Introduction

Styles of thinking: The special issue

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The term ‘Styles of Scientific Thinking’ has its origin in the work of the historian Alistair Crombie. Styles are in his writings part of a grand narrative of Western science stretching back to the Ancient Greeks right through to our contemporary science. Crombie’s ideas are presented in an imposing three volume work published in 1994 with the equally imposing title Styles of Scientific Thinking in the European Tradition: The History of Argument and Explanation Especially in the Mathematical and Biomedical Sciences and Arts. But long before the publication of those weighty volumes many philosophers and historians of science had become very familiar with the idea of styles of thinking through the writings of Ian Hacking; and it is Hacking’s work on styles of thinking that was the inspiration for this special issue.

Most of the papers that appear here (James Elwick’s and Otavio Bueno’s are the exceptions) were first presented at a workshop in Cape Town in March 2011. The aim of that workshop and indeed this special issue was to investigate and clarify the concept of styles of thinking; in particular, the kinds of philosophical uses the idea might have. Although the term ‘styles of thinking’ has been made familiar by Hacking and adopted by many others, it is fair to say that a systematic treatment of the idea and its philosophical importance has been lacking. Hacking has published on the idea sporadically (about once every ten years, as he says) and criticism and critical elaboration of the idea has also been infrequent.1 This issue is an attempt to make up for that lack. All of the contributors are engaged in the project, in one way or another, of trying to make sense of styles of thinking and their import. They offer a great variety of views and criticisms. The reader can get some sense of that diversity by considering some of the themes discussed in these papers: included are discussions of relativism, pluralism, realism and anti-realism debates, modelling, “big picture” histories of science, art history and philosophical anthropology to name but a few.

Clearly such diversity suggests something about the richness of the idea of styles of thinking but it gives someone writing an introduction on such a topic something of a problem. I’ll begin by giving a very brief sketch of Hacking’s published ideas on styles and some of the key philosophical ideas that emerge. I will then very briefly outline the content of each of the seven papers. I end with some brief remarks about the future of research on the concept of styles.

1. Some background

Let me begin with a terminological stipulation. Hacking’s first published articles on the topic of styles (Hacking, 1982, 1992) use the term “Styles of scientific reasoning” rather than “thinking” since “thinking is too much in the head for my liking. Reasoning is done in public as well as in private: by thinking..., talking and arguing and showing.” (Hacking, 2002, p. 182). Subsequent publications have multiplied the terminology: we have been offered styles of thinking and doing; styles of thinking and doing in the European Tradition and “genres of thought”. To avoid any confusion, in this introduction I will talk throughout about styles of thinking and sometimes more generally of the styles project.

Styles of thinking are, put most simply, ways of finding out about our world. Hacking follows Crombie in identifying six styles of scientific thought which emerge at different times in the history of Western science. They are:

1. The mathematical style
2. The hypothetical modelling style
3. The experimental style
4. The statistical style
5. The classificatory style
6. The historico-genetic style2

1 It is telling, I think, that the most systematic critical survey of the idea of styles of thinking, Kusch (2010), makes use of a great deal of unpublished material by Hacking. This is an idea which has yet to get a fully worked out treatment satisfactory to Hacking. Perhaps Hacking (2009) comes closer than any previous account.

2 Hacking prefers subtly different names to Crombie. Some contributors, eg. Winther, to this volume prefer to use Crombie’s labels.
Hacking has at times suggested that new styles emerge from the marriage of two or more on this list and that some of Crombie’s original six might be further subdivided. For example, the experimental and the modelling style are combined into what Hacking (1992) has called the laboratory style. In mathematics, as well as the Greek style of mathematics centred on proof, we have the algorithmic style with its origin in the Medieval Islamic world (Hacking, 2009). Many who have taken a fancy to the label “styles of thinking” or “style of reasoning” have suggested more radical variations. Arnold Davidson (2001) has suggested that there is a psychiatric style of reasoning and one of the contributors to this special issue, James Elwick (2007), has written about specific styles of reasoning employed by 19th Century British naturalists, biologists, and medical scientists.

In this special issue most of the authors accept the basic template of six with which Hacking and Crombie both begin their respective projects. So I shall concentrate on elaborating a little some of the ideas specifically behind this conception of a style of thinking.

Although according to Hacking (1992) there are no necessary and sufficient conditions for something to be style, certain key features can be picked out. Each style brings with it new objects, new kinds of sentences and new methods of reasoning. For example with the mathematical style come new abstract mathematical objects, a new method of proof and new kinds of sentences expressing axioms and theorems. With the experimental and modelling styles come unobservable entities, new procedures for verifying empirical hypotheses and constructing mathematical models of physical systems and new sentences expressing these ideas and so on. Hacking attaches a positivist gloss to his claim about new empirical hypotheses and constructing mathematical models of styles come unobservable entities, new procedures for verifying objects, and sufficient conditions for something to be a style. It is not that first we have the style and then these objects, methods and sentences. These elements are part of the style itself.

