

What Does Disciplinary Structure Tell Us About Science?

The Case of Cultural Evolution

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Outline

1. What is cultural evolution?
2. Why is it structurally interesting?
3. How can we analyze it?
4. What might we learn?

The take-home: Cultural evolution offers an excellent test-case for understanding discipline structure and formation and its epistemic consequences

Collaborators



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Cultural Evolution

Resistance

However, attempts to apply the theory of evolution by natural selection to the origins of the diverse range of beliefs, knowledge, and artifacts that constitute human culture have met with great resistance... (Mesoudi et al. 2004, 1)

A Taxonomy

1. **historical** approaches: evolution can show us how human cognitive capacities (including the cultural) have been built
2. **selectionist** approaches: cultural items like ideas, techniques, or artistic styles have followed a “selection-like” competitive process
3. **kinetic** approaches: cultural patterns can be explained as a “population” effect arising from the aggregate behavior of individuals (like learning)

(see Lewens 2015, ch. 1)

Diverse Targets

Scanning the table of contents of Boyd and Richerson (2005) reveals cultural evolution as applied to (the evolution of) social learning, norms, ethnic markers, reciprocity and altruism, punishment, cooperation, and agriculture.

Diverse Targets

A survey sent to members of the Cultural Evolution Society (Brewer et al. 2017) picked out as important topics like pro-sociality, tribalism, cognition, and cultural transmission, and their applications in fields as diverse as economics, governance, policy-making, and conflict resolution.

The Structure of Cultural Evolution

Synthesis?

Another advantage of interdisciplinary synthesis is the explanation of what appear to be diverse cultural phenomena in terms of a handful of common underlying processes. [...] **Identifying common causes across these superficially diverse phenomena** might lead to their discovery in yet other cases, once researchers know what to look for. (Mesoudi 2011, 209)

Synthesis?

The most important topic for future study picked out
by the Cultural Evolution Society survey:

knowledge synthesis

Synthesis?

Some CE theorists, then: there either **actually is** an overarching theory in cultural evolution, which we can discover if we analyze it correctly, or there **should be** such a theory, which we should task ourselves with creating.

Synthesis?

Assuming that social and cultural phenomena can be reduced to the individual can be seen as **offering a distorted, rather than simplified, view of these phenomena**. Models and methods based on this ontological view are inadequate if in their aim to explain cultural change they highlight only certain, arguably minor, factors in societies and cultures, such as the transmission from one individual to another and individual-level cognitive biases. (Valković 2024, 293)

An Empirical Question

From a theoretical perspective, we see both **calls for synthesis** and **skepticism** about the possibility of such a synthesis.

This calls for empirical support: What is the current state of the field? Is cultural evolution playing a “synthesizing” role? If it is, what parts of its theoretical framework are doing so?

How Can We Study It?



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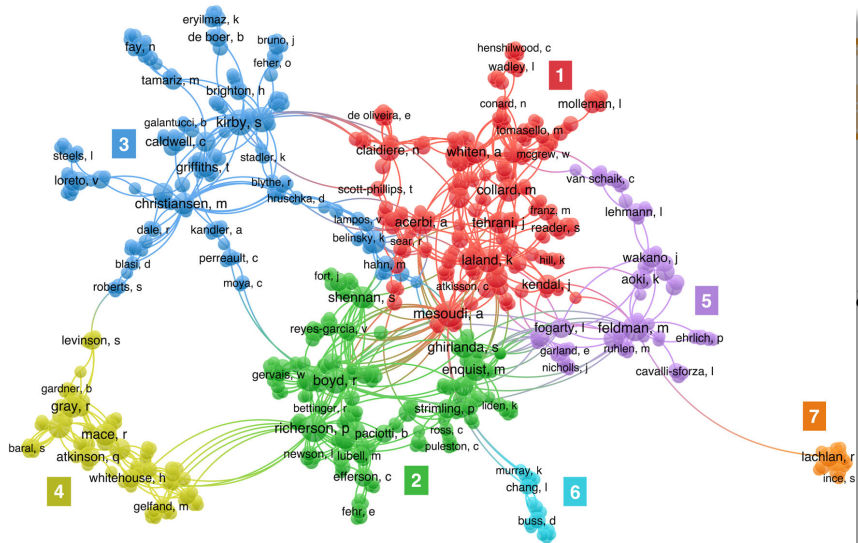
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OPEN

A bibliometric analysis of the interdisciplinary field of cultural evolution

Mason Youngblood ^{1,2} & David Lahti^{1,2}

ABSTRACT The science of cultural evolution is unified in its application of evolutionary logic to socially transmitted behavior, but diverse in methodologies and assumptions. Qualitative reviews have encouraged integration by illuminating points of divergence and fostering interaction. This effort would be greatly enhanced by quantitative data on patterns of collaboration and idea sharing in the literature. In the present study, we apply a novel



