

Heidegger, Measurement and the 'Intelligibility' of Science

Denis McManus

1. Introduction: Heidegger and Science

This paper provides a sympathetic reading of Heidegger's early remarks on science. The prospects for such a reading may seem dim since his overall philosophical outlook appears to be anti-naturalist with problematic idealist leanings; for example, despite the fact that Heidegger claims to reject realism and idealism (a claim I will refer to as (C1)), he attacks a conception of the constitution of the non-human world as made of up what he calls 'present-at-hand' [*vorhanden*] objects and insists instead on the primacy of what he calls 'ready-to-hand' [*zuhanden*] objects, objects such as hammers and spanners, objects whose identity is seemingly determined by their place in human practices. (In what follows, I will refer to this attack and this 'primacy' claim collectively as (C2).) Moreover, his more specific remarks on science seem intended to reveal *a priori* commitments implicit within the thought and practice of scientists, commitments which sit uncomfortably with the claim to objectivity normally made for scientific knowledge. Much of this paper will be devoted to two of these commitments:

(C3) Scientific knowledge presupposes a 'prior' or 'antecedent [*vorgängige*]' projection of the state of Being' of the objects that scientific knowledge claims to describe.

(C4) Scientific knowledge presupposes—is bound up with, is unintelligible without reference to—certain specific practices.

I have formulated (C4) in deliberately vague terms but all of Heidegger's commentators agree that he wants to make a claim of something like this form. The puzzle that this paper addresses, in connection with (C1–4) and (C5–6) to be introduced soon, is: can we assign clear senses to the claims they embody and, if so, can those claims possibly be true? (C1), for example, is a claim often made on Heidegger's behalf;¹ one contribution that I hope my paper makes is to set out a clear sense of just what such a claim might mean, of just what it might mean to 'reject both realism and idealism'.

I begin in Sec. 2 by sketching in very broad brush-strokes a map of some philosophical terrain, one which identifies two particular questions concerning

what it is for thought to be intelligible and assigns (admittedly rough) senses to the terms, 'realism' and 'idealism'.² Sec. 3–4 present (C2–4) and the way in which they invite an idealist construal; Sec. 5 argues, however, that (C2) is best understood as questioning whether Sec. 2's questions—and hence their proposed realist and idealist answers—make sense; Sec. 6–7 build on that argument, proposing that when we reflect on our practices of measurement, we can see (C3) and (C4) as articulating how measurement is made possible by modes of understanding that are naturally labelled 'practical',³ and embody in a recognizable way 'projections of the Being' of that which is measured, but in connection with which Sec. 2's realist/idealist questions of intelligibility make no sense. As a result, we also acquire a sense of how our observation of the *Vorhanden* might be said to 'presuppose' mastery of the *Zuhanden* and an appreciation of the distance between Heidegger's proposals and problematic realisms and idealisms. In other words, we acquire an interpretation and defence of (C1–4). I elaborate upon this in Sec. 8–10 where I respond to three different ways in which one might attack my Heideggerian account of the relationship between the measured and our practices of measurement.

There have been several notable attempts in recent years to demonstrate the relevance of Heidegger's work to an understanding of the sciences;⁴ these attempts have taken a central part of their brief to be to dispel the impression that Heidegger is, in some way, hostile to the sciences and the interpretation I offer can be seen as standing in this tradition too. Nevertheless, Heidegger is also concerned to reveal (C5) a way in which scientific practices can obscure as well as illuminate our worlds and (C6) a 'forgetfulness of Being' in which he suggests the sciences necessarily partake (EP 224, HCT 1–2, PICPR 23–24).⁵ To understand how there can be these two sides to the Heideggerian story and how that story might yet be a plausible one about science as we know it, we must turn, I suggest, to his discussion of authenticity.⁶

