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**Rethinking Culture and
Cognition**

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Abstract

Paul DiMaggio's (1997) *Annual Review of Sociology* article urged integration of the cognitive and the cultural, triggering a cognitive turn in cultural sociology. Since then, a burgeoning literature in cultural sociology has incorporated ideas from the cognitive sciences—cognitive anthropology, cognitive psychology, linguistics, neuroscience and philosophy—significantly reshaping sociologists' approach to culture, both theoretically and methodologically. This article reviews work published since DiMaggio's agenda-setting piece—research that builds on cross-disciplinary links between cultural sociology and the cognitive sciences. These works present new ideas on the acquisition, storage, and retrieval of culture, on how forms of personal culture interact, on how culture becomes shared, and on how social interaction and cultural environments inform cognitive processes. Within our discussion, we point to research questions that remain unsettled. We then conclude with issues for future research in culture and cognition that can enrich sociological analysis about action more generally.

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INTRODUCTION

Paul DiMaggio's (1997) *Annual Review of Sociology* article urged integration of the cognitive and the cultural. Studying lived culture, he argued, becomes a cumulative endeavor only if scholars learn how individuals apprehend, store, retrieve and share culture, and how culture informs relations and action. DiMaggio (1997, p. 263) warned that cultural sociology was plagued with implicit assumptions and mistaken presuppositions about "what culture does and what people do with it." Applying cognitive research, he suggested, could rectify these problems.

DiMaggio's article triggered a cognitive turn in cultural sociology. Emerging literature incorporated ideas from the cognitive sciences—cognitive anthropology, cognitive psychology, linguistics, neuroscience and philosophy—significantly reshaping sociologists' approach to culture, both theoretically and methodologically.

This article reviews progress made since DiMaggio's agenda-setting piece. We focus on a burgeoning literature that builds on cross-disciplinary links between cultural sociology and the cognitive sciences. Such work provides new answers to several central questions in cultural sociology: How is culture acquired, stored, and retrieved? How do forms of personal culture (nondeclarative/declarative) interact? How is culture shared? How do social interaction and cultural environments inform cognitive processes? Within our discussion, we also point to research questions that remain unsettled. We then conclude with issues for future research—work in culture and cognition that can enrich sociological analysis about action more generally.

WHAT IS CULTURE?

At one level, culture exists as publicly available repertoires—codes, classifications, frames, narratives, models, customs and rules—that we draw upon when we think and act (Patterson 2014, Swidler 2001). Bourdieu (1984) argued that this "public culture" resides in social spaces—settings that order actors according to certain social positions and relations. As individuals occupy such spaces, culture is encoded within them, ingrained in brain and body, forming what Lizardo (2017) calls "personal culture." Personal culture includes two elements: "nondeclarative culture" (skills, dispositions, schemas, prototypes, and associations), and "declarative culture" (values, attitudes, orientations, worldviews, and ideologies).

Most sociologists contend that public and personal culture exist relationally, advancing DiMaggio (1997, p. 274) observation that culture inheres in the interaction of information, schemas, the symbolic universe, and, we would add, the interaction between people—both with one another and with the physical environment.

HOW DO WE ACQUIRE, STORE, AND RETRIEVE CULTURE?

Recent research in the cognitive sciences provides important insights on cultural acquisition, storage, and retrieval.

Acquisition

"Acquisition" refers to how individuals learn nondeclarative and declarative forms of culture. Increasingly, cognitive scientists agree that these different types of culture display different operating characteristics and depend on separate brain systems (e.g., Smith & DeCoster 2000, Squire 1992).

Nondeclarative culture involves skills such as bike riding, distinguishing humans from animals, and classifying someone's gender or race upon first meeting. It is acquired slowly from repeated

exposures or recurrent activities and does not involve conscious awareness. Thus, those applying it cannot necessarily explain it. However, nondeclarative culture stands at the ready, allowing quick reactions to environmental prompts. In contrast, declarative culture involves careful, conscious classifications, justifications, and rationalizations. It is acquired via explicit, symbolically mediated information. Typically derived through limited exposures, this form of culture is often utilized when situational disruptions beckon careful attention or thought (see, e.g., Chaiken & Trope 1999, Smith & DeCoster 2000).

Recent research identifies various cognitive mechanisms involved in cultural acquisition. Some of these mechanisms have become especially central in the literature. The discovery of “mirror neurons,” for example, helps explain imitation, empathy, and intersubjectivity (Iacoboni 2009). Mirror neurons activate when we perform or observe others perform certain motor actions (e.g., clapping, smiling, or throwing a ball) or certain emotional reactions (e.g., pain, disgust, or sadness). By capturing both what is being done and why, mirror neurons facilitate “embodied simulation”—the mental experiencing of perception and action in the absence of their external manifestation. Embodied simulation explains how someone can know what, when, and why to act or feel something never done or felt before (Bergen 2012, Gallese & Goldman 1998, Iacoboni 2009). These ideas directly contrast with other perspectives in the cognitive sciences, such as cognitivism or computational theories of cognition, because they treat cognition as something that extends beyond the brain to include the body and the environment in which the body is situated (Clark 1997, Gallese 2018).

Mirror neurons and embodied simulation are important to cultural acquisition; they represent neural structures and processes that enable “doxic” situations—the harmony between external and internal structures that gives culture a taken-for-granted character (Bourdieu 1977, Ignatow 2007, Lizardo 2007). These discoveries have implications for social interaction as they imply the potential for “a shared neural state realized in two different bodies that nevertheless obey the same functional rules” (Gallese 2007, p. 3). The findings also add another explanatory level to sociological accounts of the bodily and affective entrainment that arises when people come together, and how coming together affects cognition and action (Collins 2004, p. 42).

