Historical Contingency: A Special Issue on Epistemic & Non-Epistemic Values in Historical Sciences

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Historical contingency has been a central theme of much recent work in the philosophy of historical science. This includes a rich and interdisciplinary literature on the role and nature of contingency in sciences like evolutionary biology, paleontology, geology, ecology, astrobiology, and more. Philosophers have approached the shared historical character of these sciences through mostly metaphysical and epistemic questions about the nature of life's past, trends and determinism, the presence (or absence) of directionality, the fragility and causal dependence of events, and the success and nature of narrative explanations in these contexts. Much of this work has centered around a particular controversy about the nature of life's history.

Contingency as a feature of historical analysis in much of this work derives from Stephen Jay Gould's characterization of evolutionary history. In that treatise, Gould analyzed work concerning the fossils of the Burgess Shale, a quarry that houses some of the earliest fossils from the Cambrian period over 500 million years ago. He asked: if we were to replay the tape of life, would outcomes be largely the same or vastly different? The Burgess shale fossils included a striking variety of animal body plans, and Gould wondered how differently the world today might look if most of the animals today had descended from one

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or more of the stranger Burgess creatures. He speculated that each evolutionary replay would differ widely from current history, and argued that human existence, for example, was a lucky happenstance dependent on the intricacies of past trajectories that could not have been predicted from the outset. There was strong dissent to follow from Simon Conway Morris, a paleontologist who argues that evolution's repeatable nature made the existence of, for example, complex intelligence highly likely – evolution is largely constrained and converges on outcomes that tend to repeat across phylogenies despite various historical paths and starting points. The Gould-Conway Morris controversy developed over disputes concerning the nature of life's history and the inevitability and predictability of historical outcomes.

There has been much scientific work to test the significance of contingency in both natural and laboratory experiments. However, philosophers have mainly focused on characterizing the nature of contingency and history's metaphysical structure. Gould also suggested a connection between historical

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contingency and narrative explanation, and philosophers in the meantime have worked to understand this connection.\(^5\)

This philosophical and scientific work has raised questions of the following form:

– What are the different meanings of ‘historical contingency’?

– How is contingency related to narrative styles of explanation?

– How, in practice, can scientists investigate questions about contingency, using modeling, comparative methods, experimental techniques, or other approaches?

– What would count as evidence for (or against) the claim that history is contingent?

– If history is contingent, what makes it so? What are the sources of contingency?

– If history is contingent, what are the consequences of contingency?

– How is historical contingency related to other issues in evolutionary theory, such as the importance of natural selection, or the prevalence of passive trends at larger scales?

These questions weave together in complicated ways. For example, Beatty distinguished different senses of contingency in Gould’s work, namely, historical contingency or contingency upon initial conditions compared to contingency per se.\(^6\) Beatty noted that this distinction tracks two different versions of Gould’s thought experiment: at times, Gould imagines rewinding the tape of history to some point in the past, tweaking some upstream variable, and then playing the tape forward again. Sometimes, though, Gould imagines replaying the tape multiple times from the same initial conditions. The second sense of “contingency” – contingency per se – connects with Gould’s discussions of unpredictability, since it suggests that downstream outcomes could not be predicted from initial conditions. Subsequently, other philosophers pointed out that historical contingency involves both dependency on initial conditions and intricate path dependencies that affect the probability distributions of outcomes moving forward in time.\(^7\)

Exploration of contingency’s different meanings has drawn attention to the metaphysical nature of life’s history and its relationship with explanation: Why do narrative explanations


\(^{6}\) Beatty, “Replaying Life’s Tape”.

\(^{7}\) Desjardins, “Historicity and Experimental Evolution.”
carry so much explanatory power? Do we need to make a metaphysical bet on (in)determinism in order to account for their use? Beyond metaphysical questions, the nature of evidence for the claim that life’s history is contingent has been controversial to say the least.

