

Scientific Styles, Plain Truth, and Truthfulness

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ABSTRACT. Ian Hacking defines a “style of scientific thinking” loosely as a “way to find things out about the world” characterised by five hallmark features of a number of scientific template styles. Most prominently, these are autonomy and “self-authentication”: a scientific style of thinking, according to Hacking, is not good because it helps us find out the truth in some domain, it itself defines the criteria for truth-telling in its domain. I argue that Renaissance medicine, Mediaeval “demonology”, and magical thinking pass muster as scientific according to Hacking's criteria. However, application of these thought styles to the entities they introduce generates statements that logically imply a set of “ordinary” statements—or what Bernard Williams calls “plain truths”—which, contra the claims of autonomy and self-authentication, allows styles to be assessed from a style-independent perspective. Using Williams' notion of plain truth, I show that Renaissance medicine, demonology, and magical thinking, in reality issue in many plain falsehoods. This confronts us with what I call Hacking's dilemma: either define stricter necessary conditions on being a style of scientific thinking, or concede that some styles albeit scientific are not as good at finding things out about the world as others. I make three suggestions to deal with the dilemma.

1. Introduction. Defining Styles

A ‘style of scientific thinking,’ according to Ian Hacking, is a ‘way of finding things out, practiced in what we call the sciences’ (Hacking 2009, 5).¹ Hacking’s primary examples are six styles of what he calls the ‘European Tradition,’ the mathematical, hypothetical (modeling), experimental, taxonomic, probabilistic, and historic-genetic style; but he emphasises that this list due to Crombie 1994 merely provides ‘useful templates’ not likely to cover *all* styles (p. 7). He makes clear that there are distinct styles of scientific thinking outside of the European tradition, as well as extinct styles no longer in use (Hacking 1992c, 16, 2009, 84ff, 2012, 607).

What the European ways of finding things out have in common is that they happen to be part of the tradition Hacking is most familiar with, and they are distinctive enough to be immediately recognisable. Take, for example, the mathematical style:

[M]athematical reasoning and the ability to do it is something all of us recognize, even if some of us are good at it and others are not. We know when something demands mathematics. That is an amazing fact [...]. Why do we call all that mathematics at all? It is so many things, a motley, axioms, proofs, pictures, insight, calculation. But there it is, a distinct style of thinking, no matter how we label it (Hacking 2009, p. 13).

Hacking commends Crombie for having applied the concept of a style ‘like an early taxonomist noticing the birds and the bees. He said *Look!*’ (Hacking 2012, p. 601). It would be misguided to attempt anything but an ostensive definition of scientific styles, in Hacking’s eyes, because there are no necessary and sufficient conditions for being one; and any philosophical argument about how to classify them would just be ‘artificial’, scientific styles of thinking do not have ‘essences’ (Hacking 2009, pp. 12, 17, 20, 2012, p. 601).

Yet, Hacking also says this about styles:

¹ More recently, Hacking has preferred the label “style of scientific thinking & doing in the European tradition” (Hacking 2012, 601). The concept of a style of scientific reasoning has gone through various iterations in Hacking’s work, from Hacking 1982 which first introduced it, to Hacking 1988, 1991, 1992b, 1992a, to a more systematic presentation in Hacking 1992c and further updates in Hacking 1996, 2009, 2012. For the purposes of this paper I will use the term “style” for short, and rely on what appears to be Hacking’s definitive exposition in Hacking 2009 and Hacking 2012, with occasional excursions to Hacking 1982, 1983, 1992c for examples and comment.

I contend that when it crystallizes, a style of scientific thinking introduces new objects, and new criteria for the truth or falsehood of statements about those objects. A style, with its specific methods of reasoning, does not answer to any criteria except its own. It is not good because it helps find out the truth in some domain. It itself defines the criteria for truth-telling in its domain. Thus in a certain sense each style is autonomous and “self-authenticating”. That certainly sounds radical, and that is what I mean. (Hacking 2009, p. 21)

On an earlier occasion Hacking explicitly referred to some of the characteristics he mentions here as ‘at least necessary,’ ‘essential’ and ‘definitive features’ of styles (Hacking 1992c, pp. 10-13). I interpret this passage as making three distinct and rather interesting theoretical claims. (The practice of) a given scientific style, once ‘crystallised,’² has: (1) *ontological* import, as it postulates a distinct new class of entities; (2) *methodological* import, as it introduces a new method of reasoning that specifies truth conditions for statements about those entities; (3) *epistemic* import, as in virtue of defining the correct way of telling the truth about them, a style determines how knowledge about its entities is to be produced (in other words, since statements referring to style-specific entities are candidates for truth or falsehood only within the framework of the style, putative errors become undetectable from without). As Hacking puts it: ‘To say that these styles of thinking & doing are self-authenticating is to say that they are autonomous: they do not answer to some other, higher, or deeper, standard of truth and reason than their own. To repeat: No foundation. The style does not answer to some external canon of truth independent of itself’ (Hacking 2012, p. 605).

Hacking 2009 has two further ideas: (4) the practice of each style must be grounded in “built-in” human cognitive capacities without which the style would not be possible, capacities that are subject to biological evolution (p. 26); and finally (5), styles despite being dependent in this way on our cognitive endowments must be thought of as products of *cultural innovation* and *evolution*, since the existence and permanence of a style is guaranteed only through its continued use in a specific cultural and institutional context. In other words, a style ultimately is a *social practice*, and it ‘withers’ or ‘fails’ not by refutation, but only when we cease to use it, in which case ‘we are disinclined to call it scientific anymore’ (p. 47-48). A study of styles consequently must be *genealogical* rather than analytical, part of a ‘natural history of human beings,’ or of a ‘philosophical anthropology’ (p.

² For more on the metaphor of ‘crystallisation,’ see *infra*.

48; see also Hacking 2012, pp. 606-607 and *infra*).³

The primary theoretical deliverable of this picture of scientific styles of thinking and doing, Hacking suggests, is an answer to—or rather, a dissolution of—a number of age-old questions in European philosophy about certain types of object: for example, the ‘interminable ontological debates’ about mathematical objects in the philosophy of mathematics between platonists on the one hand and constructivists, formalists, fictionalists, etc., on the other, or those about theoretical entities in the philosophy of science between realists and empiricists, instrumentalists, etc., are a result (Hacking claims) of the introduction by specific styles of thinking of the relevant class of objects into our discourse. It is therefore ‘not surprising that these ontological debates are above all European in nature’, as they are possible only in the context of the relevant European style (p. 23)—nothing more than, perhaps, an idiosyncrasy of European culture that other cultures can safely ignore.

My approach here will be not to question whether Hacking’s theory of styles achieves his aim (for some legitimate doubts, see Ritchie 2012). Nor will I quibble with Hacking about any of his putative hallmarks of a scientific style, essential or not. I shall for the sake of argument grant all of (1)-(5) and ask, instead, what follows if the theory is true. Hacking recognises an immediate worry, relativism, and is at pains to clearly distance himself from it. He says that his theses about styles, objects, and statements about those objects, are far from amounting to a relativist stance, since they are ‘pro- foundly rationalist in character’ and ‘part of an explanation of what we call objectivity’ (Hacking 2009: 23)⁴. When he speaks of ‘objectivity,’ he means

‘[...] chiefly to affirm that the truths discovered in the sciences are true, independent of what we think, or of how we discover them. That is wholly consistent with saying that their truth conditions are products of the styles of thinking in whose domain they fall’ (p. 24)

True statements about the past (about dinosaurs, for example) are true independently of the availability of a scientific style of thinking that defines their truth conditions, and similarly mathematical statements did not become true when mathematics as a

³ Hacking 2009: 46-48 sees himself as making only three principal claims about styles. But his doctrine of the self-authentication of styles has both a methodological and epistemological component (cf. Ruphy 2011), and his thesis regarding the cognitive cum cultural foundation of styles contains two distinct sub-elements—hence (1)-(5).

⁴ Hacking 2012 is even more sanguine, suggesting that the problem of relativism is ‘sophomoric’ and not even part of the ‘Big Problems’ of philosophy. Nevertheless, he recognises the need, and announces the intention, to deal with counterexamples that would appear to support relativist interpretations of his views (Hacking 2012, p. 608); see *infra*.

method of reasoning came into being—the Pythagorean theorem is not true at a time, and false at another, etc. (p. 23). Hacking suggests it would be foolish to hold that styles *create* their objects, as they merely *introduce* them into our discourse (ibid.). Entities individuated using a specific style simply were not previously noticeable among the things that exist (Hacking 1992c, p. 11). Neither is it correct to say that styles fix the truth value of propositions about style-specific objects; the world does (Ruphy 2011, p. 1216).