Sec. 11–12 show how my account still leaves room for a notion of descriptive frameworks 'failing to fit' the world; crucially though, the issues that such failures raise differ from those which Sec. 2 sets out, and with which realists and idealists contend, by virtue of being, in a sense, questions of value or of self-knowledge: a certain kind of pernicious emptiness can enter our scientific discourse, an emptiness which I use my earlier discussion of measurement to throw into relief and which, in Sec. 13, I suggest is naturally characterised in the terms that articulate Heidegger's notion of inauthenticity. What this reveals is not only a reading of (C5–6) but also a new dimension on which we may plot 'intelligibility' and 'unintelligibility', one which Sec. 2's questions only obscure. When inauthentic—a condition into which the working scientist is constantly in danger of falling—our words are unintelligible, nonsensical; but, to adapt Wittgenstein's words, 'it is not as it were [their] sense that is senseless' (1967 sec. 500), their saying something that is ill-suited to making claims about the world; instead our words are empty or, to use Heidegger's term, idle.

2. Some Philosophical Terrain: Intelligibility as Con-formity

Characteristically, post-Cartesian philosophy orients itself around sceptical questions concerning whether we really have knowledge of the external world, other minds, the past, etc. But arguably, when we worry that our thoughts about the external world, say, might be false, we presuppose an answer to a certain question about what one might call the 'intelligibility' of those thoughts: how must our thoughts and that world be constituted for it to be possible for the former to represent or misrepresent the latter?

One of the most basic thoughts of philosophy can be seen as an answer to that question: that thoughts and the world share 'forms', with the 'intelligibility' of thought envisaged as something like a fit, an isomorphism, between the 'form of thought' and the 'form of the world'. The latter refers not to the particular way in which, as a matter of contingent fact, the world happens to be but instead to something that might be called the world's 'logical' or 'metaphysical possibilities': the objects that happen to exist within it, as well as those that could happen to exist in it, belonging to certain fundamental kinds, possessing certain very fundamental or essential properties and standing to one another in certain very fundamental or essential relations. In the relevant senses of 'form' and 'correspondence', the 'form' of the thought, 'There is a black pen on the table in front of me', would 'correspond' to the 'form' of the world in which there happens to be a blue pen on the table in front of me in that that thought embodies a false but nonetheless intelligible claim about that world: that thought articulates another way in which the world might have been, reflecting, in some sense, the kinds of objects that might be found in that world, the kinds of properties that they might have and the kinds of relation in which they might stand.

It is this conception of intelligibility that I will call 'intelligibility as conformity'. To ask how exactly one ought to understand the key notions it involves—'contingency', 'logical' and 'metaphysical possibility', 'kind', 'being fundamental' and 'being essential'—is obviously to raise fundamental philosophical questions. But I take it that anyone familiar with a little philosophy has a rough sense for how these notions are meant to be understood here.

If one adopts a con-formist conception of intelligibility, one immediately confronts a second question: how do thought and world come to have common forms? To ask this question is not to ask how a thought comes to be true of a particular fact but rather how a thought comes to be the kind of thing that is capable of being true or false of a particular fact: an answer to the latter question would provide an account of the seemingly manifest fact that we *can* think about the world, this feat understood as the existence of a con-formity between our thoughts and the world.

Answers to this second question come in two very broad kinds: what I will call 'realist views', which state that the form of the world (somehow) dictates that of thought, and what I will call 'idealist views', which state that the form of thought (somehow) dictates that of the world. Heidegger reads Kant's first *Critique* as neatly summing up the problems that these alternatives face. He identifies there

the proposal that 'all comportment toward beings carries within it an understanding of the manner and constitution of the being of the beings in question' (PICPR 16).⁷ Our capacity to recognize an object of type *x* as an *x* presupposes, the argument goes, an understanding of what it is to be an *x*. But this immediately raises a problem: how can one acquire a mastery of the concept of an *x*, this capacity to recognize something as an *x*? And what basis does this mastery have? It cannot be gathered *a posteriori*: we cannot acquire an understanding of what an *x* is by encountering an *x* unless we are able to recognize an *x* as an *x*, which is precisely the capacity for which we are seeking to account. As Sellars puts it:

[I]nstead of coming to have a concept of something because we have noticed that sort of thing, to have the ability to notice a sort of thing is already to have the concept of that sort of thing, and cannot account for it. (1956 sec. 10)

This realisation might prompt one to claim that the understanding in question is instead something that arises from *within us*, that it is, in some sense, innate. But this understanding is meant to be an understanding precisely of entities which are not themselves our creation, insight into that which we, as finite creatures, encounter as coming 'from without', as 'other than' us. So why should 'an understanding arising within us' have any bearing on such entities? Kant's articulation of this point is to present this insight as specifically a *synthetic* kind of *a priori* insight: it seems to be a substantial anticipation of the ways of the world though not one derived from acquaintance with that world.

So we face a dilemma. Realism attracts us because it preserves the 'independence' of the objects we judge; the problem with realism is that it also renders our understanding of those objects a mystery. The idealist 'solution' is to bite the bullet and sacrifice the status of that understanding as of entities which are truly *other than us*; but, for many philosophers, that sacrifice, which would make room for an *a priori* understanding, is still too great to make.⁸

3. 'The Antecedent [*Vorgängige*], Non-objective, Field-demarcating Projection of Beings as Nature' (EP 196)

It is tempting to place Heidegger's (C3) in the territory that our map assigns to the idealists:

The classical example of the historical development of a science and even for its ontological genesis, is the rise of mathematical physics. What is decisive for its development does not lie in its rather high esteem for the observation of 'facts', nor in its 'application' of mathematics in determining the character of natural processes; it lies rather in *the way in which Nature herself is mathematically projected*. In this projection something constantly present-at-hand (matter) is uncovered beforehand, and the horizon is opened so that one may be guided by looking at those

constitutive items in it which are quantitatively determinable (motion, force, location, and time). Only 'in the light' of a Nature which has been projected in this fashion can anything like a 'fact' be found and set up for an experiment regulated and delimited in terms of this projection. The 'grounding' of 'factual science' was possible only because the researchers understood that in principle there are no 'bare facts' [*'blossen Tatsachen'*]. In the mathematical projection of Nature, moreover, what is decisive is not primarily the mathematical as such; what is decisive is that this projection *discloses something that is a priori*. Thus the paradigmatic character of mathematical natural science does not lie in its exactitude or in the fact that it is binding for 'Everyman'; it consists rather in the fact that the entities which it takes as its theme are discovered in it in the only way in which entities can be discovered—by the prior [*vorgängigen*] projection of their state of Being. (BT 413–14)⁹

In articulating (C3), Heidegger presents scientific observation and theorizing as another case of a 'comportment toward beings' that 'carries within it an understanding of the manner and constitution of the being of the beings in question'. The development of that thought that endows it with idealist airs is Heidegger's apparent proposal that the source of that presupposed understanding is ourselves; why else, we might ask, would Heidegger describe it as a 'projection'? But how then can findings based on such projection be anything other than artefactual, creatures of an imposed framework without roots in that upon which it is imposed? Wouldn't a need for a 'scientific projection' undermine the *prima facie* status of scientific knowledge as knowledge of the world as it is 'out there', a world that the scientist did not create?

4. *Zuhandenheit*, *Vorhandenheit* and the 'Praxis of Theoretical Research'

This view may seem to chime with (C2). Exactly what Heidegger means by *Zuhandenheit* and *Vorhandenheit* and in what sense the former is 'fundamental' or has 'primacy' are difficult, important and controversial questions. At different points, Heidegger seems to mean different things by 'the *Vorhanden*', including the objects studied by natural science, a particular ontological category in which philosophy characteristically but erroneously includes all entities, and *meaningless* objects, mere *thats* without place in any system of reference or description.¹⁰ The entities whose 'kind of Being' is *Zuhandenheit* Heidegger calls '*das Zeug*' (which Macquarrie and Robinson translate as 'equipment' (BT 98)) and, when introducing this term, he gives an illustrative list: 'In our dealings we come across equipment for writing, sewing, working, transportation, measurement [*Messzeug*]' (BT 97). For objects to present themselves with this kind of Being, they must present themselves within practices, 'dealings', of ours: for example, we encounter things as hammers in the course of building or repairing. But Heidegger also insists that the experience of perceiving *vorhanden* objects is,

in some sense, dependent on a background provided by our practices: the *Vorhanden* loom, first and most immediately, when *zuhanden* objects break or go missing, but also within the distinctive practices of doing science. This takes us to (C4):