Mirror neurons and embodied simulation dominate research in the cognitive sciences, though these ideas are not “settled law” (Gordon 2009, Iacoboni 2009 review current objections). Yet, while sociologists cannot directly see the operation of mirror neurons or embodied simulation, many find this work useful in filling gaps surrounding our understanding of cultural acquisition. Sieweke (2014, p. 34) uses mirror neurons to explain institutionalization through imitation, arguing that mirror neurons are plausible mechanisms that explain both “Bourdieu’s concept of mimesis, and empirical findings on the understanding of others’ actions and intentions.” Summers-Effler et al. (2015, p. 450) suggest that mirror neuron research could enhance ethnographic work, providing “firmer ground for investigating perceptual and emotional dynamics that are outside the realm of conscious deliberative processes.” Pagis (2015) taps mirror neuron research to understand group meditation and the interactive transfer of moods such as equanimity and peacefulness.

Building on embodied simulation, Wacquant (2004) demonstrates how the nondeclarative culture of boxing becomes ingrained in boxers’ minds. Lande (2007, p. 106) uses embodied simulation to study military recruits’ breathing techniques, illustrating how community newcomers “acquire culture via bodily practices that orient people to one another.” Others explore embodied simulation as a mechanism for nurturing empathy among members of animal activist movements (Hansson & Jacobsson 2014, Villanueva 2019).

Some social scientists warn against blindly embracing mirror neuron and embodied simulation research, urging consideration of how these mechanisms respond to context—particularly differentiation and inequality among interactants (e.g., Pitts-Taylor 2013, Schubert & Semin 2009). To

address such issues, social psychologists are studying when mirror neurons affect over- or underimitation. For example, overimitation occurs in unfamiliar settings, encouraging the acquisition of the idiosyncratic, noninstrumental behaviors common to many cultural rituals (Flynn & Smith 2012, Hoehl et al. 2019). Underimitation occurs when mirror neuron systems malfunction, ultimately hindering social involvement and social connectedness (Ramachandran 2011). Gutsell & Inzlicht (2010) offer caveats to embodied simulation, illustrating how shared understandings may be restricted to members of the same in-group. Schubert (2004) explores gender's impacts on embodied simulation, showing that men and women simulate different experiences when confronted with symbols of power.

While work on mirror neurons and embodied simulation helps illuminate the theoretical “black boxes” surrounding cultural acquisition, sociologists must explore the strengths, weaknesses, and applicability of these discoveries across various sociocultural contexts and among members of different social groups. These areas beckon further research.

Storage

Cognitive scientists propose various models that explain how mental representations are stored (Smith 1998). “Schemas” receive the most attention among sociologists. Schemas are mental structures related to memory and pattern recognition; they provide a framework for organizing information. Some researchers contend that schemas represent abstracted commonalities across multiple experiences, influencing how we perceive, interpret, and remember people, places, objects and events. This latter point, however, is still being debated (Gilboa & Marlatte 2017).

Certain cognitive processes can influence how information is stored, in both schemas and more restricted representational forms such as “prototypes.” Prototypes are representations that exaggerate critical features of categories, focusing brains exclusively on category “ideals.” For example, “graded membership” is an operation that gauges the similarity of a stimulus to its prototype. When brains encounter observations that lack all or most of a prototype's critical attributes, observations can be marginalized within or dismissed from a category. As this process ensues over time, graded membership forcefully establishes asymmetry—imbalance in prototype contents—as the brain's *modus operandi* for information storage (Decock & Douven 2014, Rosch 1973).

Sociologists use graded membership to better understand cultural storage. Cerulo (2006) studied classifications of best- and worst-case scenarios. She shows that groups and communities develop elaborate practices that background or erase worst cases, prioritizing the best in societies. When cultural practices emphasize the positive, they couple the brain's propensity toward “asymmetrical thinking” with the cultural practice of “positive asymmetry.” Via positive asymmetry, public culture encourages the storage of sunny-side images in individual and collective memory, making best-case scenarios easiest to access in social situations.

Several researchers have demonstrated detrimental effects of positive asymmetry. The process infiltrates professional training and organizational operations, blinding decision-makers to danger (Cerulo 2006, Fligstein et al. 2017, Freudenburg & Alario 2007). Others document how positive asymmetry guides migration choices (Koikkalainen & Kyle 2016), goal setting, and educational attainment (Reynolds & Baird 2010, Smith-Greenaway & Yeatman 2019), or the evaluation of prosocial initiatives (Child & Witesman 2019).

Now consider “neural binding,” another cognitive process that can influence information storage. In neural binding, neural networks combine distinct, highly diverse representational and affective information—potentially acquired at different times and places—and merge that information into one cohesive concept. Cognitive scientists contend that this information is quickly and

continually combined and recombined, generating a variety of potential responses to different environmental and contextual stimuli (Senkowski et al. 2008).

Lakoff & Johnson (1999, pp. 555–56) highlighted neural binding in cultural contexts. Their work on metaphorical thinking and meaning-making suggests that metaphors bind neural aspects of sensorimotor activity to abstract concepts that underpin thinking. For example, spatial issues inform metaphorical descriptions, intended meanings, and comprehension of experience. Stock prices “rise and fall,” and negotiations involve “two steps back and one forward.” As we engage with others, we “move on,” “retreat,” or “stand our ground.”

Several studies support these ideas. Miles et al. (2010) showed that mental time travel—thinking about past or future—results from neural binding of abstract metaphorical representations with sensorimotor systems that regulate human movement. When asked to envision moments from both their past and their potential future, experimental subjects engaged in retrospection more often leaned backwards; those engaged in prospection more often leaned forward. Neural binding also proves critical to thoughts about inclusion and exclusion. Zhong & Leonardelli (2008) asked people to think about times when they were excluded versus incorporated in a group or activity and to estimate room temperature during these cognitions. Subjects reported a cold room when remembering exclusion and a warm room when recalling inclusion. Cerulo (2019) offers a broader review of this literature.

