.g., Shotter 1993; Wierzbicka 1996).

Cultural theorists may grant that work on the neural embodiment of language may be restricted to the acquisition and use of concrete conceptual knowledge, but claim that it cannot account for how persons engage the world of more “abstract” concepts. That is, we see abstractions as more properly “cultural” with their meaning fixed by arbitrary convention (Parsons 1938). Contrary to this view, the neural embodiment thesis is a general account of how people process the meanings of all concepts: both “experience-near” and “experience-distant” (Barsalou 2003a; Lakoff 2009). The key is to outline an infra-individual mechanism, capable of neurocognitive implementation, allowing persons to conceptualize abstractions—i.e., those not directly grounded in imminent experience—using embodied resources (Barsalou 2016).

This mechanism is *analogical transfer*, especially as instantiated in conceptual metaphors (Lakoff 1993, 2009). Via this mechanism, resources can be recruited from an experience-near (concrete) source-domain to conceptualize the structure of an experience-distant (abstract) target domain. This mechanism, foundational to first-generation work on conceptual metaphor (Gentner 1983; Lakoff and Johnson 1980) and Schwartz’s exemplary sociological work on vertical classification (Hertz 2013[1960]; Lukes 2003; Schwartz 1981),<sup>2</sup> is naturally realizable in realistic neural architectures, yielding the contemporary “neural theory of metaphor” (Lakoff 2009).

Take, for example, professional success, which people often associate with verticality metaphors such as “moving [on] up,” “*climbing* the corporate ladder,” “getting a *raise*,” or “coming out on *top*.” Success may also be associated with forward movement along a path, “getting *ahead*,” “*surpassing*,” “*advancing*,” “going the *distance*,” or “leaving everyone else *behind*.” Often success is not without difficulty, which tends to be understood as *obstacles* along the path or ladder that must be *overcome*, however, certain people may “run into a *barrier*,” or certain groups may encounter a “glass *ceiling*,” stopping their forward progress (see Lakoff and Johnson 1999, pp. 52–53). At the level of lexical choices there is a variety of words and phrases, but when reduced to the embodied concepts underlying each, we can see an implicit (and coherent) *cultural model* of professional success/failure. As this domain is less experience-near than, say, walking in a field or up a hill, it is conceptualized by analogy to bodies moving along more or less difficult terrain. Conceptualizing abstract domains using motion metaphors re-activates many of the

<sup>2</sup> For work on lateral classification see Hertz (2013[1960]) and Lukes (2003).



same sensorimotor schemas that would be used if one was moving (Casasanto and Boroditsky 2008; Sakreida et al. 2013; Wood et al. 2018), providing intuitive internal coherence to the model (Lakoff 2009), and explaining its “catchiness” (Sperber 1996, pp. 57–67).

The modal conception of linguistic meaning and conceptualization just sketched also suggests cultural sociologists should handle neo-Saussurean “meaning contrastive” notions with care and a little more skepticism (Bloch 2012). Perhaps the most influential neo-Saussurean concept in American cultural sociology is that of the “binary code.” Alexander and Smith, for instance, claim that “binary opposition” is “a *precondition* of discourse” (2001, p. 143, emphasis added) and go even further to argue “that culture [is] a classification system consisting of binary oppositions” (2001, p. 145). With “political culture,” this binary structure establishes “the categories of sacred and profane in civic life” (Alexander 1992a, p. 302).

Although binaries are pervasive in social life, their power to “structure” may not be necessarily due to their foundational status in a *disembodied* sign system. Rather, we can conceive binaries from a modal embodiment perspective, as emerging from the sensorimotor and proprioceptive experience of our “binary” bodies as first noted in classic work in embodied phenomenology (e.g., Todes 2001)—back and front, up and down, left and right—which carry their own unique, and often asymmetrical, entailments, as also recognized by Durkheim, Mauss, and their students (Hertz 2013; Lukes 2003; Schwartz 1981). The enablements and constraints of binary discourse are thus grounded in the meaning-making potential of the body (Dreyfus and Spinoza 1999) linking action, conceptualization, and culture at an infra-individual level (Lakoff 2009).