One very important difference between Hacking and Crombie is that Hacking, unlike Crombie, emphasises discontinuities in the development of styles. At certain points in history styles crystallize. That is to say, there is “a fixing of how to go on in the future, usually after centuries, perhaps millennia, of inchoate precursors” (Hacking, 2009, p. 14).

In his most recent published work Hacking (2009) has further elaborated the idea of styles by drawing on the work of Bernhard Williams. Williams (2002) draws an important distinction between truth which is timeless and truthfulness which has a history. Following Williams, Hacking now tells us that styles of thinking are in part the history of the development of new ways to be truthful and that these new ways of being truthful find coherent expression at particular points in history.

These thoughts find neat expression in the following schema. Each style involves:

\[ (\star) \text{A shift in conceptions of what it is to tell the truth about X.} \]
\[ (\star\star) \text{This significant change took place in the Y century, and its emblem is Z.} \]

So fleshing this out for the mathematical style for example we get this:

\[ (\star) \text{A shift in conceptions of what it is to tell the truth about geometrical objects.} \]
\[ (\star\star) \text{This significant change took place early in the sixth century B.C.E., and its emblem is Thales.} (\text{Hacking, 2009, pp. 104).} \]

Two further key and controversial ideas in Hacking’s presentation are his claims that styles are autonomous and self-authenticating. Styles are autonomous in the sense that although they first arise in particular cultures and environments (say Ancient Greece with the mathematical style) they are not hostage to those origins. Styles can and do function in very different social and cultural contexts after they crystallize. By the term ‘self-authenticating’ Hacking means that “sentences of the relevant [style-dependent] kinds are candidates for truth or for falsehood only when a style of [thinking] makes them so.” (Hacking, 2002, p. 191) So styles do not need support or justification from some style-independent reasons.

2. The papers

With this quick summary of the very idea of a style of thinking in place, we can turn now to consider briefly the individual contributions to this volume. Many people have been drawn to Hacking’s work on styles because he has presented it as away of bringing history and philosophy of science together or perhaps more accurately of using the history of science in the service of philosophical goals. But it is clear in Hacking’s own contribution to the special issue that the history of science is just one source among many for illuminating the idea of a style of thinking. Hacking tells us in this paper that the styles project takes equal inspiration from “Anthropology, sociology, and cognitive science, especially of the more speculative sort.” The philosophical work styles do for Hacking is something he has called variously in other works “philosophical anthropology” or “philosophical technology” and here “historical ecology”. What we are here being shown is philosophy on the grand scale. The aim is no less than to understand Man and his place in nature or at least Western scientific humans and their relation to their environment and culture. Anyone who wishes to know how Hacking’s conception of scientific styles has evolved over the last thirty years, and the layers of complexity it has taken on, will learn much from the first paper in the special issue.

The next three papers in this volume all try to make some broader sense of what styles of thinking are and what uses historians and philosophers can make of them. Chunglin Kwa’s paper reflects on the very word ‘style’. He traces the concept from its home in art history, focussing especially on the work of Alois Rieg! at the end of the 19th Century. Kwa draws out a number of important themes from Rieg!’s work; in particular a focus on the “collectivities” which sustain each style. These “collectivities” include not just the practitioners of a particular style but also the public who receives its products. Furthermore there is an ethical dimension to each style; styles embody particular values, not reducible to cognitive states. Kwa suggests in the closing paragraphs how these broad ideas can be used to illuminate each of the six scientific styles of thought listed above.

James Elwick’s paper asks the question: what use is the concept of “styles of thinking” to an historian of science. Elwick argues that the key idea of the styles project (and indeed in much of Hacking’s work) is that it provides an account of the conditions of the possibility for the emergence of certain concrete scientific ideas, practices and institutions. For example the statistical style made possible statistical mechanics, randomized controlled trials and the national statistical agency. This leads naturally to a stratigraphic metaphor in which layers of different ‘deeper’ or ‘higher’ conditions make possible the emergence of other less abstract conditions and the concrete events, institutions and theories which are the primary locus of the historians’ interest. Elwick shows how this

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1 Bueno’s contribution is the one real exception.
2 Indeed some remarks of Hacking suggest this is not even in principle possible.
same metaphor plays a role in number of other thinkers’ work and ends by suggesting how it may be useful for the historian to think with this metaphor explicitly in mind. Specifically Elwrick contends that concentrating on the conditions of possibility rather than the causes of the phenomena they are interested in (as historians normally do) will aid historians in three ways: it can help them get a firmer understanding of the much abused word ‘context’ and its nuances; it opens up a new way to think about counterfactual histories; and it provides some of the necessary background for writing big, ambitious history of science since it provides an important tool for comparative histories.