Yet, since the discoverability of the truth conditions of its propositions depends on the existence of the style, it seems that on Hacking’s view, every new scientific style generates, as it were, its own sphere of objectivity: a style ‘answers to no criteria but its own,’ because it alone is the arbiter over what ‘truth-telling’ actually consists in in its domain (p. 26). Thus, Hacking’s theory of styles is really best seen as ‘a theory about the *origins of objectivity*’ (p. 79; my emphasis). Even God, presumably, if she wanted to know the answer to a mathematical question or refute a mathematical proposition, would have to do so by way of mathematics. The theory implies, among other things, that users of one style cannot encroach upon the territory of the users of another—for example in the shape of the former pointing out error or irrationality to the latter—precisely because the rationality of a style of thinking as a way of bearing on the truth of a class of propositions about style-specific objects is not open for style-independent criticism⁵. Hacking quotes Bernard Williams to affirm that the practitioners of any one style cannot be considered more or less rational, objective, or better or worse informed than the practitioners of another (p. 38, Williams 2002, p. 170-171), and makes it clear that he considers this an important and attractive feature of his account.

I shall contend that acceptance of a combination of three of Hacking’s positions leads nevertheless to unattractive consequences. These positions are the following:

- (i) it is (with the possible exception of (1)-(5) above) impossible to define necessary and sufficient conditions or other similarly abstract and gen-

⁵ Jack Ritchie (personal communication) points out that it seems nevertheless possible in actual scientific practice that claims made in one style might be questioned or challenged by claims made in another, or in a combination of styles. For example, advances in evolutionary theory (using the historic-genetic style), or in biology (using the hypothetical and experimental styles) appear to have led to reform in the taxonomic style. If so, then this would tell against the doctrine of autonomy and self-authentication of styles (claim (3) above). Hacking 2012, p. 608 recognises that the last three styles on Crombie’s list (probabilistic, taxonomic, and historic-genetic style) might differ from the first three in ‘the way they are related to truth’, but does not explicitly acknowledge as possible the kinds of violations of autonomy described by Ritchie.

- eral require- ments on being a ‘style of scientific thinking’ and hence on being a *science* (Hacking 2009, pp. 12, 20, 2012, p. 601)⁶.
- (ii) (styles of scientific thinking come into being and flourish under specific socio- cultural, historical, and institutional conditions, falling into disuse only when
 - (iii) these contingent, external, conditions cease, *not* because of deficits of ration- ality or for other internal reasons (Hacking 2009, p. 26, 2012, p. 607).
 - (iv) we cannot justifiably judge someone who operates in a given scientific style as having more or less ‘objective’ or ‘rational’ conceptions than someone working in another; neither can we say that we adopt a style because it is good at getting at the truth: both of these judgements illicitly presuppose a relevant metric of ‘objectivity’ or ‘goodness’ that is independent of the style it is being applied to (Hacking 2009, pp. 34, 38, 2012, p. 605).

In the next section, I present three examples of a style of thinking that passes muster as scientific according to (1)-(5): Renaissance medicine, Mediaeval ‘demonology’, and magical thinking. I show that certain statements referring to entities introduced by these putative styles are most naturally interpreted as false when assessed from a style-independent perspective, i.e. the perspective of no style in particular. I argue that if, *contra* Hacking, such a perspective and assessment are both possible and justified, then we are confronted with a dilemma. To explain certain styles’ apparent lack of success in producing truths, we would have to either give up (i) and define stricter conditions on being a scientific style; or relax (ii) and (iii), and accept that these styles, albeit scientific, are not particularly good at finding things out about the world, which would commit us to the un-Hackingian position that there is a metric of ‘goodness’ that is independent of the style it is being applied to, after all. Hacking, it is safe to say, is certain to reject both horns of this dilemma by insisting on the impossibility of assessing the truth of style-specific propositions from style-independent perspectives. On his account, the *very idea* of ‘truthfulness’ about the objects of a style receives its content from the style itself, because the latter defines the truth conditions for propositions about them.

Section 3 takes a closer look at Williams 2002 from whom Hacking borrowed his notion of ‘truthfulness.’ I show that Hacking’s use of Williams’ term is idiosyncratic and has none of the connotations intended by Williams. The latter focuses on truthfulness as an attachment to the value of truth, which he parses as the sort of virtues people

⁶ This assumes that necessary for the practice of science is the use of at least one scientific style of thinking.

display ‘in wanting to know the truth, in finding it out, and in telling it to other people’ (Williams 2002, p. 7)—in particular, the virtues of *accuracy* and *sincerity*. I argue that we could hardly see users of Renaissance medicine, ‘demonology’, and magical thinking as committed simultaneously to both accuracy and sincerity, because some applications of these styles to their objects make them appear decidedly inaccurate. Such a claim is possible from Williams’ perspective, because he recognises the existence of a stock of ‘plain truths’ common to all humans independent of their language, enculturation, and style. Williams defines plain truths as statements about everyday features of the environment that anyone would readily recognise in what he calls the ‘State of Nature’. Gods, witches, supernatural agencies, and other such entities introduced by some doubtful styles are not everyday features of the environment in Williams’ sense. Therefore, although we could be said to be ‘truthful’ about these entities in Hacking’s sense—by uttering sentences governed by the truth conditions of a style of thinking that introduces them into our discourse—we cannot speak ‘plain truths’ in Williams’ sense about them. I argue that some of the pronouncements of the putative styles are plain falsehoods, in Williams’ sense, which opens the possibility—contra Hacking’s as well as Williams’ stated positions—of evaluating the practice of some styles as less truth-conducive than others, after all.

In the final section, I review the potential of Hacking’s notions of ‘crystallisation’ and ‘self-stabilisation technique’ to characterize scientificity; and the objection that appeal to ‘plain truths’ cannot by itself do the work of sorting out what is scientific from what is not. I conclude that there are but three ways to solve Hacking’s dilemma: (a) occupy one of the horns and define more stringent demarcation criteria for styles, (b) elucidate the relationship between style-independent statements and style-dependent ones in order to establish a meta-standard of goodness of styles, or (possibly) (c) avoid the dilemma via an analysis of the relationships between styles.

2. Mercury, Witches, Rainmakers

2.1 Mercury

According to Hacking, a scientific style of thinking that has existed in the past is the ‘Renaissance medicine’ of Paracelsus.⁷ The 16th-century Swiss physiologist, alchemist, botanist, and astrologist Philippus von Hohenheim, known as Paracel-

⁷ Introduced in Hacking 1982, 1983, and reasserted in Hacking 2012, p. 607 as a style ‘no longer with us’.

sus, subscribed to a mystical theory of three spiritual principles that govern the cosmos (the *tria prima* of alchemy). Like many other medical practitioners of the European late Middle Ages and the Renaissance, Paracelsus deployed a curious type of reasoning—which Hacking calls ‘reasoning by similitudes’—that freely intermingles causal, logical, and semantic relations. Hacking cites Paracelsus’ explanation of how to treat syphilis as an example: ‘Syphilis is to be treated by a salve of mercury and by internal administration of the metal, because the metal mercury is the sign of the planet, Mercury, and that in turn signs the market place, and syphilis is contracted in the market place’ (Hacking 1983, p. 71).⁸ Hacking emphasises that although Paracelsus’ thought processes would have been familiar to many of his contemporaries, the network of possibilities and modalities that he recognised made him ‘someone so utterly different from us’ that *we cannot even assign a truth-value* to Paracelsus’ sentences (ibid.). Hacking quotes another such sentence: ‘Nature works through other things, such as pictures, stones, herbs, words, or when she makes comets, similitudes, halos and other unnatural products of the heavens’ (pp. 70-71). Indeed, pictures, stones, herbs, and words to the modern Western mind are certainly rather different categories of things, with causal roles that are rarely seen as intersecting.

Despite its strangeness, Hacking suggests that Paracelsus’ way of thinking is, or was, a scientific style.⁹ Indeed, it does introduce new objects, the *tria prima* of sulphur, mercury, and salt, as active principles; it also introduces a method of reasoning about these objects and their causal effects on disease in terms of ‘similitudes’; and it is self-authenticating, in the sense that the way in which Paracelsus’ claims were proposed and defended means that it is only from *within* his way of reasoning that we even recognise them as possibly true-or-false (ibid.). True to his theoretical commitments, Hacking nowhere in his body of work goes on record to say that any one of Paracelsus’ beliefs is actually *false*. He charitably interprets even rather colourful statements by Paracelsus’ contemporaries who practiced the same or a similar style, such as ‘ducks are generated from barnacles’ or ‘rotting logs floating in

⁸ ‘Mercury’ symbolises the market place to Paracelsus, because the Roman god after whom the planet is named is a cultural import of the Greek god Hermes, who in Greek culture was the god of the market place.

⁹ Hacking 2012, p. 607 explains that ‘[i]n the whig history used by the styles project, styles of thinking & doing in the European tradition are cumulative. This is a virtual necessity, for we define them retrospectively, in terms of how we got to here’. In other words, even though from today’s perspective ‘we can scarcely comprehend [Paracelsus’ style of thinking] in all its richness and [...] absurdity’ (ibid.), it rightfully belongs to the archive of past scientific styles. ‘When a style comes into being, it does not supersede an already existing one but rather enlarges the palette of modes of reasoning available to scientists’ (Ruphy 2011, p. 1221).

the bay of Naples generate geese’, as simply part of a discourse deploying categories that are unintelligible to us (ibid.). Only when we have learned the latter do we begin to speak Paracelsus’ language or to ‘inhabit his world,’ an expression which, Hacking assures us, ‘does not strain metaphor.’ Until then, ‘we can express him in English, but we cannot assert or deny what is being said’ (ibid.). Hacking’s point, sandwiched between a discussion of varieties of incommensurability (p. 67-74), is that propositions that are the outcome of the application of a style of scientific thinking do not assert what we think they might assert when divorced from their style of origin. That is why the claims of past styles cannot be truth-evaluable in the same way as propositions belonging to contemporary ones.