Such focus on contingency can be contrasted against views that emphasize repeatability, inevitability, predictability, and directedness concerning how historical explanations are structured in life sciences that center on analyses of the past. Conway Morris has even outlined the metaphysical consequences of his catalog of convergences for the meaning of evolution through a theistic lens.\(^8\) There has been frustration over the tit-for-tat nature of the contingency versus convergence debate expressed by Jonathan Losos in a 2017 Darwin lecture.\(^9\) Despite his call to stop making lists of convergences and evolutionary one-offs during the lecture, the question-and-answer period was consumed by proposed cases of convergences. His 2017 book *Improbable Destinies* characterizes the debate as sometimes misguided with assumptions concerning the exclusive nature of repeated emergences of similar traits and the role of chance-driven differences.\(^10\)

Because many philosophers think that engagement with the above questions about contingency is one of the things that makes historical science *historical*, and thus a common feature among various life sciences, literature in the philosophy of science frequently engages with and mirrors issues in the philosophy of history. Such issues include how contingency undermines the prospect of exceptionless laws, causal relationships among series of events, scale of analysis (i.e. micro versus macro evolutionary scales), probability of outcomes, and categorizing trends and conditions for contingent history.

In recent years, however, philosophers of science have given more and more attention to questions about how non-epistemic (ethical, social, political, aesthetic) values figure in the practice of science. To give one example, Caitlin Wylie emphasizes the role of aesthetic values in fossil preparation.\(^11\) In other recent contributions, Derek Turner and Adrian Currie explore the role(s) of aesthetic values in historical science more generally.\(^12\) Joyce Havstad shows

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8 Conway Morris, *Life’s Solution*.
how ethical and conservation values come into play in collection practice. Havstad has also explored the ways in which inductive risk can become an issue in the reconstruction of human evolutionary history. Historians of science have recognized the larger social and political dimensions of Gould’s work specifically, which is especially relevant for framing investigations of values in the historical sciences.

Philosophers of historical science are just beginning to engage in this larger discussion of values in science. The logical empiricists bequeathed a picture of science as committed to the value-free ideal. Reichenbach’s 1938 distinction between the contexts of discovery and justification seemed to relegate non-epistemic values to playing a merely psychological or historical role in the process of generating hypotheses and theories. Kuhn’s historical turn in 1962 revealed the role of subjective aspects of application concerning theoretical or epistemic virtues, which opened the door for subjectivity (both individual and community) in the basis of theory choice. The late 1970s well into the 1980s included the emergence of social studies of science, in particular the ‘strong program’ in the sociology of scientific knowledge (SSK) challenging the autonomy of a value-free realm of rational content of science set as an ideal against which other cognitive activities should be assessed. In addition, the empirical laboratory studies contributed to the picture of science as socially-constructed.

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Feminist interventions in philosophy of science explored the consequences of these approaches and argued for the role of values as permeating the very content of science. Non-epistemic (i.e., moral, political, social, cultural) values were shown to permeate contexts of scientific reasoning meant to involve epistemic factors for assessing theories and hypotheses (i.e., accuracy, simplicity, and so forth). Heather Douglas showed how a better understanding of the scientific process replaced Reichenbach’s contexts of discovery and justification. Instead ‘value-free’ meant internal reasoning processes concerning evidence, observations, data characterization, etc. should remain free of non-epistemic values that might be involved in the ‘external’ parts of science, such as project choice, funding avenues, etc. Douglas demonstrated how non-epistemic factors are integral in cases where there is uncertainty and a chance of error in three internal stages of science (e.g., methodological choices, gathering/characterizing data, and data interpretation). There have been challenges to the epistemic/non-epistemic distinction though. For example, Longino maintained that a more appropriate distinction is (1) contextual values that refer to preferences concerning personal, social, and cultural values as belonging to the social and cultural contexts in which science is done, and (2) constitutive values as ones that govern acceptable scientific practice and method. Phyllis Rooney was also skeptical that drawing a sharp distinction between epistemic and non-epistemic values was useful.