[T]heoretical research is not without a *praxis* of its own. Reading off the measurements which result from an experiment often requires complicated 'technical' set-up [*technischen Aufbau*] for the experimental design. Observation with a microscope is dependent upon the production of 'preparations'. Archeological excavations, which precedes any Interpretation of the 'findings', demands manipulation of the grossest kind. But even in the 'most abstract' way of working out problems and establishing what has been ordained, one manipulates equipment for writing, for example. However 'uninteresting' and 'obvious' such components of scientific research might be, they are by no means a matter of indifference ontologically. The explicit suggestion that scientific behaviour as a way of Being-in-the-World, is not just a 'purely intellectual activity', may seem petty and superfluous. If only it were not plain from this triviality that it is by no means patent where the ontological boundary between 'theoretical' and 'atheoretical' behaviour runs! (BT 409)

Part of the interpretative controversy alluded to above is that if 'theoretical research is not without a *praxis* of its own'—if 'the theoretical' has a 'primordially practical character' (EP 199)¹¹—then that would seem to suggest, as, for example, Blattner and Rouse have argued, that its peculiar objects would be fundamentally *zuhanden* after all.¹²

All I wish to note here is that whether one sees the *Zuhanden* as somehow more fundamental than the *Vorhanden* or sees the *Vorhanden* as themselves *zuhanden*, non-*Dasein* entities will turn out to be *fundamentally* characterisable in terms that essentially refer us to the existence and activities of *Dasein*.¹³ Such a dependency of our understanding of the entities around us upon the different ways in which we practically engage with these objects seems to be another source in Heidegger for a problematic idealism.

5. Understanding Without Fit: Manipulating the *Zuhanden*

But things cannot be quite that simple: Heidegger numbers among those who have suggested that we ought to reject both realism *and* idealism as confused. Many philosophers have made this claim (C1) but they typically disappoint; they normally turn out, despite their claims, to be mired in a species of realism or idealism after all. Is Heidegger any different? And do we have a clear sense of what it might mean to 'reject realism and idealism' anyway?

I suggest that Heidegger's intent in concentrating our attention on *zuhanden* objects is precisely one of undoing a shared assumption of the idealists and realists described in Sec. 2, namely, that intelligible thoughts 'con-form' with the

world, that we can think about the world because the form of our thinking fits the form of the world. Corresponding to his rejection of the assumption that our most basic experience of the entities around is experience of them as *vorhanden* is Heidegger's rejection of the assumption that intelligent activity is a matter of bringing together a thinker and a world, as we might imagine when we fixate on our relations to *vorhanden* objects, relations of observation and contemplation. Instead:

The kind of dealing which is closest to us is . . . not a bare perceptual cognition, but rather that kind of concern which manipulates things and puts them to use. (BT 95)

Heidegger identifies a number of aspects of such activity, including the fact that when we come to master the tools involved, they acquire a 'transparency' for us; in our 'primordial relationship' to it, the hammer 'withdraws' (BT 99):

The less we just stare at the hammer-Thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become. (BT 98)