## Neural embodiment and the problem of intersubjectivity

“Every day” reality is taken-for-granted as shared; it is an “intersubjective” world (Garfinkel 1967, p. 36). Intersubjectivity maintains a hallowed place in cultural sociology as it would be hard to imagine social organization at any level without some attunement of thought and feeling between two or more individuals.<sup>3</sup> Beginning with Berger and Luckmann (1966), and the dividends paid by Schutz’s phenomenological sociology, the “problem” of intersubjectivity is the “enigma of how man [sic] can understand his fellow man [sic]” (Schutz 1962, p. 179; see also Russell 1905, p. 480). It is interesting, however, precisely because it is only an enigma for those who have time and motivation to think about it. It takes a “special motive” to make our intersubjective reality problematic (Garfinkel 1967, p. 37), and therefore it happens rarely. Presumably, we cannot have direct experience of another’s subjectivity, and so, since Schutz, sociologists have attempted to explain the ease with which ego can seem to know what alter is thinking.

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<sup>3</sup> The very act of thinking about this possibility necessitates bracketing knowledge of human (and primate more generally) evolution [see for example Kaufmann and Cordonier (2011)].



The phenomenological solution involves positing that persons rely on a set of *default assumptions* presuming the existence of intersubjective agreement before examining whether such evidence exists (Stoltz and Lizardo 2018). When such assumptions are violated, the situation requires more or less deliberate repair. People learn the default assumptions via prior experience; shared understandings are built “by people testing and checking each other’s talk, by them questioning and challenging it, reformulating and elaborating it” (Shotter 1993, p. 1; see Iacoboni 2009, p. 666 for a critique).

This solution, which we might call *deliberative*, is valid sometimes, but it is unlikely to represent the fundamental way in which persons relate to one another at an intersubjective level (Gallese and Metzinger 2003). One problem is that the deliberative solution overlooks what Maurice Bloch calls the “indeterminacy concerning the physical boundaries of individuals” (2015, p. 5; see also Wilson 2004a). It glosses over an important question (where do the selves of persons begin and end?), one which is especially problematic outside of Western cultural coordinates.

If experience does not dictate the “natural” boundaries of other persons, and if individuals do not rely on linguistically mediated assumptions and principles to deal with this demarcation issue, then is this massive empirical underdetermination problem solved? Recent work in the cognitive neuroscience of social cognition may hold the key to an answer. We refer in particular to the discovery of the “mirror neuron” system in humans and other primates (Gallese 1998; Iacoboni 2009; Lakoff 2009; Lizardo 2007). This neural system instantiates a mechanism capable of accounting for the routine ability of persons to “read” minds and to comprehend the meaning of actions at a direct (non-symbolic) level (Gallese and Metzinger 2003, p. 381).

As Bloch (2015) argues, just as humans “go in and out of” each other’s bodies in sex and birth, they interpenetrate each other’s minds. This feat is made possible by a shared neural substrate that becomes active whenever a person performs an action *and* perceives the execution of the same action by conspecifics (Iacoboni 2009; Rizzolatti et al. 1988). As Ferrari and Gallese (2007, p. 73) note, “our nervous system has been constructed in such a way it enables us to capture others’ living experiences just by watching them.” Thus, besides providing a non-deliberative, infra-individual solution to the problem of intersubjectivity, one aligned with the actor’s phenomenological experience of the pervasive ease of mutual understanding. As such, the infra-individual mirror neuron mechanism has fruitful implications for cultural sociology. Here we briefly consider two: role-taking and solidarity, and thick description.

## Role-taking and solidarity

As Franks notes, in Mead’s classic theory of role-taking the “actor incorporates the imagined response of the other into his emerging behavior” (2013, p. 28). For Mead, the medium of this incorporation is the “significant symbol.” The mirror neuron mechanism reveals the embodied foundations of intersubjectivity, including the neural representation of selves, intentions, and goals at a motor level (Gallese and Metzinger 2003), thus overcoming the residual linguistic bias in Mead’s



conceptualization of role-taking. In this account, inferences as to the other's state of mind can be automatically simulated from the perceptual and sensorimotor schemas gained from mundane experience in the world (Lakoff 2009; Wood et al. 2018). This implies persons mutually coordinate at an infra-individual level without the mediation of significant symbols (linguistic or otherwise), a phenomenon with a long history of examination in sociology and psychology (going by the name of "imitation" in Tarde) and "entrainment" in contemporary interactionism (Summers-Effler et al. 2014).