For cognitive scientists, the neural binding mechanism fuses seemingly unrelated categories—for example, red/passion, female/difficult, male/assertive—and helps build multi-dimensional concepts—i.e., roles and identities (see, e.g., Feldman 2013, Zimmer et al. 2006). Cultural sociologists can elaborate on the storage of such fusions by identifying and isolating different elements and contextual conditions that tie neural binding to meaning-making or meaning-maintenance. Taylor et al. (2019) offer one promising attempt, identifying contexts in which neural binding leads to innovative meaning-making versus stabilizing meaning-maintenance. Moreover, they show how the mind binds the perception or memory of objects to the objects’ membership categories—something that helps explain the cognitive workings of concepts such as family resemblance (also see Domínguez Rubio 2014).

Sociocultural studies of the senses and meaning-making also build on neural binding. Vannini et al. (2013) explored olfactory sense-making, noting the reflexive experiences by which individuals bind somatic sensations with personal, interpersonal, and cultural notions of moral, aesthetic, and logical desirability. Cerulo (2018) studied commercial perfumes, showing that certain ingredients bind with concepts of class and race—e.g., citrus with professionalism and whiteness, and patchouli with exoticism and Asians and African Americans. Schwarz (2015) identified meanings bound to noises in urban settings. Certain noises fused with positive and negative stereotypes of groups occupying different sides of social class boundaries. Lembo (2020) studied sexual meanings bound to musical sound. She found that identifying music as “sexual” was linked to subjects’ particular bodily orientations to accumulated past experiences.

With additional study, sociologists could better illuminate how social experience mediates neural binding. What roles do interactive contexts play in the combining, recombining, and merging of information into a single cohesive experience? How does one’s position in social space influence this process? These questions represent fruitful research opportunities.

Activation

Encountering and deciphering new information requires “activating” stored schemas as well as other representations, including concepts and verbal and visual images (Shea 2018). Once activated, schemas and other representations help us retrieve or modify material stored in memory.

Sometimes, new information is congruent with existing schemas and representations and is effortlessly “assimilated” with pre-existing material. For example, individuals may have conceptions of what chairs, weapons, love, or risk look or feel like and assimilate new observations and experiences into preheld categories. “Accessibility” is also important here. Repeatedly retrieving some items over others facilitates later recall of frequently tapped material and inhibits recall of non-tapped material (Axelrod 1973, Gilboa & Marlatt 2017). Some refer to this as “retrieval-induced forgetting” (RIF) (Anderson & Levy 2009).

Not all information is automatically integrated into existing schemas and representations. Schemas, for example, can be “accommodated”—changed or created—when new information is incongruent with preheld material. Accommodation, however, involves gradual changes of broad knowledge structures, making the process difficult to study (Ghosh & Gilboa 2014, p. 108).

Certain mechanisms activate schemas and other representations in ways that foster misperceptions. “Spreading activation,” for example, involves encountering a stimulus that makes one representation and others linked to it more salient (e.g., Collins & Loftus 1975). “Implicit bias,” the unconscious association of stereotypical characteristics with certain people, places or things, may result in judgment errors. Racial, ethnic, or gender biases ingrained in pre-existing schemas may encourage misattributions of another person’s criminal intent, intellectual ability, or personal demeanor, hampering the accommodation of newly acquired data (Kang et al. 2011, Levinson 2007, Valian 2005).

“Priming”—exposure to stimuli that steers responses to material encountered at a later time—can also influence the activation of schemas and other representations. For example, voters primed by schools, either by voting in a school or by being exposed to schools in a laboratory experiment, activate schemas related to schools. These primes lead to more support for school ballot initiatives (Berger et al. 2008). Similarly, priming someone with religious messages can activate prosocial schemas, making one more likely to behave with kindness and empathy in emerging situations (Shariff et al. 2016).

As is true for mirror neurons and embodied simulation, sociologists cannot directly observe how schemas and other representations are activated. Nevertheless, cultural sociologists attempt to build on advances in the cognitive sciences to better understand meaning-making. The relationship between public and private culture proves important to this work (although it sometimes leads to the conflation of cognitive and cultural schemas; see Wood et al. 2018). Some studies show that variable emphases of certain cultural repertoires—differences emerging from one’s location in social space—can activate cognitive schemas of tolerance or intolerance toward the other (Calcutt et al. 2009; Enriquez & Saguy 2016; Hunzaker 2014, 2016); reproduce beliefs about gender, motherhood, or work-life balance (Blair-Loy 2009, Correll et al. 2007); or activate liberal versus conservative schemas related to social issues such as poverty or environmental action (Hunzaker & Valentino 2019, Markle 2019, Molinsky et al. 2012).

Sociologists have also explored the conditions that can activate implicit stereotypes. Ridgeway (2014) shows that stereotypical racial and gender schemas are most likely to be activated when the social distance between interactants is greatest. Such activations can have life-and-death outcomes, influencing the neighborhoods in which one lives, access to proper healthcare and quality schools, or reactions from police (Fitzgerald & Hurst 2017, Kahn & Davies 2017, Massey 2007, Sampson & Bean 2006). Other researchers study the factors that activate implicit biases connected to central social issues—i.e., workplace conditions, work-life balance (Cech et al. 2018), and childbearing decisions (Shepherd & Marshall 2018). To better understand representational activation, Schaap et al. (2019) and Shepherd (2011) advocate for implicit association tests in sociological research. Such tests could empirically document available representations in different social spaces.

