Mechanics and dynamics of social construction: Modeling the emergence of culture from individual mental representation

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Abstract: This paper presents a parsimonious model of social construction that can be extended and applied by researchers interested in unpacking how culture emerges from individual meaning-making. Using a review of contemporary cognition research, it first hones in on the mental representation processes which drive individual sense-making in social situations. It then uses agent-based modeling (ABM), a modern simulation tool used to theorize how emergent phenomena arise from individual behaviors, to systematically demonstrate how this cognitive mechanism generates macro-level dynamics. Specifically, it shows how mental representation processes can account for cultural emergence and subgrouping, cultural path dependency and lock-in, endogenous cultural change, and the manifestation of these collective dynamics as variations in individuals' experiences of culture. The final part of the paper discusses a few initial implications of this work including the expanded use of ABM in cultural theory, testing and verification of this theoretical work using Implicit Association Testing (IAT) and large-scale quantitative analyses, and this model's significance for existing qualitative approaches to the study of culture.

Keywords: cultural theory; cognition; mental representation; agent-base modeling; emergence

1. Introduction

The study of culture has produced some of the most compelling, nuanced, and convincing models of social life ever formulated. Long before behavioral economics began grappling with the shortcomings of *homo economicus*, cultural research had established an extensive body of work on the critical role meaning and context play in human action. At the macro-level too, cultural research has identified the ability of shared meaning to both mobilize populaces and enable the continuation of existing structures, even when such collective enterprises do not directly benefit the individuals participating in them. With a few notable exceptions (e.g. Berger

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& Luckmann, 1966; Bourdieu, 1984; Giddens, 1984), however, the manner in which individual meaning-making aggregates into larger scale cultural dynamics is more often assumed than specified or tested. Even when explicit, verbal explanations of how individual actions lead to societal outcomes are offered, their complexity makes their application to real world research on the nature of the mechanisms that drive these processes unwieldy if not entirely intractable. In short, though cultural researchers may recognize that there is a vitally important causal link between individuals and collectives, present conceptualizations do not enable us to study the transition from micro-to-macro as directly or effectively as we could.

The present work will address this gap in contemporary cultural research by developing a parsimonious and empirically grounded model of social construction that can be extended and applied by cultural researchers interested in unpacking and studying the processes via which cultural dynamics emerge from individual meaning-making. The primary tool it will employ to this end is a simulation method that is specifically designed to investigate how macro-level wholes become greater than the sum of their individual parts: Agent-Based Modeling (ABM). ABM is one of the key computer simulation methods developed over the past decades in the transdisciplinary study of complex systems dynamics, and it is characterized by its simulating of individual "agents" whose interactions unintentionally and spontaneously lead to the emergence of macro-level epiphenomena. It has been used in fields ranging from physics to microbiology, and within the realm of the social sciences, it also has been used to model any number of phenomena including segregation (Schelling, 1971), the emergence of organizations and markets (Padgett & Powell, 2012), and unpopular norms (Centola, Willer, & Macy, 2005). Up until now, a major barrier to its integration into cultural sociology has been a tendency in the ABM field toward using theories of action that do not compellingly resonate with the sort of meaning-

centric action that is at the heart of most cultural theory[1]. To address this issue, the present work will "mine the intersections of cognitive sociology and neuroscience" (Cerulo, 2010) in order to develop a model of individual meaning-making that is simultaneously grounded in empirical research on human cognition, faithful to the core models of action found in cultural research, and amenable to systematic elaboration via ABM.

The primary aims of this piece will be to first, demonstrate how the meaning-centric actor of cultural theory can be translated into a form that is amenable to modeling through ABM and second, to systematically show via ABM how the interactions of these sorts of actors lead to the spontaneous emergence of known cultural dynamics such as the establishment of collective representations and cultural subgroups, cultural path-dependency and lock-in, endogenous cultural change, and the manifestation of these macro-level dynamics via individuals' varying experiences and enactments of culture. By establishing this fundamental level of validity for the model and systematically specifying the set of baseline dynamics it can account for, this work will lay a foundation for further cultural research that uses ABM to rigorously investigate and specify how social construction plays out under a vast number of complex circumstances. Furthermore, the establishment of this model will prompt investigation into new methodological approaches to the empirical study of culture and refinements in established methods, toward the

[1] Much of the ABM work that has been done in the social sciences has relied upon some version of a rational-choice actor, a model of action that has never been central to cultural studies. Other ABM work that has centered on social influence and learning processes will have very important functional similarities to the model under consideration here. The critical difference for this work, however, will be its extensive and sustained engagement with several established bodies of cultural theory as well as contemporary research on the nonrational and unconscious cognitive processes responsible for individuals' construction of meaning.

end of verifying these theorizations. Though space limitations will prohibit a comprehensive exploration of all these potential new lines of work, the last section will provide an early overview of a few promising directions. Namely, it will very briefly discuss: how the effects of power and the physical environment on social construction processes might be modeled using ABM; how Implicit Association Testing (IAT) (Greenwald, Mcghee, & Schwartz, 1998) might be used to directly study and test the proposed link between individuals and culture; some ways we might update existing quantitative approaches to create large-scale cultural analyses that test these models; and the significance of this work for qualitative approaches to cultural research .

2. Mental Representation: The Cognitive Mechanics of Sense Making

The move to place models of culture in dialogue with contemporary research on cognition (Dimaggio, 1997; Cerulo, 2002; Cerulo, 2010) has yielded many insights, including in the adjudication between long standing debates in the sociology of culture (Vaisey, 2009; Vaisey, 2008), specification of fine-grained mechanisms which underlie established theories of culture (Lizardo, 2007), reintroduction of the body back into sociological models of culture (Ignatow, 2007), and a reworking of classical conceptions of action with respect to contemporary research on different modes of cognitive processing (DiMaggio, 2002). In order to unpack the mechanics of human meaning-making, this work follows this literature's example and begins with one of the most significant discoveries that has come out of modern cognition research – what we are consciously aware of represents only a small fraction of the cognitive processing that is really occurring (Bargh, 1982; Lieberman, 2007; Kahneman, 2011).