For instance, Chartrand and Bargh (1999; see also Lakin et al. 2003) refer to the automatic tendency to adopt the postures, gestures, and mannerisms of interaction partners the "chameleon effect" (cf. Collins 2004 on 'entrainment'; and see Summers-Effler et al. 2014 for an application of the neural embodiment approach to ethnography). Whether persons can "mirror" one another, and by implication share the same "lifeworld" as the other person, may thus depend on whether there is a common experiential history between them. The extent to which we can observe mirroring thus becomes an empirical question and may be tied to traditional concerns with socio-cultural processes generating and perpetuating "symbolic boundaries" between groups (Lamont et al. 2008) and reinforcing status hierarchies (Ridgeway 1991). For instance, Cheng and Chartrand (2003) find participants more likely to mimic another if they believed them to be a "peer" rather than a "superior" (see also Molnar-Szakacs et al. 2007 for cross-national comparisons of gestures).

This dovetails rather seamlessly to a key observation from sociology and anthropology regarding the importance of ritual in producing solidarity. Certainly, Durkheim's *Elementary Forms* is central to this tradition. Specifically, he observes otherwise dispersed populations "com[ing] together, concentrating itself at specified places for a period...because a collective emotion cannot be expressed collectively without some order that permits harmony and unison of movement, [their] gestures and cries tend to fall into rhythm and regularity" (quoted in Bellah 2005, pp. 183–210). Similar observations are made by McNeill in *Keeping Together in Time*, as it relates to "muscular bonding," in which militaries, religions, and social movements exploit the emotional consequences of moving together in time such that individuals experience "boundary loss" or they feel as if they are one (1997, p. 8). More recently, Summers-Effler (2010), building upon Collins' interaction rituals, explores why social movements fail or succeed. She argues that what we tend to think of as stable groups should actually be conceived as "rhythmic patterns of organization." The mirror system provides the neural mechanism by which moving together in rhythms lays the pre-linguistic foundations of solidarity.

### Thick description

Many sociologists are already sensitized to the diversity of embodied skill and capacity (Engman and Cranford 2016; Mellor and Shilling 2010; Pitts-Taylor 2015) and can contribute to the growing body of research on the neuroscience of social cognition. While this opens several rich possibilities for cultural analysis, we should pursue this project with caution. Incongruences in mirroring are likely to be



of social significance, but it is unlikely that we can find a limiting case of no mirroring between persons at all; only gradations in the degree of mirroring. In this respect, the existence of the mirror neuron mechanism rules out the possibility of persons occupying completely unbridgeable worlds of meaning and experience as an empirical absurdity (Gallese and Metzinger 2003), thus deflating a popular argument against the unity of the natural and social sciences (e.g., Winch 2012). Even people with drastically different life experiences, languages, and “cultures” (in the folk sense) are still likely to share a great deal of practical experiences by dint of sharing a common physical world of objects and structured experiences afforded by the body.

In this respect, the operation of the mirror neuron mechanism also has concrete *methodological* implications for cultural analysis. We can draw a relevant example from Geertz’s extensive discussion (1973, pp. 6–7) of Gilbert Ryle’s (1971) example of boys winking in his essay on “thick description.” Seen in the above light, knowing the difference between blinking and winking (or a parody of the wink) may be possible even in the absence of a shared “public code” that settles the meaning of the action (Mukerji 2014). Cultural sociologists may have to countenance the possibility that the embodied simulation mechanism associating specific bodily actions with action-intentions at a non-linguistic level may fix the “meaning” of certain actions among persons. This approach also suggests that learning the “public code” of winking may not be a sufficient condition for noticing how the various fine-grained (and provisional) distinctions between, for instance, a sincere wink and a parody of a wink in situ (Lempert 2014).