Sociologists are also exploring the conditions under which priming from public culture impacts schema activation. Some study heavy media coverage of disasters, crime events, or political scrimmages and how such priming later activates schemas of racial bias (Dixon & Maddox 2005, Sonnett et al. 2015). Others explore how information sequencing in public apologies can prime an audience and ultimately activate schemas of guilt versus innocence (Cerulo & Ruane 2014). Still others explore how spatial arrangements or situational exchanges can prime people in ways that later activate various schemas (Fine & Fields 2008, Harvey 2010). But for all our progress, more research is needed to better determine consistent patterns versus contextual variations linking priming and the activation of mental representations.

New sociological work on schemas and representations is quickly emerging. Some especially promising studies explore how cognitive schemas are shared and how they become part of public culture (Hunzaker 2016, McDonnell 2014, Rotolo 2020). Another contribution involves aggregating attitude data to detect shared ways of organizing beliefs at the supra-individual level (Boutyline 2017, Goldberg 2011). Bail (2014) combines traditional qualitative methods with automated text extraction methods to identify shared schemas and representations. Hunzaker & Valentino (2019) propose a concept-association-based approach to data collection on individuals' schematic associations, followed by model concept network representations of shared schemas.

The cognitive sciences have taught us much about the processes at work in activating schemas and other representations. But sociologists must elaborate on such work, continuing to show how schemas are shared, how they become part of the public culture, and how those phenomena are influenced by contexts of interaction.

HOW DO TYPES OF PERSONAL CULTURE INTERACT?

The relationship between conscious and unconscious knowledge has interested sociologists from the discipline's inception. Much sociological theory emphasizes the weight of nondeclarative culture relative to declarative culture and outlines the conditions that may lead actors to think and act reflectively (see Bourdieu 1977). Recently, sociologists have turned to "dual process models" of cognition to extend these arguments and explore the relationship between nondeclarative and declarative culture across a wide range of subdisciplines (e.g., Auyero & Swistun 2008, Srivastava & Banaji 2011).

DiMaggio (1997) introduced the main assumption behind these models: two modes of cognitive processing, an automatic default mode and a deliberative mode triggered by circumstances that encourage increased cognitive resources. Vaisey (2009) articulated sociological applications of dual process models, highlighting their consistency and complementarity with several highly influential contemporary sociological theories—especially Bourdieu's theorization of the habitus, which emphasizes schemas for perception, action, and attendant dispositions (Lizardo & Strand 2010). Vaisey drew on Haidt's (2001) dual process model, a so-called default-interventionist model, and emphasized the duality between automatic and deliberative cognition, with the latter activated only when automatic cognition proves problematic or yields incorrect responses. This approach now constitutes what has been dubbed "sociological dual process models" (Vila-Henninger 2015).

Dual Process Models in the Cognitive Sciences

Cognitive scientists disagree about the central characteristics of dual process models (Chaiken & Trope 1999, Evans & Stanovich 2013, Smith & DeCoster 2000). Scholars acknowledge the existence of two basic cognitive modes: an autonomous mode that does not require controlled

attention or working memory and another mode requiring working memory with the capacity to perform mental simulation and separate supposition from belief. Research in social cognitive neuroscience documents this distinction, identifying two neurological systems—the X-system and the C-system—associated with reflexive and reflective cognition, respectively (Lieberman 2003). The former activates areas of the brain that perform associative learning (the amygdala, basal ganglia, and lateral temporal cortex) and the latter activates areas where the brain performs executive control and explicit learning (the prefrontal cortex, cingulate cortex, and medial-temporal lobe).

Cognitive scientists agree about little beyond this basic distinction (Evans & Stanovich 2013). They note that autonomous and controlled processing are not easily distinguishable, as both types of cognition—commonly referred to as Type 1 and Type 2, respectively—may involve conscious and unconscious cognitive processes and may be rule based (Evans & Stanovich 2013, p. 227). Dual process theorists generally agree that Type 2 processing is sequential and rule based but disagree about whether Type 1 processing is associative and built on parallel neural networks (Evans 2008, p. 261). They also disagree about the relationship between the two types of cognition. Thus, the duality between Type 1 and Type 2 processing assumed by the sociological dual process model lacks consensus among cognitive scientists.

Some researchers propose models that present a more interactive relationship between the two processing types, including the parallel and hybrid dual process models. The former posits that the two processing types operate simultaneously rather than serially from the beginning of reasoning processes (Sloman 1996). The latter, by contrast, maintains that the two processing types are blended; Type 1 processes can produce both heuristic and logical intuitions based on the kind of reasoning generally associated with Type 2 processing (Bago & De Neys 2019, Pennycook et al. 2015). Thus, while the default-interventionist model maintains that individuals resort to Type 2 cognition when Type 1 processing proves problematic, the hybrid model suggests that individuals can solve this problem through intuitive logical knowledge without engaging the cognitively onerous Type 2 processing (Bago & De Neys 2019, p. 7). Lastly, some dual process model theorists argue that cognition may be not dualistic but tripartite (Evans 2009, Stanovich 2009). The third process monitors and evaluates the relationship between Type 1 and Type 2 processing. This proposed third process mediates the interaction of the other two through intentional cognitive processes involving different mechanisms that serve higher-order functions of controlling behavior (Evans 2009).

Dual Process Models in Sociology

Vaisey's (2009) default-interventionist dual process model has dominated the sociological literature because its premises are consistent with fundamental sociological assumptions about the relationship between declarative and nondeclarative culture, particularly the weight of automatic cognition and action (see Bourdieu 1977, Dewey 2002). In essence, Vaisey's model added information about cognitive processes to substantiate sociological theoretical claims about culture and cognition, particularly the relationship between nondeclarative and declarative knowledge.

