**Other Histories, Other Sciences**

, *Science as it could have been:*

*Discussing the contingency/inevitabilism problem*. University of Pittsburgh Press, Pittsburgh, 2015, pp. x+462,, Price US$ 61.95 hardback, ISBN 978-0822944454

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This volume is the first devoted to an intriguing, provocative, and complex set of philosophical and historical issues concerning the contingency of science. Although reflection on these issues is longstanding, shaped by the various ‘turns’ in twentieth-century philosophy of science – ‘linguistic’, ‘historical’, ‘sociological’, and ‘practical’ – and by a growing appreciation of social and material cultures that shape scientific enquiry. The terms of the modern form of the debate were set by someone whose own thinking was shaped by those ‘turns’—Ian Hacking (1999, 2000). The main positions are *contingentism* and *inevitabilism*, whose main point of contestation is whether the history of a particular scientific discipline could have (first) developed differently than it actually did and (second) still have been as non-trivially successful as what came to be actual science. These two broad claims are affirmed by a contingentist, but denied by the inevitabilist. Although these two positions, as they stand, open up a rich set of issues, they invite very different sorts of responses. For that reason, they urgently needed to be located within a broader and more systematic framework – one that is sensitive to the welter of philosophical, empirical, and historiographical issues they open up, and also capable of integrating them in suitably sophisticated ways. A great merit of this volume is that it provides the sophisticated framework that the contingency debate has needed. The editors and contributors are to be commended for presenting the fullness of the contingency debate so fully.

The richness of the contingency debate contrasts with its neglect within the philosophy of science. In her excellent introduction to the volume (which can also serve as a primer for the debate), Léna Soler diligently documents the ‘crucial but neglected’ topic of contingency (p.1).[[1]](#footnote-1) Crucial, because contingency raises a set of issues obviously related to very familiar debates, for instance concerning realism and pluralism, but also allows us to identify and explore issues that might otherwise be occluded. At a more local level, contingency is a powerful new source of insight and understanding on a wonderful range of topics, as the chapters variously attest. Contingency can be a source of many things: new ways to think about, and argue for or against, realism and antirealism or pluralism and monism; a supportive grounds for developing the practice and theory of counterfactual history; a new way to grasp the significance of the various dimensions of science; a resource for making explicit entrenched and often invisible assumptions and commitments; a way to connect philosophy of science with the philosophies of mathematics or of psychology, by seeing both how contingency might apply to other disciplines and how other philosophers might develop it—and more besides.

At its most portentous, the question of the contingency of science can, in Soler’s words, contribute to efforts to ‘foster a profound change of spirit regarding science’, and enable deeper reflection on ‘our scientifically based form of life’ (p.42). It was not inevitable that ours would become a culture with a deep confidence in science, nor is it obvious that this confidence will continue. After all, that confidence has always been challenged and continues to be so today. It is a testament to the contributors to and editors of this volume that all of these rich possibilities are explored and addressed. Readers will naturally—dare one say inevitably—dispute or disagree with the arguments and claims made, but that is exactly what this volume is intended to encourage and facilitate.

**The contingency debate**

There are different ways to think about the contingency debate, starting with Soler’s distinction between the *objects* and *strength* of contingency claims—the ‘what’ and ‘how-much’ questions, as she dubs them. Various things can be judged contingent, and the book offers many, many potential objects, including, but not limited to, particular concepts, theories, results, methods, experimental techniques, ontologies, disciplinary norms and structures, aims of enquiry, and wider social and material cultures (p.8).

The diversity of objects that can be subjects of contingency claims has three important implications. First, one needs different sorts of arguments for claims about the contingency of different sorts of objects—or, put another way, contingentist arguments will be more compelling, if more difficult to make, the more specifically they define their objects. Second, one can be contingentist about certain objects but inevitabilist about others. A contingentist might think that the end results of scientific enquiry are inevitable, but the particular paths by which one reaches them are highly contingent. (Incidentally, this is a use of geographical metaphors in the contingency debate: it would be interesting to see further work on how different metaphors can affect the ways that we can think about the contingency of science – following the lead of Trizio 2008, §1. After all, the ways that we do and can *think* about contingency might, themselves, be contingent in ways that could have non-trivial affects upon our philosophising.)

