Have Schemas been Good to Think With?¹

Vanina Leschziner and Gordon Brett
University of Toronto

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Schemas are one of the most popular explanatory concepts in cultural sociology, and are increasingly used in sociology more broadly. In this article we ask the question: have schemas been good to think with? We answer this question by analyzing the ontological, epistemic, and methodological bases of schemas, including the conceptualizations, claims, assumptions, and methods that underpin the use of schemas in sociological inquiry. We show that sociologists have developed two distinct, contradictory, and often conflated perspectives on schemas, what we refer to as culturalist and cognitivist perspectives. We suggest that schemas have acquired a polysemic character in sociology, and that they have become a (more narrow and consequently more scientifically legitimate) proxy for *Culture*, and that these features have (paradoxically) facilitated the popularity of schemas within the discipline. Sociologists have recently begun to make the necessary advancements to turn schemas into a more useful explanatory concept, through both analytical improvements (by distinguishing schemas from both public culture and other forms of nondeclarative personal culture), and methodological innovations (for better deriving schemas from survey data, texts, and experiments). Yet, some challenges remain, and the analytical value of schemas remains promissory. We conclude by offering some guidelines for making more specific and measured claims about schemas in sociological research.

Introduction

Since the publication of DiMaggio's (1997) article "Culture and Cognition," interest in cognition has grown exponentially in sociology. In the quest to explain how culture and cognition shape action, sociologists have had recourse to a wide variety of analytic tools, drawing on both sociological concepts (e.g., habitus) and theories from other disciplines (e.g., dual-process models). Few other concepts have proven as attractive for accounting for the linkages between culture and cognition, and how these shape action, as that of *schemas*. Sometimes referred to as cognitive schemas and other times as cultural schemas, sociologists

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have increasingly turned to schemas as a mechanism to explain how culture shapes cognition and action by endowing individuals with mental representations (Cerulo et al., 2021; DiMaggio, 1997; Lizardo, 2017; Patterson, 2014; Vaisey, 2009). This has helped the sociology of culture move towards increasing analytical and empirical specificity about how cultural and cognitive factors shape social processes (e.g., Cerulo, 2006; McDonnell, 2016; Swidler, 2001; Vaisey and Lizardo, 2010; Winchester, 2016).

While the concept of schemas is especially relevant to the sociology of culture, it is relied upon to do much of the explanatory work in sociological analyses across a wide range of sub-fields and methods. In the past few years, schemas have been used in the literature on gender (e.g., Epstein, 2007), race (e.g., Fox and Guglielmo, 2012), ethnicity (Brubaker et al., 2004), inequality, poverty, and mobility (e.g., Sampson and Raudenbush, 2004), and political sociology and social movements (e.g., Steinman, 2012), to name but a few areas. If schemas have been used so widely, it is in part because they are purported to explain mechanisms that sociologists were not able to specify before (i.e., *how* socially shared ideas cluster together and guide action). It is also, to a large extent, because schemas are variously and vaguely understood (see Wood et al., 2018), so they are used to capture a diverse -- and contradictory -- array of phenomena (see Taylor and Vickers, 2017), chief among which are representations that are inside and outside the mind.

It is only in the past five years that sociologists working in the area of culture and cognition began to look more closely at the concept of schemas to better specify what schemas are, what social and cultural mechanisms they can account for, and what kinds of data and methods can be used to empirically study them (e.g., Boutyline and Soter, 2021; Hunzaker and Valentino, 2019; Wood et al., 2018). This has entailed great analytic progress from the

conceptual vagaries that have characterized the concept of schemas and its uses in sociology, but there is still work to be done to develop a better understanding of what schemas are, and how they can -- and cannot -- be empirically investigated.

The guiding question of this article revolves around the value of schemas as an analytic tool, specifically the ways in which schemas may have been both good and bad to think with. To answer this question, we examine the ontological, epistemic, and methodological place of schemas in sociological analysis. While other recently published articles about schemas have done much to specify what schemas are (Boutyline and Soter, 2021; Hunzaker and Valentino, 2019; Wood et al., 2018), what distinguishes this article from extant examinations of the concept is a broader scope of analysis of schemas and their place in sociology, and an epistemic focus on the claims and assumptions underpinning the use of schemas in sociological research (for this kind of approach, see Abend, 2018; Abend et al., 2013). Answering our guiding question requires looking closely into the understanding and use of schemas in sociology, and placing this in the broader context of the development of the sociology of culture. Our aim is to assess how schemas have -- and have not -- improved knowledge of cultural and cognitive processes. This examination will allow us to shed light on both the analytical potential and pitfalls of this concept, and suggest the most promising ways to empirically investigate schemas and apply them to sociological analysis.

Our examination of schemas begins with an overview of the concept, starting with its origins in psychology before moving to the importation of schemas into sociology, and how the understanding and application of schemas has changed over time. We zoom in on the claims and assumptions sociologists make when using schemas, that is, the explicit and implicit choices they make when they conceptualize and operationalize schemas, and present them in their work. We

follow this with an examination of how schemas have been used in empirical analysis in the past few years. We close the article with an assessment of where sociological knowledge of schemas stands at present, and suggestions for best practices in the study of schemas moving forward.

The Development of the Concept of Schemas

The memory psychologists Bartlett ([1932] 1995) is credited with having first defined schemas in the early 1930s, though some of the credit also goes to Piaget (1952), and further back to Kant ([1781] 1998), whose understanding of schemas Bartlett follows closely. Schemas, as Bartlett ([1932] 1995: 199) saw it, are a perceptual filter formed within an individual after a given experience, and strengthened with following experiences that the individual perceives similarly. Bartlett ([1932] 1995: 7) saw memory as an active process, in that it does not store all past experiences, but organizes them into a general set, which results in the formation of stable neural pathways that guide perception, learning, and action. The pathways accumulate in an actor's long-term memory and serve as knowledge structures that get activated in her working memory when they are relevant. An important point is that all individual experiences turn into abstract knowledge to produce schemas, according to Bartlett, and that these are unconscious (Brewer, 2000: 77).

The concept of schemas developed by Bartlett had a big impact on psychology in the 1970-1980s, when the discipline was moving away from behaviorism and towards cognition, and solidified as cognitive psychology (Brewer, 2000: 69). Indeed, the major conceptualizations of schemas still in use today are a close reflection of Bartlett's definition (e.g., Axelrod, 1973; Mandler, 1984; Rumelhart, 1980; Rumelhart, Hinton and Williams, 1986). Schemas are seen as networks of strongly connected cognitive elements -- which represent generic concepts stored in

memory -- that work together to process information at a given time by filling in information that is ambiguous or absent (Rumelhart, 1980: 37-39; Rumelhart, Hinton and Williams, 1986: 18; Strauss and Quinn, 1997: 49). Schemas vary in their level of abstraction (Casson, 1983: 430; D'Andrade, 1995: 126-130), but they are always reconstructions of past events, shaping meanings and giving expectations for the future (Graesser and Nakamura, 1982; Minsky, 1975; Rumelhart, 1980). As such, they are considered the “building blocks of cognition” (Rumelhart, 1980), both structures of information and processors of information, that is, “a pattern *of* action as well as a pattern *for* action” (Neisser, 1976: 56). Some schemas are individual, and others universal (i.e., so called image-schemas), but they are thought to be cultural when they are shared among actors who have had similar experiences (Strauss and Quinn, 1997: 122).

Right from its inception, the concept of schemas exhibited a duality, conceived as structures *and* processors of information.² As we move to review the sociological literature on schemas, we will find a similar duality. A significant difference, however, is that, until recently, the sociological literature rarely addressed the two aspects of the concept -- i.e., structures of substantive content and cognitive processes -- explicitly. We turn to the importation of schemas into sociology, and this duality, next.

Sociological Conceptualizations of Schemas

While the burgeoning interest in the workings of the mind (Cerulo, 2010; Cerulo et al., 2021; Lizardo et al., 2016; Patterson, 2014) has brought about a sharp rise in the use of schemas in empirical and theoretical work in sociology (e.g., Foster, 2018; Hunzaker, 2016; McDonnell, 2014), sociologists have been using the notion of schemas for a few decades. Schemas were first

² Indeed, two theories of schemas have been identified in Bartlett's work (Brewer, 2000).

introduced into the discipline to account for cognitive processes by Cicourel, who defined them as “packaged units of knowledge that include information about how this knowledge is to be used” (Cicourel, 1981: 100). Cicourel’s ideas entailed categories and computational procedures, as well as an evaluation process based on data and expectations (Cicourel, 1981: 101). However, Cicourel’s article, published in the *Annual Review of Sociology*, did not engender much interest in cognitive processes. It was not until DiMaggio’s (1997) own *Annual Review of Sociology* article “Culture and Cognition,” which made a strong case for the study of cognition, that sociological interest in schemas as processors of information took off. To be sure, Sewell’s (1992) highly influential article on the duality of structure and agency reintroduced schemas to sociology before DiMaggio, but Sewell approached schemas from an altogether different perspective, as we explain below.