Vaisey's work stimulated much research consistent with its analytical and methodological premises. Such studies contend that sociologists investigating how culture motivates action ignore what types of culture are key. To remedy this gap, these scholars (e.g., Martin & Desmond 2010, p. 8; Miles 2015, pp. 680, 699) typically focus on the effects of implicit values, cultural worldviews, or schemas on behavior and/or social relations, methodologically relying on surveys, experiments, and social network analysis (e.g., Hoffmann 2014, Miles 2015, Vaisey & Lizardo 2010). Some explore how nondeclarative knowledge shapes political or social behavior (e.g., Boutyline & Vaisey 2017, Martin & Desmond 2010). Miles and colleagues (Miles 2015, Miles et al. 2019) rely on the

implicit association test, which is commonly used in social psychology to access Type 1 processing among research subjects and assess implicit cognition, in this case the effect of prosocial values on behavior. Other researchers combine the sociological dual process model with social network analysis, examining the relationship between implicit cultural worldviews and the formation of social ties (e.g., Hoffmann 2014, Vaisey & Lizardo 2010). Whereas Vaisey & Lizardo (2010) find that moral orientations toward behavior operate as relational filters, predicting future network composition, Hoffmann (2014) reexamines the same empirical questions, suggesting instead that cultural schemas, behavior, and social networks have a more complex, reciprocal relationship (see, e.g., Goldberg & Stein 2018, Schafer 2014, Srivastava & Banaji 2011).

Some sociologists argue that dual process models have narrowly focused on personal culture while ignoring the role of social interactions and settings in shaping cognition and action (Lamont & Swidler 2014, Shepherd 2011). Others contend that this research attends to how subconscious thinking shapes action but largely ignores how Type 2 cognition may inform behavior or how declarative and nondeclarative culture interact (Moore 2017, Vila-Henninger 2015). Such critiques sparked qualitative research that produced empirical observations on the two types of culture in action. Cerulo (2018) and McDonnell (2014) utilized focus groups to capture different cognitive processes at work, specifying what leads individuals to rely on Type 1 or Type 2 cognition, or toggle between the two. Others use interviews and observation to highlight how characteristics of space and place influence cognitive processing (e.g., Auyero & Swistun 2008, Harvey 2010, Mische 2014). Overall, this research shows that disorganized sites, rife with uncertainty, risk, or tension, are more likely to trigger Type 2 processing, while organized, safe, or routinized spaces encourage Type 1 processing. Lastly, some researchers propose more expansive models than the sociological dual process model to account for the varied ways in which individuals combine declarative and nondeclarative knowledge in action (e.g., Leschziner & Brett 2019, Leschziner & Green 2013, Winchester 2016).

HOW IS CULTURE SHARED?

How does cognition shape, and how is it shaped by, interaction and influence between individuals and groups? Recently, cognitive scientists have explicitly incorporated social interaction and social groups into their research. This social turn has led to a rich array of findings relevant to cultural sociologists.

We focus on findings that address key issues central to the culture and cognition literature—specifically, social aspects involved in the formation and updating of mental representations and memory, and the learning and updating of social rules. These findings illustrate the social mechanisms that underlie the development, persistence, and change of personal culture and help us understand the relationship between personal and public forms of culture. Moreover, such research provides cultural sociologists with insight into how individuals and groups form shared interpretations of the social world, develop shared memories and emotions, and learn about the expectations and behaviors of others.

Social Context of Cognition

Social cognitive neuroscientists have identified sets of brain circuits that are involved in key interpersonal processes relevant to culture. These include nonverbal social perception (recognizing others as social beings), experience sharing (observing the behaviors of others), and mentalizing (understanding the mental states of others; Doré et al. 2015). Some of these findings have clear

implications for sociological research on how people develop shared understandings of language, symbols, and behavior.

Brain coupling in interpersonal interaction. Recent work on “brain coupling” in interpersonal interaction documents how shared interpretations are generated in interaction. Using functional magnetic resonance imaging (fMRI) to assess neural activity, researchers show that listening to a story told by another person temporally couples the neural response patterns of the listener to those of the speaker. The more aligned the neural activity of story listeners to the neural activity of story speakers, the better the shared comprehension of that story (Stephens et al. 2010). Listeners to a story who share the same interpretation of a story also share similar neural responses (Yeshurun et al. 2017). Relatedly, the field of experimental semiotics (e.g., Galantucci & Garrod 2011) illustrates how symbols—signs with regular relation to their referent—develop through interaction between individuals. Understanding how and when brains become coupled helps us understand complex joint behaviors and the development of shared meanings (Hasson et al. 2012).

Shared attention. When pairs or groups of individuals attend to the same external stimulus (e.g., works of art, written exchanges, or a social scene) and assume that others share that focus, they experience “shared attention.” Being in a state of shared versus individual attention directs more cognitive resources toward processing the stimulus (Shteynberg 2010). These additional cognitive resources result in better memory for, more extreme evaluations of, and more emotional intensity toward the stimulus (Shteynberg 2015). Additionally, individuals are more likely to learn from others’ behaviors when they know those behaviors are being observed by similar others. The effects of shared attention are stronger when shared with close others simultaneously, versus sequentially (Shteynberg 2015). Shared attention may also facilitate shared memory and shared evaluations of public culture and social rules.

Socially shared retrieval-induced forgetting. Interaction sequences can affect memory and forgetting, leading to the emergence of collective memory (or forgetting) in groups (Hirst et al. 2018). RIF, in which one specific memory inhibits the activation of related memories, can last over time and make subsequent retrieval of competing memories slower and more difficult to recall (e.g., Anderson & Levy 2009). RIF can occur socially; those listening to a speaker who selectively recalls elements of a story can experience inhibition of related memories. This is referred to as “socially shared retrieval-induced forgetting” (SS-RIF) (Cuc et al. 2007). Importantly, SS-RIF is transitive: The selection of details shared by one individual can be transmitted into a subsequent discussion, producing SS-RIF across social interactions (Coman & Hirst 2011, Drost-Lopez & Coman 2018).