Rasmus Winther’s contribution seeks to understand the connection between Hacking’s styles of thinking and two other important ideas in current philosophy of science—Kuhnian paradigms and scientific modelling. Winther first suggests that we may think of these categories for analysing scientific practice as hierarchically organised. Many models are nested within scientific paradigms and paradigms are in turn nested within particular styles of thinking. For example standard models of pendulum motion are nested within the Newtonian paradigm which is in turn nested within the hypothetical modelling style. However, Winther shows that this understanding is simplistic. Using systematics as a case study, he argues that there is an interweaving of these categories and more importantly, thinking about their complex interactions can provide new and deeper insight into scientific work, “[its] process and products, the practices and representations, and [its] social-technological impact.”

The next two papers can be seen indifferent ways to take up the theme of the self-authenticating nature of styles. The claim that styles are self-authenticating has often been the focus of philosophical criticism of Hacking’s work. Many have worried that allowing styles to be self-authenticating must lead to some kind of pernicious relativism. Jeremy Wanderer’s paper suggests one way in which Hacking might respond to these charges.

Wanderer focusses on Hacking’s recent emphasis on “legendary beginnings”. As the brief schema provided above indicates, Hacking claims that the crystallization of each style is associated with a great, perhaps even, a mythical figure. It is tempting to think of this as merely a literary device; a way of drawing attention to the fact that crystallizations are part and parcel of our folk history of science. But Wanderer sees in them something altogether more significant. Focussing in particular on the example of Thales as the emblem of the mathematical style, Wanderer claims that these legendary narratives serve a particular philosophical purpose that a standard historical telling of the emergence of a style cannot. An important, and in some ways obvious point about the six styles listed by Hacking and Crombie, is that these are our ways of thinking. We feel bound by the norms and methods of each style. They characterise for us good thinking and practice. A linear historical narrative cannot demonstrate that for us since it will inevitably make the adoption of a style seem contingent. However, legendary narratives, what Wanderer calls retrospective narratives, can do this for us. These are tales told by individuals who already accept the style in question and they help bring to light the norms implicit in the style and explicate our adherence to them. They are in that sense precisely self-authenticating tales in a way no purely historical account could possibly be.

Jack Ritchie’s paper focusses on the relation of the styles project to realism-anti-realism debates. Hacking has claimed that a ‘by-product’ of each style is a realism debate. With the mathematical styles comes a philosophical worry about the existence of abstract objects; with the experimental style a worry over the existence of unobservables and so on. This observation has been combined with a dismissive attitude towards these debates in Hacking’s work. Ritchie suggests one motivation for that attitude is the idea that styles are self-authenticating. If styles themselves do not need extra-stylistic justifications, then equally it is otiose to ask for a special philosophical justification for the existence or non-existence of numbers or unobservables. Ritchie contends that although some realist and anti-realist arguments may be dismissed this way, this sort of argument does not touch more sophisticated views like van Fraassen’s Constructive Empiricism.

In the final paper Otavio Bueno offers a novel take on styles of thinking. Bueno conceives a style as “a pattern of inferential relations that are used to select, interpret, and support evidence for certain results”. Unsurprisingly then Bueno thinks there are many more styles than the six Hacking and Crombie identify. Bueno goes on to show how his notion of style (what he calls a narrow style as opposed to the broad styles discussed by Hacking and Crombie) can illuminate several episodes in a number of different sciences, including mathematics, chemistry and molecular biology. The up-shot of these particular analyses Bueno claims is more evidence for the disunity of the sciences. Styles are useful analytic tools to show just how deeply this disunity goes. Even closely related fields and methods often employ diverging narrow styles.

3. The future of styles

I began by saying that there had been a lack of critical engagement with the styles project. This special issue rectifies that situation to some extent but what, if anything, does it tell us about the future of scholarly attention to the notion of styles of thinking? The most obvious observation one can make about the special issue taken as a whole is the great diversity of themes and ideas picked up by the individual contributors. That suggests, as I said in the opening paragraphs, something about the richness of the styles project. But it also points to how much more needs to be done to clarify the central idea of a style of thinking and what significance it should have for philosophers and historians of science. Some key lines of inquiry have been opened up here, I think, but a lot more work needs to be done.

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References


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5 Actually the names that Winther uses to talk about the different styles are closer to Crombie’s exposition than Hacking’s.
6 As discussed in different ways in the work of Bas van Fraassen (1980), Nancy Cartwright (1999) and others.
7 To name only the ones that seem most salient to me: How seriously should we take talk of ‘styles’? (Are styles of thinking very different from other uses of the term?) What exactly is meant by self-authentication and how can one advocate the self-authenticating nature of styles while avoiding relativism? Is Hacking correct to limit the styles to Crombie’s list of six? Are we being invited to do a new kind of historically informed philosophy or is the styles project meant to provide us with answers to some standard problems in the philosophy of science? Hacking, of course, has said something in answer to all of these questions. I hope these contributions will prompt fuller clarifications.