Were we to allow ourselves the benefits of the experimental style of thinking and modern medicine, we could say fairly categorically that mercury cannot be used to treat syphilis, at least not successfully, and that it cannot be used to successfully treat it for the reasons Paracelsus states. Mercury has anti-inflammatory properties that may have allowed it to kill the syphilis bacterium in cutaneous applications to ulcers and open sores, so that it may have been partially effective against the more obvious *symptoms* of syphilis; but it is a neurotoxin that is lethal in high doses and leads to chronic poisoning and kidney failure in lower ones.¹⁰ Even if we use the term ‘mercury’ to refer to a spiritual principle (the ‘transformative agent’ mercury and/or the god of the market-place) as Paracelsus presumably did, then it would be equally safe to say that that does not successfully treat syphilis, either, as there is little evidence in modern science for the causal efficaciousness of the *tria prima*, or Mercury the god of traders. Of course, contemporary medicine and the experimental style are far removed from Paracelsus’ way of thinking, so it is on Hacking’s account neither appropriate nor justified, nor possible, to apply its standards of truth to evaluate Paracelsus’ practice.

Yet, Renaissance medicine together with reasoning by similitudes is an *extinct* practice today, and we need to ask why. Hacking emphasises that it would be a serious mistake to think that Paracelsus’ medicine died, because it did not cure people; for just as we must avoid the temptation to think that we adopt a style because it is good at getting at the truth, we equally must resist the pragmatist urge to say that scientific styles persist because they *work*, and fail to persist when they do not (Hacking 2012, p. 607). This is because, according to Hacking, European medicine never actually cured anyone until the late 19th century, so something else must be going on: ‘We do not well understand the switch from (to use one possible descrip-

¹⁰ The first cure for syphilis was discovered by Paul Ehrlich in 1909. For osteological evidence from London cemeteries that mercury “treatment” of syphilis in the 17th to 19th centuries was in fact often destructive, see Tucker 2007, p. 223

tion of what happened) what Foucault called the *épistème* of the Renaissance, to that of the era of Representation and what he called the Classical Period or what others call Early Modern Europe. But it certainly was not because something did not work' (Hacking 2012, p. 607). In Hacking's eyes, a purely pragmatist criterion of success cannot explain why we transition from one style of thought to another, because it is ruled out by the autonomy of styles: a style of thinking devises on its own the purposes for which it must work. It determines *what counts as 'working'* (ibid.).

This suggestion is *prima facie* quite seductive. But it deserves a second look: what could be involved in a new style of thinking redefining, in terms that are entirely specific to itself and inapplicable to other styles, the notion of what it is for it to work? Unlike 'explanatoriness,' 'simplicity,' 'coherence,' and other such meta-theoretical concepts, the notion of something working (a method or calculation, a trick, an idea, a machine) is rooted in ordinary life and common sense. Practical reasoning transcends any particular thought style as defined by Hacking, and applies equally to all. Even in the case of the mathematical style it is not non-sensical or obviously false to suggest that the fact that the style enables—usually in combination with the hypothetical and experimental styles—successful predictions and practical applications in physics and the other 'mathematical sciences' is the main reason why it has endured for millennia. This is, in fact, a premise of much contemporary philosophy of mathematics and science;¹¹ the empirical success of mathematics via its applications in the natural sciences is generally seen as self-evident, indeed as trivially so, i.e. as self-evident even from a non-mathematical perspective.

Moreover, even if we granted that the mathematical style generates its own style-specific understanding of what shall count as its success, there are obstacles to this happening in the case of reasoning by similarities and its application in Renaissance medicine. Medicine is not just the science of the diagnosis, treatment, and prevention of disease, it is also its practice. An answer to the question whether a given medical treatment 'worked' or 'failed,' while sometimes not self-evident and requiring theoretical knowledge (for example in oncology, epidemiology, psychiatry, etc.), more often requires little to no scientific sophistication. Treatment success can be assessed by

¹¹ See e.g. the 'indispensability argument', Putnam 1975, p. 60ff, Resnik 1997, p. 46ff; cf also Papineau 1993, p. 191ff. It is true that, say, proof techniques in mathematics are said to "work" if they produce interesting and important new proofs, enable the solution of long-standing mathematical problems, or give rise to interesting new questions—an intra-disciplinary 'success' criterion not readily applicable outside of mathematics; idem for new mathematical concepts, methods of calculation, etc. But this theoretical sense in which a bit of mathematics "works" has narrow scope, and is not the pragmatic one.

whether a patient experiences symptomatic pain relief or does not; regains cognitive or other functional abilities such as sight, hearing, use of limbs, or fails to do so; is easier to care for, or not; resumes her previous activities or does not; experiences an improvement in ‘quality of life,’ or does not, etc. (see e.g. Wingblad, Brodaty et al. 2001; Robinson, Brown et al. 2005; Brown, Edwards et al. 2008). Certainly, no treatment could count as ‘successful’ if it were followed in short order by the death of the patient.

It is hard to see how our multi-dimensional and often very practical medical success criteria could be determined by, or in some other way be dependent on, the deliverances of any particular thought style. Consequently, we need not rely on modern medicine or contemporary styles to justify the claim that the statement ‘mercury cures syphilis’ is *false*: this is and always was ascertainable from the perspective of no style of thinking in particular. The historical record seems to bear this out. Not only did contemporaries of Paracelsus doubt the efficacy of mercury as a treatment, and Paracelsus himself recognise its toxicity at least when administered as an elixir (see e.g. Frith 2012), the general population appears to have known perfectly well that syphilis—even though often treated at length by famous and expensive “doctors”—could not be cured. Historians of disease take the existence of the popular saying ‘A night with Venus, and a lifetime with Mercury’ to demonstrate precisely that (Lindemann 2015, p. 98).

It is therefore historically as well as philosophically incorrect to suggest, as Hacking does, that what counted as a successful remedy in 16th-century medicine might not be the same as what counts as such in 21st-century medicine; and that the reason for which the style of thinking that undergirded Renaissance medicine disappeared was not at least in part its pragmatic failure. In a sufficiently large number of cases the efficacy of a given medical treatment is decidable in much the same manner as the question whether or not the cat is on the mat, i.e. without use of *any* scientific thought style. It is, as Bernard Williams would put it, a ‘plain truth’ recognisable by all (see *infra*). In particular, a person with syphilis in its secondary or late stages will be identified as gravely ill even by a child. Thus, although there was undoubtedly much else that accompanied and hastened Europeans’ move away from reasoning by similitudes, such as e.g. the new mechanistic philosophy from the 17th century onwards providing an alternative explanation for many phenomena, there will have been little doubt in medical practitioners’ minds (if they were sincere and accurate) as well as in patients’ minds that many “cures” of the time were far from guaranteed to work. And this belief will have been at least partially instrumental in the move.

Paracelsus' medicine is a problem for Hacking. If it is correct to say that 'Mercury cures syphilis' is false not just from the vantage point of modern medicine, but false *simpliciter*, then so will be many comparable propositions justified by reasoning by similitudes that ground the practice of Renaissance medicine. In fact, the reasoning itself will begin to appear systematically unsound. We then seem to face a dilemma: either Paracelsus' medical reasoning does not constitute a genuine style of scientific thinking after all, in which case we would need to jettison (i) and formulate additional criteria for being a scientific style; or Paracelsus' style of thought, albeit a scientific style by the standards of the time, withered for the reason that it is not a particularly good style for finding things out about the world, with the implication that there is a metric of 'goodness' that is independent of the style it is being applied to, after all—in which case we would need to give up (ii) and (iii). Hacking, it is safe to say, is likely to reject both horns of this dilemma, by reiterating his claim that the propositions of a style are not truth-evaluable from without it. This, I have claimed, is not ultimately plausible in the case of Renaissance medicine. Worse, the case cannot be dismissed as isolated, either: there are further apparent counterexamples to the autonomy and self-authentication of styles.

2.2 Witches

Allen 1993 proposes what he describes as a sympathetic application and extension of Hacking's concept of style to late Mediaeval and early Modern witchcraft trials in Europe and the United States. Allen argues that the inquisitors and magistrates who participated in these trials employed a specific and entirely idiosyncratic type of reasoning in order to justify the conviction of putative *witches* and *heretics*: the 'scholastic-inquisitorial' style of 'demonology' (p. 99). He shows how demonology satisfies Hacking's criteria for a style of scientific thinking, for demonology introduces new objects, the aforementioned 'witches' and 'heretics' (1); it deploys a method of reasoning determining the truth-conditions of statements about these objects that consists of a combination of the interpretation of scripture and the application—via a sort of legal casuistry—of putative 'laws' of witchcraft to real life cases (2); and it is self-authenticating, since it claims that only properly constituted tribunals following the sanctioned method can identify and convict witches (3) (pp. 106-113, 115-117). Conditions (4) and (5), finally, are also trivially satisfied. Hacking himself pleads 'no contest' to the observation that by his own criteria demonology amounts to a scientific style (Kusch 2010, p. 163).