Network structure—larger patterns of interactions in a group—also shapes the extent to which group members share memories of information. Reinforcement from others matters. When networks are clustered (meaning that individuals interact with those with whom their network neighbors interact), the overlap in memory between group members is greatest (Coman et al. 2016). The temporal order in which people in particular network positions interact matters as well. When individuals who serve as bridges between clusters have discussions early in a set of interactions, there is more convergence in memory within a group (Momennejad et al. 2019).

Shared and collective emotions. Individuals observing the emotional states of others simulate those states in their own brains, creating overlapping patterns of brain activity. This results in emotional contagion, or “affect sharing,” between the perceiver and the perceived (see Doré et al. 2015). When people jointly experience emotions in a situation, group-level emotions distinct from the aggregation of individual-level emotions emerge. These collective emotions stem from

emotional influence between individuals in a situation and can lead to a variety of both prosocial and antisocial collective behavior (Goldenberg et al. 2020). Emotions facilitate the transmission of shared meaning and information by increasing communication and bonding in a group (e.g., Kashima et al. 2019), as Collins (2004) argues. Thus, more empirical work can examine the interactional dynamics that give rise to shared and collective emotions.

Social status and representing the minds of others. The process of “mentalizing”—thinking about others’ thoughts and feelings—is a core social function that shapes representations of the social world. Research suggests this process varies by the social standing of individuals within a group. In a novel experiment that combines pre-existing social groups, network information about relationships within the groups, and fMRI measures of brain activity, Zerubavel et al. (2015) found that the brain activity associated with seeing the faces of people who are popular within the group facilitates understanding their mental states. Being in a lower social status position in a group is associated with greater activation of brain areas associated with mentalizing (Muscatell et al. 2012). This means that social status in groups shapes the extent and the type of social information processing that individuals engage in.

Social Context of Cognition in Sociology

The findings reviewed above suggest that social interaction and group processes are central to how culture is stored at the individual level. (For work on cognition in and about social networks, see Smith et al. 2020.) Below, we review sociological work that pays particular attention to the role of interaction and transmission in the formation of building blocks of culture—particularly representations and social rules. Some of this work does not explicitly incorporate cognitive science insights but nonetheless provides important social context for integrating and applying those insights in future sociological work.

Transmission of information and norms. The information communicated between individuals and groups has implications for shared interpretations of the social world, including ideas about the beliefs and knowledge of others, and how we understand behavior in a group or population. Decisions about what to communicate and what not to communicate are grounded both in existing cognitive structures and in social rules. For example, Hunzaker (2014), drawing on a paradigm developed by Kashima and colleagues, finds that cognitive schemas shape the information transmitted to others, thus affecting what information and impressions others receive. This process often reifies and spreads information that confirms stereotypes while suppressing information that disconfirms stereotypes. The selective sharing of information can be driven by an awareness of audiences and their beliefs (e.g., Lyons & Kashima 2003) or the desire to reduce internal inconsistencies in the experience of schemas (e.g., Hunzaker 2016).

The transmission of information depends on beliefs about the nature of social relationships and the social acceptability or stigma of certain behaviors. What we decide to tell others is governed by our role obligations to them and a set of socially learned notification norms (Ryan 2006). Individuals are less likely to disclose more stigmatized experiences to others; they tailor the decision to disclose or withhold information (e.g., information on having an abortion or their political beliefs) to what they perceive others believe (Cowan 2014, Cowan & Baldassari 2018). This has the effect of reinforcing existing patterns of public opinion.

Interaction dynamics also underlie the formation of norm perceptions, sometimes through shaping the types of social information individuals use to make inferences about the group. Individuals’ representations of group norms depend on their social relationships in the group as

individuals selectively disclose information about their own behavior (Kitts 2003). Those individuals to whom others pay more attention are better able to influence the beliefs and behaviors of others—at both the collective and the dyadic levels (Paluck et al. 2016). Ridgeway & Erickson (2000) demonstrate how beliefs about relative status become widely shared in two ways: through treating people according to the group’s status beliefs and through others’ observing such status-related behaviors. While these studies do not explicitly measure cognition, they all rely on assumptions about cognition relating to group members. These ideas can be integrated with newer work from the cognitive sciences.

Finally, McDonnell et al.’s (2017) theory of “resonance” between individual interpretation and forms of public culture draws on insights about the role of interaction and cognition. They argue that the fit between a cultural object and how individuals use the object depends on the cognitive and emotional conditions that establish definitions of situations, objects, and people as produced through interactions with others.

Modeling transmission through network structure. Understanding structures that facilitate the transmission of ideas, concepts, objects, and behaviors in social interaction is essential to key questions in the sociology of culture. A robust literature across many fields models transmission through social networks, including models of the spread of complex social contagions (e.g., Guilbeault et al. 2018). Relatively little of this work explicitly incorporates new empirical insights about social cognition. This is an area of great potential for sociologists.

Recent work has instead used agent-based modeling to posit how cognition affects transmission. Shaw (2015) builds a model of cultural transmission in which interacting agents with particular mental representations come to share those mental representations as they learn from each other unconsciously. This suggests the size of the population of interacting agents and the patterns of connection between them shape the extent to which representations are clustered within subgroups or shared in broad populations. In contrast, Goldberg & Stein (2018) suggest that, instead of thinking about sharing culture as a process of contagion (i.e., social influence results in some cultural unit being transferred from one individual to another), it may follow a process of “associative diffusion.” Here, what spreads are observed associations between population-based beliefs and behaviors and subsequent changes in preferences and behavior based on these observations. Their formal model illustrates that associative diffusion produces cultural differentiation—the concentration of preferences within subgroups of the population—independent of particular underlying network structures.

More explicitly incorporating recent work on interaction and cognition will open new areas of inquiry in the study of culture and cognition. Given the centrality of interaction and transmission to social life, findings from the cognitive sciences in these areas can expand the research questions we pose (e.g., How are forms of personal and public culture created, used, remembered, and transformed through interaction and group processes?) and enrich our understanding of how social interaction underlies the sharing of culture in and across populations.