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Correction

ary field

Digital History and Philosophy of Science

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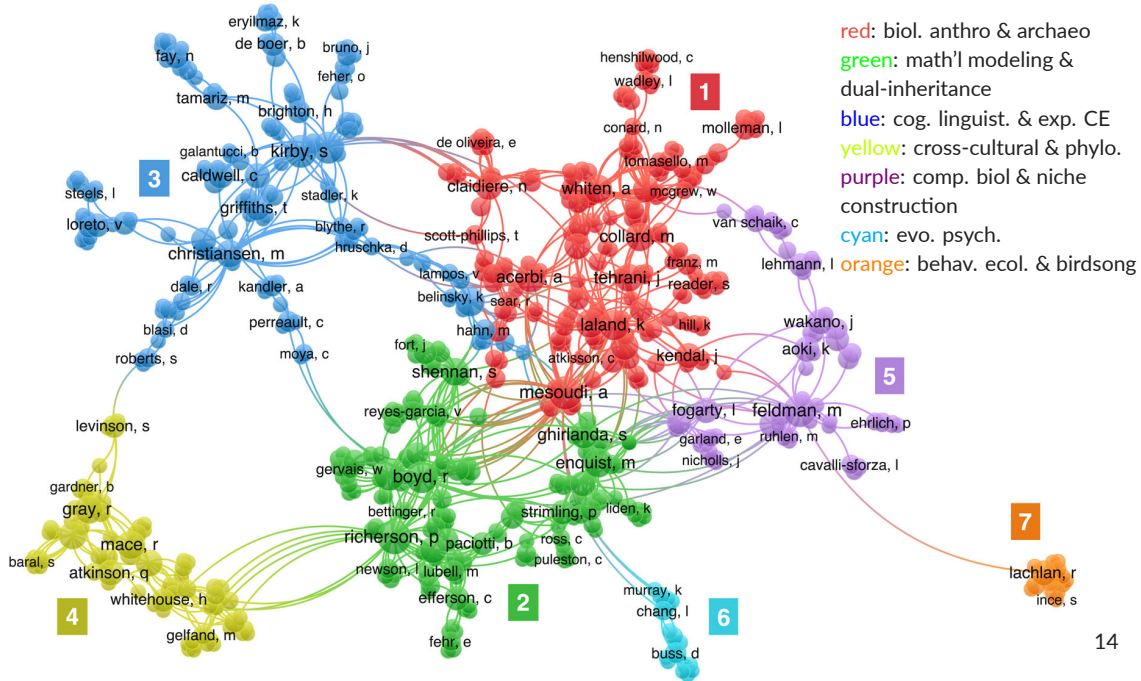
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Abstract

We explore here the potential advantages and disadvantages of digital analysis of texts for work in integrated HPS. The scope, completeness, reliability, and transparency of these kinds of approaches make them *prima facie* extremely useful for precisely the kinds of analytic questions that integrated HPS is concerned with. As an example, we explore the last forty years of development in the field of cultural evolution, paralleling and expanding upon an analysis performed by Youngblood and Lahti (2008). We consider the ways in which digital methods can shed light on the authors of papers in



Limitations

- Only the **collaboration network**, not the content of papers
- Limited selection criteria (only the phrase “cultural evolution”)
- No **underlying theory** of discipline structure

Initial Conclusions

1. The fragmentation of cultural evolution **is a real phenomenon**, at least in terms of collaboration.
2. If the “mathematical modeling and dual-inheritance theory” cluster is supposed to serve as the “unifying theory” for CE, this analysis **doesn't let us see that**.

Leveling Up

Let's take the limitations of Youngblood & Lahti's analysis, and systematically try to do better.

Theories of Discipline Structure

What kinds of **theoretical lens** could we offer in order to understand this kind of fragmented disciplinary structure?

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Let's consider three.

I. A Null Hypothesis

At least some disciplinary fragmentation will be driven by very general processes: **division of labor, specialization**, and the desire to make a name for oneself and **create an academic niche**

II. Panofsky on “Archipelagos”

Behavior genetics is fragmented and poorly institutionalized; its members struggle to secure material and symbolic resources and often experience status anxiety linked to their scientific identity, yet the field enjoys tremendous public attention. (Panofsky 2014, 32)

II. Panofsky on “Archipelagos”

Behavior genetics resembles less a soccer field and more an *archipelago*. Different behavior geneticists—residents of various islands—have multiple, competing attachments: to local identities, interests, and practices; to their disciplinary “mainlands” (psychology, psychiatry, genetics, neuroscience, and such); and to “behavior genetics” as a whole. (Panofsky 2014, 32–3)

III. Love on Erotetic Structure

What if we take seriously the idea that a field **doesn't need** a “unifying” theoretical framework to be a well-functioning field?

Alan Love argues this is the case for developmental biology: it instead has an **erotetic structure**, driven by its **research questions**.

III. Love on Erotetic Structure

Developmental biology is organized by “broad clusters of questions that reflect generally delineated phenomena whose explanatory characterization sets the agenda of research” (Love 2014, 41).