The sociological literature on schemas can be broadly divided into two traditions, what we refer to as culturalist and cognitivist, that mirror the duality in the concept of schemas we noted above. Whereas the culturalist perspective generally approaches the study of schemas as sets of taken-for-granted ideas that guide action “from the outside in” (e.g., Blair-Loy, 2003; Swidler, 2001), the cognitivist perspective investigates schemas as mental mechanisms whereby intersubjectively shared ideas shape action “from the inside out” (e.g., DiMaggio, 1997; Vaisey, 2009).

From the culturalist perspective, the notion of schemas has been used interchangeably with concepts such as those of cultural models or frames (cf. Goffman, 1974; see Wood et al., 2018), as sets of interrelated ideas that actors learn when they come into contact with other actors, organizations, or institutions (e.g., Swidler, 2001). Blair-Loy’s (2003) work on the careers of women executives -- much in line with Swidler’s theory -- is a clear example of this view.

Indeed, she contrasts her take to those who view schemas as cognitive frameworks, defining schemas as taken-for-granted models for understanding the world (Blair-Loy, 2003: 220) that constrain action regardless of whether individuals believe in them or not (Blair-Loy, 2003: 176).

From the cognitivist perspective, schemas are thought to guide action through opposite mechanisms. Here, rather than constraining action from the outside in, schemas are thought to guide action from the inside out (cf. DiMaggio, 1997), as mental structures that guide action in a largely subconscious manner (Vaisey, 2009). Just as Swidler's (1986; 2001) toolkit theory is an exemplar of the culturalist view, Bourdieu's ([1980] 1990) practice theory, and his concept of the habitus in particular, has been the sociological model for the cognitivist view (see Lizardo and Strand, 2010). Stemming from different research traditions, the two conceptualizations of schemas point to two different processes -- cultural and cognitive -- shaping social action, and have spawned distinct lines of research dedicated to account for each of these processes (e.g., Enriquez and Saguy, 2016; McDonnell, 2016; Winchester, 2016). We review the development of the two traditions below.

The Culturalist Perspective on Schemas

Arguably the most influential conceptualization of schemas in sociology presents these as flexible and transposable structures with cultural content (Sewell, 1992).³ Sewell makes numerous references to schemas (N= 104) in his article, and offers the following (Sewell, 1992: 7-8):

³ Sewell was the most highly cited source for the term "schema" in an analysis we conducted of articles published in five top sociology journals from 1990 to 2016. For our sample, we selected articles from the two top generalist journals, and the top journals in three relevant sub-fields, namely the sociology of culture, social psychology, and theory. The five journals are: *American Sociological Review*, *American Journal of Sociology*, *Poetics*, *Social Psychology Quarterly*, and *Sociological Theory*.

“The rules of social life” should be thought of as including all the varieties of cultural schemas that anthropologists have uncovered in their research: not only the array of binary oppositions that make up a given society's fundamental tools of thought, but also the various conventions, recipes, scenarios, principles of action, and habits of speech and gesture built up with these fundamental tools.... What I mean to get at is not formally stated prescriptions but the informal and not always conscious schemas, metaphors, or assumptions presupposed by such formal statements.

Sewell follows Giddens' (1984) notion of rules in his definition of schemas, taking schemas less as heuristics than as cultural codes that shape action.⁴ In effect, Sewell (1992: 20) goes on to state that “[a]gency arises from the actor's *knowledge of schemas*, which means the ability to apply them to new contexts” (emphasis added). That actors may have knowledge of schemas runs counter to the notion that schemas are mental structures that guide action through largely uncontrolled (i.e., subconscious) cognitive processes (e.g., Rumelhart, 1980). From the culturalist perspective, schemas are external objects that can be held and grappled with.

When schemas are presented as publicly known structures of substantive content, Goffman (1974) is commonly cited as a source. Of course, Goffman has not written much about schemas, but about frames, the structures that shape individuals' understanding of situations (Goffman, 1974: 22). Frames are assumed by actors, and used to figure out what is happening in a situation (Goffman, 1974: 26). To the extent that actors share views about central types of frames (particularly what Goffman called primary frameworks), these make up a fundamental part of culture (Goffman, 1974: 27). In short, frames constitute public knowledge, shared cultural codes that guide social life in particular contexts. This view is similarly represented in Swidler's

⁴ Rules are central to Giddens' theory (1984), constituting what he calls practical consciousness. Giddens (1984: e.g., 22, 90) follows the phenomenological tradition in viewing rules and tactics -- or “typified schemes” -- as the techniques through which actors habitually negotiate everyday life. Knowledge of procedure, Giddens (1984: 22) states, is by definition methodological, in that it does not entail specific information but rather a “generalized capacity” to act across varied situations.

(e.g., 2001) work.⁵ In *Talk of Love*, Swidler (2001) makes a few mentions of schemas as phenomena akin to cultural codes. Indeed, Swidler (2001: 186) critiques cognitive psychologists for focusing on the cognitive processing of schemas, while disregarding the organization of the situations where schemas operate -- an argument closer to Goffman than to the cognitivist perspective on schemas. The quest for cultural sociologists, Swidler (2001: 209) argues, is to understand why given cultural schemas structure life more than others.

The different conceptualizations we presented in this section have some key attributes in common, chief among which is an emphasis on the public, external, codified nature of socially shared knowledge. Such knowledge influences action from the outside in, and it is knowledge that can often be consciously held, grappled with, and even (in some cases) manipulated. These attributes all stand in contrast with the cognitivist perspective on schemas, as we show below.

The Cognitivist Perspective on Schemas

Though Bourdieu is only rarely cited as a source for schemas in the sociological literature, he bears significant influence on cognitively inclined sociologists who use schemas in their work (e.g., Lizardo and Strand, 2010; Vaisey, 2009; Vila-Henninger, 2015). Much unlike the culturalist perspective, here schemas constitute actors' practical knowledge of the social world, operating at a subconscious level (cf. Bourdieu, [1979] 1984: 468). This is because schemas give rise to "products of an unwilled, unselfconscious systematicity" (Bourdieu, [1979] 1984: 44) that stand in contrast to principles that could be explicitly stated. For Bourdieu ([1979] 1984: 468), actors' practical knowledge consists of schemas for perception, appreciation, and action, and are the product of the objective division of actors into classes. Far from static, these

⁵ Swidler (2001) is commonly cited in literature that presents schemas consistently as publicly known structures with substantive content, but rarely in publications that take a cognitivist approach to schemas.

“generative schemes” are transferable across areas of practical knowledge of the social world (Bourdieu, [1979] 1984: 170, 175). In contrast to the sociological view of schemas as public cultural codes, here schemas are viewed as heuristics, malleable structures stored in the brain (Lizardo, 2004: 383) or, in other words, as nondeclarative personal culture (Lizardo, 2017).

It was not until the so-called “cognitive turn” that the cognitive foundations of Bourdieu’s practice theory -- and the role of schemas in perception, thought, and action specifically -- were brought to the foreground (Lizardo, 2004; Lizardo and Strand 2010). That Bourdieu made reference to schemas for thought and action in one of his many definitions of the habitus (e.g., Bourdieu, [1979] 1984: 420) was surely no news but, prior to the “cognitive turn” in cultural sociology, the interpretive emphasis was on other aspects of Bourdieu’s theory, such as practice, social reproduction, and social distinction (e.g., DiMaggio, 1982; Lamont, 1992).

While cognitively inclined sociologists are generally influenced by Bourdieu, they draw on the cognitive sciences (especially cognitive psychology, cognitive anthropology, and cognitive neuroscience) to characterize schemas specifically (e.g., Cerulo, 2010; Cerulo et al., 2021; DiMaggio, 1997; Vaisey, 2009; Vila-Henninger, 2015). Here, schemas are defined as connectionist networks, neural structures created from experience that, through weighted neural connections, lead individuals to automatically organize and process stimuli, thereby shaping perception and behavior (see Cerulo, 2010: 125-127; Patterson, 2014: 9; Vaisey, 2009: 1685-1686). A central feature of schemas that is often emphasized is that they filter perception and attention by filling in for missing information (Cerulo, 2006; 2018; DiMaggio, 1997). In other words, schemas are mental shortcuts, or expectancies at the individual level (Patterson 2014: 9), given that they filter the perception of stimuli based on prior experience rather than actual observations.