I suggest that a further crucial feature of such forms of intelligent action is that they are themselves characterised by reference to the 'objects' that they involve. Hammering, for instance, is an activity that involves . . . hammers; it is an activity that takes place *among* particular objects, a way of using objects that cannot be characterised except by reference to the relevant objects. As a result, there is no sense to be made of the idea of a *fit* between the person's activities and the objects, of the idea that hammering and hammers fit—or might fail to fit—one another. We cannot distinguish 'what the person is doing' from 'what is happening to the objects involved' in a way that will yield two separate elements that might fit—or fail to fit—one another, because 'what the person is doing' is itself a matter of 'what is happening to the objects involved'. This does not imply that we cannot distinguish the craftsman from his tools—'[t]he shoemaker is not the shoe' (BPP 171)—but it does imply that what makes him a craftsman is something to do with those tools: to understand what hammering is, is to understand hammers and to understand what hammers are is to understand hammering. The activities of the person are not constituted independently of the relevant objects and thus, between them, there can be no question of correspondence or fit. These activities and these objects are, one might say, 'internally related'. As Heidegger puts it, a *zuhanden* object 'can genuinely show itself only in *dealings cut to its own measure* (hammering with a hammer, for example)'; hammering 'appropriates' hammers 'in a way which could not possibly be more suitable' (BT 98, italics added).

According to Heidegger then, the realist/idealist question of fit presupposes an ontology of subjectivity that is without foundation. Its appeal, he suggests, results from our fixation on observation and contemplation. But even these are worldly activities:

Knowing is nothing but a mode of being-in-the-world; specifically, it is not even a primary but a founded way of being-in-the-world, a way which is always possible only on the basis of a non-cognitive comportment. (HCT 164)

If so, we do not really understand the question of fit that realists and idealists propose to answer: when we reflect on thought, including scientific thought, we will always, perhaps unwittingly rely, at some point, on an understanding of the thinker as already *in* the world about which she thinks.

In the rest of this paper, I offer a defence and elaboration of this suggestion through an exploration of how (C3) and (C4) can be seen as capturing insights into our practices of measurement: such practices embody 'projections of the Being' of that which is measured which are antecedent to—go before, *vor-geht*—our arrival at any determinate measurements, 'projections' which we master when we acquire certain recognizably 'practical', 'worldly' forms of understanding, and in connection with which con-formist questions of fit make no sense.

6. Measurement, Applied Arithmetic and the Need for an 'Antecedent' and 'Practically-enacted' 'Projection'

It makes sense to talk about discovering a particular number of stones because this has implications for what one might say about them—'how many there are'—in a minute's time or when seen from a different angle, or when inspected by other people we would describe as 'competent counters'. Shadows that a group of objects throw, however, do not present the same stable patterning: different people may individuate the shadows differently and the forms that the shadows take may constantly fluctuate. Since our 'results' lack the robust implications that our enumeration of stones boasts, there is very little point in counting such shadows or, for similar reasons, the clouds in an overcast sky or the ripples on the surface of a lake. We certainly could come up with *some* figures but the 'results' derived would be unreliable in the sense that there would be virtually nothing that we could do with them: if our assessments of the number of stones before us were as fluid, we could not use those assessments in anything like the way we presently do and to the suggestion that one counts stones one might reply not merely 'Why?' but 'Why bother?'

One might propose that such cases show us a particular descriptive framework—here arithmetic—'failing to fit' the world. But an immediate objection to this proposal would be to say that it may well be possible to apply arithmetic in such cases but that it may take some work before we discover how to do it. My concern here is with just what such 'work' and such 'discoveries' look like.

Let us consider an example. Pouring one amount of water into a tank which already contains another amount of water does not yield two amounts of water;

but the level of the water increases. Let us suppose that each 'amount' is the contents of a particular cup filled to the brim. Let us further suppose that the cross-section of the tank is uniform from top to bottom and that there are gradations on the side of the tank, equally spaced all the way from the top to the bottom. We can now predict the number of gradations covered by remembering how many times we poured in cups of water that were full—if pouring in one cup's worth raises the level one gradation, pouring in another will raise the level up to the second gradation from the bottom—and we can now answer some interesting questions: for example, if we know how many times we poured the contents of the cup into the tank, then we can tell whether the cup was always full to the brim by seeing how many gradations the total amount covers.