HOW DO CULTURE AND COGNITION INFLUENCE ACTION?

Within sociology, culture and cognition are not simply objects of study. Rather, they are analytic resources, considered in tandem and used to explain how intersubjectively shared meanings internalized by actors influence action. This focus distinguishes sociological approaches to action from cognitive scientists’ concern with behavior. The culture and cognition perspective encourages us to reconsider core principles in cultural sociology, producing two important shifts in explaining action.

The first shift addresses the relationship between motivation and action, moving the focus to the cognitive mechanisms whereby culture shapes action (Lizardo & Strand 2010, Vaisey 2009). Dual process models, with their emphasis on automatic cognition and habitual action, significantly informed this shift, centralizing ontological and methodological issues about what motivations are and how best to access them. Whereas some argue that motivations for action are largely subconscious (Miles 2015, Vaisey 2009), others counter that motivations become articulable motives, influencing action more reflectively (Vila-Henninger 2015, Winchester & Green 2019). Ontological and methodological questions about the explanation of action are inherently intertwined, with dispositional and representational views pitted against one other. Dispositional views focus on the weight of automatic cognition and habits and examine how practical logic guides action, through methods such as surveys and experiments. Representational views attend to public culture and the role of symbolic meanings in shaping action, and they investigate how people's accounts inform their actions through qualitative methods.

While the first shift places mental mechanisms at the center of explanatory arguments, the second shift moves the focus on culture, cognition, and action beyond the confines of the mind. Here, sociologists attend to what cognitive scientists call 4E cognition—embedded, embodied, enacted, and extended cognition (Newen et al. 2018). While the foci of these four approaches differ, they share a nonmentalistic or internalist understanding of cognition and highlight the inherent connection between mind, body, and environment. Whereas the embedded cognition approach focuses on the causal influence of the environment on cognition, the embodied approach attends to the role of the body, enacted cognition emphasizes the active interaction between mind and environment, and extended cognition focuses on the constitutive relationship between the mind and extrabodily objects or processes (Newen et al. 2018).

Sociologists draw on embedded and enacted cognition, as well as the associated situated cognition approach (Haugeland 1995, Lave 1988, Ward et al. 2017) emphasizing the inherent connectedness between mind and environment. They draw on earlier pragmatist formulations (Dewey 2002), highlighting how the environment anchors cognition and action (Auyero & Swistun 2008, Harvey 2010, Martin 2011). They also rely on scholarship on the senses and embodied cognition (Clark 1997) to underscore the intrinsic relationship between mind and body in explaining how culture shapes action (Cerulo 2018, Ignatow 2007, Winchester 2016). Others follow insights from extended cognition and distributed cognition, the latter with its focus on the interactive relations between minds and artifacts (Clark & Chalmers 1998, Hutchins 1995), as well as materiality studies (Keane 2003) and affordance theory (Gibson 1979) to examine how larger structures—whether social or material—comprise cognitive systems and anchor cognition (Domínguez Rubio 2014, Norton 2019).

Beyond Cultural Sociology

Attending to the cognitive sciences has produced shifts in the foci within cultural sociology. But core principles on how culture and cognition shape action are also beginning to impact certain substantive fields within sociology at large.

Because of the long-standing reliance on the concept of framing (focusing attention by arranging some aspects of perceived reality in ways that make them more salient than other aspects), social movement scholars were ready to embrace a culture and cognition approach to understanding social action. Some have explored how schematic activation fuels social action among members of collective movements, including immigrant youth movements (Enriquez & Saguy 2016), environmental activism (Farrell 2013), and changes to established laws (Kostiner 2003). McAdam

et al. (2003) use several historical examples to show how relational and environmental changes can bring about a “cognitive conversion” that gradually crystallizes emergent understandings among movement participants, eventually triggering certain lines of collective action.

In related research, some social movement scholars underscore the importance of simultaneous attention to automatic and deliberative cognition (or Type 1 and Type 2 cognition), studying the role of each within the interactive history of collective action. While certain cultural events or arrangements may initially trigger emotions and automatic cognition (i.e., a police shooting, a hate crime, or a sexual assault), successful movement organizers must transform feelings into action (Goodwin et al. 2001, Reger 2004). Often, this involves redirecting movement participants’ attention from emotional triggers to deliberative reasoning and conscious challenges to existing schemas. In this way, action is redirected toward productive planning rather than conflict escalation (McDonnell 2014, Mische 2014).

Scholars of religion are also applying insights and findings from cognitive science in their work. Spurred by cognitive anthropologists and cognitive psychologists—Justin Barrett and Pascal Boyer among them—sociologists of religion began to explore the relationship between religion, cognition, and practices such as prayer, forgiveness, group boundary maintenance, moral action, and the exercise of religious belief (for good reviews, see Wuthnow 2007, 2008). In related work, scholars have debated the relationship between moral beliefs, intuitions, goals, and action. To what extent is action guided by moral intuitions stored as Type 1 processes (e.g., Vaisey 2009) versus the matching of skills or tools to the situation to produce action (e.g., Swidler 2008)? How does one precisely characterize the nature of moral intuitions? Are moral intuitions time and situationally invariant? Miles (2015, p. 680) argues that religious values operate through a Type 1 cognitive pathway and are important to many forms of action across contexts, like praying, attending religious services, and caring for others. Luft (2020) contributes an articulation of the central role of cognition about other people in order to understand moral action.