From this perspective, schemas are not like cultural codes -- or public culture -- that can be strategically used, but rather “deep, largely unconscious networks of neural associations that facilitate perception, interpretation, and action” (Vaisey, 2009: 1686). Vaisey goes further to make a strong case for the use of schemas to understand how culture shapes action, arguing that the concept of schemas entails a “robust notion of motivation,” given that it automatically produces evaluations and behavior (Vaisey, 2009: 1687; for a critique of this position, see Vila-Henninger, 2015: 250-253).⁶

Our review of the culturalist and cognitivist perspectives on schemas has outlined extant definitions of the concept in sociology; that is to say, we have focused on explicit claims sociologists have made about schemas. But the use of schemas in the sociological literature has also been shaped by implicit assumptions that underpin this concept, so we turn to discuss such assumptions next.

The Epistemic Position of the Concept of Schemas

The founding and evolution of the sociology of culture in the U.S., starting in the early 1980s and into the 1990s, had the ironic outcome of turning research on culture into a legitimate and popular enterprise, yet at the expense of the concept of culture. In contrast to the kind of cultural analysis pioneered by Geertz (1973), the major foundational figures of the sociology of culture in the U.S. obliterated *Culture* as an object of study, instead turning their attention to specific cultural processes (e.g., DiMaggio, 1982; Lamont, 1992; Swidler, 1986; Wuthnow, 1987). Bourdieu’s (e.g., [1979] 1984) own work, fundamental for this new sub-field, introduced

⁶ Vila-Henninger (2015: 250-253) draws on research from cognitive neuroscience (see Moll et al., 2005) to critique Vaisey’s (2009) position, arguing that motives -- while subconsciously produced -- get combined with situational and social perceptual knowledge to generate motivations, which drive action. This means there is variance in the degree to which actors may be conscious of their motivations (Vila Henninger, 2015: 252).

a set of concepts to capture major cultural processes, but hardly used the concept of culture (see Lizardo, 2011: 33-34).⁷ With their attempts to legitimate culture as an object of study (a project seen especially clearly in Swidler's (1986) work), sociologists moved away from claims about *Culture*, a concept too ill-defined (Patterson, 2014; Smith, 2016) for a sociological sub-field with any aspiration of becoming mainstream in the U.S.. The role of culture and its effects on action was thus made sense of through analytical concepts that served as proxies for culture, such as habitus, toolkits, or frames.

We suggest that the concept of schemas, introduced into sociological research in the 1990s (Sewell, 1992; DiMaggio, 1997), was one such proxy, and that here lies one of the two keys to understand why this concept has been so popular in sociology, and increasingly so. Much unlike the concept of culture, schemas presented the advantages of not being weighted down by historical baggage (see Kroeber and Kluckhohn, 1952; Sewell, 1999), being more narrowly defined, and operationalizable as a mechanism (see Gross, 2009) to explain how culture shapes action. This has afforded the concept of schemas a certain scientific legitimacy, facilitating claims-making about culture's causal effect on action, an endeavor that would have been less successful with the sole recourse to the concept of culture itself, without any proxy more easily subject to operationalization.

This being said, evidence of the use of the concept of schemas in sociological research shows that this concept has been taken to have the -- often inconsistent -- ill-defined attributes that had been traditionally assigned to *Culture*. Chief among these attributes is the location of schemas both inside and outside the mind. Much like the concept of culture, schemas are

⁷ Furthermore, while Bourdieu has been one of the very central figures in the sociology of culture right from its inception, and is generally regarded as a theorist of culture in sociology, as Lizardo (2011: 28) notes, in anthropology, Bourdieu is viewed as central for having helped the discipline move away from the centrality of the concept of culture, and the legacy of Geertz' work (see Lizardo, 2011: 28-31).

conceptualized variously, sometimes defined and used in precise terms, other times defined and used ambiguously, and still others not defined at all and used ambiguously (see Wood et al., 2018: 245-246).

When schemas are specifically defined as inside the mind, scholars are likely to follow DiMaggio's (1997) conception of schemas as mental structures, as well as literature from the cognitive sciences (broadly defined) (e.g., Hunzaker and Valentino, 2019). This literature, as we have seen, characterizes schemas as concrete (neural) structures with a specific location in a person's brain and tied temporally to the enactment of experiences. When schemas are represented ambiguously as either external objects or internal mental phenomena, it is generally due to one of two different reasons. First, in many cases, the term is commonly used in a casual and vague manner, such that it may be invoked less than a handful of times in an article, and used as a synonym to other cultural phenomena like frames, labels, or genres (e.g., Wagner-Pacifici and Schwartz, 1991: 381). Second, and another common occurrence, the notion of schemas constitutes a central and specified component of an article, but is used ambiguously, typically in line with Sewell's (1992) own ambiguous conceptualization (e.g., Enriquez and Saguy, 2016: 112). For Sewell (1992: 8), schemas are virtual objects that "cannot be reduced to their existence in any particular practice or any particular location in space and time" (see also Wood et al., 2018: 246).

In short, all of the above means that schemas have been considered as personal culture as well as public culture (see Lizardo, 2017; Wood et al., 2018: 246). While we noted this central distinction in the definitions of schemas in the previous section, the analytic focus here moves beyond explicit definitions, to examine the ideas, beliefs, and assumptions that implicitly inform the use of schemas as explanatory tools in research. In turn, this means that our focus moves

beyond the sociology of culture literature where schemas and neighboring concepts are core objects of study, to survey how schemas are understood and applied in sociological research more broadly, whether they are afforded a concrete and central role as explanatory tools, or are used in a vague and tangential manner.

Across the sociological literature, when schemas are considered as personal culture, they sometimes appear to comprise nondeclarative knowledge, but not always. When they are treated as a form of declarative personal culture, they are equated with such phenomena as categories, classifications, or scripts (e.g., Enriquez and Saguy 2016: 111; Fox and Guglielmo, 2012: 340; Reeves, Gilbert and Holman, 2015: 45-46; Silva, 2012: 507; Young, 2002: 665-666). In these cases, schemas appear as ideas that actors have somehow incorporated, but not in such a way that actors can no longer access them consciously, so they can still articulate those ideas. Literature on “gender schemas” is a common example of this (e.g., Blair-Loy’s, 2003; Read and Oselin, 2008). Conversely, when schemas are viewed as nondeclarative personal culture, they most characteristically appear in the form of habitus (e.g., Vaisey 2009: 1686), itself defined as a schema for perception and action, so deeply internalized that it becomes second nature (cf. Bourdieu, [1980] 1990). Sociologists in culture and cognition, more likely to draw on the cognitive sciences, along with Bourdieu’s conceptual arsenal, are more inclined to conceptualize schemas as neural networks, and therefore to understand them as nondeclarative knowledge (see Wood et al., 2018: 246). The clearest examples of this view are evidenced in the most recent literature on schemas (e.g., Boutyline and Soter, 2021; Hunzaker and Valentino, 2019), discussed in the following section.

When treated as a form of public culture across the sociological literature, schemas appear in a wide variety of guises, including frames, formal classifications, genres, labels,

typifications (e.g., Enriquez and Saguy, 2016: 112; Howard, 2006: 314; Saguy and Ward, 2011: 56; Wagner-Pacifici and Schwartz, 1991: 381). Insofar as the understanding of schemas as public culture has been less informed by knowledge from the cognitive sciences than by sociological formulations (i.e., Sewell, 1992), it is not surprising that this usage of schemas presents more variation. Here, schemas may be equated to deliberative, formalized, or official knowledge, such as cultural or artistic genres or bureaucratic classifications (e.g., Steinman, 2012: 1084), knowledge that can be consciously handled and deployed, much like Sewell (1992) conceived of schemas.

In short, in this section we have highlighted two of the most fundamental issues in the understanding and use of schemas in sociology. One, whether schemas are considered to be public culture, much like other cultural phenomena, and therefore existing (at least in part) outside the mind, or whether they are considered personal culture, and located specifically in a person's brain. Two, whether schemas constitute conscious knowledge, such that individuals can choose to adopt them, modify them, or discard them, or whether they constitute knowledge that actors cannot consciously grapple with because it is triggered automatically in the brain through neural connections, shaping cognition, perception, and behavior without conscious control.