By introducing the 'technology' of tanks with uniform cross-sections and equally-spaced gradations and the practice of using a particular container so as always to add what we come to call a 'standard unit' volume of water, we are now treating water in a way which allows us to apply arithmetical rules to it meaningfully.¹⁴ In this "*technischen*" *Aufbau*', we have found a way of treating this domain in a way analogous to that in which we treat other 'countables'; a domain which appeared to resist arithmetically-informed description has succumbed.¹⁵

7. The 'Founding' of Measurement in *Zuhandenheit*: Transparency and Fit

In this example, we see how particular measurements presuppose an 'interpretation', a 'projection of the Being', of the domain measured and also the *kind* of work—the kind of stage-setting, as Wittgenstein might put it—involved in establishing such a 'projection': it is an innovation in the sphere of the *Zuhanden*, what one might call a 'practical' development.

The *Messzeug* necessary share key characteristics of paradigmatic *zuhanden* objects. For example, our normal relation with these tools and the framework of description that they enact is usually one of unreflective use; the usual 'transparency' to us of such tools shows up in the fact that we need to remind ourselves of their role (as the preceding section served to do) and normally only become aware of their playing that role when their use misfires, when we realise that the cup leaks or that the cross-section of the tank is not quite uniform after all.

But what about the crucial question of 'fit', and its inapplicability in connection with the *Zuhanden*? There is something that merits the label 'understanding' here in that one can apply these measuring tools correctly or incorrectly; but there would be something potentially misleading in calling it an understanding 'of the way the world is.' I want to suggest that what we discover when we develop the technology of measuring cups etc. is not the way in which liquids have hitherto hidden their 'arithmeticality'. Instead we have reconceptualised liquids so as to fore-ground something about them that we can describe in arithmetical ways. We place these entities within a different 'projection' and

allow other features of theirs to become apparent. We do not learn how to measure characteristics that we previously couldn't measure; instead we come to measure characteristics with which we had previously not engaged.

To use an analogy, imagine a person who did not understand that to measure the height of a person one needs to lay the measuring rod *straight* along the body, as opposed to criss-crossing all the way up. One *could* proceed in that way—perhaps Wittgenstein's famous 'wood-sellers' represent an analogous case (Wittgenstein 1978 Part I)—but ought one to say that such a person will produce *mistaken* measurements of height, whereas the person who lays the measuring rod straight along the body produces *correct* measurements of height? In one sense, that seems right but it might mislead, for instance, if one concluded that laying the measuring rod straight along the body must therefore be the *correct* way of measuring height. This formulation sounds like a matter of fact: 'It turns out that this happens to be the correct way of measuring height'. But it isn't; laying the measuring rod straight along the body *is* what it is to measure height. To learn how to measure heights by learning to lay the measuring rod straight along the body is not so much a matter of learning *how* to measure heights as how to measure *heights*. It is not that one learns something *about* heights; rather one learns *of* heights. To echo a sentence I used earlier, one might say that the activities of the subject—laying the measuring rod *straight* along the body—are not constituted independently of those of the relevant objects—their characteristic being measured being precisely their *height*. These two kinds of 'activity' on the part of 'subjects' and 'objects' are, one might say, 'internally related'; no question of 'fit' emerges here because heights too 'show themselves only in dealings cut to their own measure'.¹⁶

8. 'Impure Beholding' and the Manipulating/Seeing Distinction

This view clashes with another, familiar interpretation of the contribution that the technology of measurement makes. In *Being and Time*, Heidegger identifies—as 'the foundation of western philosophy' no less—the thesis that '[p]rimordial and genuine truth lies in pure beholding' (BT 215). Immediately after the passage from BT 409 that I quoted in Sec. 4, Heidegger articulates the following possible objection to his remarks on the 'praxis' of 'theoretical research', a natural objection for we philosophers with our professional commitment to the 'remarkable priority of "seeing"' (BT 215):

Someone will hold that all manipulation in the sciences is merely in the service of pure observation—the investigative discovery and disclosure of the 'things themselves'. 'Seeing', taken in the widest sense, regulates all 'procedures' and retains its priority. (BT 409–10)

From this perspective, 'manipulative' 'procedures' merely serve to get us into a position from which our powers of 'pure observation' can take in what there is to see; different 'procedures' more or less successfully achieve that objective

but such 'external precautions' (EP 178) are of no significance when it comes to characterising what it is that we come to see; thought of such 'procedures' can be dispensed with once we are ready to allow 'pure observation' to take over once again.