In direct contrast to theoretical models which emphasize strategic and deliberative behavior (Camic, 1986), it is now widely understood and accepted that much of our cognition,

including social cognition, occurs outside conscious awareness (Ferguson, 2007; Bargh, 1982; Bargh & Morsella, 2008; Dijksterhuis, Chartrand, & Aarts, 2007; Haidt, 2001; Lieberman, 2007; Iacoboni, 2009; Keysers & Gazzola, 2006). Among the many aspects of cognition that fall under this heading of "automatic" are those parts of cognition responsible for immediate, reflexive sense-making of perceived stimuli[2]. Historically, these processes which mediate between sensory perception and the interpretations that shape our conscious awareness have been broadly referred to as "mental representation"[3] (Payne & Cameron, 2013; Wyer, 2007)**.** In realms as diverse as social psychology, artificial intelligence, and linguistics, the nature and structure of these representations have been a central topic of debate, with proposed conceptualizations falling under a wide variety of headings including, mental models (Holland, Holyoak, Nisbett, & Thagard, 1986), schema (Bartlett, 1932; Taylor & Crocker, 1981; D'Andrade, 1995), and "theories" (Murphy & Medin, 1985).

2.1. Associations and Mental Representation

[2] This does not imply that *all* of human meaning-making is unconscious; conscious thought can be and often is applied to such automatically constructed interpretations. Contemporary research indicates, however, that such conscious attention mostly occurs when there has been a breakdown in automatic interpretive processes or a purposeful effort is made to consciously attend to them (Wyer, 2007; Lieberman, 2007; Kahneman, 2011).

[3] The concept of "representations" has been evoked in many different ways in culture. Its usage here is a minimal, flexible conception of representation as sets of mental associations which arise from individual processes of learning and experience, a definition compatible with both toolkit and practice approaches to culture (Lizardo & Strand, 2009).

Mental representations are commonly understood as being built from networks of mental associations[4]. In this view, representations can be understood as emerging from a spreading activation (Collins & Loftus, 1975) of a series of remembered sensations or understandings that have previously been linked together in one's experience (Morewedge & Kahneman, 2010; Feldman, 2006; Damasio, 1989). To illustrate how this works, begin with Geertz's classic example of a wink (Geertz, 1973). Here, the initial stimulus is the visual processing of another individual rapidly closing and opening one eye. Upon perceiving this event, a spreading activation of remembered experiences that have historically co-occurred with seeing an eye rapidly shut and open are brought to the forefront of the mind. In this situation, prior experiences with inside jokes or conspiracies would prompt associated concepts of "veiled communication" and "privately shared understandings" to arise in one's cognitive processing. These associational "jumps" are what allows actors to rapidly and automatically construct a meaningful interpretation of the other individual as "winking" to covertly convey information.

As Geertz points out, however, there are several possible interpretations in this scenario. Congruently, we can expect an individual to have several bodies of past experience with a given stimulus and thus, several different associational networks that could activate. Extending the current example, someone may have three significant bodies of past experience with an eye rapidly shutting and opening that involve either real veiled communications, farcical over-exaggeration (a "burlesque"), or involuntary muscle contractions due to something such as stress or a foreign object (a "twitch").

[4] There are many ways of conceiving of these associations. These distinctions are not critical to this model, but see (Payne & Cameron, 2013) for an excellent overview.

If this is the case, what set of associations does the brain ultimately use to interpret the situation? The answer involves the inhibition and activation of different association networks (Morewedge & Kahneman, 2010; Feldman, 2006). Upon perceiving a particular stimulus "cue", the brain swiftly and automatically uses additional information from other sources such as the physical setting, social context, interaction history, and the other representations that have been being used up until then to determine which of the representations provides inferences (i.e. associational jumps) that "best match" (Feldman, 2006) what is happening (see Figure 1 for a visual depiction of this process).

Figure 1 About Here

In this example, the preceding conversation, facial expressions, and tone of voice could all be used to determine whether a conspiracy, burlesque or twitch has occurred. Such distinctions are able to happen due to the fact that those additional bits of perception preferentially spread the activation of one associational network over others. This disproportionate confirmation of one particular representation ends up making it the most "accessible" (Bruner, 1957; Higgins, 1996) representation and makes other candidate representations much less likely to be used (see also work on "priming" in Bargh (1982) and Bargh & Morsella (2008)). So long as information feedbacks in the environment continue to match up reasonably well to the inferences and expectations (i.e. activated associations) generated by a particular mental representation, that representation should continue to unconsciously structure the individual's understanding of what is going on (Binder & Desai, 2011; Kahneman, 2011; Feldman, 2006; Norman & Shallice, 1986).

What happens when representations only offer a partial interpretation of a situation, such as in scenarios requiring creativity? Or even further, when an individual encounters a truly novel situation for which there is no existing representation? In both of these cases, we would expect actors to be forced away from automatic, rote interpretations and into a more deliberative, conscious consideration of what is happening. For partially complete representations, we might expect an individual to use automatically supplied interpretations, expectations, and behavioral proscriptions as a "toolkit" (Swidler, 1986) that she will then use to strategically navigate the new parts of the situation (see Vaisey, 2008, 2009). In a truly novel situation, we would likely expect an even greater degree of creativity and new learning as the individual consciously and deliberatively attempts to recombine and rework what little applicable knowledge she already has into a form that successfully and reliably deals with the situation at hand (Kahneman, 2011; Feldman, 2006)[5]. If the novel aspects of these situations become regular occurrences, the associations developed in this phase of conscious effort could eventually lay the basis for a new representation (Lisman & Sternberg, 2013) [6].

2.2. The Sociality of Mental Representation

Mental representation and its underlying structures of association account for the "construction" aspect of human meaning-making, but the "social" aspects of the process must still be addressed. Social construction, in the context of this model, is defined as the collective

[5] This second understanding of deliberative recombining and reworking of existing models is very much in line with Swidler's (2001) more recent work on culture.

[6] This treatment of the relationship between deliberation and automaticity is congruent with the much deeper exploration offered by Elder-Vass (2007) as well as classic phenomenological accounts of institutionalization (Berger & Luckmann, 1966).

sense-making which emerges from individual mental representation processes playing out in the realm of human interaction. To understand what makes this application of mental representation in social situation dynamic, it is easiest to begin with the relatively simpler case of mental representation in the non-social world:

Figure 2 About Here

To give an exaggeratedly simple illustration of what is occurring in Figure 2, begin with a hypothetical situation in which I have two competing representations of a physical substance. One infers that it is a "solid" and the other that it is a "liquid." In encountering this substance in the real world, obtaining additional information to confirm one representation over the other should be relatively straightforward. If I step on the substance and my foot falls through and gets wet, this information unambiguously disconfirms the "solid" representation and brings the "liquid" to the forefront. The critical point here is that the behavior of the physical substance remains static and independent of my representation of it.