A third implication is that the degree of contingency or inevitability of a given object can be diachronically variable. The contingency or inevitability of an object can and often fluctuate over time in response to changing material, social, and epistemic conditions. As James T. Cushing (1994) argued in an important early book on contingency in the history of physics, the entrenchment of that Copenhagen interpretation of quantum mechanics was not inevitable, given its empirical equivalence with David Bohm’s alternative. But a complex series of contingent events – documented with skill by Cushing – eventually led to the hegemony of the Copenhagen interpretation (see Pessoa 2001).

The upshot is that many different things can be objects of contingency claims, to greater or lesser degrees that shift across their history, and this has implications for the methodology of the contingency debate. Some contributors to this volume elect to use quite specific case studies—like the case of what *counts* as ‘mathematics’ (chapter 11) or the disappearance of introspection as a method in psychology (chapter 12). Others explore – and usually defend – the use of counterfactual history, often with reference to the work of Greg Radick (2005, 2008) on counterfactual histories of biology. Indeed, such histories are enjoying something of a renaissance, with the emergence of such impressive recent studies as Peter Bowler’s (2013) *Darwin Deleted*, discussed by Kinzel (2016), and the engaging collection *Remarking the ‘West’* (Tetlock *et al* 2006).

Defending counterfactual history is important to contingentism for a couple of reasons. These include its roles in exposing hidden assumptions that might affect our thinking about the development of science (like an entrenched commitment to monism and inevitabilism) and its potential to sketch out what the alleged alternatives to actual science might be (see Kinzel 2016; Tambolo 2016). After all, those who are sceptical about contingentist talk often respond with what Hacking calls the ‘put-up-or-shut-up’ response: either make good on that talk by putting up plausible examples of the alternatives, or shut up about them (see Hacking 2000, p. 70; Kidd 2016; Trizio 2008, p.258). Soler offers a systematic rebuttal of the ‘put-up-or-shut-up’ response in chapter one – a persuasive one, in my judgment – and this is part of a wider ambition of this volume. This to change the terms of the contingency debate within philosophy of science, which many of the contributors argue is illegitimately skewed in favour of both monism and inevitabilism, whether explicitly as a commitment or, more commonly, as an implicit set of assumptions. Overcoming entrenched resistance to contingency requires an embrace of what Emiliano Trizio (chapter four and Trizio 2008) calls the ‘multiplicity thesis’: to accept that history could have led to stabilised projects of enquiry different from, incompatible with, but as successful as our own, such that a multiplicity of alternative scientific accounts of the subject matter are possible. Only if history could have gone other ways – and gone well – could contingentist claims about other sciences be taken seriously. Developing these claims about the conjunction of contingentist and multiplicity theses opens up a difficult set of issues, of course, about the definition of *success* and *equivalence* and the *decidability* of specific claims and the messy relationships between the historiographical, epistemological, and metaphysical issues at work in all of these worries.