The implication is that so-called “thick description” may only be achieved by a deployment (whether intuitive or reflexively) of the techniques that have recently been codified as “carnal sociology” (Mears 2014; Pitts-Taylor 2015; Wacquant 2004). Becker and Geer (1957, p. 28), comparing the virtues of participant observation to that of the interview, suggest that a problem for the latter is the degree to which “the researcher has observed the behavior he [sic] is talking about.” A virtue of ethnography that Geertz, Becker, Geer, and many others omit is that “participant observation” is more than just being present to “objectively” record activities on paper as they unfold (in fact, as even the well-honed human mind can only focus on so much, a great deal of potentially relevant information in the situation will evade conscious perception). Rather, the significance of the technique is that, as the analyst engages in the same activities of the participants, recording the practical requirements of those activities in the body of the analyst (Mears 2014). The participant observer can grow increasingly confident in their automatic inferences as to the meaning of an action, phrase, or event in that context as they become enculturated into the local context (Pagis 2010).

## **Making one out of many: the binding problem**

Binding is the infra-individual processes via which two initially separate cognitive (or affective) elements are “fused” into a single representation. This operation results in perceptual, cognitive, and affective constructs endowed with unitary experiential



qualities. From the perspective of cultural sociology, binding may, therefore, be one of the most fundamental neurocognitive processes (Taylor et al. 2019).

For instance, binding is involved in the generation of implicit (or explicit) associations between previously unrelated cultural elements (Goldberg and Stein 2017; Shepherd 2011); the link between cognitive representations of objects, events, properties, and specific affective values [e.g., linking “men” and “powerful” or “success” and “good” (Robinson et al. 2006)]; the integration of singular or concrete representations (e.g., “woman” and “parent”) to generate higher level concepts pertaining to roles and identities (“mother”) which are then bound to particular occupants or “fillers” (Bloch 2008); and even the linkage between the material pole of symbols (signifiers) and their cognitive meanings (signifieds). The capacity of humans to bind unrelated elements into single constructs may lie behind the bewildering capacity for cultural variability and idiosyncrasy that is the traditional impetus for cultural analysis (Sewell 2005).

Most cultural sociologists help themselves to concepts playing the role of binding. The most famous, as already alluded, is the Saussurean idea of the permanent link (e.g., like two sides of a sheet of paper) between the acoustic “image” of the linguistic symbol (signifier) and the concept it points to (signified). These formulations, while evocative, remain imprecise. In this respect, considering binding as an infra-individual process opens lines engagement with the cognitive neurosciences that can link up to work in cultural sociology emphasizing the discursive side of “social construction” (e.g., focusing on how linguistically articulated symbols come to be linked in historically specific ways).

A focus on different forms of binding sensitizes cultural sociologists to the *experiential* dimension of cultural phenomena (Johnson 2012). For example, how is it that in the United States, a good proportion of the population come to experience *dangerous black men* as a unified object, one that can be directive of behavior at an implicit level, such as crossing the street (Steele 2011)? How can the Eucharist be immediately experienced as *sacred* even in the absence of discursive “belief” (Sørensen 2007)? What is it about the motorbike that provides a pathway to “authenticity” among working-class Britons (Willis 1978)? Recent work modeling the neurocognitive realization of binding mechanisms can shed light on some of these issues, while allowing cultural analysts to make finer-grained distinctions between different ways in which “binding” manifests itself as a cultural phenomenon and the contextual conditions that facilitate it.

Most work on the “Neural Binding Problem” (Feldman 2013) in neuroscience focuses on lower-level forms of unification, such as addressing mainly issues of perceptual binding in visual fields and figure-ground distinctions (von der Malsburg 1994), and the neurophenomenological substrates of unity in consciousness (Cleermans 2003). Higher level forms of binding (e.g., conceptual, symbolic, or affective) are treated under the heading of “variable binding” (Browne and Sun 1999). Variable binding refers to the processes by which “symbols are designated to represent entities” (Browne and Sun 1999, p. 189). Our focus is on this last given its more direct relevance for core work in cultural sociology (Taylor et al. 2019).

We highlight one such process here: *convolution* and the development of *semantic pointers* (Thagard and Stewart 2011). Convolution is the infra-individual process



by which two or more already-learned representations, encoded in the pattern of firing of populations of neurons, bind to form a unique representation that is irreducible to its component parts. With convolution, binding occurs not when neurons fire together, but when pre-learned patterns, sometimes recruiting entire neural subpopulations, come to be temporally synchronized (Thagard and Stewart 2011).<sup>4</sup> Convolution is a useful mechanism for theorizing cultural phenomena because it plays the role of a “compression operation” (Blouw et al. 2015, p. 6)—that is, a mechanism by which people mesh diverse lower order cultural elements (e.g., perceptual, experiential, symbolic, and/or affective) into higher order representations that can be manipulated, used, and experienced as a unity. These composite representations—or “semantic pointers” (Eliasmith 2013)—are made possible by variable binding processes. They may also be a good candidate for the emergent mental entity that Durkheim (1974) once referred to as “collective representations.”