Moving into the social arena complicates matters significantly. The same fundamental principles of representation still apply to social interaction but are complicated by the fact that the behaviors I am trying to interpret are themselves dependent upon the representations other actors have of the social situation. If I enter into an interaction with a stranger in an unknown setting, neither of us may know initially if a "friendly" or "hostile" representation is more valid. For me, the behavior of the stranger will become a critical source of information feedback for my own confirmation process. Simultaneously, however, the stranger will also be looking at my behavior. Though neither one of us actually knows what is happening, if I accidentally behave in a way that confirms the other's more "hostile" representation, I may unintentionally make his

"hostile" representation more accessible. If this happens, his own actions are likely to start acting in conformity with that representation, which would in turn confirm my own "hostile" representation. Given the right, or in this case wrong, sequence of initial interactions, we may find ourselves trapped in a mutually reinforcing, "hostile" representation even though we might have both initially preferred a "friendly" one.

This a simplistic rendering of interaction, but it points to a fundamental aspect of human life. In the fashion described above, we can see how the mechanics of mental representation make our representations of the social world inextricably dependent upon the representations of those around us. As was done for the physical case, this basic circumstance of can be conveyed in a general schematic:

Figure 3 About Here

Based solely on the implications that follow from the mechanics of mental representation, we can derive a conception of social interaction as an implicit, mutually adaptive learning process between individuals. There is even further reason, however, to assert that this unconscious process of social learning constitutes a foundation of social interaction. Namely, findings from embodied cognition research point to an understanding of humans as beings who are inherently skilled at and oriented toward "matching" the representations of each other. Much of this work has come about from studies of human imitation, empathy and learning (Iacoboni, 2009)**,** with some of the most compelling evidence coming from research and theorization on sense-making via mental "simulation," and its relationship to the brain's so called "Mirror Neuron System" (MNS) (Barsalou, 2008; Keysers & Gazzola, 2006; Gallese & Goldman, 1998)

and the existence of "shared circuits" (Keysers & Gazzola, 2006) in the brain which activate representations of our own experiences when we witness another individual experiencing something similar (Barsalou, 2008)[7].

3. From Cognitive Mechanics to Cultural Dynamics

Understanding the cognitive mechanisms of meaning construction is essential to developing an explanation of how the interactions between individuals aggregate into culture. Unpacking exactly how culture emerges from this aspect of cognition, however, is non-trivial. Fortunately, recognizing the central role of implicit learning in generating shared social realities situates this model in direct dialogue with several decades of research on emergent system dynamics. By laying out the connections between the cognitive mechanisms of social construction and these dynamics, it becomes clearer how this individual-level model of sense-making can serve as a foundation for social construction.

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3.1 An Illustrative ABM of Social Learning

Much of the work that has been done on the emergence of collective behavior via social learning processes has relied on the use of Agent Based Modeling (ABM). ABM is, among other things, a tool for systematically exploring the unintended macro-level phenomena that arise from individual-level "agents" behaving according to simple sets of rules (Epstein J. , 2006; Macy & Willer, 2002; Hedstrom & Ylikoski, 2010). The primary power of ABMs is their ability to show how individual behaviors can, without top-down planning, lead to the spontaneous emergence of

[7] For a very relevant debate on the implications of the MNS for theories of practice in culture, see Lizardo (2007) and also Turner (2007).

macro-level orders. The use of ABMs in the social sciences dates back to at least Schelling's demonstrations of the unintentional emergence of segregation in neighborhoods (Schelling, 1971), and recent decades have seen their rapid adoption in research areas across sociology (Macy & Willer, 2002; Hedstrom & Ylikoski, 2010; Epstein J. , 2006).

For the purposes of demonstrating some of the emergent features social learning processes are known to generate, this paper has developed an illustrative ABM. A full exploration of the consistency of this model with related models of social and physical phenomena is beyond the present scope. In general though, it will bear a strong resemblance to many models of social influence processes (see for example Axelrod, 1997; Epstein J. M., 2001; Carley, 1991; Nowak, Szamrej, & Latane, 1990). It will also bear a strong relationship, like these other models do, to statistical physics models that consider processes of mutual adaptation between individual entities (for an overview, see Castellano, Fortunato, & Loreto, 2009). The present ABM is not meant as an alteration to this existing body of work on social learning dynamics but is included as the necessary vehicle required to demonstrate how individual processes of mental representation lead to cultural phenomena.

3.1.1 Model Design

There are a very large number of ways one could operationalize social learning into an ABM. Examples include but are not limited to Bayesian updating, genetic algorithms, and neural networks. While there are benefits and drawbacks to using these more sophisticated agent designs, the fundamental dynamics of social learning can also be explored using a much simpler

and more easily understood process of reinforcement learning. The following captures the simple learning algorithm[8] that every agent uses for each round of interaction in these simulations:

1) Play *representation* with highest *representation weight*
   If two or more representations have same weight
   randomly choose one

2) For each interactional neighbor playing a *representation*
   add 1 to that associated *representation weight*

3) Repeat steps 1 and 2 with updated *representation weights*

This process of learning (analogous to the process depicted in Figure 1), when carried out in a social context (analogous to the process depicted in Figure 3), is sufficient to reliably illustrate some of the macro-level phenomena that emerge from social learning.

For this particular ABM, each agent is given the option of imposing one of four "representations" (indicated in Figure 4 by four different colors). Other social learning models usually limit agents to adopting two possible states (e.g. Epstein J. M. (2001) and the voter models reviewed in Castellano, Fortunato, & Loreto (2009)) or allow them to take on a very large number of states via genetic algorithms (e.g. Axelrod, 1997)**.** Though in reality we could expect that there might be more than four and far less than several hundred candidate representations that could be imposed in a real world social interaction, the basic dynamics that arise in these models remain fundamentally similar.

The structure of who interacts with whom in a system is known to be a critical factor in the macro-level dynamics that emerge from social learning (Castellano, Fortunato, & Loreto, 2009; Kauffman, 1993). In order to demonstrate some of the ways that interactional structures

[8] This is similar to the "best response given a sample" rule used in Arthur's El Farol Bar problem (Arthur, 1994) and in Epstein's model of norm adoption (Epstein J. M., 2001).

might influence emergent cultural processes, I situate agents within different static network structures for each simulation run and have each network tie represent an interactional partnership. In order to achieve some realism in network structures, I build networks using the Strogatz-Watts Small World algorithm (Watts & Strogatz, 1998; Wilensky U. , 2005), with a new network constructed for each simulation run. Networks varied across each run in their levels of connectivity (average path length) and extent of cliquishness (average clustering coefficient)[9].