What has made schemas so popular in sociology, well beyond the sociology of culture? Rather than specificity, coherence, and operationalizability, it is the polysemy of the concept of schemas that has facilitated their popularity. And here lies the other key to understand why schemas have been so widely used in sociology. The extensive and polysemic use of this concept has in turn helped schemas appear exceptionally significant and powerful (ironically, not unlike the older conceptualization of *Culture*), and has led to the use of this concept in analytically unprincipled ways. This has had consequences within the discipline that have largely gone

unnoticed, including not only conceptual conflation -- i.e., schemas are conceived of as disparate phenomena -- but also contradiction, insofar as schemas are seen as both mental structures and public classifications, declarative and nondeclarative knowledge.⁸

Theoretical engagements with the concept of schemas put the consequences of this conceptual conflation and contradiction into high relief. An especially clear example of this is the use of schemas in the context of toolkit theory (Swidler 1986; 2001).⁹ Across her work, Swidler uses the terms “schemas,” “cultural schemas,” and “collective action schemas” repeatedly, typically in reference to Sewell’s (1992) conception (see Swidler, 2001: 204-213; 2013: 336; Swidler and Ardit, 1994: 322). Given Sewell’s idiosyncratic conceptualization of schemas, this in itself constitutes a source of confusion. The confusion is evidenced in that even cognitively minded scholars disagree interpretively on whether Swidler’s use is *ambiguous* as to whether schemas constitute public or personal culture (Wood et al., 2018: 246) or if she conceives of schemas strictly as public culture (Quinn, 2018: 180). Considering the conceptual issues that plague schemas, it should not be surprising that scholars also occasionally position “cognitive schemas” as part of a cultural toolkit (e.g., Ecklund, et al., 2017: 281; Ivanova-Gongne, 2015: 610; Stainback, Ratliff, and Roscigno, 2011: 1166). This is a notable contradiction because cognitive schemas are emblematic of the kinds of cultural explanations toolkit theory explicitly positions itself *against* (see Swidler, 1995: 31-32; 2008: 617-618).

⁸ To be clear, widely shared ideas can be said to be both inside and outside people’s minds, as when actors internalize common understandings of public categories and classifications. It becomes a contradiction when a concept is alternatively defined as a mental structure *or* a publicly upheld set of objects, subjects, and meanings.

⁹ Though toolkit theory does not involve the theorization of cognition, it makes claims about how culture influences action that imply cognitive processes, and has therefore been an important perspective for the area of culture and cognition. In effect, Swidler’s (1986; 2001) ideas about cultural fragmentation and the causal influence of culture on action have been points of debate among scholars of culture and cognition since the birth of this area (DiMaggio, 1997; Vaisey, 2009; see also Brekhus, 2015).

Swidler's (1986) "Culture in Action: Symbols and Strategies" famously challenged Weberian and Parsonian approaches to the explanation of action, arguing that the influence of ultimate values and ends on action was limited. Swidler offered an alternative account wherein culture shapes the capacities (habits, skills, and styles) through which individuals construct larger assemblages of action ("strategies of action"). Taken independently, this could be interpreted as a narrow theoretical shift away from a view of culture as providing the *ends* of action, towards one in which culture provides the *means* for action. Swidler (1995; 2001) expanded upon this position in later works, arguing against "inside-out" explanations of culture that focus on individuals' powerful, deeply internalized beliefs and values. Swidler countered that we get more explanatory leverage by looking at how culture influences action from the "outside-in," for external elements of culture (most notably codes, contexts, and institutions (see Swidler, 2001:160-180)) that people may not believe in, hold deeply, or even see as meaningful, carry more powerful effects on action. She positioned this perspective within a broader trend, beginning with the work of Geertz (1973), wherein cultural theorists "externalized the locus of culture" (Swidler, 1995: 28). Her stance became even more explicit in her published exchange with Vaisey (Swidler, 2008; Vaisey, 2008a; 2008b). There, she plainly noted that the collective organization of cultural meanings takes priority over individual-level, social-psychological accounts of culture in action, and that "the question of how culture shapes action can't be answered by figuring out better models of how it operates in the heads of individuals" (Swidler, 2008: 617).

While toolkit theory situates itself against "deep structures" generally, culture and cognition scholars have demonstrated why Swidler's work is incompatible with cognitive schemas specifically. Synthesizing insights from the cognitive sciences and theories of practice,

Vaisey (2009) argues that action is not motivated by “cultural tools” but by “deeply internalized schematic processes” (Vaisey, 2009: 1687). Vaisey highlights the contrast between how schemas and cultural tools operate. While cultural tools are things people “deploy” and can be “picked up and put down” (Swidler, 2001: 24; Vaisey, 2009: 1679, 1686, 1707), which implies a degree of volition or conscious control, schemas are neural associations that operate without conscious control. Lizardo and Strand (2010) elucidate another aspect of toolkit theory that is in direct tension with schemas, namely its anti-representationalist commitments. Unlike classical approaches to culture, such as those of Weber or Parsons, toolkit theory does not require any assumption that individuals have internal mental models that reproduce the external cultural environment to explain the coherence or consistency of action. Insofar as mental representation and automaticity are two of the fundamental criteria defining schemas (Boutyline and Soter, 2021), toolkit theory simply does not support schema-based cultural explanations.

While the debates we have presented above are fairly recent, and still highly relevant, the sociological literature in culture and cognition has since made great strides in the analytical understanding of schemas, looking much more closely at what schemas are and how they work. This literature has done so both theoretically, drawing on a wider range of knowledge from the cognitive sciences, and empirically, through novel methodologies and more rigorous empirical studies to capture the features of schemas and ways in which they operate. We turn to them next.

Analytical and Methodological Advancements in the Study of Schemas

In recent years, there has been an influx of theoretical, analytical, and methodological scholarship which has provided greater clarity and specificity as to what schemas are and are not, what they do, and how they can be measured (e.g., Boutyline, 2017; Boutyline and Soter, 2021; Hunzaker and Valentino, 2019; Taylor and Stoltz, 2020; Wood et al., 2018). These contributions

have been made primarily by scholars focused on culture and cognition. Here, we discuss the analytical and methodological advancements these contributions have made, as well as a few lingering issues that hinder the sociological study of schemas.

Culture and cognition scholars have more clearly untangled the cognitivist and culturalist conceptions of schemas, and demonstrated that when schemas are specifically defined as mental structures, they can be profitably combined with forms of public culture in sociological analysis (Arseniev-Koehler and Foster, 2021; Boutyline and Soter, 2021; Wood et al., 2018). A clear example of this is the analytic separation of schemas and frames (Wood et al., 2018), two concepts that are routinely conflated, often tasked with explaining the same phenomena (e.g., the organization of perception), and both treated as internal and external representations. Wood et al. (2018) clarified these concepts by characterizing schemas as a form of nondeclarative personal culture, and frames as a form of public culture. Wood et al. (2018) have also improved our understanding of how schemas and frames interrelate: frames evoke meanings by activating pre-existing schematic associations, but schemas can also be learned from and closely match public frames, particularly in cases where individuals interact with frames without pre-existing schemas (see Arseniev-Koehler and Foster, 2021).

One of the problematic tendencies within sociology, as we have suggested, has been the use of schemas as a generic label for any form of cultural knowledge that cannot be articulated or consciously accessed (see Rotolo, 2021). As a response to this, sociologists in the area of culture and cognition have recently aimed to disentangle schemas from other forms of nondeclarative culture (see Boutyline and Soter, 2021; Rotolo, 2021; Valentino, 2021). Rather than treating nondeclarative culture as a homogenous category, some scholars have focused on *differentiating features* of nondeclarative culture, which allow them to distinguish schemas from elements like

embodied knowledge or prototypes (Boutyline and Soter, 2021; Johnston et al., 2021; Rotolo, 2021). One feature that differentiates types of nondeclarative culture is their *representational character*, that is, the nature of the object or structure in the mind that carries information about the external world. While schemas are said to carry interpretable information about the world (Boutyline and Soter, 2021), certain elements of nondeclarative culture like embodied capacities may not (Boutyline and Soter, 2021; Strand and Lizardo, 2015: 48). In addition, while the information carried by schemas is abstract and general, other (representational) forms of nondeclarative culture like prototypes -- the quintessential example of a category -- (Johnston et al., 2021; see Rosch, 1978) are more specific and image-laden.