While basic perceptual binding allows us to pair together color and form percepts to form on-the-fly distinctions between, say, green apples and red oranges (van der Velde and de Kamps 2006), a semantic pointer might include this information and more contextual information like “green apples are sour” or “red oranges are blood oranges.” This process is recursive: semantic pointers can themselves be bound via convolution to form even higher level representations, allowing for otherwise different semantic pointers to come together into a “supra” pointer and stored in long-term memory. Compressing experiential and cultural information into semantic pointers, however, comes at a cost: since they exist as summaries, they can be decomposed to only approximate their parts—not fully reconstitute them (Blouw et al. 2015).

There are two implications of isolating infra-individual binding processes for cultural sociology. First, since convolution gives rise to novel (emergent) representations, two or more cultural elements that bind in time and space need not be bound at all times (Taylor et al. 2019; Quilley et al. 2013). This is the difference between what Lakoff (2009) refers to as *obligatory* (characteristic of perceptual bindings such as an apple’s shape and color specifications) and *nonce* bindings (put together on the fly and determined by characteristics of context). This approach suggests that some lines of research in cultural sociology may be on the right track in conceptualizing culture as an individual’s repertoire (i.e., procedural memory) for forming coherent representations as situations arise rather than storing them ready-made (Lizardo and Strand 2010; Martin 2010), and thinking of cultural change as the diffusion of metaphors, objects, and dispositions reflecting novel bindings between previously unassociated concepts and practices (Goldberg and Stein 2017). Second, the fusing of two or more cultural elements need not (and, in everyday life, usually is not) linguistically mediated. To be sure, Durkheimian symbol sacralization processes are central instances of variable binding—such as when material objects, events, and historical figures become core pointers to emotionally shared collective discourses

<sup>4</sup> This phenomenon is analogous to what cognitive neuroscientists refer to as “temporal synchrony” (Feldman 2013; Shastri 1996), or the idea that analysts are more likely to observe binding when the neurons are activated concurrently.





and memories in a community (Armstrong and Cragge 2006; Wagner-Pacifici and Schwartz 1991), but are not necessarily the most empirically common instance.

Binding processes operating over linguistic symbols cannot be the most common form given the inefficiency of such symbols to carry rich experiential meaning directly (Evans 2009; Glenberg 1997). As Ignatow notes (2015, p. 6), language is a prompt to *simulate* in acts of meaning construction rather than directly encode pre-packaged meanings in most everyday instances. This thesis implies that language functions mainly as a vocal or written transformation of an otherwise non-linguistic bind (Bloch 1991). For instance, this latter may include iconic and imagistic ways of performing “power” in the everyday material arrangements, e.g., linking power and position in the vertical dimension (Schubert 2005; Schwartz 1981). In this way, the binding of non-arbitrary meanings to discursive, relational, and performative elements may be a crucial part of a multilevel mechanism contributing to the emergence and reproduction of power as a social phenomenon (Reed 2013).

## Discussion

Having offered concrete examples of how insights from cognitive neuroscience may inform cultural analysis, we are now in a position to specify what we see as the most coherent stance for sociologists interested in productive dialogue between cultural sociology and cognitive neuroscience. Any fruitful influence of cognitive neuroscience in cultural sociology provides naturalistic foundations, which, in this case, entails admitting that the processes and mechanisms described in cognitive neuroscience are constitutive of the social actor (Turner 2007).