Finally, in order to not just look at agents' behavior but also the degree to which they had become entrenched in a representation, I construct a "conviction" measure for each agent:

$$Conviction_{agent} = \frac{w_1}{w_1 + w_2 + w_3 + w_4}$$

Where w is the weight of a given representation and w_1 is the weight of the representation that an agent is playing in a given turn.

This measure of conviction is analogous to a measurement of how strongly a dominant representation is being confirmed by an individual's social environment and thus relates to how likely she is to be engaging with the contents of that representation in a more deliberative or taken-for-granted fashion.

[9] Network size ranged from between 10 to 100 agents, the clustering coefficient for networks between .005 and .728, and average path length of the networks between 1.56 and 12.26

3.1.2 ABM Implementation and Execution

I used the agent-based modeling software NetLogo 4.1 (Wilensky U. , Netlogo, 1999) to implement the agent learning algorithm and model design described above. In order to be able to discuss general system behaviors and dynamics, I ran 2,000 individual simulations and recorded measures which captured each system's initial network structure and size, as well as a set of metrics at the end of each run which helped summarize the final state of the system[10]. Each simulation run began with me creating a set of agents and situating them on an interactional network, built according to the previously described approach, which determined who would be interacting with whom for the course of that run. During this setup phase, I also initialized each individual agent with a set of random weights between 0 and 10 for each of the four possible representations that they could play.

After this initial setup process, I allowed each simulation to run with no further involvement from me in the system's progress or behavior. Beginning from their randomized initial state, each agent began interacting with their specified interactional partners according to the learning process described previously. Every round or "turn" of interaction began with agents choosing to play the representation which had the highest weight for themselves personally and ended with them observing their neighbors' behavior and updating their own representation weights according to what they saw. All subsequent collective dynamics and orders which emerged in the system arose purely as the unintended consequences of this foundational process of individuals learning from their social interactions.

[10] These metrics included number of turns to system convergence, the number of final subgroups which emerged in the system, and the average conviction level of the system at time of stabilization.

I allowed each simulation to continue running until each system reached a final, stable state wherein no other changes in individual or macro-level behaviors would occur. In order to assess this point of "system convergence," I relied on the average of all the individual agents' conviction measures in the system (i.e. the average conviction). An important quality of this average conviction measure is that changes in its value effectively reflect how much the *relative weights* of different representation are changing for individual agents in the system. As such, when the average conviction level is no longer changing, it indicates that agents have reached a state where feedbacks from their social interactions have stabilized to such a degree that no further learning will cause them to change the representations they are applying. I allowed each of the 2,000 simulation runs to continue for as many turns as it took for this average conviction level to not change by more than .001 over a thousand turns[11]. As evidenced by the qualitative fact that systems settled into their final configurations long before they reached this cutoff, this standard proved to be a very conservative way of determining when systems had converged.

4. The Emergence of Cultural Dynamics from Mental Representation Processes

Without the ability to elaborate upon the basic social learning mechanism which drives mental representation in social situations, it would not be possible to systematically and reliably connect these cognitive processes to macro-level cultural dynamics. An ABM approach, however, allows us to overcome the hurdles of computational complexity in order to undertake this exploration. The following results demonstrate how the foundational mechanism of individual mental representation, when allowed to play out across a system of interaction,

[11] This produced a wide range of individual simulation run lengths, from 1,792 turns to 25,234 turns, with an average run length of 3,283 turns.

systematically produces rich statements on collective, cultural dynamics. As will be noted, these statements will resonate significantly with several bodies of existing knowledge in classical and contemporary cultural research. This consistency with established understanding will be used to help confirm the baseline validity of this theorization of how individual cognitive processes aggregate into cultural processes.

4.1 Emergence of Shared Representations

In all of the 2,000 example simulation runs, systems began in a random, unordered state:

Figure 4 About Here

Here and in the following figures, each small circle represents an individual agent, its color indicates the representation it is applying, and the lines, including those stretching across the system and those found along the border of it, show the other agents with whom each agent interacts over the course of the simulation run.

In every case, the system eventually converged on a final state in which subgroups of interacting agents settled into perpetually imposing the same representation as their in-group neighbors. Some examples of what these final, macro-level orders looked like are shown in Figure 5:

Figure 5 About Here

The convergence of these systems into such patterns illustrates a foundational characteristic of social learning dynamics - spontaneously emerging, macro-level orders. Given that there was no system-level programming used in the simulation and that no agents had access to information about the global state of the system, this emergence of order is not trivial. To the contrary, it cleanly demonstrates how actors attempting to understand what is happening in their immediate social context can unintentionally move an entire system from unordered chaos into a stable order.

Recognizing that mental representation in social interaction is an unconscious process of social learning, a basic but foundational statement follows from these results: *due to the innate cognitive mechanics of mental representation, prolonged interaction between individuals is sufficient to cause the emergence of stable, shared social realities across said individuals.* According to this perspective, collective representations do not require conscious planning in order to arise, nor even a common physical environment. Instead, the emergence of such systems of shared meaning is directly attributable to the processes of individual minds making sense of the social world around them.

Identifying the causal primacy and sufficiency of mental representation in the emergence of systems of shared meaning provides a direct, micro-to-macro link between microinteractionist theories and cultural emergentist perspectives. More specifically, this result shows how an individual-level, cognitive mechanism readily gives rise to the "collective representations" (Durkheim, [1915]) central to Durkheimian schools of thought and clarifies a primary pathway for the creation of systems of tacitly shared definitions - a phenomena which is relevant to sociological models concerned with "fields" (Bourdieu, 1984; Fligstein & McAdam, 2012) and "social mindscapes" (Zerubavel, 1999). This result also asks us to reconsider theories like those

of social phenomenologists on lifeworlds (Schutz, 1967), Goffman's frame analysis (Goffman, 1974), and the American Pragmatists' work on interaction (Blumer, [1969]) as descriptively rich explorations of how this abstract process of social learning plays out in small group settings. Additionally, it resonates with both Berger and Luckmann's theorization of the construction of social reality (Berger & Luckmann, 1966) and Giddens' model of structuration (Giddens, 1984) while going one step further by formally specifying how individuals can simultaneously constitute and be constituted by culture.