Another differentiating feature is the *complexity* of different types of nondeclarative culture. Some forms of nondeclarative cultural knowledge are more complex than others, with higher-level cultural knowledge (e.g., cultural models) emerging from lower-level knowledge (e.g., embodied knowledge) (Rotolo, 2021; Valentino, 2021). Simpler forms of cultural knowledge like image-schemas, which are experiential gestalts derived from our recurring bodily interactions with the world, serve as the building blocks for understanding more abstract conceptual domains. For example, the CONTAINER¹⁰ schema is derived from our experience of our bodies as containers for things (like food), and this schema is used to make sense of life (e.g., “I’ve had a full life,” “life is empty without you”) (see Brett et al., 2020). Furthermore, cultural models (which cognitive anthropologists often use interchangeably with schemas) are a more complex type of nondeclarative culture, composed of several conceptual metaphors about a cultural domain (Quinn, 2018; Rotolo, 2021). For example, in his research on religious understandings, Rotolo (2021) uncovers a variety of conceptual metaphors (e.g., “religion is a

¹⁰ Following the convention in cognitive linguistics (e.g., Lakoff and Johnson, 1980), we list image-schemas in capital letters.

journey,” “religion is a building/structure,” “religion is a tree”) which compose an implicit cultural model, propositionally rendered as “religion provides a path for the journey of life, giving people a source of knowledge from which to start, a core identity, a containing framework to distinguish right from wrong, and a link to reality so one is not floating in meaninglessness” (Rotolo, 2021: 16-17). Such models may aggregate into even more complex “logics” (DiMaggio, 1997; Valentino, 2021). Unlike schemas or cultural models, which are composed of internalized associations between concepts, logics also comprise evaluations about these concepts (Valentino, 2021).

These analytical developments have clarified what schemas are and are not, how they can be distinguished from other types of nondeclarative culture, and how they relate to public culture, but some issues remain. Given the extent of the confusion around the concept of schemas, semantic choices around what schemas should be called are not trivial, and the recent analytic improvements, with all their analytic clarifications, have also brought about new terminological dilemmas. Although they do not prescribe their terminology, Wood et al. (2018) specifically use the term “schemas,” rather than “cognitive schemas” or “cultural schemas,” because they find both of these two modifiers redundant. They argue that, on the one hand, all schemas are cognitive and, on the other, schemas are generally cultural because they tend to be learned, rather than innate. Alternatively, Boutyline and Soter (2021) argue that schemas vary greatly in both their degree of sharedness (ranging from the idiosyncratic to the universal) and in the significance of social learning to their diffusion (i.e., the degree to which they are learned through others, rather than through personal learning). This gives the modifier “cultural” an important and specific meaning for Boutyline and Soter (2021), distinguishing cultural schemas from non-cultural cognitive schemas like idiosyncratic implicit stereotypes (e.g., “men love

tomatoes”), or image-schemas that are potentially universal (e.g., UP-DOWN). While we agree with Boutyline and Soter’s (2021) explanation, we also recognize that this term carries some risk.¹¹ Though the term “cognitive schemas” may be redundant, one of its advantages is as a reminder to scholars that claims about schemas are necessarily claims about the inner workings of the mind.

Although initially it appeared that sociologists’ enthusiasm towards schemas as an explanatory concept had greatly outpaced the methods available to study them, in recent years sociologists have focused specifically on improving the empirical study of schemas (see Miles, 2019: 352-356; Mohr et al., 2020: 32-34). Nowhere is this clearer than in the methodological innovations for deriving schemas from survey data. While Vaisey’s (2009) pathbreaking article measured schemas with a single survey item, we now have more formal methods to derive schemas from survey data (Boutyline, 2017; Goldberg, 2011). In general, these methods use patterns of response similarity among groups to identify shared schemas. Goldberg’s (2011) relational class analysis (RCA) measures schematic similarity as *relationality*. In this case, relationality means the extent to which people agree on the structures of relevance and opposition in a given domain; that is, they organize meaning in similar ways even if they differ on specific attitudes. RCA computes a measure of relationality and uses a graph-partitioning technique to separate “classes” of respondents based on the schema with which their responses most closely align. More recently, Boutyline (2017) developed a modified version of RCA called “correlational class analysis” (CCA) which measures schemas through correlation rather than relationality and, as he demonstrates through simulations, is more accurate at detecting schemas. These methods allow sociologists to use survey data to establish which groups of people share a

¹¹ One of the risks in favoring the term “cultural schemas” is that it is possible that scholars will simply continue to conflate and/or confuse the cognitivist and culturalist conception of schemas.

particular schema (i.e., which “class” they belong to), interpret the content of the schema, and determine how widely shared the schema is within a sample population.

There have been further methodological innovations to capture features of schemas that attitude measures in survey data cannot capture. For example, Hunzaker and Valentino (2019) have developed a concept-association task that can measure the cognitive associations between concepts (e.g., political concepts). In this method, participants are first primed to activate relevant cognitive associations, and are subsequently shown a large number of concept pairs (e.g., “immigration” and “chronic unemployment”) and prompted to respond rapidly as to whether or not they are related. As Hunzaker and Valentino demonstrate, their method allows scholars to analyze how the contents of schemas vary across groups,¹² establish which elements within a given schema are more central and influential, measure the meaning of schemas as bounded in the relations between its closely connected concepts, and visualize schemas’ networks of concept-associations.

Schemas can also be studied through text data (Arseniev-Koehler and Foster, 2021; Taylor and Stoltz, 2020). Arseniev-Koehler and Foster (2021) argue that neural word embeddings -- language models like Word2Vec -- are formal models for learning schemas. Word2Vec uses an artificial neural network (a computational model used to detect patterns in data) to learn distributed representations of semantic information (concept meanings that are distributed across several computing units (e.g., neurons)), which in this case are word-vectors. Word2Vec learns these distributed representations by making predictions about which words will appear as the model “reads” the text, and Arseniev-Koehler and Foster (2021) suggest that

¹² While both Goldberg’s (2011) and Boutyline’s (2017) methods inductively partition groups based on individuals’ responses, Hunzaker and Valentino’s (2019) method requires the research to begin with known cultural groups, like liberals and conservatives.

schemas can be operationalized as these distributed representations. Based on the premise that neural word embeddings are a plausible model of the representations people learn from language, the word-vectors learned by Word2Vec from large bodies of publicly available texts should approximate the schemas learned by real human beings from those same texts.

These methods have opened the way for using a variety of data to better identify schemas, analyze their content, establish their level of sharedness, and more. Still, scholars are presented with noteworthy challenges when treating schemas as an object of study. Something that generally remains implicit in methodological articles and empirical research on schemas is the simple fact that schemas cannot be observed directly. Because of this inconvenient fact, research about schemas and the methods used to measure them must rely on inferences -- often quite large inferences. First, existing sociological methods (both traditional and new) for measuring schemas require sociologists to make inferences about an internalized mental structure based on some form of externalization, whether it be behavior, talk, keystrokes, survey choices, or interview responses (McDonnell and Vercel, 2019). Thus, sociologists treat patterns of externalization as evidence of shared mental representations.

Secondly, sociologists agree that schemas generally operate automatically, yet often purport to have identified schemas based on data and methods that do not necessarily require respondents to rely upon automatic processing, including interviews, focus groups, and RCA (see Miles, 2019; Miles et al., 2019). Most of these methods generate responses that involve a (generally unknown) mix of Type 1 and Type 2 processing (often referred to as automatic and deliberate cognition, respectively, in sociology) from respondents (Miles, 2019), which means that sociologists often infer an implicit mental structure without guaranteeing an implicit mental process. Hunzaker and Valentino (2019) have been more forthcoming about this limitation than

most. They note that their concept-association method likely requires Type 2 processing from respondents and therefore captures networks of consciously perceived associations between concepts, rather than tapping into *implicit* networks of association between concepts (Hunzaker and Valentino, 2019: 974). Ultimately, what should be made clear is that sociologists generally capture external traces of potential schemas, not schemas themselves.

In general, some external traces are likely better indicators of schemas than others. For example, culture talk is an objectively worse trace of schemas, as it requires making inferences about a mental structure that is largely automatic and non-verbal in character via deliberately considered verbal data. Conversely, because concept-association methods (Hunzaker and Valentino, 2019) more directly measure the individual-level associations which compose schemas, and at least attempt to motivate respondents to rely more upon automatic processing through prompts, they are likely better indicators of schemas.

Nonetheless, we follow Boutyline and Soter (2021) by suggesting that at present there is no single method able to measure every facet of schemas, and therefore the most appropriate data and methods for measuring schemas are contingent on the particular facet of schemas under study. Boutyline and Soter (2021) note that sociologists' conceptions of schemas and methods for capturing them can be organized at either the *functional* level (i.e., the consequences of schematic processing for behavior, e.g., providing the default-assumptions about people, places, and objects that guide behavior) or the *algorithmic* level of explanation (i.e., the representations and computations underlying schematic processes, e.g., implicit associations) (Boutyline and Soter, 2021; Foster, 2018; see Marr, 1982). While concept-association approaches and schematic class analyses are better positioned to make claims about the algorithmic level, specifically the content of mental representations, they do not empirically test the functional properties of

schemas (e.g., pattern completion). Conversely, methods that scholars claim allow access to the functional properties of schemas (e.g., ethnographic observations of “schematic activation” (see Jerolmack and Khan, 2014: 196)) do so without empirically measuring the algorithmic features of schemas -- while, it must be noted, additionally making a large inference that it is schemas, rather than any other form of personal culture, that are motivating behavior.