A main locus of these complex and difficulty issues is, of course, the relationships that can and should obtain between contingentism and inevitabilism and realism and antirealism. It is well established within this debate that the natural pairing of ‘contingentism-antirealism’ and of ‘inevitabilism-realism’ is, as Soler (p.15) nicely puts it, ‘conceptually most comfortable and empirically most frequent’. But other pairings are possible, even if they might seem exotic, peculiar, or otherwise difficult to reconcile with our inherited epistemic sensibilities. It is at this point that the idea of *deep contingency* comes into play. It is not only science—defined as broadly as one likes—that is subject to historical contingency, but also a much wider set of assumptions and convictions, of a sort that will fundamentally shape the sorts of epistemic enterprises that come to seem intelligible and compelling for the members of a given culture. Much of this volume focuses on micro-contingencies within the sciences that have developed, but there is also the question of the macro-contingency of those sciences and of the whole scientific enterprise itself. Science is, after all, historically peculiar, and some of the most egregious forms of inevitabilism and triumphalism take the form of the insistence that the emergence of science is a *sine qua non* of a developed culture. But even if an imperative to develop accounts of the nature of reality are parts of human nature, the inevitable development of accounts that are recognisable as scientific, in our terms, is far from obvious. These sorts of claims about the deep contingency of science are not well developed within the mainstream of the philosophy of science, with a few honourable exceptions, including the later writings of Paul Feyerabend (1999). A central theme of his *Conquest of Abundance* is, at least on some readings, that there are many ways of experiencing and engaging with the world that human beings have developed over time, and that ‘science’ represents only some of these. Such ‘abundance’ is, however, explored according to the historical and cultural contingencies that shape the interests and concerns of different cultures and their projects of enquiry (see Kidd 2017).

The idea of deep contingency is liable to take the contingency debate into much deeper waters. This volume wisely confines itself to a set of epistemological and historiographical issues of a sort liable to attract the interests of philosophers, historians, and sociologists of science. Certainly there is something here for most of those engaged in science studies, including a mix of old and familiar and hot and trendy topics (realism and pluralism, for instance) and a variety of sciences and disciplines (physics, psychology, mathematics) and many different claims and concerns (counterfactual history, material culture, ontology) and more besides. As such, it succeeds admirably in its aims of showing how and why the contingency debate connects to many established and emerging debates, while also emphasising the new and original issues that reflection on the contingency of science can offer. There are a few topics that contingency surely relates to but which are not addressed in this book, including some, like the problem of unconceived alternatives, that are gestured to in footnotes. But that is not a serious problem. This is a very rich volume and if the contributors and editors are right about the ways that science at large is shaped by contingency, then we should expect many more volumes like this into the future. Those interested in exploring the widening and deepening ramifications of the contingencies in and of science should welcome this book as a wonderful guide and inspiration.

**Contingency and science in ‘Continental’, feminist, and postcolonial thought**

This volume is mainly aimed at historians, philosophers, and sociologists of science who are interested in the various issues posed by questions of contingencies and inevitabilities in the sciences. But there are other areas of philosophy with a sustained interest in those issues, and distinctive ways of thinking about them, which also bear mention.

The two that stand out, at least in my judgement, are (first) certain currents in twentieth-century German and Austrian philosophy and (second) certain currents in feminist and postcolonial science studies of the last forty or so years. In both cases, one finds systematic reflections on the emergence and development and authority of (aspects of) the scientific enterprise, of a sort that incorporate a strong if often latent sensitivity to its historical and cultural contingencies. Within these traditions, there is much that those of us interested in contingency can draw upon, including new methods, concerns, and intellectual contexts.

Sensitivity to the historical contingency of the sciences is deeply rooted within what we might very broadly call ‘continental European’ philosophy. Its deepest roots arguably lie in Michel de Montaigne and his realisation of the role of accidents of history and culture—wars, political climates, social and religious developments—in shaping the intellectual interests, projects and ambitions of a tradition. The path of enquiry could have turned in other directions, including the more epistemically modest one urged by those humanists, like himself, sensitive to the ‘vanity of learning’.

Such epistemic modesty was defeated, as it turned out, by the soon-to-be-regnant confidence in science that sprung up soon after, but it recurs again in the writings of the 17th century French Enlightenment *philosophes*. A striking feature of their writings is a sense of the historical contingency of science, related to their larger sense that the way that history and culture have gone has prevented what later came to be called Enlightenment. Voltaire saw that cosmological theorising is shaped by the contingency of cultural location– vacuums for English physicists, plenums for their French rivals. Diderot and d’Alembert went further, arguing that the contingencies of culture affect not only the particular theories a community can pursue, but also the fundamental possibility of scientific enquiry. Their praise of Bacon was not only for his contributions to methodology, but for successfully transforming the ‘dominant taste of his century’ and in the process the ‘depths of dark night’ of scholasticism that had ‘emasculated the sciences’ in England (in Kramnick, 1995, pp.55, 8, 10-11). Although none of these philosophers *theorised* contingency in science, they were alert to it and they clearly perceived how scientific theories, practices, and sensibilities were shaped by non-inevitable historical, social, and religious developments.