The mere existence of emergent order is not the only finding here. When first thinking of a system of individuals who are oriented toward aligning their representations of the social world, there is often a naïve expectation that this will lead to a monolithic consensus on a single shared representation. As can be seen in Figure 5, however, though all systems stabilized, the patterns that characterized those final orders varied. In point of fact, though all systems stabilized, only 11% of them stabilized with a complete consensus across the system. This result illustrates an important feature of systems of social learning, that of "mimetic divergence" (Macy & Willer, 2002). Mimetic divergence is a well-established phenomenon that refers to the emergence of subgroups throughout a system of individuals who are trying to sync up to those around them (see Axelrod, 1997; Epstein J. M., 2001; Nowak, Szamrej, & Latane, 1990; Carley, 1991 for other examples).

The important, real-world implication of this is that, even assuming that social construction processes are driven by individuals' unconscious orientation toward matching their representations of others, the emergence of uniform, monolithic cultures is unlikely. Instead, a diversity of subgroups should be understood as the most likely outcome of individuals trying to make sense of their local interactional contexts. Said more succinctly, the default expectation

should be that *social systems are most likely to be characterized by subgroups of shared representations, not system-wide consensus.*

Though subgrouping should be expected, it is not inevitable. A benefit of ABM is that it allows us to think more deeply about the interactional arrangements that facilitate or inhibit the spread of shared representations. A finding demonstrated through these simulations is that it is not just the size of a system, but also the connectedness and cliquishness of it that matters. In general, it was not only small systems but also well-connected and less cliquish ones that achieved a final state in which many agents collectively agreed on shared representation (i.e. fewer subgroups)[12]. This pattern is illustrated in Figure 5 with different systems, from left to right, being characterized by higher levels of connectivity and lower numbers of subgroups. These results are consistent with a body of work that has investigated the role of topology on the dynamics of social learning (Castellano, Fortunato, & Loreto, 2009). More substantively speaking, these results highlight that it *is not just size of systems of interaction but also the ability of information to move across that system which governs patterns of shared meaning.*

This insight harkens back to classical theories such as Simmel's work on the causal role of interactional patterns in shaping cultural characteristics (Simmel, 1955; Simmel, 1971) and Durkheim's propositions on the effects of social density (Durkheim, 1964). It also motivates a much deeper integration of contemporary research on social diffusion and networks (e.g. Granovetter, 1973 and Rogers, 2003) and models of social construction and culture. In particular, it emphasizes that such diffusion models are not only important for understanding the spread of

[12] Average path length, clustering coefficient, and number of agents were all highly significant predictors of the number of subgroups that formed. Number of agents was *not* a significant predictor of whether or not full system consensus was achieved.

consciously accessible objects such as fads, rumors, or technological innovations but are also important to understanding how people's unconscious senses of shared social reality come to be established and reinforced.

4.2 "Lock-in" and Path-Dependency in Systems of Shared Meaning

Though all systems converged to a state in which agents settled into perpetually using a particular representation, at no point did agents stop going through their process of learning. This is characteristic of another dynamic of these systems: emergence of self-reinforcing patterns of interaction that "lock-in" macro-level orders. When there is high variability and disorder in the interactional environment[13], individual agents try many different representations of what is happening. Before long, however, a small set of agents may stumble into syncing up to each other at the same time. Due to the confirming interactional feedback they experience from each other at that point, they start becoming more likely to continue to behave in that way. If this pattern continues over the course of a few more interactions, the interacting agents can became set into a pattern of mutual reinforcement. The newly formed stability of the freshly constituted subgroup then creates conformational "pressure" on nearby agents to conform to that representation. If those nearby neighbors end up getting "pushed" into doing so, the group effectively expands and the dynamic becomes stronger.

Arising directly from this self-reinforcing dynamic of groups is the fundamentally *path-dependent* nature of these systems. Prior to self-reinforcing processes becoming established,

[13] Such as would be the case in formative periods in systems or after a major exogenous shock (e.g. war, natural disaster, major institutional failure). The relationship to classic notions of *anomie* is hard to miss.

individual behavior can have a significant impact on the eventual state of the system. Early on, an individual consistently asserting a particular action or refusing to take part in one might be sufficient to change the course of what representation gets established in its local context. This in turn can have a potentially large effect on what the eventual macro-level order looks like. Once a group homes in on the same representation, however, it becomes increasingly difficult for individual deviations from that norm to affect the behavior of others due to the diminishing impact of individual action in the face of larger group reinforcement.

Connecting processes of mental representation in social contexts to this dynamic demonstrates how the same cognitive mechanisms which lead to the emergence of shared social realties also account for their persistence and reproduction. As individuals arrive at similar representations of the social environment, their behaviors begin to conform to that representation. Such behavior, in turn, acts as confirming informational feedback for others who share that representation. Over time, this cycle of feedback leads to widespread enactment and overwhelming confirmation of one representation over and against other ones. This offers a clear illustration of how collective representations move from an initial, volatile state into a later, more stable one via an unconscious version of Merton's "self-fulfilling prophecy" (Merton, 1948). Said differently, it demonstrates how *a system of shared social representation that has become sufficiently established will also "lock-in" via patterns of self-reinforcement*.

Understanding the path-dependent nature of these systems also points toward the variable influence of the individual versus the group in cultural processes. Namely, it means that *individuals will have a stronger causal role in the early stages of establishing shared social realities but will, over time, become increasingly less influential as the sway of the group becomes dominant*. This insight is consistent with work on the key role of entrepreneurs in the

establishment of fields (Fligstein & McAdam, 2012; Dimaggio, 1982) and more classic models of institutionalization (Berger & Luckmann, 1966; March & Simon, 1958). It also resonates with rational choice and historical institutionalist models of institutional path dependency (e.g. North, 1990; Pierson, 2000; Mahoney, 2000) but does so via an actor that is much more congruent with sociological institutionalism (e.g. Meyer & Rowan, 1977). It also supports arguments for the necessity of multiple levels of analysis in social science (Meyer & Jepperson, 2000) while even going so far to anticipate when different levels will contain more relevant causal stories.

4.3 Origins of Endogenous Change in Culture

Though agents in these simulations all reached a final state in which they imposed the same representation indefinitely, not all of them achieved a high level of certainty in the representation they settled on. Looking past outward behavior and into the "conviction" agents had in their representations clarifies this deeper dynamic. Figure 6 shows the same systems presented in Figure 5 except now, the agents are shaded such that the darker the agent, the more "conviction" it has that the representation it is playing is correct.