The Potential and Pitfalls of Studying Schemas

This article has been driven by the question of how schemas may have -- and may have not -- advanced cultural analysis, a question that may seem somewhat audacious to some, and one with a self-evident (affirmative) answer to others. Superficially, it may look like the wide use of the concept is, in and of itself, evidence of its merits or utility. However, concepts gain traction for a variety of reasons, including their ambiguity or polysemy (see Davis, 2008; McMahan and Evans, 2018), and we have shown that this is the case for the concept of schemas. While polysemy is not inherently negative, and can be productive in some instances, the polysemy of the concept of schemas has heretofore not led to the “cumulative enterprise” that DiMaggio (1997: 263) had envisioned when he established schemas as a basic unit of cultural analysis. Sociologists have used different conceptions of schemas that are contradictory, have often conflated them, and used them in unprincipled ways. They have therefore been talking past one another, while under the false impression that they are all speaking the same language (see Taylor and Vickers, 2017: 28-29). Furthermore, the knowledge about schemas gleaned from extant research is, at least in part, incommensurable.

Rather than presupposing that schemas have been good to think with, we have considered it important to assess the state of the art in the understanding of schemas, especially given the

increasing popularity of this concept. We have thus examined the explicit conceptualizations and implicit assumptions underpinning schemas, beginning with the first definitions in psychology and covering up to the most recent methodological innovations in sociological research on schemas. What we have found is that the analytic progress that schemas appeared to have provided is in some respects illusory (see Abbott, 2001), or at least remains promissory. While schemas have been introduced as a narrow, scientifically legitimate mechanism for cultural analysis, they have -- at least to some degree -- simply replaced the analytic role of *Culture* in sociological explanation, imbibed the incoherence of the concept of culture (see Patterson, 2014; Smith, 2016), and extended the methodological pitfalls in empirically investigating its inner workings and function. Indeed, we have suggested that the two keys for understanding the popularity and influence of schemas in sociology are their analytic position as a proxy for culture, and their polysemic character.

Drawing on the analytic vocabulary introduced by Lizardo (2017), we have shown that schemas are assumed to be a form of public and personal culture, as well as declarative and nondeclarative culture, and treated as equivalent to a variety of cultural elements, including frames, scripts, categories, labels, and genres. Inconsistency of usage and indistinguishability from neighboring concepts are not the marks of a good concept (Gerring, 1999), or at least not the marks of a concept that proves productive for the cumulative enterprise of scholarly knowledge. This being said, much progress has been made in the understanding of schemas in sociology in the past few years. Sociologists have begun to recognize that, schemas being an important component in cultural analysis, they are however poorly understood, and difficult to measure through conventional sociological methods.

Sociologists have made strides analytically by better establishing what schemas are, how they are acquired and used, what distinguishes them from other cultural and cognitive entities, and how they interact with these entities (Boutyline and Soter, 2021; Cerulo et al., 2021; Hunzaker and Valentino, 2019; Wood et al., 2018). Methodologically, they have established both better methods to study schemas using survey data, and new methods to capture schemas in texts and through online experiments (Arseniev-Koehler and Foster, 2021; Boutyline, 2017; Goldberg, 2011; Taylor and Stoltz, 2020). Yet, some semantic and inferential concerns remain and, at present, we have better but still imperfect methods to capture what is theoretically one of the most important explanatory concepts in cultural analysis.

Moving forward, we suggest that sociologists approach schemas in a more specific and specified manner. First and foremost, future research on schemas would do well to begin with an explicit and internally coherent conception of schemas. Thus, if schemas are defined as cognitive structures, they should be understood as networks of representations stored in the brain, which organize and process stimuli in an uncontrolled (i.e., subconscious) manner; and they should not be confounded (whether in theory or empirical analysis) with other forms of nondeclarative personal culture (e.g., embodied knowledge), forms of personal culture that are declarative and/or subject to conscious control, or forms of public culture.

Second, the *level of explanation* intended in the research should be specified. Is the research aimed at the *functional level* of schemas (i.e., what schematic cognition does, and/or its consequences for behavior), and/or the *algorithmic level* (i.e., the internal representations and computations underlying schematic processes) (Boutyline and Soter, 2021; Marr, 1982). Lastly, there should be a tight fit between (and explicit justification of) the level of explanation aimed at

and the data and methods employed in the research, and an explicit account of the inferences required for claims-making about the content, operation, and/or function of schemas.

For example, ethnographers may claim that they have data on the functional level of schemas, and provide naturalistic observations of schematic acquisition and activation in support of their claims (Jerolmack and Khan, 2014:196), but ought to acknowledge that they are making the (rather large) inference that it is schemas, and not any other form of nondeclarative culture (e.g., embodied knowledge) that drives their research subjects' actions. Conversely, productive methods (McDonnell, 2014; McDonnell and Vercel, 2019) are better positioned to access (functional-level) schematic activation (as well as the sharedness of schemas) by capturing the associations people use to create new objects; however, scholars using these methods should note that they rely on response time as an indicator of schematic processing, when speed is a *typical correlate* rather than a *defining feature* of automatic cognition (Evans and Stanovich, 2013: 225). For their part, scholars who claim that they can tease out the cognitive content of schemas through interviews, and provide an algorithmic level explanation, should (at minimum) note that schemas are non-verbal in character, and that interviews can hardly provide direct access to nondeclarative knowledge (see Pugh, 2013; Vaisey, 2014). Scholars employing schematic class analyses (Boutyline, 2017; Goldberg, 2011) are likely better able to make claims about algorithmic level properties of schemas than those using interviews, but with two caveats that should be acknowledged. First, they can only make claims about internal representations, but not about computations underlying schematic processes. Second, the methods they use do not guarantee Type 1 processing in responses, and therefore may not be capturing *implicit* associations exclusively.

Current methods -- including the most promising methodologies to study schemas -- likely require additional validation and/or modification to improve the study of schemas (see Boutyline and Soter, 2021; Miles, 2019). For instance, while Hunzaker and Valentino's (2019) concept-association task is a particularly promising method that provides insight about schemas at the algorithmic level, it could be given functional-level validation by using the network structure of concepts to predict how those same respondents perform automatic pattern completion within that same conceptual domain (Boutyline and Soter, 2021). Furthermore, although Hunzaker and Valentino (2019) instruct respondents to respond rapidly, following their first instinct, this does not guarantee automatic processing. This could also be improved, as Miles (2019: 355) notes, by modifying the task to allow respondents to indicate associations using keystrokes instead of mouse-clicks, which would increase the speed of the responses and make it more difficult for deliberation to intervene. Conversely, concept-association could be used to validate schematic class analyses (Boutyline, 2017; Goldberg, 2011) -- which can only measure schematic associations at the group level, and indirectly -- by more directly measuring the associations between concepts at the individual level (Miles, 2019: 354). Productive methods (McDonnell, 2014; McDonnell and Vercel, 2019), which allow for the interplay between Type 1 and Type 2 cognition, could be modified by placing respondents under a cognitive load (e.g., asking respondents to remember an eight-digit number (Miles, 2015: 695)) which would impede the operation of Type 2 processing and leave Type 1 processing and schematic associations uninhibited.

On the whole, methodological advancement in the sociological study of schemas remains an important and unfinished project. The concept of schemas has proven increasingly popular in sociology, but to turn this concept into a fruitful object of study and solid analytical tool, there is

still work to be done, both methodologically and analytically. We urge sociologists to continue the recent efforts to specify the understanding of schemas, including what they are, how they work, and how they relate to action, as well as to improve the measurement of schemas and their relationship to culture. More work in this direction would help to refine and validate the recent notable breakthroughs, and place the study of schemas on much firmer ground.