As we argued at the outset, this does not entail reductionism, as this position is perfectly compatible with an ontology of emergent systems (Wan 2011), “wide realization” (Wilson 2004b), and “explanatory pluralism” across different domains (McCauley and Bechtel 2001). This last point relates closely to the explanatory unit of analysis. If a cultural sociologist is to embrace cognitive neuroscience, then methodological individualism, with individuals as rock-bottom black boxes and the tools of commonsensical belief-desire psychology, and literary narrative as the main way to “interpret” action, is not a coherent strategy (Strand and Lizardo 2015). We argued instead that *infra-individualism* is a more coherent strategy. If we are to turn to infra-individual mechanisms, then this raises the question of physicalism, and, as before, it is not clear that a uniquely determined position for the cultural sociologist exists. Our point is that asking cultural sociologists to embrace a minimalist form of physicalism compatible with naturalism (and no “spooky” entities) is not asking for much.<sup>5</sup>

An instructive example in this respect is that of psychoanalysis. Once central to many strands of social theory, including structural functionalism, critical theory, and their immediate offshoots (Elliott 2019; Marcuse 2012; Parsons 1964; Smelser 1999),

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<sup>5</sup> Only cognitive neuroscientists must embrace strong versions of the psychoneural identity theory, and this is mostly for methodological reasons.



psychoanalysis stands out as the most ambitious strands of 20th century social theory, especially in its attempt to link “unconscious” processes to societal outcomes. In this respect, there is a non-trivial relationship between the Freudian penchant to go “below consciousness” and the infra-individualist call to go one level “below” the individual. However, we argue the parallel is stronger than this. While psychoanalysis became influential in social theory and the humanities more general in the form of a purely mentalistic “meta-psychology” couched in concepts and mechanisms (e.g., ego, id, repression) seemingly unmoored from underlying neural processes and their realizers, this was not the way that Freud initially conceived of it. Instead, the earliest version of psychoanalysis, as laid out in the “Project for a Scientific Psychology” (Freud 1966) was in fact in the form of an (armchair) *neuroscience*, one that was surprisingly accurate for its time (Pribram and Gill 1976). In that respect, we can see the infra-individualist project as both an update and a reset of the original psychoanalytic impetus to deconstruct the individual as a unitary entity in social science.

An additional advantage of the infra-individualist emphasis in contemporary cognitive theory is that it makes hash of the 19th-century debate (revived in the post-functional period under the heading of the micro–macro debate) regarding the direction of sociological causality. While the distinction between individual affecting society or society influencing the individual, as in the “social structure and personality” tradition, describes early efforts to incorporate cognition into social theory, the state of current cognitive-sociological and neuroscientific research implies that the distinction was misguided from the outset and was a misleading basis from which to engage in disciplinary boundary work.

As Geertz (1973) first noted, humans evolved such that developing functioning neural architectures requires cultural supplementation (Lakoff 2009; Tomasello 1999). The specification of how mechanisms at the cognitive and neural levels may inform theorizing in cultural analysis, such as the ones mentioned earlier, confound simplistic binaries between “inside the head” and “outside the head,” which cultural sociologists sometimes traffic into justify anti-cognitive commitments (Wuthnow 1989). When going “below” the individual, the cultural sociologist will not find atomized elements, but rather the repository of *shared* cognitive processes constitutive of “socially embodied” collective knowledge (Collins 1993). These processes, in their turn, *spill out* into the world via bodily, interactive, and material scaffoldings for the realization of socio-cultural phenomena (Wilson 2004a).

We close by returning to the issue of the implications of cognitive neuroscience for everyday practice in cultural analysis. As alluded to at the outset, we believe that the two fields have, at the moment, a “moderate” type of dependence. That means that conditional on questions or approach, some cultural sociologists—especially those seeing their work as closer to “humanistic” forms of inquiry traditionally defined—can carry out their work with either no or minimal engagement with cognitive neuroscience. Yet, note that even within the humanities, studies of literature, aesthetics, narrative, and history, are beginning to make contact with cognitive neuroscience, as given by emerging interfields such as the “neurohumanities.”<sup>6</sup>

<sup>6</sup> <https://scienceandsociety.duke.edu/research/research-areas/neuroscience-society/neurohumanities>.