Figure 6 About Here

The two left-most systems in Figure 6 illustrate another characteristic that emerges from mimetic divergence. Not only do subgroups arise but also a consistent patterning of less "sure" agents at the edges of groups along with much more certain ones in the interior. This makes sense. Agents on the edges of subgroups, by definition, maintain ties to other subgroups. Though the majority of their ties are to their own subgroup and thus their subgroup's representation dominates, continued interactions with other types of agents provide an on-going source of disconfirmation which prevents them from becoming fully "settled" in that representation.

Conversely, for agents completely embedded within their own subgroups, the behavior of everybody remains entirely consistent with their own understanding. As such, they are the only ones able to become completely "sure" that they have the right representation.

Looking at the system-level measure of "average conviction" provides another level of insight. The average conviction of all systems begins very low due to the variability of observed behaviors in interactions. As self-reinforcing patterns of behavior become more prevalent, average conviction begins to rise. In the majority of cases, however, this average conviction levels off at a level well below[14] the 100% that would indicate all agents are completely sure of their representation. Only in those special cases in which a system reached full "consensus" does the average conviction achieve this level.

Looking at the behavior of average conviction at different times and in different circumstances makes some deeper statements on the dynamism of these systems possible. One way to think about average conviction is as an inverse measure of the "tension" within a system. The lower the average conviction, the greater the number of agents who are not entirely settled into what they are doing and thus, the greater the number of agents who are motivated to potentially change their state. This stable yet strained state is a hallmark of systems that are able to achieve a "self-organized criticality" (Bak, Tang, & Wiesenfeld, 1988) which can produce a "punctuated equilibrium" dynamic - long periods of global stability that are periodically disrupted by waves of change as unsettled agents attempt to resolve their state and, unintentional change the shape of the macro-level order.

For the sake of simplicity and establishing a baseline of dynamics, the present model stops short of giving agents the ability to creatively overcome this sort of tension and thus

[14] The average over the 2,000 runs of the average conviction measure was 78%

generate this type of punctuated equilibrium dynamic. These results are able to, however, demonstrate how such patterns of persistent, potentially transformative, unsettledness can emerge spontaneously in a system. In particular, these results emphasize how having *a diversity of connected subgroups within systems of shared meaning engenders a capacity for endogenously originating, system-level change*.

4.4 Manifestation of Cultural Dynamics is Individual Experiences and Enactments of Culture

As covered earlier, the ability of mental representations to provide valid inferences is a key element in determining whether or not an individual will engage with the contents of said representation in either a more conscious, deliberative fashion or a more unconscious, automatic manner. So long as the automatically supplied representation of a situation remains relatively unproblematic, individuals' limited deliberative processing resources are not likely to be directed toward its contents. Once disrupted at a sufficient level, however, individuals' conscious processing will be drawn toward this breakdown in inference validity and they will become more likely to resort to using their deliberative capacities to make sense of what is going on[15].

Representational disruption is captured in this model by the state of "low conviction" for an agent. When agents are in this state, it indicates that though they are behaving in a way that is congruent with their most strongly confirmed representation, their social environment does not entirely fit with that model of what is happening. We can say that such a state signifies a circumstance within which an individual is likely to be experiencing many "breaches" in their representation of the social world. Consequently, these individuals have an increased likelihood

[15] A classic example of how this sort of process manifests comes from the Ethnomethodologists' breaching of "normal forms" (Garfinkel, 1967).

of becoming consciously aware of the contents of that representation. Agents with "high conviction" correspond to those whose representations remain relatively unproblematic. For such individuals, representations of the social world are most likely to remain safely in the background as taken-for-granted reality.

Understanding this link between patterns of settledness and the mechanics of mental representation creates deep connections between individual experiences of social reality and macro-level dynamics of culture. For instance, by considering how macro-level social orders become established and lead to individuals becoming more strongly reinforced in their representations (i.e. in seeing how the "average conviction" of system rises as order emerges), we can see more clearly how *as shared meaning becomes locked-in, individuals' representations do a better job of validly making inferences about social interaction and thus, the contents of those representations move further into the realm of taken-for-granted realities*. As also covered earlier, this success in mental representation does not entail the cessation of deliberative thought in the system, just that certain elements of regularly experienced situations will be automatically processed and in so doing, conscious attention will be freed up for other tasks[16]. What this finding does indicate, however, is that as systems become established, the amount of conscious attention individuals spend *on* their social context will diminish as the increasing regularity of social interaction allows them to devote more of their deliberative energies to problems that are occurring *within* the increasingly predictable social environment.

This insight is congruent many other existing models. To name just a few, it simultaneously resonates with Berger and Luckmann's (1966) and March and Simon's (1958)

[16] Both (Leschiziner & Green, 2013) and (Vaughan, 2002) provide excellent empirical examples of this.

accounts of institutionalization as being characterized by individuals moving from conscious problem-solving into rote habits. In a more contemporary vein, work by Sewell (1992) on the transformation of structures through "events" and by Swidler (2001) on individuals' engagement with culture in "unsettled" versus "settled" times also becomes very relevant here, especially in their emphasis on how explicit awareness gives over to increased automaticity in cultural experience and enactment over time.

Recall though, that even as systems on average become more settled, not all agents are able to achieve a final state in which representations are completely confirmed. Beneath diversified, macro-level orders of connected sub-groups, there is additional patterning in levels of individual conviction (see Figure 6). As discussed, it was just these patterns of low certainty at the edges of groups and high certainty in the middle which laid the groundwork for endogenously originating, system-wide change. Combining this understanding with how individual conviction maps to real cognitive states yields a compelling insight into how culture's capacity for endogenous change manifests via individual experiences of social reality.

In the center of subgroups, where individuals are completely surrounded by others who confirm their subgroup's representation, we see agents with highest certainty. The real world analog to this situation entails that *the more embedded an individual is in a group, the more we should expect that individual to be engaged with the group's shared meanings in an automatic, taken-for-granted manner*. As one moves to the edge of groups, however, we find actors whose ties to outside groups provide a continual source of disconfirming evidence for their dominate representation. This leads to the complementary proposition that *the more interaction individuals have with other groups, the more likely they are to engage with their own group's set of shared meanings in a deliberative, conscious fashion.*

Going further into the relationship of these unsettled areas to systems' potential for macro-level change, we can also now state that *the individuals at the edge of group constitute a potential reservoir of endogenously originating, system-level change in cultural systems*. In specific, we can see here how individuals at the intersection of different sets of shared meaning are cognitively pressured into becoming consciously aware of social representation contents that other, more deeply embedded individuals experience as taken-for-granted reality. We can also speculate further that it is these individuals who are attempting to make sense of what is happening at the interface of different social worlds who are most likely to produce new, explicitly articulated models of social reality which, if they are able to spread through the system, can remake existing macro-level patterns and form the basis for new sets of taken-for-granted realities.

