

Introducing this Special Issue

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In November of 2020 we wrote to a handful of cultural evolution researchers to invite them to a pre-read workshop in Brittany, France, sponsored by the Borchard Foundation. We described the topic as follows:

The burgeoning field of cultural evolution has expanded significantly in recent years; it now supports an international society, and a bi-annual conference; researchers are drawn to the field in increasing numbers, as though they are long lost prodigal daughters and sons. This gives rise to a challenge for the field. With psychologists, sociologists, modelers, philosophers, primate researchers, data scientists, anthropologists, and many more all flocking to cultural evolutionary theory, we believe the broad lack of agreement about mechanisms used in cultural evolutionary explanations is a concern. We recognize that other opinions are available. Darwin was oblivious to the gene as a unit of biological selection. Just as the absence of a mechanism of inheritance did not thwart Darwin's ability to articulate the most important theory biology has ever known, so (as argued by Mesoudi, Whiten & Laland, 2004) cultural evolution can continue apace without clarity about mechanisms of transmission. Nonetheless, even if mechanisms need not be fully articulated in this context, we are convinced that a workshop, and subsequent edited volume, that deals head-on with the challenge to discuss and explain a

handful of key mechanisms for cultural evolution and knowledge transmission, would be of great benefit to a diverse readership.

The authors represented in this volume were asked to select what they considered to be a mechanism within their area of expertise, and discuss its formation, composition and/or operation in some detail. When initially planning for the colloquium (delayed twice due to the pandemic), we summarized and discussed recent work on mechanistic explanation in the philosophy of science and appended a short bibliography (e.g. see Cunningham 2021), but we thought it best not to seek to impose a singular concept of mechanistic explanations upon authors. The ultimate result of our work, this issue, is a collection of eight papers from diverse fields within cultural evolution each of which seeks to explain or assess one explanatory mechanism.

Why the comparative absence in cultural evolutionary theory of attempts to mechanistically explain subcomponents of culture? In the humanities, this might be due to emphasis on individuals' agency and decision-making, and on roles of historically important individuals. This is not integrated into the 'population thinking' approach familiar in much of cultural evolution. Models supporting that approach reduce the dimensionality of human decision-making to options like 'observe, copy, or act', for example. In the social sciences, many *explananda* are not themselves suitable for mechanistic explanation – we recognize this. Second, cultural evolution appears far more model-driven than theory-driven. Model-based research poses challenges to researchers who seek to derive, then test, hypotheses from core principles, an activity that, historically, has led to discovery of new mechanistic explanations. Third, as noted, some leaders in cultural evolution eschew the need for use of a central mechanism for cultural transmission. Fourth, as Table 1 makes clear, a significant obstacle to developing unified mechanistic explanations of cultural phenomena – and simultaneously, a bright spot in cultural evolution's nascent development – is the diversity of methods and radical explanatory pluralism represented within this loosely organized field.

Many cultural evolutionary scientists nonetheless use the concept of a mechanism. Cavalli-Sforza and authors (Guglielmino et al. 1995, 7585) restrict the term "mechanism" to refer to processes such as vertical and horizontal transmission, one-to-many transmission, "group pressure," and purported laws of transmission. Mesoudi and co-authors (Mesoudi et al. 2013, 194) refer to "individual-level mechanisms of variation, selection, and transmission." It may be more charitable to read this comment as referring to taxonomic categories of families of mechanisms since the authors also call guided variation, random copying, content biases, apprenticeship, emulation, exaptations, and chance

TABLE 1 The variety of cultural evolutionary explanations

Method	Field of Study	Research Question	Source
Hypothesis Testing	Developmental Psychology	What social conditions must be met for effective knowledge transmission to preschool children?	Moll, 2018
Mathematical Modeling	Linguistics & Genetics	What is the relation between linguistic family and genetic transmission?	Cavalli-Sforza & Feldman 1981
Data Mining	Anthropology	What factors best explain diachronic trends in woven patterns in historical Iranian textiles?	Matthews, et al., 2011
Evolutionary Explanation	Physiology & Paleoanthropology	What accounts for the staggering morphological differences between the human and chimpanzee digestive tract?	Wrangham 2010
Phylogenetic Analysis	Literature & Data Science	Given the many extant manuscripts, which are arranged in many disparate orders, what is the original order of <i>The Canterbury Tales</i> ?	Barbrook, et al., 1998
Next Generation DNA Sequencing	Genetics & Psychology	What accounts for the unusual pattern of distribution of the central dopamine regulatory gene complex around the world?	Chen, et al., 1999

factors like accidents and copying errors mechanisms (2013, 196). Henrich, Boyd and Richerson (2013) refer to three “mechanisms” that explain increases in cultural “fitness”: population structure, cultural learning, and the “acquisition of improvements from previous generations” (134–5). Dean, Vale, Laland, Flynn, and Kendal (2014, 5), referring to transmission chain experiments, identify “mechanisms” that explain participant behavior including observation of others, teaching others, seeing completed artifacts, and combinations thereof.

Traditional evolutionary psychologists tend to use the term “mechanism” to refer to evolved cognitive modules with an input-output structure (as seen in Gangestad, Haselton, & Buss 2006). These sets of mechanisms are varied, members of the sets appear to occupy different levels of explanation, and their proponents make a dissonant number of distinct ontological assumptions. Still, cultural evolutionary researchers are attempting to find “mechanisms” in subcomponents of culture, especially pertaining to cultural transmission, and they do seek to explain those mechanisms with theory.