References

- Abbott, Andrew. 2001. *Chaos of Disciplines*. Chicago, IL: University of Chicago Press.
- Abend, Gabriel. 2018. "The Love of Neuroscience: A Sociological Account." *Sociological Theory* 36(1):88-116.
- Abend, Gabriel, Caitlin Petre, and Michael Sauder. 2013. "Styles of Causal Thought: An Empirical Investigation." *American Journal of Sociology* 119(3):602-654.
- Arseniev-Koehler, Alina, and Jacob G. Foster. 2020. "Machine Learning as a Model for Cultural Learning: Teaching an Algorithm what it Means to be Fat." *SocArXiv preprint*.
- Axelrod, Robert. 1973. "Schema Theory: An Information Processing Model of Perception and Cognition." *The American Political Science Review* 67(4):1248-1266.
- Bartlett, Frederic C. [1932] 1995. *Remembering: A Study in Experimental and Social Psychology*. Cambridge: Cambridge University Press.
- Blair-Loy, Mary. 2003. *Competing Devotions: Career and Family Among Women Executives*. Cambridge, Mass.: Harvard University Press.
- Bourdieu, Pierre. [1979] 1984. *Distinction: A Social Critique of the Judgment of Taste*. Cambridge, Mass.: Harvard University Press.
- . [1980] 1990. *The Logic of Practice*. Stanford, CA: Stanford University Press.
- Boutyline, Andrei. 2017. "Improving the Measurement of Shared Cultural Schemas with Correlational Class Analysis: Theory and Method." *Sociological Science* 4(15):353-393.
- Boutyline, Andrei, and Laura K. Soter. 2021. "Cultural Schemas: What They Are, How to Find Them, and What to Do Once You've Caught One." *American Sociological Review*: forthcoming.
- Brekhus, Wayne H. 2015. *Culture and Cognition: Patterns in the Social Construction of Reality*. Cambridge, UK; Malden, MA: Polity Press.
- Brett, Gordon, Daniel Silver, and Kaspar Beelen. 2020. "The Right Tool for the Job: Problems and Solutions in Visualizing Sociological Theory." *Journal for the Theory of Social Behaviour* 50(2):223-248.
- Brewer, William F. 2000. "Bartlett's Concept of the Schema and its Impact on Theories of Knowledge and Representation in Contemporary Cognitive Psychology." In *Bartlett, Culture & Cognition*, edited by Akiko Saito. Hove, UK: Psychology Press, pp. 69-89.
- Brubaker, Rogers, Mara Loveman, and Peter Stamatov. 2004. "Ethnicity as Cognition." *Theory and Society* 33:31-64.

- Cerulo, Karen. 2006. *Never Saw it Coming: Cultural Challenges to Envisioning the Worst*. Chicago; London: The University of Chicago Press.
- . 2010. "Mining the Intersections of Cognitive Sociology and Neuroscience." *Poetics* 38(2):115-132.
- . 2018. "Scents and Sensibility: Olfaction, Sense-Making, and Meaning Attribution." *American Sociological Review* 83(2):361-389.
- Cerulo, Karen, Vanina Leschziner, and Hana Shepherd. 2021. "Rethinking Culture and Cognition." *Annual Review of Sociology* 47: forthcoming.
- Cicourel, Aaron V. 1981. "The Role of Cognitive-Linguistic Concepts in Understanding Everyday Social Interactions." *Annual Review of Sociology* 7:87-106.
- D'Andrade, Roy. 1995. *The Development of Cognitive Anthropology*. Cambridge, UK: Cambridge University Press.
- Davis, Kathy. 2008. "Intersectionality as Buzzword: A Sociology of Science Perspective on what makes a Feminist Theory Successful." *Feminist theory* 9(1):67-85.
- DiMaggio, Paul. 1982. "Cultural Capital and School Success: The Impact of Status Culture Participation on the Grades of U.S. High School Students." *American Sociological Review* 47(2):189-201.
- . 1997. "Culture and Cognition." *Annual Review of Sociology* 23:263-287.
- Ecklund, Elaine Howard, Jared L. Peifer, Virginia White, and Esther Chan. 2017. "Moral Schemas in Articulation and Intuition: How Religious People Evaluate Human Reproductive Genetic Technologies." *Sociological Forum* 32(2):277-297.
- Enriquez, Laura E., and Abigail C. Saguy. 2016. "Coming out of the Shadows: Harnessing a Cultural Schema to Advance the Undocumented Youth Movement." *American Journal of Cultural Sociology* 4:107-130.
- Epstein, Cynthia Fuchs. 2007. "Great Divides: The Cultural, Cognitive, and Social Bases of the Global Subordination of Women." *American Sociological Review* 72(1):1-22.
- Foster, Jacob G. 2018. "Culture and Computation: Steps to a Probably Approximately Correct Theory of Culture." *Poetics* 68:144-154.
- Fox, Cybelle, and Thomas A. Guglielmo. 2012. "Defining America's Racial Boundaries: Blacks, Mexicans, and European Immigrants, 1890–1945." *American Journal of Sociology* 118(2):327-379.
- Geertz, Clifford. 1973. *The Interpretation of Cultures*. New York: Basic Books.
- Gerring, John. 1999. "What Makes a Concept Good? A Criterial Framework for Understanding Concept Formation in the Social Sciences." *Polity* 31(3):357-393.

- Giddens, Anthony. 1984. *The Constitution of Society: Outline of a Theory of Structuration*. Berkeley: University of California Press.
- Goffman, Erving. 1974. *Frame Analysis: An Essay on the Organization of Experience*. New York: Harper & Row.
- Goldberg, Amir. 2011. "Mapping Shared Understandings Using Relational Class Analysis: The Case of the Cultural Omnivore Reexamined." *American Journal of Sociology* 116(5): 1397-1436.
- Graesser, Arthur C., and Glenn V. Nakamura. 1982. "The Impact of a Schema on Comprehension and Memory." *Psychology of Learning and Motivation* 16:59-109.
- Gross, Neil. 2009. "A Pragmatist Theory of Social Mechanisms." *American Sociological Review* 74(3):358-379.
- Howard, Jenna. 2006. "Expecting and Accepting: The Temporal Ambiguity of Recovery Identities." *Social Psychology Quarterly* 69(4):307-324.
- Hunzaker, M.B. Fallin, 2016. "Cultural Sentiments and Schema-Consistency Bias in Information Transmission." *American Sociological Review* 81(6):1223-1250.
- Hunzaker, M.B. Fallin, and Lauren Valentino, 2019. "Mapping Cultural Schemas: From Theory to Method." *American Sociological Review* 84(5):950-981.
- Ivanova-Gongne, Maria. 2015. "Culture in Business Relationship Interaction: An Individual Perspective." *Journal of Business & Industrial Marketing* 30(5):608-615.
- Jerolmack, Colin, and Shamus Khan. 2014. "Talk is Cheap: Ethnography and the Attitudinal Fallacy." *Sociological Methods & Research* 43(2):178-209.
- Johnston, Josée, Shyon Baumann, and Merin Oleschuk. 2021. "Capturing Inequality and Action in Prototypes: The Case of Meat-Eating and Vegetarianism." *Poetics*: 101530.
- Kant, Immanuel. [1781] 1998. *Critique of Pure Reason*. Cambridge, UK: Cambridge University Press.
- Kroeber, A. L., and Clyde Kluckhohn, C. (1952). "Culture: a critical review of concepts and definitions." Cambridge, MA: *Papers of the Peabody Museum of Archaeology and Ethnology, Harvard University*, 47(1).
- Lakoff, George, and Mark Johnson. 1980. *Metaphors We Live By*. Chicago: Chicago University Press.
- Lamont, Michèle. 1992. *Money, Morals, and Manners: The Culture of the French and the American Upper-Middle Class*. Chicago: The University of Chicago Press.
- Lizardo, Omar. 2004. "The Cognitive Origins of Bourdieu's Habitus." *Journal for the Theory of Social Behaviour* 34(4):375-401.