There are, again, numerous points of connection between this model and existing cultural theory. In terms of social transformations being driven by a movement of established taken-for-granteds into the sphere of deliberative consideration, work by both Bourdieu (1977) and Habermas (1984) on social change become extremely relevant. There is also a resonance in this part of the model with work on social movement "framing" (Snow, Rochford Jr., Worden, & Benford, 1986) not only because of the inherent connection between the notions of frames and mental representation, but also because of the similarities between "frame alignment" processes and the "conceptual blending" (Fauconnier & Turner, 2002) processes that are often used to creatively overcome problematic representations. This conceptual blending process is also highly relevant to the creative behavior of individuals in gaps between institutional contexts in a fashion that is quite congruent with Swidler's (2001) work. It also motivates another new way of

engaging with network concepts like structural holes (Burt, 2004), weak ties (Granovetter, 1973) and brokerage (Stovel & Shaw, 2012) in models of cultural change.

5. Theoretical and Empirical Implications for the Sociological Study of Culture

The findings of this cognition-based model of social construction are quite consistent with established work on culture. Of critical importance, however, is the fact that this model did not arrive at these conclusions by design; it did not set out to replicate and confirm these known insights. Instead, it sought only to systematically and rigorously extrapolate out the macro-level implications of individual mental representation processes. Showing how a single cognitive mechanism can reproduce the insights of a wide variety of existing work does not, of course, immediately obviate established models of culture, even if it may ultimately lead to future questions concerning when they should be preferred over this more parsimonious theorization. It does, however, establish a foundational level of validity for this theory of social construction and confirms the viability of using ABM to unpack the link between individual meaning-making and cultural dynamics.

Having accomplished this necessary first task, it is appropriate to start considering implications of this model for future work. Unfortunately, present space considerations do not allow for a complete exploration of all these potential lines of theoretical and empirical development. The following sections, however, will briefly introduce some promising avenues of future work that this new approach opens up.

5.1 Extending the Use of ABM in Cultural Theorization

In order to establish a foundational set of dynamics, the agent-based model presented here was kept fairly simple. Having validated the baseline model however, it is possible to begin considering how one might extend it further to investigate how culture arises from individuals in richer, more complex contexts and circumstances. A major benefit of using ABM for theory building is that undertaking such extensions is a relatively simple task[17]. The brief discussions that follow offer just two of a large number of possible ways this model might be modified to explore other aspects of cognitively driven, social construction processes.

5.1.1 The Role of the Physical in Social Construction Processes

A purely social environment for individual learning was used in this baseline model (i.e. the process pictured in Figure 3). In reality though, socially shared representations often involve inferences about the physical world as well as the social one. Examples of this would include social representations that contain expectations on the degree to which human actions can alter the natural environment, perceptions concerning the desirableness of particular foods or objects, interpretations of bodily sensations associated with emotions or sexual attraction, or inferences of psychological traits based on observed bodily characteristics like biological sex, skin complexion, or physical ability level. From the perspective of this model, these scenarios all share a deep commonality in that they involve potentially contentious situations in which both the social *and* the physical environment provide confirming information for individuals' shared

[17] Beyond clarifying particular subjects, these sorts of modeling extensions, by virtue of their common microfoundation, would also show how those subjects connect to each other and the foundational model developed here. As such, this ABM approach provides a potential basis for a new, truly progressive research programme (Lakatos & Musgrave, 1970) in cultural sociology.

representations of the world (i.e. they involve the processes featured in both Figure 3 and Figure 2).

Recognizing these dual sources of confirmation leads to a number of different questions: How does the presence of a relatively static source of confirmation feedbacks impact collective representation? Does physical reality constrain the set of collective representations that can become established or can social pressures overwhelm the non-conformance of the physical world with people's representations of it? If so, under what conditions does the social win out over the physical or vice versa? All of these questions can readily be explored through ABM by creating variations of the present model that incorporate the presence of non-social information feedbacks in agents' learning (i.e. including a learning process analogous to what is shown in Figure 2). By varying factors like the strength of non-social feedbacks, presence of them at different points in system development, or their level of commonality across individuals, this modeling approach could contribute to new formal theorizations of how external physical environments and lived, bodily experiences affect the dynamics of social construction.

5.1.2 Modeling "Power" in Social Construction Processes

Another line of possible work would be to use ABM to look at the multivalent issue of "power" in cultural processes. Here, power can be conceived of broadly as an increased ability to further the adoption and entrenchment of one representation over other competing representations. The real world manifestation of such a process would be individuals or groups possessing, for whatever reason, an ability to disproportionately influence what becomes established as others' background, taken-for-granted realities. Conceptualized in this way, there

are several avenues through which we could conceive of and model "power" in the social construction.

One avenue of influence may simply be getting to act early in a system's stabilization. As mentioned, an actor or group of actors who assert a particular representation during periods of uncertainty might be able to substantially affect the eventual shape of the macro-level order, and it would be easy to explore how variations in the timing of this action relate to different abilities to influence cultural lock-in processes. Another pathway to power might arise through one's position in a structure of interaction. Namely, highly visible (i.e. central) actors who consistently assert a particular representation may be able to act as "focal points" which drive the informational feedbacks of many other actors simultaneously. Further network characteristics could also compound this effect, such as there being a unidirectional flow of information out from a central actor (a kind of "broadcasting" scenario) or situations in which actors in a system are able to see a central actor but not each other. One final means of influence might come through particular individuals or representations carrying more weight in representational confirmation processes. In the baseline model, agents' interactions with every neighbor were weighted equally, but factors such as affective ties or particularly charismatic or intimidating actors might make us expect that such informational weighting should vary between individuals. Similarly, we might expect representations with strong emotional content (Davidson, Maxwell, & Shackman, 2004) or which resemble one's existing ideas (Friedrich, 1993) to have a stronger effect. For all these scenarios, it would be an easy matter to modify the baseline ABM in order to explore more deeply how these avenues of influence impact cultural dynamics under a variety of complex circumstances.