A more fully matured sense of contingency only comes much later in the history of philosophy, most obviously in the writings of Michel Foucault on the human sciences. But let me focus on two later figures, namely, Edmund Husserl (1970) and Martin Heidegger (1977), in their respective ‘later’ periods. In writings like *Crisis of the European Sciences* and *The Question concerning Technology*, one finds a set of claims about the contingencies of, respectively, ‘post-Galilean science’ and the distinctive ‘way of revealing’ the world—which Heidegger dubs ‘technology’—that underlies modern science. These claims are complex and need careful and critical exegesis, but they share two crucial features. First, they explicitly emphasise the deep contingency of (certain features of) the modern sciences, such as its supporting ‘life-world’ (*Lebenswelt*) or ‘way of revealing’ the world. Second, they use this sense of contingency to reflect philosophically on the epistemological status and cultural authority of those sciences.

Although there is some discussion of Heidegger and Husserl in this volume—in chapters eleven and twelve, respectively—this is of their remarks on mathematics and psychology specifically, rather than deep contingency more generally. So far, the only writer to develop a contingentist position using their ideas is David E. Cooper (2002, ch.8). A useful job for future scholars would be to explore the potential contributions of Heidegger and Husserl’s later works to the contingency debate. (A good starting place would be Hyder and Rheinberger 2010 and Glazebrook 2012, respectively).

The second place to look for philosophical reflection on the contingency of science is within the broad and rich area of feminist and postcolonial science studies. Questions about contingency are often motivated not only by curiosity about how else things might have been, but also a more urgent sense that the way things are currently is problematic and in need of reform. The opening sentence of Evelyn Fox Keller and Helen Longino’s collection, *Feminism and Science*, is that the ‘natural sciences have assumed a position of unparalleled authority in twentieth-century Western intellectual life’ (Fox Keller and Longino 1996, p.1). But those sciences (in the forms we have inherited them) might *not* have assumed that authority (in the ways that they have) and certain of our philosophies of science (as they have developed) may have disguised this fact from us (see Potter, 2006, Introduction). Taken together, a sense of the contingency of our ways of organising, practising, and understanding science are but one set among possible others. Moreover, the ways we have inherited are demonstrably not good ways for a variety of ethical and epistemic reasons.

More importantly, a sense that (some aspect of) science is contingent is likely to be strong among those groups and communities with legitimate reasons to be critical of those (aspects of) science, whether on moral, epistemic, practical, or other grounds. In the last fifty or so years, an obvious set of groups that fit that description are feminist and postcolonial science studies scholars. A main theme of feminist philosophy of science is, as Alison Wylie (2000) puts it, to identify and evaluate the ways that ‘contingency and constraint’ have functioned in the development of science. The critical concerns of these scholars lie, roughly, at two levels. Within science, there is the realisation that concepts, theories, and practices of various sciences can and do both reflect and perpetuate various gendered and racialized biases – ones contingently inherited from wider society, that have directed and deformed enquiry in various ways, and that ought to be nullified or corrected for in a way that would result in very different projects of enquiry. Beyond science, feminist and postcolonial critics document the many ways that science – construed at the level of a cognitively and culturally authoritative institution – has contributed to the marginalisation of women, minoritised ethnic and racial groups, aboriginal peoples, and non-human animals and natural environments (see Harding 2011). If history had gone in less discriminatory and less oppressive ways, then science would have been very different.