For other cultural sociologists the links are stronger and the dependencies are clearer (Cerulo 2010). This is especially the case for cultural sociologists interested in the link between meaning, action, and experience (Lizardo and Strand 2010), enculturation via skill acquisition (Pegis 2010; Winchester 2016), the link between language and cognition (Ignatow 2007; Stoltz and Taylor 2017), or the way that persons are coupled via intersubjective “entrainment” loops (Summers-Effler et al. 2014), among other topics. These analysts are increasingly unable to have the luxury to ignore developments in cognitive neuroscience as they speak to the core nature of the fundamental concepts used to interpret empirical materials and account for observed phenomena. Ignoring the cognitive scientific work would lead, as we noted at the outset, to analytic pitfalls, theoretical dead-ends, and misleading conclusions. This situation is likely to become more pressing as the boundaries between the fields become blurrier and the trafficking of concepts, theories, and tools at the interfield trading zone becomes more intense.

In this last respect, the nascent interfield that stands as a so far successful model of how the type of productive interchange we envision is that of *neuroanthropology* (Lende and Downey 2012).<sup>7</sup> This is an apposite model for cultural sociologists, because it is a merger between the ethnographic/cultural side of anthropology and cognitive neuroscience. Some of the leaders of the new field are qualitative anthropologists steeped in a similar “fieldwork culture” (e.g., Downey 2014) as sociological ethnographers (Wacquant 2015).

In spite of the existence of the relatively successful neuroanthropology merger, it is important to reiterate that cultural sociology is a more complex and multifaceted area and that we may be speaking of *multiple* lines of connection to cognitive neuroscience; some of which will be stronger, others weaker. For instance, it is clear that understanding the neural foundations of language has implications for the work of the growing number of cultural sociologists who use automated text analysis to capture meaning structures (Ignatow 2015), but cognitive-neuroscientific insights may be less important for those pursuing something closer to cultural history, narrative studies, or other forms of “textual” interpretations of action.

Nevertheless, insofar as these last do help themselves to substantive theories about the ways that symbols work, or the nature of meaning and language and their link to practices (Biernacki 2000), then developments in cultural theory inspired by cognitive neuroscience will indirectly affect even the most humanistic strands of work. In this respect, an argument can be made that all branches of cultural analysis, irrespective of method or approach, will be affected by the neuroscientific turn—some more strongly than others. This is not a bad thing, since, as we noted at the outset, while not all cultural theorists or cultural sociologists need join the cognitive neuroscience fray, *better* cultural theory and *better* cultural analysis (and perhaps in the near future better cognitive neuroscience) would result from such engagement.

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<sup>7</sup> <https://blogs.plos.org/neuroanthropology/>.



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**Omar Lizardo** is the LeRoy Neiman Term Chair Professor in the Department of Sociology at the University of California, Los Angeles. His areas of research interest include the sociology of culture, social theory, social networks, the sociology of emotion, social stratification, cognitive social science, and organization theory. He is currently a member of the editorial advisory board of *Social Forces*, *Theory and Society*, *Poetics*, *Sociological Forum*, *Journal for the Theory of Social Behaviour*, and *Journal of World-Systems Research* and, with Rory McVeigh and Sarah Mustillo, he is one of the current co-editors of *American Sociological Review*.

**Brandon Sepulvado** is a PhD candidate in the Department of Sociology at the University of Notre Dame, where he is also affiliated with the Interdisciplinary Center for Network Science and Applications (iCeNSA). He specializes in computational social science, and his research has been supported by the U.S. government (through NSF and a Fulbright fellowship), the French government (through a Chateaubriand fellowship), the Nanovic Institute for European Studies, and the Countway Library of Medicine. His published work has appeared in such venues as *Sociological Theory*, *American Sociologist*, and *Journal for the Scientific Study of Religion*.

**Dustin S. Stoltz** is a Ph.D. candidate in the Department of Sociology at the University of Notre Dame and a Doctoral Affiliate with the Kellogg Institute for International Studies. His primary field of inquiry is economic sociology, followed closely by cultural sociology, network analysis, organizational studies, computational social science, and cognitive social science. His published and forthcoming work is in *Sociological Theory*, *Journal for the Theory of Social Behaviour*, *Socius*, *Poetics*, *The American Sociologist*, and the *European Journal of Social Theory*.

**Marshall A. Taylor** is an Assistant Professor of Sociology at New Mexico State University. His areas of research interest include cultural and cognitive sociology, computational social science, and political sociology. His published work has appeared in such venues as *Sociological Theory*, *Poetics*, *American Journal of Cultural Sociology*, *Socius*, and the *Stata Journal*, among others.