5.2 Implications for the Empirical Study of Culture

Building a parsimonious theory of the emergence of culture from individual mental representation requires the use of ABM, and it is of potential benefit that this computational approach can be easily extended by others who are interested in further unpacking micro-to-macro links in social construction processes. While ABM can provide well developed and internally consistent models of the social world, however, it cannot ultimately confirm the external validity or usefulness of those models on its own. Such a task can only be accomplished through the empirical testing of its models against real-world observations. Fortunately for this particular line of theorization, its empirical grounding in cognition research provides researchers some new methodological approaches that might be used to test these models and more generally, study the link between individuals and culture in the field. The following discussion offers a brief overview of some of these potential lines of development.

5.2.1 Implicit Association Testing and the Study of Social Construction

Implicit Association Testing (IAT) is a method for testing the strength of automatic associations within individuals' mental representations (Greenwald et al., 1998). By systematically defining the connection between individual mental representation processes and macro-level cultural dynamics, this work motivates a serious investigation by cultural researchers into the potential use of IAT in uncovering deep, nonrational aspects of social construction processes as they are instantiated within individuals.

Much of the work that has been done with IAT so far has focused on uncovering preexisting associations individuals carry, with a specific concentration on the existence of implicit biases. In terms of cultural research, recognizing that these associations are indicative of

larger processes of social construction implies that IAT may prove useful to those who want to know when, where, and for whom socially constructed meanings are either being reinforced or reworked. To give a concrete example, one research design might seek to look at the ways individuals' implicit associations with "police" vary given not only their race, but also the amount and source of recent news coverage they have been exposed to concerning police shootings and associated protests. Another design might look at how exposure to different subgroups' media affect individuals' implicit associations between certain physical characters and concepts of "beauty".

Use of IAT, however, is not hypothetically limited to established associations. Work in the arena of Status Construction Theory (Ridgeway, 2006), for instance, provides evidence that new meanings can also be created in controlled, experimental settings. Though this work has historically relied on behavioral metrics to assess the construction of status in small group settings, the theoretical work presented here indicates that we may actually be able to use IAT to see this construction play out on unconscious levels as well. There is nothing that inherently limits the potential applicability of this methodological approach to the realm of status and bias, either. For example, it might be possible to watch how exposure to particular political ads help to establish either negative or positive mental associations with specific policies or candidates, or investigate how games played with made up currencies establish implicit associations between said tokens and notions of "value" or "desirability." This combination of small group experimentation and using IAT to assess the formation of new implicit associations may very well offer a direct way of verifying the results of present and future ABM work.

5.2.2 Using Profiles of Behavior and Statement to Study Large Scale Cultural Processes

While IAT represents a potentially powerful means for getting at social construction at the individual-level, research on large scale cultural dynamics also requires approaches that can capture macro-level trends. The present theory's focus on mental representation has the potential to inform methodologies in this arena too. More exactly, work currently in preparation will be able to demonstrate how shared mental representations should be expected to manifest as shared profiles of behavior and statement that are detectable using unsupervised machine learning methods (e.g. cluster analysis and topic modeling) as well as latent variable statistical modeling (e.g. principle component analysis and multi-dimensional scaling) (*work in progress*). Many of these methods are already, explicitly and implicitly, used to study culture, with the most familiar example likely being Bourdieu's use of multiple correspondence analysis (Bourdieu, 1984). This theory not only supports the use of these methods in the study of culture but also provides an explanation for why these methods work and how they might be employed to create even more powerful analyses of cultural processes.

Namely, a central assertion that follows from the meaning-making actor developed here is that we should not only be concerned with what specific traits tend to co-occur in individuals at a specific time and place (i.e. high income and playing tennis or driving a hybrid vehicle and being pro-choice) but perhaps more importantly, in the emergence and change of these profiles across time and interactional space. Though space limitations prevent a full development of the argument here, it can be asserted that there exists a positive relationship between one's conformance to shared behavioral profiles and one's degree of entrenchment in dominant representations (*in progress work*). This link between what this model has referred to as "conviction" and these behavioral profiles motivates a general methodological approach which

can verify these modeled cultural dynamics via investigations into how such profiles cohere, change, and dissolve over time and social contexts. Furthermore, the generality of this theoretical model also asserts that we should expect studies of how traits come to "hang together" or "fall apart" to be relevant across social life, not just in matters of class/personal taste or political ideology. This general approach is well suited to analyses of large-scale social data, and might provide for another fruitful arena in which to test present and future models of social construction.

5.2.3 Implications for Qualitative Approaches to the Study of Culture

This work has used a computational approach to unpack cultural processes, and the methodological implications it has considered are ones that happen to be amenable to quantitative research. It would be a major mistake to infer from these characteristics, however, that this perspective in any way undermines the importance of popular cultural research practices such as qualitative research or rich theorizations of contextualized sense-making processes. To the contrary, there is much in this perspective that affirms the absolute necessity of our continued investment in these modes of research and theory. Not only does this model argue for the causal primacy of meaning-making in social life but also that the construction of such meanings should be understood as occurring via highly contingent and historically unique processes of social interaction. At the same time that this model asserts that meaning will arise from social interaction, it also contends that researchers are unlikely to be able to predict what those meanings will be without a deep familiarity of the social contexts which gave rise to them. Consequently, this work must be understood as complementing and supporting these existing approaches to cultural research rather than competing with them.

6. Conclusion

This paper has sought to offer cultural researchers a new tool for directly connecting individual meaning-making processes to macro-level cultural dynamics. It began with a review of research on mental representation processes in order to develop an empirically grounded model of individual sense-making and then used ABM to show how these processes aggregate into cultural phenomena. In particular, this model was able to speak to the spontaneous emergence and patterns of shared representation, cultural path-dependency and "lock-in," endogenous sources of cultural change, and the manifestation of these collective processes in individuals' experiences of culture. The discussion of these results also identified many connections between this model and existing bodies of cultural theory in order to establish the validity of this ABM approach to culture. The final section offered some initial explorations of the implications of this theory for future work, including the expanded use of ABM in the theorization of social construction processes, the potential use of IAT and large-scale statistical analyses to test and verify these models, and the implications of this work for qualitative research and rich theory in culture.

The main benefits of theories such as the one presented here are their capacity to empower researchers to investigate essential but complex processes in social life and their provision of new tools for developing deeper insights into society. Such benefits cannot be brought to their full fruition by a single individual but must be actualized through the efforts and insights of many individuals working in dialogue with one another. Consequently, the work developed here must ultimately be evaluated in terms of its ability to foster such conversations between researchers and its capacity to inspire new ways of thinking about and studying culture.

As with all shared models, its most important test will inevitably be its ability to collectively assist us in making sense of the world.

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