Shared in common with feminist and postcolonial science studies scholars is not only a descriptive claim about the other ways that sciences could have developed, but also the hope that the sciences could still be redeveloped in alternative ways. Contingency resonates with pluralism and, for many people, the fruits of pluralism are not only epistemic enrichment – as Hasok Chang argues in his contribution to the book —but also an extension of rights and opportunities and possibilities to the groups that are non-privileged due to the contingencies of our sexist and racist and non-ideal cultural history. A compelling example of a vision that uses a sense of the contingency of the scientific enterprise as it has come to be to promote epistemically and culturally emancipatory projects is the work of Sandra Harding.

In books like *Sciences From Below*, Harding has called for ‘realistic assessments of both Western and non-Western knowledge systems’ and their supporting social worlds (Harding, 2008, pp.5-6). This means appreciating not only the deleterious effects of both the sciences and technologies of the Global North, but also their particularity and contingency. Although Harding does not make contingency a central theme, it is clearly there in her insistence that there were and to a degree still are ‘sciences from below’ that never got to be developed for contingent reasons. Such themes are repeated by other scholars who are alert to the ways that our current scientific systems and institutions either disadvantage certain groups or have been contingently transformed by those with insidious motives – ‘doubter-mongers’ keen to suppress certain areas of enquiry, say, or military and corporate interests who promote certain theories, interpretations, and disciplines at the expense of others (see Proctor and Schiebinger 2008). A theme absent from this volume is the fact that contingency is often deliberately created and deployed by those who are concerned to interfere with the course of enquiry. Contingency may be a natural feature of enquiry, but it can also be created and induced by those with suspect motives. That which is contingency could be otherwise – and many groups have financial, political, or ideological interests in trying to ensure that certain areas of science (like climate science) develop in less robust ways. If contingency implies vulnerability, then that can mean *opportunity*.

It is clear that placing contingency within the much larger contexts indicated by these ‘continental’, feminist, and postcolonial thinkers will add further complexity to the debate. Alongside realism and pluralism there is scope for thinking about contingency in relation to moral and social issues concerning gender and race and, if one follows Husserl and Heidegger, into heady talk of radical cultural critique—of the ‘crisis of European sciences’ and the ‘oblivion of Being’. Such talk might be too much for many philosophers of science, of course, but it does underscore the deep truth in Soler’s proposal that philosophical reflection on contingency can at its most ambitious contribute to ‘a profound change of spirit regarding science’ and our form of life. Wittgenstein – another ‘Continental’ alert to the contingency of science – once remarked that the ‘spirit’ that underlies our ‘age of science and technology’ could radically change in ways that we cannot anticipate (1980, p.6; see Cooper 2017). This is yet another example of uses of a sense of contingency to challenge the ways that science has reflected and fuelled various objectionable ‘isms’ – scientism, sexism, racism.

This volume offers rich resources for those who wish to explore, defend, or challenge that ambition. The peculiar absence of contingency from so much philosophical reflection on science was surely a contingent feature of our history – one so obviously influenced by a monist regime structurally hostile to contingentism and by a slow uptake of feminist and postcolonial insights and by a distancing from continental European reflections on the deep contingency of science. *Science as It Could Have Been* is a powerful defence of the contingency of our science but also – perhaps more importantly – of our ways of thinking philosophically about it. if the history of science could have gone differently, then so, too, could the history of the philosophy of science.

A last thought about contingency and science. I am writing these words two days after Donald Trump was elected President of the United States. That was not an inevitable event but it does create a web of new contingencies. Within science, many things are now uncertain—funding for climate science might be cut off, environmental scientists might face gagging if they contribute their expert perspectives to debates about energy policy, political and public respect for the cognitive authority of science might be more radically eroded. This is an unwelcome dimension to the contingency debate. Science could have been different. It might still become very different—and different can mean *better*, or it can mean *worse*. What is needed now is robust, careful debate about the sorts of values and concerns that our science ought to incorporate—and which it ought to guard itself against (see Fehr and Plaisance 2010). Philosophers of science are well-placed to take active roles in that debate and to help us to understand and respond positively to the contingencies of science in a hostile time. This book comes at the right time to help us to do that.

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1. All references are to this work unless otherwise indicated. [↑](#footnote-ref-1)