Yet, although many individuals throughout the ages and cultures may have been called a ‘witch’, there are no generally confirmed or commonly observed *witches* as demonology conceives of them, in the sense of human beings who are regularly and unproblematically observed to display the supernatural powers and other attributes that demonology ascribes to witches. (In the way in which objects satisfying the attributes ascribed to, say, ‘Moose’ or ‘Eland’ are commonly and unproblematically observed in some parts of North America and Africa, respectively; witches, in other words, unlike Moose or Eland are not everyday features of the environment which we ourselves can readily pick out. See Section 3.2). Since ‘witches’ are a central entity introduced by the style, it would seem then that the majority of the statements of demonology are systematically *false* (or at least meaningless, depending on your theory of reference).

If this is correct, then our dilemma would again be this: we could either explain the falsity of demonology by conceding that its scholastic-inquisitorial style of thinking does not constitute a genuinely scientific style after all, in which case we need to give up (i); or grant that demonology, albeit a ‘scientific style,’ withered because it turned out that it is not particularly good at finding things out about the world, in which case we need to relinquish (ii) and (iii). Hacking presumably would not regard this as a dilemma, either. Although Hacking 2012, in part a response to a collection of papers at a workshop on styles at the University of Cape Town in 2011, acknowledges demonology as ‘a sort of counterexample’, and a ‘topic arising’ that he cannot treat for reasons of space (p. 608). We can only speculate that his treatment would consist in insisting once more on self-authentication and autonomy: demonology qua style defined its own standards of ‘goodness’ and persisted as long as socio-political, historical, economic, and institutional factors favoured its existence.

2.3 Rainmakers

Another item on Hacking 2012’s list of topics arising that by his own recognition require further discussion is “magical thinking’, be it in traditional religions or as subcultures of industrial societies’ (ibid.). I will use African magical thinking as a perspicuous example of this style. (Others could be used; Alston 1991 and Forrester 1996 for instance make claims analogous to those below for Roman Catholicism and psychoanalysis, respectively, see Kusch 2010, p. 170). According to many traditional African belief systems the cosmos is populated with spiritual forces and other sources of power such as medicine, magic, and witchcraft (Asante and Mazama 2009, p. 180;

Moro and Myers 2009, p. 139-140); the deceased can under certain conditions become ‘ancestors’ who create a spiritual link between their descendants and the spiritual world of the god(s) and other spirit powers (Peek and Yankah 2004, p. 3); the disobeying of social norms and taboos upsets the ancestral spirits who can punish you through illness; to treat the latter ancestors need to be contacted and placated via the services of a healer or shaman with special powers (p. 494-495); privileged intermediaries between the living and God, rainmakers, can cause rain to fall and to stop (p. 264); and so on. These beliefs and practices are undergirded by what, I will argue, amounts to a scientific style of thought according to Hacking’s criteria.

For, (1) the propositions of African magical thinking introduce a class of entities with supernatural powers, such as ancestral spirits, shamans, witches, *muti* (medicine), as well as malevolent spirits such as *tokoloshe*,¹² etc. (see e.g. Mutwa 1996, cited in Horsthemke 2010, p. 28-29; Fordred-Green 2000). (2) African magical thinking deploys a style-specific method of reasoning that defines criteria for the truth/falsehood of statements about these entities: most importantly, divination, soothsaying, and the channeling of an ancestor by a shaman. Asante 2005, p. 40 (cited in Horsthemke 2010, p. 30-31) refers to these as distinctively *African ways of knowing* (cf. also Moro and Myers 2009, p. 145).¹³ (3) The latter are self-authenticating, because only a person who has undergone a period of initiation and calling (Mlisa 2009) can successfully and correctly perform the services of divination, soothsaying, or channeling (Mzimkulu and Simbayi 2006; Bührmann 1982); idem for a shaman’s medicinal practice. Finally, African magical thinking trivially satisfies condition (4), i.e. practice of the style would not be possible without one or several human cognitive capacities;¹⁴ and (5) it most certainly is a product of cultural innovation, existing and persisting only through its continued use in a specific cultural and social context.

What applies to African magical thinking would apply in modified form to many other belief systems, traditional or not, and religions worldwide. The question that arises is again the following: what are we to make of the fact that a set of statements in African magical thinking about core style-specific objects—such as, say, ‘rainmak-

¹² ‘Muti’ and ‘tokoloshe’ are part of South African magical discourse, but have close equivalents throughout most Southern African and Sub-Saharan African cultures.

¹³ One could of course observe that divination, for example, or the communication with supernatural beings, is as much a practice or a rite as it is a reasoning that establishes truth-conditions; and that African magical thinking may not amount to a scientific style on those grounds. But Hacking fashions his styles explicitly as ‘styles of thinking and doing,’ and African magical belief systems can and have been supplied with rationalisations by traditional sages in the African oral tradition, as well as by theorists (see e.g. Mutwa 1996; Mzimkulu and Simbayi 2006).

¹⁴ As Kusch 2010, p. 170 notes, Hacking’s universal cognitive capacities-criterion (Hacking 2009, p. 26), being universal, is rather toothless.

ers can make rain’, or ‘*tokoloshe* attack travellers at night’—appear to be *false*, if we attempt to verify them using style-independent descriptions? (see next Section). The dilemma, which by now we might call Hacking’s dilemma, is again that acknowledging this possibility seems to require us to give up either (i), or (ii) and (iii). Hacking prefers not to acknowledge it. I will argue next that this in many cases requires denying what Williams 2002 calls ‘plain truths.’

3. Truthfulness and Plain Truth

3.1 Truthfulness

‘Why not “let a thousand flowers bloom” and recognise Renaissance medicine, demonology, magical thinking, etc., as scientific styles of thought?’ the reader might ask (cf. Rupy 2011, Bueno 2012). Many philosophers are attracted to the view that—far from establishing that some styles of thinking lead to false beliefs—all an enumeration of dead or in some sense marginal styles can illustrate is, at most, the *historicity* and cultural specificity of styles; and, perhaps, that some styles are more commonly recognised, practiced, or useful than others. As an anonymous reviewer put it, styles are merely *tools*, and one cannot refute a tool. Moreover, if, as Hacking argues, even the concept of a style’s usefulness is not style-independent, then there simply are no grounds for kicking any style of thought out of the club of science. This retort relies substantially on what Hacking 1992c calls a ‘much used lemma from the strong programme in the sociology of knowledge,’ namely that ‘[t]he truth of a proposition in no way explains our discovery of it, or its acceptance by a scientific community, or its staying in place as a standard item of knowledge’ (p. 14).

What matters more to the sociology of knowledge than a scientific style’s propensity to generate truths are non-epistemic factors that can account for its development, its adoption, and its (relative) permanence in a given culture. Allen 1993, concluding his discussion of demonology, eloquently puts the thought as follows:

What once passed for true may lose credibility and eventually even intelligibility, becoming lost knowledge. In some cases we still have the sentences (in historical texts), but they are like antique banknotes which nobody can

spend. The sentences of [demonology] are like that. [...] It would [...] be pointless to insist (as if it explained how demonology could play its guiding role) upon the *falsity* of demonological sentences. More important than their being untrue (by our lights) is their having had historical currency, once actually *passing for true*, penetrating the practical reasoning of inquisitors, magistrates and kings. What is important, then and now, is *what* passes for true, for *whom* it passes, to what *effect*. (p. 119; emphasis added).

Hacking seems committed to concur. He concedes that ‘truth’ per se is not historical (he takes truth to be a purely formal concept consistent with Tarski’s semantic theory), and that the true propositions of, say, the mathematical or probabilistic style are omnitemporally so; even the tensed truths of a style are omnitemporally true, if true at all (Hacking 2009, p. 15). But he insists that true propositions can literally not be asserted, reasoned about, or verified, without a corresponding style that ‘puts in place’ the conditions for their truth (ibid.). In other words, without the style there are no ‘ways to tell the truth’ about the objects of the style, and there can therefore be no *truthfulness* in their regard. One simply cannot be truthful about X without there being a way to tell the truth about X.