This issue of *Journal of Cognition and Culture* offers readers a suite of articles each of which explicitly discusses one explanatory mechanism common to a field of inquiry within cultural evolution, and we hope that the conjunction of eight attempts to do this will lead to future focus and reflection about cross-disciplinary bridge laws and intertheoretic evidential relations. This goal has seemed to us timely and important for, according to a report about a survey of members of the Cultural Evolution Society, “knowledge synthesis” was rated as the single most important challenge facing the field (Brewer et al. 2017, 1).

In the first article, **Peter Richerson** and **Robert Boyd** explore the role of neurobiological mechanisms in making humans a cultural species. Neurogeneticists and others argue that what Richerson and Boyd call “culturally based behavior” is governed or controlled by genes, while social scientists argue that genes occupy a limited role in explaining such behavior. The authors adopt a “cultural niche hypothesis” that says a variety of mental modules supportive of “culturally based behaviors” are biologically adaptive *and* that culture plays a significant role in explaining why. Following consideration of variation in human cultures, the human brain emerges as an organ of phenotypic flexibility, akin to the immune system.

In the second article, **Olivier Morin** explores two factors leading to cultural stability rather than cultural change. Morin distinguishes between two kinds of conservatism. One is rooted in the assumption that established traditions are superior to potential alternative solutions (evolutionary conservatism). The other, status quo conservatism, is motivated by aversion to the risks and losses that come with change, regardless of whether the tradition is superior to innovative alternatives. Morin turns to coordination games to achieve a better understanding of the conditions under which agents, and possibly cultures, are averse to change – such as when coordination between agents is complex and hard-won.

In the third article, **Fanxiao Wani Qiu** and **Henrike Moll** focus on the cultural evolutionary mechanism of teaching. The authors highlight the underappreciated role that children’s knowledge of teaching plays in the success of knowledge transmission. Qiu and Moll survey experimental and observational

studies showing that from a young age, children are not just learners but also budding teachers, who share relevant information with one another and, potentially, with members of older generations. The authors urge that cultural evolutionary theory take this mechanism of cultural transmission into account in future theorizing.

In the fourth article, **Emma Flynn** argues that imitation is a key mechanism of cultural evolution. She gives an overview of studies she and others have conducted with the goal to mimic cross-generational transmission of cultural innovations. In these experiments, “chains” of children are prompted to communicate to one another, either dyadically or in a group, their attempts to open puzzle boxes. Flynn acknowledges some of the limitations of these diffusion-chain studies when it comes to simulating cross-generational knowledge transmission (e.g., the absence of multiple individuals in a generation and of multiple generations at a given time). She nevertheless concludes that the high fidelity with which children tend to communicate their solutions supports the view that imitation is a key mechanism in cultural evolution.

In the fifth article, **Mathieu Charbonneau** and **James W. A. Strachan** scrutinize the epistemic gains yielded by imitation studies and, more broadly, by studies presupposing that copying is a major mechanism in cultural evolution. Charbonneau and Strachan compare explanations by imitation to infamously tautological *vis dormitiva* explanations. According to their provocative argument, because explanations pointing to an imitation mechanism are circular, cultural evolutionary scientists should adopt new research paradigms that focus on the processes of interaction and coordination between agents involved in knowledge exchange. In some ways this paper takes issue with Flynn’s and, frankly, most of the field’s conviction that imitation is central to human uniqueness and to cumulative culture, while implicitly highlighting the importance of the findings from Qiu and Moll above about the active character of cultural transmission in children.

In the sixth article, **Joëlle Proust** traces how, along with cumulative culture, humans developed increasingly complex forms of meta-cognition. Proust postulates that more basic forms of metacognition, such as error monitoring, are common to humans and other primates. However, only in humans did these fundamental forms of self-evaluation further evolve into curiosity-led inquisitiveness and, ultimately, cooperatively and normatively structured ways of sharing epistemic attitudes toward states of affairs. One might say that Proust examines important cognitive underpinnings of conventions and institutions – the explanatory role of which Ryan Nichols investigates in his article.

In the seventh article, **Hugo Mercier** explores the relevance of reputation management – the portrayal of oneself as, e.g., competent and trustworthy – for

cultural evolution. Mercier argues that reputation management should be recognized as an important mechanism by both dual inheritance theory and cultural attraction theory. By working on their reputation as successful and prestigious, agents raise their chances of standing out as copy-worthy models for novices (dual inheritance theory). And by circulating reputation-enhancing messages with particular content, agents shape the pool of those cultural elements that others preferentially attend to and will further circulate in their interactions with one another (cultural attraction theory).

Finally, in the eighth article, **Ryan Nichols** provides some philosophy of science commentary on three theories of institutions. These are what he calls a cognitive psychological theory, an ecological theory, and a self-interested theory. Though each faces challenges, each is also *prima facie* plausible and worth further development. Taken as a whole, what emerges is that each of these theories seems to be targeted at a distinct *explanandum*, all within the context of understanding institutions.

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Conflict of Interest

The authors have no known conflicts of interest to disclose.

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