III. Love on Erotetic Structure

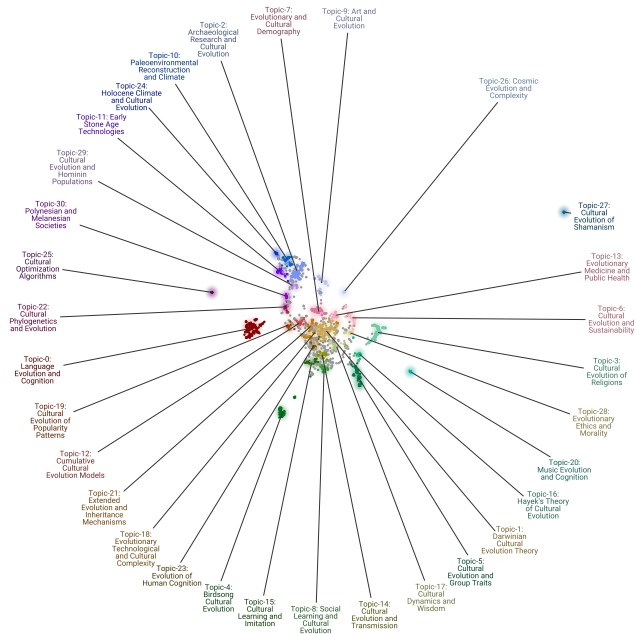
Knowledge and inquiry in developmental biology are intricately organized, just **not by a central theory or group of models**, and this erotetic organization is epistemologically accessible to the participating scientists. (Love 2014, 43)

New Literature Analysis

We've built two larger corpora – one (more-or-less) reproducing Y&L, and one moving well beyond it – to try to expand and improve upon their analysis of the field.

And we can analyze the **content** and **citations** in this corpus, in addition to authorship and collaboration.

What Can We Learn?

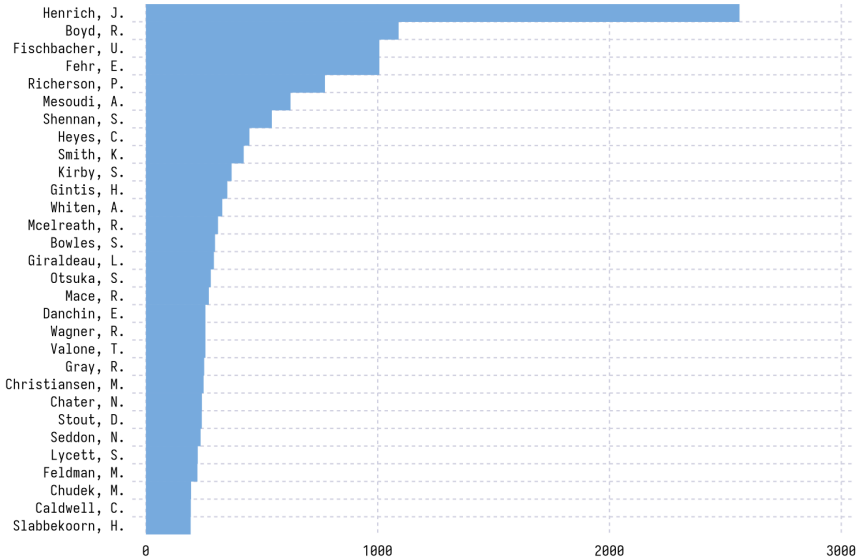


Some Content Results

There *does* seem to be a “core” here: it’s composed of topics like “Darwinian Cultural Evolution Theory,” “Extended Evolution and Inheritance Mechanisms,” and “Social Learning and Cultural Evolution.”

But there *also* seems to be quite a few “islands”: research on shamanism, on language, on birdsong, and perhaps most troublingly for fans of synthesis, a **large island** containing almost all of archaeology and biological anthropology.

Author



Number of citations

Some Citation Results

There are a number of complex effects that we need to disentangle here – most importantly, the impact of **highly prestigious journals**. Authors #3 and #4 in the list only wrote two articles each. But those articles were in *Nature*...

Moving Forward

There are three levels here: the **structure of the literature** in cultural evolution, the **disciplinary or social structure** of the field, and the **epistemic structure** of the theory itself.

Can we approach all three of those questions at once? Can we study how they mutually inform one another?

Moving Forward

A first target (in progress): Let's see if the three theories of disciplinary structure we saw above have **testable consequences** for the the structure of the literature.

Related targets: How has this structure changed over time? If there is a **push toward unification**, we might expect the field to become **more** tightly linked to the “central island” with time, or to rely more heavily on “anchoring” theoretical citations.

Moving Forward

Longer-term questions: What kinds of links exist between first-order claims about the theory of CE (i.e., different ways of understanding cultural evolutionary processes) and the structure that they would entail for the discipline itself?

Following Love, how does the training or textbook tradition in CE reflect the structure of the field that we detect empirically?

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