Hacking explicitly borrows the concept of ‘truthfulness’ from Williams 2002 in order to connect truth with history (Hacking 2009, p. 1-2). He says that *ways to tell the truth*, unlike truth itself, have a ‘genealogy’—which Hacking does not try to further characterise, but Williams describes as ‘a narrative that tries to explain a cultural phenomenon by describing a way in which it came about, or could have come about, or might be imagined to have come about’ (p. 20). A genealogy of a style of scientific thinking, consistently with the aforementioned sociological lemma, does not try to explain the birth of the style by its capacity to increase our stock of true beliefs about a subject matter. This, as Allen 1993 says, would be missing the point. Genealogies, rather, focus on how and why we became interested in the relevant subject in the first place, i.e. on how practice of the style acquired a point. In particular, a genealogy of Crombie’s European styles will show, Hacking hopes, how ‘a way to be truthful’ about the objects of these styles came into being, and why it became important to us to be truthful about them in the first place.

But Hacking’s use of the notion of ‘truthfulness’ is idiosyncratic. He glosses ‘truthfulness’ as ‘telling the truth about something’ or ‘way to tell the truth’ (Hacking 2009, p. 2, 33). His focus is on the historicity of the criteria for telling the truth about X: truth-conditions for statements about X are defined and discovered at a particular time and place—often by a legendary individual, the scientific trailblazer of a particular style (Hacking 2009, p. 36ff; Wanderer 2012). Williams’ focus is elsewhere

entirely: he is concerned with ‘truthfulness’ as a commitment, a suspiciousness against deceptiveness and being fooled, and the ‘eagerness to see through appearances to the real structures and motives that lie behind them’ (Williams 2002, p. 1). Williams thinks a commitment to truthfulness is the main antagonist of the relativist or subjectivist suspicion about the possibility or existence of truth itself (ibid.). Associated with these two currents of ideas are two opposing camps, he says. On the one hand, there is the ‘common sense party’, those who subscribe to a style of philosophy that seeks to affirm and rehabilitate truth by pointing to its fundamental or everyday role. On the other, there are the ‘deniers,’ philosophers who are sceptical or deny the existence of truth, or at least its possibility in large thought structures such as historical narrative, social representations, self-understanding, psychological and political interpretation (Williams 2002, p. 5). Williams 2002’s explicit theoretical goal is to resolve the tension between the two camps, by making what we know about truth and our chances of arriving at it *fit* with our need for truthfulness (p. 3).

The aim is ecumenical in spirit, and Williams often assumes the role of Solomonic arbiter between the parties. He concedes to the common sense party that even the most obstinate deniers will *know* that it is Tuesday or that they are in the United States (as the case may be), and that there are good reasons for thinking that one could not even learn a language without a large class of statements being assumed true (p. 5). Simultaneously, he acknowledges that this rehabilitation of truth only goes so far, as it does not yet assuage the deniers’ legitimate worries about the larger thought structures (ibid.). Departing from his role of arbiter, however, Williams also makes it clear that his primary concern is with the intrinsic *value* of truth. He spells this out as the value of states and activities associated with the truth, in particular ‘the qualities of people that are displayed in wanting to know the truth, in finding it out, and in telling it to other people’ (Williams 2002, p. 7)—namely the virtues of *accuracy* and *sincerity*. In Williams’ eyes, to the extent that the deniers lose a sense of the value of these virtues, they ‘shall certainly lose something and may well lose everything’ (ibid.). These concerns are rather un-Hackingian. For while Hacking mentions ‘accuracy’ as relevant, the term occurs only sporadically in Hacking 2009, not at all in Hacking 2012, and is glossed as ‘usefulness’ in Hacking 2004. Neither does Hacking have much truck with Williams’ view that truth has *intrinsic* value, in other words, that its value cannot be reduced or subordinated to other values. He speculates that this idea may be specific to those civilisations that have been moulded by Aristotle and the Bible (Hacking 2004, p. 147). ‘It is better’, he says, ‘to *play down the intrinsic*, relating it to a needed role in our lives’ (ibid., emphasis mine).

The unease that some readers may experience when thinking of Renaissance medicine, demonology or magical thinking—or indeed of Roman Catholicism, psychoanalysis, and comparable thought styles that satisfy (1)-(5)¹⁵—as scientific, will probably spring from the same well as Williams’ intuition that those who have lost sight of the intrinsic value of truth may have “lost everything”. Hacking urges us to accept that styles *define* what it is to be ‘truthful’ about their domains. But truthfulness is more than first laying down via development of a specific style of thought the truth conditions for what you are going to say, and then saying it according to the rules of the style. It is the result of a commitment to accuracy, Williams insists, the disposition to acquire correct beliefs, and sincerity, the disposition to reliably transfer one’s beliefs (usually via language) to a common pool of knowledge shared with others (Williams 2002, p. 44). While the practitioners of some of the mentioned dead or doubtful styles may or may not have been *sincere*, I will suggest that they could not possibly have been *accurate*. For if we consider statements about objects specific to some of the doubtful styles independently of the truth-conditions defined by these styles, they appear to imply everyday statements that turn out to be no truths at all. Hacking, as we have seen, thinks that to consider them in this way is strictly impossible. Williams’ notion of truthfulness implies that it is, as I shall argue presently.

3.2 Plain Truth

In the context of a discussion of language learning, Williams notes that what we consider and call a ‘plain truth’ can depend on our language and its classificatory terms (Williams 2002, p. 50). For there are plain truths in our language and society such as ‘The telephone is over there’ that may not be available as such to the inhabitants of a society sufficiently different from ours; and conversely, there will be plain truths available in their language and society, that are not available to us. Williams claims that although we need not deny that most of the statements of this other society and culture are true and in certain cases even *plainly* true, there will be certain other types of statement regarded as such that we shall regard as false (p. 51). His examples are: ‘a god has passed this way’ and ‘a “supernatural” force (as we would put it) is at work’ (ibid.). This discrepancy notwithstanding, there is a stock of plain truths, Williams

¹⁵ Not all aspects of Roman Catholic thought and practice display self-evident “magical qualities”, of course, and neither do all approaches that fall under the category of psychoanalysis. But, say, the doctrine of transubstantiation certainly does, as well as the practice (and underlying theory) of exorcism; similarly, dream interpretation in the case of psychoanalysis has long been suspected of being “unscientific”. (For more detail, see Alston 1991 and Forrester 1996).

maintains, that will be common to all humans independently of their language and enculturation. They are those truths that we recognise in what he calls the ‘State of Nature,’ a genealogical abstraction in which ‘there is a small society of human beings, sharing a common language, with no elaborate technology and no form of writing’ (p. 42).

Plain truths in the State of Nature are statements about ‘everyday features of the environment which we ourselves readily pick out, people, animals, trees, fruits, bodies of water, the sun and the moon and such things’ (Williams 2002, p. 52-53). Gods and supernatural agencies according to him are *not* features of the everyday environment of the State of Nature, because their identification does not play as basic a role in human thought as the identification of those everyday features. In Williams’ naturalistic outlook, such entities can safely be left out of a description of the State of Nature, because they can be appealed to at a later stage of the genealogical narrative, possibly as parts of a larger structure of thought that attempts to explain the everyday features that we do recognise (ibid.). Thus, demonological propositions—for example ‘witches float when bound and tossed over deep water’ or ‘witches might be pricked and not bleed’ (Allen 1993, p. 110-111)¹⁶—could not express plain truths *à la* Williams, as witches are not the type of object about which we can speak the kind of plain truths we speak about people, trees, and bodies of water. (Although we can of course attempt to be ‘truthful’ about them in Hacking’s sense, by using the demonological style.)

People, trees, and bodies of water are not entities that need to be ‘introduced’ into our discourse by a particular style of thinking, because they are already there before any scientific style—witches are not. Yet, this does not mean that non-practitioners of demonology cannot reason or speak about witches. For ‘witches’ are defined in demonology as men or women with specific attributes, the presence of which in an individual it was the job of witchcraft tribunals to confirm. Since some of these attributes refer to everyday features of the environment, for example the ability to float in water when bound or not to bleed when pricked, non-practitioners can speak plain truths about the objects of demonology under style-independent descriptions, e.g. ‘men or women who float in water’, ‘men or women who fail to bleed when pricked’, etc. Thus, some statements of demonology directly logically imply statements about everyday features of the environment, the truth of which can be ascertained without

¹⁶ In Mediaeval Europe, unnatural buoyancy, a ‘super-natural sign of the monstrous impiety of the witches,’ was attributed to them based on the idea that water would refuse to ‘receive them in her bosom;’ insensitive spots, on the other hand, were attributed based on the remark by Tertullian that ‘the devil always marks his own’ (Allen 1993, p. 110)

the help of any particular thinking style. For example, if ‘witches float when bound and tossed over deep water’ and ‘person A is a witch’ are both true, then it follows that ‘A floats when bound and tossed over deep water’—a plain truth, if true. But this is not reliably observed to happen, either in our current state or in the State of Nature. Simple *modus tollens* then tells us that either witches do not float when bound and tossed over deep water, or A is not a witch, or both.

Similarly, if the principle ‘mercury’ has the power to cure syphilis, and the metal whose name signifies the principle shares its powers, then treatment with the metal ought to cure the disease. Since it does not—a plain truth, as I have argued above—either the principle does not have the power, or the metal that signifies it does not share it, or both. Finally, if rainmakers can cause precipitation, and person B is a rainmaker, then B ought to be able to cause precipitation. The truth of this latter claim should be reliably observable in terms of plain truths about the natural environment. Since it is not, rainmakers either do not exist, or do not have the power to cause precipitation, or both.¹⁷ Contra Hacking—and Williams, who does not recognize this possible use of plain truths (Williams 2002, p. 170)—style-independent truths and style-independent reasoning do seem to allow us to recognise at least some propositions of a style of thinking as false.