- . 2017. "Improving Cultural Analysis: Considering Personal Culture in its Declarative and Nondeclarative Modes." *American Sociological Review* 82(1):88-115.
- . 2011. "Pierre Bourdieu as a Post-Cultural Theorist." *Cultural Sociology* 5(1):25-44.
- Lizardo, Omar, Robert Mowry, Brandon Sepulvado, Dustin S. Stoltz, Marshall A. Taylor, Justin Van Ness, and Michael Wood. 2016. "What Are Dual Process Models? Implications for Cultural Analysis in Sociology." *Sociological Theory* 34(4):287-310.
- Lizardo, Omar, and Michael Strand. 2010. "Skills, Toolkits, Contexts and Institutions: Clarifying the Relationship between Different Approaches to Cognition in Cultural Sociology." *Poetics* 38(2):205-228.
- Mandler, Jean. 1984. *Stories, Scripts, and Scenes: Aspects of Schema Theory*. Hillsdale, NJ: Erlbaum.
- Marr, David. 1982. *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*. Cambridge, Mass: The MIT Press.
- McDonnell, Terence E. 2014. "Drawing Out Culture: Productive Methods to Measure Cognition and Resonance." *Theory and Society* 43:247-274.
- . 2016. *Best Laid Plans: Cultural Entropy and the Unraveling of AIDS Media Campaigns*. Chicago: The University of Chicago Press.
- McDonnell, Terence E., and Kelcie L. Vercel. 2019. "Productive Methods in the Study of Culture and Cognition." In *The Oxford Handbook of Cognitive Sociology*, edited by Wayne H. Brekhus and Gabe Ignatow. New York: Oxford University Press, pp. 325-340.
- McMahan, Peter, and James Evans. 2018. "Ambiguity and Engagement." *American Journal of Sociology* 124(3): 860-912.
- Miles, Andrew. 2019. "An Assessment of Methods for Measuring Automatic Cognition." In *The Oxford Handbook of Cognitive Sociology*, edited by Wayne H. Brekhus and Gabe Ignatow. New York: Oxford University Press, pp. 342-366.
- Miles, Andrew, Raphaël Charron-Chénier, and Cyrus Schleifer. 2019. "Measuring Automatic Cognition: Advancing Dual-Process Research in Sociology." *American Sociological Review* 84(2):308-333.
- Mohr, John W., Christopher A. Bail, Margaret Frye, Jennifer C. Lena, Omar Lizardo, Terence E. McDonnell, Ann Mische, Iddo Tavory, and Frederick F. Wherry. 2020. *Measuring Culture*. New York: Columbia University Press.
- Neisser, Ulric. 1976. *Cognition and Reality: Principles and Implications of Cognitive Psychology*. San Francisco: Freeman.
- Patterson, Orlando. 2014. "Making Sense of Culture." *Annual Review of Sociology* 40:1-30.

- Piaget, Jean. 1952. *The Origins of Intelligence in Children*. New York: International Universities Press.
- Pugh, Allison J. 2013. "What Good are Interviews for Thinking about Culture? Demystifying Interpretive Analysis." *American Journal of Cultural Sociology* 1(1):42-68.
- Quinn, Naomi. 2018. "An Anthropologist's View of American Marriage: Limitations of the Tool Kit Theory of Culture." In *Advances in Culture Theory from Psychological Anthropology*, edited by Naomi Quinn. Cham, Switzerland: Palgrave Macmillan, pp. 139-184.
- Read, Jen'nan Ghazal, and Sharon Oselin. 2008. "Gender and the Education-Employment Paradox in Ethnic and Religious Contexts: The Case of Arab Americans." *American Sociological Review* 73(2):296-313.
- Reeves, Aaron, Emily Gilbert, and Daniel Holman. 2015. "Class Dis-identification, Cultural Stereotypes, and Music Preferences: Experimental Evidence from the UK." *Poetics* 50:44-61.
- Rosch, Eleanor. 1978. "Principles of categorization" In *Cognition and Categorization*, edited by Eleanor Rosch and Barbara Lloyd. New York, NY: Lawrence Erlbaum Associates, pp. 27-48.
- Rotolo, Michael. 2021. "Culture Beneath Discourse: An Ontology of Cognitive Cultural Entities." *American Journal of Cultural Sociology*: forthcoming.
- Rumelhart, David E. 1980. "Schemata: the building blocks of cognition." In *Theoretical Issues in Reading Comprehension: Perspectives from Cognitive Psychology, Linguistics, Artificial Intelligence, and Education*, edited by Rand J. Spiro, Bertram C. Bruce, and William F. Brewer. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Rumelhart, David E., Geoffrey E. Hinton, and Ronald J. Williams. 1986. "Learning Representations by Back-propagating Errors." *Nature* 323:533-536.
- Saguy, Abigail C., and Anna Ward. 2011. "Coming Out as Fat: Rethinking Stigma." *Social Psychology Quarterly* 74(1):53-75.
- Sampson, Robert, and Stephen W. Raudenbush. 2004. "Seeing Disorder: Neighborhood Stigma and the Social Construction of "Broken Windows"." *Social Psychology Quarterly* 67(4):319-342.
- Sewell, William H. Jr. 1992. "A Theory of Structure: Duality, Agency and Transformation." *American Journal of Sociology* 98(1):1-29.
- . 1999. "The Concept(s) of Culture." In *Beyond the Cultural Turn: New Directions in the Study of Society and Culture*, edited by Victoria E. Bonnell and Lynn A. Hunt (Berkeley: University of California Press), pp. 35-61.
- Silva, Jennifer M. 2012. "Constructing Adulthood in an Age of Uncertainty." *American Sociological Review* 77(4):505-522.

- Smith, Christian. 2016. "The Conceptual Incoherence of "Culture" in American Sociology." *The American Sociologist* 47:388-415.
- Stainback, Kevin, Thomas N. Ratliff, and Vincent J. Roscigno. 2011. "The Context of Workplace Sex Discrimination: Sex Composition, Workplace Culture and Relative Power." *Social Forces* 89(4):1165-1188.
- Steinman, Erich. 2012. "Settler Colonial Power and the American Indian Sovereignty Movement: Forms of Domination, Strategies of Transformation." *American Journal of Sociology* 117(4):1073-1130.
- Strand, Michael, and Omar Lizardo. 2015. "Beyond World Images: Belief as Embodied Action in the World." *Sociological Theory* 33(1):44-70.
- Strauss, Claudia, and Naomi Quinn. 1997. *A Cognitive Theory of Cultural Meaning*. Cambridge, UK: Cambridge University Press.
- Swidler, Ann. 1986. "Culture in Action: Symbols and Strategies." *American Sociological Review* 51(2):273-286.
- . 1995. "Cultural Power and Social Movements." In *Social Movements and Culture*, edited by Hank Johnston and Bert Klandermans. Minneapolis, Minnesota: University of Minnesota Press, pp. 25-40.
- . 2001. *Talk of Love. How Culture Matters*. Chicago; London: The University of Chicago Press.
- . 2008. "Comment on Stephen Vaisey's "Socrates, Skinner, and Aristotle: Three Ways of Thinking about Culture in Action"." *Sociological Forum*, 23(3):614-618.
- Swidler, Ann, and Jorge Ardití. 1994. "The New Sociology of Knowledge." *Annual Review of Sociology* 20(1):305-329.
- Taylor, Henry, and Peter Vickers. 2017. "Conceptual Fragmentation and the Rise of Eliminativism." *European Journal for Philosophy of Science* 7:17-40.
- Taylor, Marshall A., and Dustin S. Stoltz. 2020. "Concept Class Analysis: A Method for Identifying Cultural Schemas in Texts." *Sociological Science* 7(23):544-569.
- Vaisey, Stephen. 2008a. "Socrates, Skinner, and Aristotle: Three Ways of Thinking about Culture in Action." *Sociological Forum* 23(3):603-613.
- . 2008b. "Reply to Ann Swidler." *Sociological Forum* 23(3):619-622.
- . 2009. "Motivation and Justification: A Dual-Process Model of Culture in Action." *American Journal of Sociology* 114(6):1675-1715.
- . 2014. "Is Interviewing Compatible with the Dual-Process Model of Culture." *American Journal of Cultural Sociology* 2(1):150-158.

- Vaisey, Stephen, and Omar Lizardo. 2010. "Can Cultural Worldviews Influence Network Composition?" *Social Forces* 88(4):1595-1618.
- Valentino, Lauren. 2021. "Cultural Logics: Toward Theory and Measurement." *Poetics*: forthcoming.
- Vila-Henninger, Luis Antonio. 2015. "Toward Defining the Causal Role of Consciousness: Using Models of Memory and Moral Judgment from Cognitive Neuroscience to Expand the Sociological Dual-Process Model." *Journal for the Theory of Social Behaviour* 45(2):238-260.
- Wagner-Pacifci, Robin, and Barry Schwartz. 1991. "The Vietnam Veterans Memorial: Commemorating a Difficult Past." *American Journal of Sociology* 97(2):376-420.
- Winchester, Daniel. 2016. "A Hunger for God: Embodied Metaphor as Cultural Cognition in Action." *Social Forces* 95(2):585-606.
- Wood, Michael, Dustin S. Stoltz, Justin Van Ness, and Marshall A. Taylor. 2018. "Schemas and Frames." *Sociological Theory* 36(3):244-261.
- Wuthnow, Robert. 1987. *Meaning and Moral Order: Explorations in Cultural Analysis*. Berkeley: University of California Press.
- Young, Michael P. 2002. "Confessional Protest: The Religious Birth of U.S. National Social Movements." *American Sociological Review* 67(5):660-688.