The question now becomes whether the culture and cognition approach can enhance work in areas with no prior ties to this lens. We have seen some activity within demography. Some demographers are incorporating insights from the culture and cognition approach in building models designed to better explain behaviors relevant to demographic outcomes. For example, Bachrach & Morgan (2013) outlined a theoretical model of fertility intentions and behaviors as a product of shared cognitive schemas and Type 1 and 2 cognitive processes. Rackin & Bachrach (2016) developed and tested a model that analyzed the relationship between fertility intentions and behavior as it relates to different cognitive processes at work during different points in the life course. Shepherd & Marshall (2018) posit an important role for the interplay of individual cognitive representations and public culture in shaping individuals’ fertility desires and subsequent behavior. They show that exposure to public culture can activate particular cognitive associations, making them more relevant to action.

The culture and cognition perspective is slowly being incorporated into public policy studies. Some promising work has already been done on how public culture can activate or shape the cognitive processes people use to interpret information on climate change—particularly media discourse (Hart et al. 2015, Kahan 2012). In another arena, Braman et al. (2005) note that public culture influences cognition. Consequently, the culture and cognition perspective could help gun control advocates more productively craft social policy in this area. Careful organizing of persuasive empirical proof on the effects of gun control could forward social meanings that are compatible with diverse cultural orientations to the topic. Evans et al. (2015) study implementing and sustaining large-scale change in healthcare organizations and systems, showing both how cognitive and cultural inertia can block support of the change initiatives and how such inertia can be overcome. Other researchers apply the culture and cognition approach to better understand

divergent views on legal punishment (Kahan & Braman 2006) and objections to the welfare state (Steensland 2006).

Race scholars' heavy reliance on cultural sociology should make this area ripe for incorporating cognitive findings as well. Some literature does exist. Triggered by Brubaker et al.'s (2004) influential article, some sociologists now rely on cognitive schemas to capture the relational and dynamic nature of race, ethnicity, and nationalism (Bonikowski & DiMaggio 2016, Lluch 2019, Rydgren 2007). Bonilla-Silva (2017) explores the repertoire of justifications and rationalizations that whites use to legitimate racial inequality. But clearly, additional perspectives are needed in this area. Ray (2019) offers one possible direction. He studies how racial schemas are connected to material and social resources within organizations, arguing that schemas connected to resources become durable structures: "Once racial structures are in place, a racial ideology arises to justify the unequal distribution of resources along racial lines" (Ray 2019, p. 32). Linking culture and cognition, race, and resource distribution could offer a new perspective on racially based economic inequality.

Earlier, we wrote about the integration of implicit bias and priming research in sociological work on race. This work could certainly be expanded. Some researchers are truly pushing the envelope on racial bias research by using virtual reality technology to seek ways of tempering implicit biases. Researchers use synchronous visuotactile stimulation or visuomotor synchrony to create a sense of "body ownership" between individuals and their avatars. Findings show that when white study participants inhabit black virtual bodies, they exhibit an immediate decrease in their implicit racial bias and discriminatory behaviors toward black actors—an effect that lasts beyond the virtual experience (Banakou et al. 2016, Maister et al. 2015, Peck et al. 2013). Sociologists have been reluctant to engage virtual reality as a research tool. However, using such technologies to alter social contexts, interactants' relationality, or social actors' characteristics could provide a novel way of exploring debates over the connection between unconscious racism and discriminatory action exercised in the courts; by police, healthcare workers, or finance sector lenders; or within everyday interactions (see, e.g., FitzGerald & Hurst 2017, Quillian 2008).

One could imagine culture and cognition enhancing the study of other sociological subfields including crime, deviance and social control, identity, inequality, politics, medical sociology and much more as we search for better understandings of decision making and subsequent action (at both the group and individual level), intragroup relations, boundary construction, identity and perceptions of the other, and strategies of social control.

CONCLUSION

DiMaggio (1997, p. 282) argued that cultural sociologists cannot avoid cognition if they want to explain how culture shapes action. He urged sociologists to make explicit the role of cognition rather than clinging to untested assumptions.

To some degree, scholars have responded to this call, as evidenced by the literature reviewed here. Knowledge from the cognitive sciences has enabled cultural sociologists to escape the traps of explanations that reduce analysis to the weight of shared meanings (and/or social structures), and to better specify a variety of mental processes and their relationship with public culture and behavior. Therefore, the debates of whether cognition is about brain or mind, is about the individual or the collective, or is an inside or outside process must give way to a more integrated approach. Cognition is an intricate melding of neural systems residing in socially situated, interacting bodies located in structured social spaces. This holistic approach is critical to moving the field forward.

Achieving this goal will not be easy, for we are still in the early stages of charting how the mind, shared ideas, and action relate to one another. Insufficient clarity about different forms of culture still mars the analysis of empirical data (Lizardo 2017). Moreover, a lack of consensus on even basic terms used in cultural sociology limits the potential for cumulative knowledge and the development of solid explanatory models (Patterson 2014).

In an effort to move this exciting field forward, we suggest that future research on culture and cognition strive for consensus as scholars pursue further study of the following issues:

- A closer investigation of the cognitive mechanisms that underpin the relationship between public culture and personal culture
- Greater understanding of the sociocultural aspects and the cognitive mechanisms that inform the acquisition, storage, and retrieval of culture by both individuals and those involved in group interaction or collective action
- Continued study of the ways in which elements of personal culture—nondeclarative and declarative—interact, particularly with reference to varying sociocultural contexts
- Additional research on the many ways in which culture is shared between individuals and within groups and networks
- Absent the ability to directly observe cognitive processes, better ways of measuring the elements and processes involved in the mutually constitutive relationship between culture and cognition
- Careful thought regarding ways to improve knowledge exchange and collaboration between cultural sociologists and cognitive scientists

Addressing these issues is not only of value to cultural sociologists. As suggested here, a culture and cognition approach to sociological questions can greatly enhance our understanding of issues central to broader sociological enterprise. Knowing this, we offer this review as an agenda for action—one that can trigger a variety of new projects and possibilities within a rapidly growing field.

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