¹⁷ Like in the case of witches, I am inclined to take it as self-evident that ‘rainmakers’ as characterized in magical thinking do not exist, and that this is or can be known without the use of scientific thought styles. Nonetheless, here is a sketch of how an argument could go. How would one ‘reliably observe’ or confirm precipitation-making powers in the absence of, say, statistical thought and meteorology (a science deploying several scientific styles) in conjunction, perhaps, with some form of neuropsychology, psychometrics, etc.? One could solicit rain from the rainmaker when the weather and/or season are *unfavourable*, because we know even without the help of meteorology that rain tends to occur under favourable conditions that can be directly observed, like an overcast sky, the start of the rainy season, etc. (Weather being erratic, we also know that favourable conditions are no guarantee for rain). If the rainmaker succeeds on more than one occasion, we would consider his/her claim to the power strengthened in proportion to the number of successes. This type of knowledge/common sense an adult could be expected to have even, or perhaps especially, in the State of Nature. For only in an already enculturated state could one make use of religious or some other item of cultural knowledge to explain away the inevitable failures of the rainmaker. (Similarly, the religious usually account for the frequent practical failures of prayer via an appeal to the attributes of God, e.g. the inscrutability of his intentions, or a religious shortcoming on the part of the believer, e.g. lack of faith, etc. But neither of these moves would be available in the State of Nature). Analogously for witches

4. Ways to tell the truth vs. the virtues of truth

One might try to deal with the above problems by distinguishing dead, doubtful or problematic styles of thought from bona fide scientific styles using criteria already implicit in Hacking's work. Some commentators have put much stock, for example, in Hacking's metaphor of 'crystallisation' (e.g. Wanderer 2012). The idea is that scientific styles are born when an irreversible shift in thought occurs, usually tied to the activity at a particular time and place of a single, legendary, and trailblazing intellectual hero—Thales, Thucydides, Pascal, Galileo, Boyle, Linnaeus, etc.—who moves the thought style from an inchoate state to a more or less fixed one. (Like styles, Hacking 2009, p. 14ff defines crystallisations mostly ostensively). We could then try to distinguish Crombie's six established styles from dead or doubtful ones by using historical evidence to show that the latter never crystallised. But this project does not get off the ground. Styles typically continue to develop and change even after "crystallisation," hence the physical metaphor breaks down; trailblazers rarely act alone (Hacking 2009, p. 17); and most importantly, reasoning by similitudes, demonology, and magical thinking actually satisfy the descriptions of a 'crystallised' style that Hacking provides, (1)-(5) above.

A related idea is that of 'techniques of self-stabilisation.' Hacking 1992c pairs the concept of self-authentication with the notion that scientific styles have 'harnessed [their] own techniques of self-stabilisation' through which they establish themselves (p. 16-17).¹⁸ For example, the adjusting of auxiliary hypotheses in order to save theories from being falsified by experimental results might be a self-stabilising technique of the 'laboratory style' (a style Hacking has since merged with the hypothetical style) (p. 15; Hacking 1992a). Hacking speculates that styles of scientific thinking could be distinguished from other styles of inquiry (for example humanistic, ethical) by the fact that only they dispose of such techniques (ibid.). Unfortunately, Hacking mentions only one shared attribute of all techniques of self-stabilisation, namely that they 'enable a self-authenticating style to persist,' which lands him in a circle: the distinguishing mark of a self-authenticating style X is that it has its own techniques of self-stabilisation {Y}, and {Y} is a set of techniques of self-stabilisation because it enables the existence of a self-authenticating style X (ibid.). This may not be fatal, but it does not help to separate dead or doubtful styles from genuine ones: the very fact that magical thinking endures today or that demonology endured for centuries, for exam-

¹⁸ There are echoes here of Lakatos' notion of 'positive heuristics' (Lakatos 1970).

ple, would imply that they harnessed their own techniques of self-stabilisation, and that they are/were therefore a style. Ruphy 2011, p. 1221 suggests that self-stabilisation techniques might be more or less ‘efficient,’ but she provides no explanation of what exactly that means. It is not surprising that after 1992, Hacking himself appears to have never mentioned ‘techniques of self-stabilisation’ again.

A more promising avenue for addressing the questions raised in this paper is to buttress the theory that each style of thinking determines what qualifies as truth or falsity by showing that, as an anonymous reviewer put it, ‘plain truths by themselves cannot do the work of sorting out what is scientific and unscientific.’ This requires showing that the *modus tollens* inferences above cannot be based simply on direct observation. That appears doable. Well-rehearsed arguments in the philosophy of science regarding the relationship between theory and observation (e.g. Duhem 1906, 1991; Quine 1951; Hanson 1958) have established that one can never use observation alone to confirm or disconfirm a scientific hypothesis about theoretical entities such as, say, gravitational waves, the superego, plate tectonics, etc. Additional ‘auxiliary’ hypotheses must be assumed true, as well as an amorphous amount of general background knowledge. Therefore no appeal to ‘plain truths’, purported to be ascertainable through direct observation and common sense alone, can help us evaluate the truth of theoretical scientific claims and, by parity of reasoning, can adjudicate the veracity of statements about theoretical entities such as ‘mercury’, ‘witch,’ and ‘rainmaker.’

The first observation to make here is that in the case of the doubtful styles, the relevant plain truths can be derived without help of scientific auxiliary hypotheses or style-specific assumptions: ‘A floats when bound and tossed over deep water’ for example follows immediately from ‘witches float when bound and tossed over deep water’ and ‘A is a witch’ by a logical principle known as Leibniz’s law, i.e. independently of any further demonological lore, auxiliary hypotheses, or background knowledge. The crux of the issue is therefore not the assumptions needed to derive plain truths, but the concept of ‘plain truth’ itself. Williams intended his example ‘The telephone is over there’ to illustrate precisely that although there may be plain truths that will not be “plain” to members of a society sufficiently different from ours (because their cultural knowledge does not enable them to immediately and non-inferentially pick out objects like telephones qua telephones),¹⁹ there is another type of plain truth common to all humans in their State of Nature whose observation is not dependent on language, enculturation, background knowledge, or indeed style of thought. In the State

¹⁹ This mirrors Duhem’s novice-in-the-physics-lab and Hanson’s X-ray tube examples (Hanson 1958: 15; Duhem 1906, 1991: II, ch. 4.).

of Nature, *ex hypothesi*, we have not developed any specific thought styles yet (Williams 2002, p. 51). The central question is thus: how plausible, reasonable, or useful is the construct of a State of Nature in this context? Williams is explicit that it is based not on empirical, for example historical/anthropological, evidence (p. 27ff), but, rather, on an abstract argument drawn from an ‘imagined developmental story’ (pp. 21, 38-39). It is, in other words, based on a fiction. A fiction which however aspires—much like Wittgenstein’s thought experiment of a ‘simple language game’ (Wittgenstein 1953, 2009, §2ff)—to be helpful, partly true, and to make sense of our real world commitments to truth and truthfulness (p. 19).

The most relevant part of this fiction for the purposes of this paper concerns language acquisition: children typically learn language by hearing sentences such that their utterance in that type of situation is ‘plainly true’ for the child, says Williams, as well as being necessary for grasping the meaning of the sentence (p. 46). He is careful to note that this is not the false empiricist claim that uttering a sentence in a “simple” perceptual situation somehow presents all of its truth-conditions to the child, or lays bare via a magic *deixis* the semantic and syntactic properties of its components (ibid.; cf. Quine 1960). It is merely the observation that there are in fact many types of situation and sentence such that the latter could not be understood without at least some exemplary sentences being uttered in some exemplary situations, and that this could not be the case if the utterance in question were not at that moment *obviously* or plainly true to the child (p. 49). For the assumptions governing any language learning situation are that the speaker is asserting something that the hearer can observe as easily as the speaker can. There is, as Williams puts it, ‘no room for the idea of a deceitful intention’ in language learning; to be possible it must ‘be conducted in circumstances of [...] primitive trust.’ Competent speakers must be assumed to be truthful, in other words accurate and sincere, and plain truths must be able to come before learners as implications of their teachers’ speech-acts, whether declarative or non-declarative. For example, uttering ‘get that cat out of here!’ should imply the plain truth ‘there is a cat here’ (pp. 47-49).²⁰

Even observing something as simple as that there is a cat involves of course complex background assumptions that could be false. But Williams suggests that adoption of the genealogical perspective allows us to draw a line between plain truths that are relative to culture and technology, and those plain truths of the State of Nature that we may think of as ‘absolute’ (pp. 49-50). The latter are *not* absolute be-

²⁰ A quintessentially Wittgensteinian argument. Compare: ‘If language is to be a means of communication there must be agreement not only in definitions but also (queer as this may sound) in judgments’. (Wittgenstein 2009 [1953], §242)

cause they themselves are indubitable or depend on nothing, but rather because they depend only on something basic and universal: those capacities and limitations presumably shared by all humans in the State of Nature capable of learning a language. In other words, while it may be true that knowing and observing that there is a cat depends on a specific language, classificatory scheme, and other cultural knowledge that includes the concept 'cat,' being able to learn the meaning of 'there is a cat' from the utterance of the sentence in a situation in which it is true, does not. Since almost every denizen of the State of Nature has this capacity qua human being, the statement that 'there is a cat' when uttered in the presence of a cat ought to be a plain truth for almost all of them.