The role of values has not yet been explicitly applied to investigations of the historical sciences. However, accessing and generating knowledge of the past has perhaps remained controversial precisely because of the role of values. We aim to start shining a spotlight on this, which we contend is a natural extension of historical sciences’ focus on the idiographic nature of unique patterns and trajectories, rather than always and only nomothetic principles.


This special issue features new and emerging work that draws connections between the literature on historicity and historical contingency and recent work on values in science. Our intent was to get clear about whether there is anything special about historical science when it comes to the role(s) that non-epistemic values play in scientific investigation.

And so, the papers in this special issue address various aspects of historical reconstruction. There are various places where non-epistemic values arise in considering not only their role in historical explanations, but also the value-laden consequences of analyzing history. For example, T.J. Perkins makes the case that if we wish to understand why certain scientific ideas succeed in gaining traction when they do, then we need to attend to the cultural readiness for those ideas. Using the reception of the Alvarez impact hypothesis in the 1980s as a case study, he argues that cultural readiness is heavily influenced by non-epistemic values. Helen Zhao discusses the warrant and legitimacy of counterfactual histories and defends their epistemic value, despite criticisms that often circulate around their speculative content. Alison McConwell explores how both George Simpson and Stephen Gould develop views about the social and political consequences of the life sciences. She argues that their different approaches converge into a larger program of resistance and social protection from misconstrued and illegitimate overreaches of the biological sciences around the Modern Synthesis.

Additionally, Rachell Powell and Irina Mikhalevich in “Wonderful Mind” discuss the socio-politically charged concepts of progressivism and anthropocentrism. They argue that there is no necessary link between progressivism and convergentism, and that convergentism is an indispensable component of battling anthropocentric assumptions concerning the mind and its evolution. Adrian Currie considers how epistemic access to the past as ‘metaphor-laden’ plays an integral role in accessing historical knowledge. That work challenges received views that values are somehow outside of or external to epistemic content. Eric Desjardins, Derek Oswick, and Craig Fox outline how control in experimental investigations is a non-epistemic value, and that its absence is what makes historical investigations significant. Specifically, by drawing from three case studies, they show how control cannot always be assumed to be the better methodological choice due to the epistemic access it prevents. Derek Turner and Ahmed Abohamad emphasize how non-epistemic values play a central role in the construction of narratives ultimately contributing to their explanatory force.

The suggestion that social, political, ethical, environmental, and aesthetic values shape our understanding of the past will not be news to philosophers of history. However, the papers in this issue all point to ways in which
non-epistemic and contextual values shape our understanding of the deeper geological and biological past. This may point to greater continuity between historiography of the recent (human) past and efforts to reconstruct deep time. The variety of different directions taken by the papers in this collection highlights the richness of the questions that open up when we begin thinking about non-epistemic values, historical contingency, and deep time. A number of cross-cutting themes emerge when the papers are studied jointly.

For example, one larger issue that emerges from this collection is the situatedness of historical science in particular historical-cultural contexts (see the papers by Perkins and McConwell). Another theme is that when we scratch beneath the surface of some traditional scientific notions that do not seem value-laden – notions such as control, or historical evidence – we actually do see some non-epistemic values in play (see the paper by Desjardins, Oswick, and Fox, as well as Currie’s paper in this collection). Still another emergent theme is that explorations of contingency and convergence in historical science often involve counterfactual comparisons, and those comparisons are also places where non-epistemic values come into play (see the papers by Zhao and Turner and AboHamad). Finally, larger questions about directionality and progress, and how those value-laden notions are related to questions about contingency and convergence, receive explicit treatment from Powell and Mikhalevich, but also crop up in some of the other contributions. In summary, this special issue draws from values at the intersection of historical, philosophical, and social scientific consequences of historical life sciences. The roles of non-epistemic values in this context have significance for broader societal concerns about the meaning(s) of life’s history, but also how values shape methodologies and epistemic processes in historical fields of science.