It has long been a bone of contention between sociologists of knowledge and philosophers of science whether there could be a special core of concepts and simple perceptual situations that provides us with 'standard meanings' uncomplicated by cultural variables.²¹ Williams readily concedes that for many propositions that we think are 'plain truths' in our actual cultures, there may be no such thing as decontextualised meaning and truth. But he insists that for *some*, we must assume that there is. To him, the very concept of truth, in the sense of the foundational role that (plain) truth and truthfulness plays in relation to language, meaning, and belief, could not be dependent on culture, but is 'always and everywhere the same,' because as the genealogy of truthfulness shows, 'we could not understand cultural variation itself without taking that role for granted' (p. 61). Plain truths, in other words, and their foundational role are an assumption that is necessary in order to explain the manifest features of our actual cultural as well as scientific practices (a transcendental argument).

Williams' discussion of plain truths reprises a familiar Wittgensteinian theme: Wittgenstein in *On Certainty* held that propositions such as 'I know that here is my hand' or 'I know that that's a tree', etc., are *grammatical* propositions governing our language game of knowledge attribution, insofar as they have the logical function of serving as a fixed point, something about which in ordinary contexts I cannot be said to be wrong or which cannot be doubted (Wittgenstein 1969, §57, §§350-354). Doubt, questioning, and the very logic of our scientific investigations, Wittgenstein argued, depend for their very possibility on some propositions being exempt from doubt, the latter being like hinges on which the former turn: 'If you want the door to turn, the hinges must stay put' (Wittgenstein 1969, §§341-343). Williams' 'plain truths' are es-

²¹ Witness e.g. Barry Barnes and David Bloor's disagreement with Anthony Flew over whether the social structure of my tribe could be causally relevant to my perceptual belief that a canoe is where it is on the river (Barnes and Bloor 1992, p. 31; Flew 1979).

entially Wittgenstein's 'hinge propositions', with a slightly more naturalist or Kantian emphasis on the universality of some of them.

Respect for the truth, finally, for Williams also has an *ethical* dimension. To Williams' mind, the epistemic is always also the ethical. He quotes Nietzsche, 'error is cowardice!' (p. 16), to remind us that the pursuit of truthfulness requires courage, and that 'each of the basic virtues of truth involves certain kinds of resistance to what moralists might call temptation—to fantasy and the wish' (Williams 2002, p. 45). This concept of 'truthfulness' in the final analysis bears no resemblance to Hacking's. Like the 'deniers' Williams spoke of, Hacking is happy to reject the significance of truth as an intrinsic value informing our cognitive pursuits; and we rarely find him vaunting respect for the truth as Williams understands it, a virtue exemplification of which is indispensable for the attainment of knowledge. And yet, Hacking both endorses genealogy as a mode of explanation and explicitly claims that he is deploying Williams's notion of 'truthfulness.' Occasionally, he even accords a special, or at least a *separate*, epistemic status to 'ordinary statements' about 'ordinary objects.'

For example, in Hacking 2009, pp. 21-22, he explains that:

'[...] scientific statements come up for grabs, as true or false, only when there comes into play a method for reasoning about their truth. *Most ordinary statements are not like this.* They have truth conditions, methods of verification and so forth, *independently of styles of scientific thinking.* The cat is on the mat. Likewise most objects are not introduced into discourse alongside styles of scientific thinking. Sticks and stones.' (emphasis mine)

Hacking accepts here not just that a large class of statements would have to be assumed self-evidently true in something like the minimalistic society of the State of Nature, but even commits himself to Williams' stronger view that this applies also to some 'ordinary statements' about ordinary objects in our *actual* state. Namely, ordinary statements about sticks and stones and, presumably, people, cats, bodies of water, the weather, etc. These must even in our current culture be assumed plain truths in the sense that they do have truth conditions independently of any style of scientific thinking. Hacking, who appears to have misread Williams on truthfulness, agrees with him at least here. Yet if plain truths exist, then they are, as I have argued contra both Hacking and Williams, a candidate for helping us sort out what is and what is not a (good) scientific style after all.²²

²² Although not necessarily for sorting out what is or is not a (good) science; unless the latter exclusively uses unscientific styles

Conclusion

The contention of this paper has been that if the truth of statements about sticks and stones, cats, trees, bodies of water, men or women who float in water, mercury, or the weather, is independent of truth conditions set down in specific styles of scientific thinking as defined by Hacking, then we are committed to a position the latter strenuously denies—namely that styles are subject to evaluation from style-independent perspectives. I suggested that this is so because statements by users of certain doubtful styles about style-specific objects directly imply ordinary statements or ‘plain truths’ in Williams 2002’s sense, whose truth conditions are independent of the style; that many of these ‘plain truths’ can be ascertained to be in fact plain false; that this implies that many statements of the doubtful styles about style-specific objects are false; and finally, that this saddles us with a dilemma I call ‘Hacking’s dilemma.’ Either those ‘styles’ whose application systematically issues in falsehoods about style-specific objects are not scientific, in which case plain truths can help us sort out what is and what is not a scientific style of thought after all; or some styles simply generate more plain truths than others, in which case plain truths could explain why we transition from one style to another. (A question left either unanswered by Hacking or subjected to non-epistemic considerations that are unconcerned with one of the basic virtues of truth: accuracy). It is, of course, a dilemma only for someone who espouses Hacking’s theory of the autonomy and self-authentication of styles.

Hacking rarely mentions ‘ordinary statements’ and their truth-conditions, and when he does only in passing. He shares the ‘deniers’ suspicion of truth, especially when glossed as absolute, and their dislike of the idea that it is of intrinsic value. He also sees no usefulness in the concept of ‘plain truth’ for the project of philosophically elucidating styles of scientific thinking. Neither does Williams, who shares Hacking’s view that plain truths are powerless to show that those who operate in a doubtful style believe something *false* (Williams 2002, p. 170). This is a mistake. The concept of plain truth is far removed from naive empiricism about direct observations, ‘protocol sentences’, and the like, and captures something essential. Mercury does not cure syphilis, no bound man or woman floats in water (at least not while they are still alive), and no rainmaker makes rain—a philosophy of science that for theoretical reasons fails to assert truths of this type could not be

called ‘truthful’ in Williams’ sense, a sense this author agrees we must not lose sight of. Something must be said about the doubtful styles discussed here, as Hacking concedes.

I see but two, or possibly three, ways of fixing things: occupy a horn of Hacking’s dilemma and (1) identify stricter demarcation criteria for a style of scientific thinking, or (2) elucidate the relationship between style-independent statements, or plain truths, and style-dependent ones, with a view to establishing a meta-standard of goodness of styles. (1), after many unsuccessful attempts, has fallen out of favour. (2) would add strongly analytic, Anglo-Saxon, flavours to Hacking’s current Parisian/Königsbergian philosophy of science—a move unlikely to find the favour of its author. Should we not wish to attempt this, we could try to (3) avoid the dilemma and elucidate the role of intra-style relations, in the hope of devising a roughly coherentist method of cross-validating styles without relying on style-independent truths, in terms of how well a style integrates with others. After all, it can hardly be a coincidence that certain styles of thought, such as the mathematical, hypothetical, and experimental style, harmonise so well in so many sciences. Of course, a successful way of tackling either (2) or (3) might lead to an answer to (1). Much hard work remains for the styles project.

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Bibliography

- Allen, B. (1993). 'Demonology, Styles of Reasoning and Truth.' *International Journal of Moral and Social Studies* 8(2): 95-122.
- Alston, W. P. (1991). Perceiving God. *The Epistemology of Religious Experience*. Ithaca and London, Cornell University Press.
- Asante, M. A. (2005). 'Blackness as an Ethical Trope: Toward a Post-Western Assertion.' *White on White/Black on Black*. G. Yancy. Lanham, Rowman & Littlefield.
- Asante, M. A. and A. Mazama, Eds. (2009). *Encyclopedia of African Religion*. Thousand-Oaks, Sage Publications.
- Barnes, B. and D. Bloor (1992). 'Relativism, Rationalism, and the Sociology of Knowledge.' *Rationality and Relativism*. M. Hollis and S. Lukes. Cambridge, Massachusetts, Massachusetts Institute of Technology.
- Brown, J. L., P. S. Edwards, J. W. Atchinson, A. Lafayette-Lucey, V. Wittmer and M. E. Robinson (2008). 'Defining Patient-Centered, Multidimensional Success Criteria for Treatment of Chronic Spine Pain.' *Pain Medicine* 9(7): 851-862.
- Bueno, O. (2012). 'Styles of Reasoning: A Pluralist View.' *Studies in History and Philosophy of Science* 43: 657-665.
- Bührmann, M. (1982). 'Thwasa and Bewitchment.' *South African Medical Journal* 61(23): 877-879.
- Crombie, A. C. (1994). *Styles of Scientific Thinking in the European Tradition: The History of Argument and Explanation Especially in the Mathematical and Biomedical Sciences and Arts*. London, Duckworth.
- Duhem, P. (1906, 1991). *The Aim and Structure of Physical Theory*. Princeton, Princeton University Press.
- Flew, A. G. N. (1979). Is the Scientific Enterprise Self-Refuting? *Eighth International Conference on the Unity of the Sciences*, Los Angeles.
- Fordred-Green, L. (2000). 'Tokoloshe Tales. Reflections on the Cultural Politics of Journalism in South Africa.' *Current Anthropology* 41(5): 701-712.
- Forrester, J. W. (1996). 'If p, then what?' Thinking in cases.' *History of the Human Sciences* 9(1-25).
- Frith, J. (2012). 'Syphilis - Its Early History and Treatment Until Penicillin and the Debate on its Origins.' *Journal of Military and Veterans' Health* 20(4).
- Hacking, I. (1982). 'Language, Truth and Reason.' *Rationality and Relativism*. M. Hollis and S. Lukes. Oxford, Blackwell.
- Hacking, I. (1983). *Representing and Intervening - Introductory Topics in the Philosophy of Natural Science*.
- Hacking, I. (1988). 'On the Stability of the Laboratory Sciences.' *Journal of Philosophy* 20(507-514).
- Hacking, I. (1991). 'Artificial Phenomena.' *British Journal for the History of Science* 24: 235-241.
- Hacking, I. (1992a). 'The Self-Vindication of the Laboratory Sciences.' *Science as Practice and Culture*. A. Pickering. Chicago, Chicago University Press: 29-64.
- Hacking, I. (1992b). 'Statistical Language, Statistical Truth and Statistical Reason: The Self-Authentication of a Style of Reasoning.' *Social Dimensions of Science*. E. McMullin. Notre Dame, Illinois, University of Notre Dame Press: 130-157.
- Hacking, I. (1992c). 'Style' for Historians and Philosophers.' *Studies in History and Philosophy of Science* 23(1): 1-20.
- Hacking, I. (1996). 'The Disunities of the Sciences.' *The Disunity of Science*. P. Galison and D. J. Stump. Stanford, California, Stanford University Press.
- Hacking, I. (2004). 'Critical Notice of Bernard Williams, "Truth and Truthfulness: An Es-

- say in Genealogy". *Canadian Journal of Philosophy* 34(1): 137-148.
- Hacking, I. (2009). *Scientific Reason*. Taipei, National Taiwan University.
- Hacking, I. (2012). "Language, Truth and Reason' 30 Years Later." *Studies in History and Philosophy of Science* 43: 599-609.
- Hanson, N. R. (1958). *Patterns of Discovery*. Cambridge, Cambridge University Press.
- Horsthemke, K. (2010). 'African and Afrikaner 'ways of knowing': Truth and the problems of superstition and 'blood knowledge'.' *Theoria* 57(123): 27-51.
- Kusch, M. (2010). 'Hacking's historical epistemology: A Critique of Styles of Reasoning.' *Studies in History and Philosophy of Science* 41: 158-173.
- Lakatos, I. (1970). 'Falsification and the Methodology of Scientific Research Programmes.' Imre Lakatos. *The Methodology of Scientific Research Programmes. Philosophical Papers. Volume 1*. J. Worrall and G. Currie. Cambridge, Cambridge University Press: 8-101.
- Lindemann, M. (2015). 'Disease and Medicine.' *The Oxford Handbook of Early Modern European History. Volume 1 Peoples and Place*. H. Scott. Oxford, Oxford University Press.1: 94.
- Mlisa, L.-R. N. (2009). Ukuthwasa Initiation of Amagquirha-Identity Construction and the Training of Xhosa Women as Traditional Healers. PhD, University of the Free State.
- Moro, P. A. and J. E. Myers (2009). *Magic, Witchcraft, and Religion: A Reader in the Anthropology of Religion*. New York, McGraw-Hill.
- Mutwa, C. (1996). *Isilwane: The Animal*. Cape Town, Struik.
- Mzimkulu, K. G. and L. C. Simbayi (2006). 'Perspectives and Practices of Xhosa-speaking African Traditional Healers when Managing Psychosis.' *International Journal of Disability, Development & Education* 53(4): 417-431.
- Papineau, D. (1993). *Philosophical Naturalism*. Oxford, Blackwell.
- Peek, P. M. and K. Yankah (2004). *African Folklore. An Encyclopedia*. New York, Routledge.
- Putnam, H. (1975). 'What is Mathematical Truth?' *Mathematics, Matter, and Method. Philosophical Papers (Volume 1)*. H. Putnam. Cambridge, Cambridge University Press.
- Quine, W. v. O. (1951). 'Two Dogmas of Empiricism.' *The Philosophical Review* 60(1): 20-43.
- Quine, W. v. O. (1960). *Word and Object*. Cambridge, Massachusetts, Massachusetts Institute of Technology.
- Resnik, M. D. (1997). *Mathematics as a Science of Patterns*. Oxford, Clarendon Press.
- Ritchie, J. (2012). 'Styles for Philosophers of Science.' *Studies in History and Philosophy of Science* 43: 649-656.
- Robinson, M. E., J. L. Brown, S. Z. George, P. S. Edwards, J. W. Atchinson, A. T. Hirsh, L. B. Waxenberg, V. Wittmer and R. Fillingim, B. (2005). 'Multidimensional Success Criteria and Expectations for Treatment of Chronic Pain: The Patient Perspective.' *Pain Medicine* 6(5): 336-345.
- Ruphy, S. (2011). 'From Hacking's Plurality of Styles of Scientific Reasoning to "Foliated" Pluralism: A Philosophically Robust Form of Ontologico-Methodological Pluralism.' *Philosophy of Science* 78: 1212-1222.
- Tucker, F. (2007). 'Kill or Cure? The Osteological Evidence of the Mercury Treatment of Syphilis in 17th to 19th-century London.' *London Archaeologist*(Spring): 220-224.
- Wanderer, J. (2012). 'The Happy Thought of a Single Man: On the Legendary Beginnings of a Style of Reasoning'.' *Studies in History and Philosophy of Science* 43: 640-648.
- Williams, B. (2002). *Truth and Truthfulness. An Essay in Genealogy*. Princeton, Princeton University Press.
- Wingblad, B., H. Brodaty, S. Gauthier, J. C. Morris, J.-M. Orgogozo, K. Rockwood, L. Schneider, M. Takeda, P. Tariot and D. Wilkinson (2001). 'Pharmacotherapy of Alzheimer's disease: is there a need to redefine treatment success?' *International Journal of Geriatric Psychiatry* 16(7): 653-666.
- Wittgenstein, L. (1953, 2009). *Philosophical Investigations*. London, Wiley-Blackwell.

Wittgenstein, L. (1969). *On Certainty*. Oxford, Blackwell.

Wittgenstein, L. (2009 [1953]). *Philosophical Investigations*. London, Wiley-Blackwell.

Bibliography

- Hacking, I. (1982). 'Language, Truth and Reason.' *Rationality and Relativism*. M. Hollis and S. Lukes. Oxford, Blackwell: 48-66.
- Hacking, I. (1983). *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*. Cambridge, Cambridge University Press.
- Hacking, I. (1988). 'On the Stability of the Laboratory Sciences.' *Journal of Philosophy* **20**(507-514).
- Hacking, I. (1991). 'Artificial Phenomena.' *British Journal for the History of Science* **24**: 235-241.
- Hacking, I. (1992a). 'The Self-Vindication of the Laboratory Sciences.' *Science as Practice and Culture*. A. Pickering. Chicago, Chicago University Press: 29-64.
- Hacking, I. (1992b). 'Statistical Language, Statistical Truth and Statistical Reason: The Self-Authentication of a Style of Reasoning.' *Social Dimensions of Science*. E. McMullin. Notre Dame, Illinois, University of Notre Dame Press: 130-157.
- Hacking, I. (1992c). 'Style' for Historians and Philosophers.' *Studies in History and Philosophy of Science* **23**(1): 1-20.
- Hacking, I. (1996). 'The Disunities of the Sciences.' *The Disunity of Science*. P. Galison and D. J. Stump. Stanford, California, Stanford University Press: 37-75.
- Hacking, I. (2009). *Scientific Reason*. Taipei, National Taiwan University.
- Hacking, I. (2012). 'Language, Truth and Reason' 30 Years Later.' *Studies in History and Philosophy of Science* **43**: 599-609.
- Williams, B. (2002). *Truth and Truthfulness. An Essay in Genealogy*. Princeton, Princeton University Press.