But if applied to the contribution that the technology of measuring cups etc. makes, this picture is misleading. The emergence of such tools is at the same time a reconceptualisation of the subject-matter: we find a way to apply arithmetic to liquids by introducing a refined sense in which we are dealing with 'volumes' of liquid and we articulate criteria of identity for such 'volumes' through the invocation of tools like measuring cups. The 'practical' achievement of mastering this *Messzeug* is not merely learning a means for describing or accessing a certain kind of entity and its properties; it is learning what kind of entities and properties these are. 'Such activity belongs to the sciences [in question]' in that if one wants to understand the entities and the properties that these sciences study, one must master these activities: 'the objects of the relevant sciences demand such activities' (EP 178).

From this perspective, these tools appear to be more than merely contingently linked to the conceptualisation that we use when we use those tools. There are, of course, certain dependencies that can be immediately ruled out: clearly the existence of any one particular measuring cup is insignificant, as is the particular standard sizes of measuring cups we use. But it seems plausible to say that an inability to understand how such cups or some analogue thereof need to be used in such contexts would constitute a failure to understand what it is to describe liquids in terms of their volumes: imagine a person who does not worry over how full the measuring cup is; or recall the person who measures people by laying a measuring rod criss-cross along their bodies. What we seem to confront here are aspects of our lives which do not fit naturally with a hard distinction between 'manipulation' and 'seeing'; 'the practical' and 'the cognitive' fade into one another. Here, as Heidegger says in the passage quoted in Sec. 4, "it is by no means patent where the ontological boundary between "theoretical" and "atheoretical" behaviour runs!".

9. Improvement in Methods of Measurement

Another way in which one can seemingly revive a question of fit between methods of measurement and what they measure is to point to the seemingly manifest fact that our methods of measurement can be improved upon: isn't such improvement the production of an understanding of that which is measured which is, in some sense, deeper, more truthful, than that which previous methods provided, a 'more suitable appropriation' of the measured?

I cannot give a comprehensive response to this criticism. But I will argue that some of the cases we are most likely to have in mind here may not constitute the counter-examples that we might initially assume and that therefore such cases of 'improvement' need to be scrutinised on a case by case basis. I will comment in

this section on two kinds of 'improvement' and in greater detail in Sec. 11–13 on a third.

Firstly and briefly, what of technical innovations, such as more powerful microscopes, that allow us to produce finer grained measurements? Such innovations, I suggest, allow us to learn more about particular lengths, say, but cannot be seen as developing our understanding of length itself. Such innovations might be less misleadingly compared to the introduction of different units of measurement, something which no one, I imagine, is tempted to see as making available measurements that are truer or deeper.

A second (though related) kind of 'improvement' is the replacement by descriptions like '5 litres as opposed to 4 litres' of descriptions like 'a lot as opposed to a little'. Have we acquired a more truthful description by switching from the latter to the former? It is difficult to deny that the latter is a more *exact* description than the former; but it remains to be shown that a more exact description is a more truthful description. I described the introduction of the technology of measuring cups, etc. as bringing about a reconceptualisation of volume. Part of what that means is that a *different* set of truths are made available to us; the measurements produced by the old system are not shown to be false by the introduction of the new system. There is no doubt that there are tasks which can be performed with the new system that cannot be performed with the old. But the reverse is also true, as Wittgenstein argues in a well-known passage:

If I tell someone 'Stand roughly there'—may not this explanation work perfectly? . . . But isn't it an inexact explanation?—Yes; why shouldn't we call it 'inexact'? Only let us understand what 'inexact' means? For it does not mean 'unusable'? . . . 'Inexact' is really a reproach, and 'exact' is praise. And that is to say that what is inexact attains its goal less perfectly than what is more exact. Thus the point here is what we call 'the goal'. Am I inexact when I do not give our distance from the sun to the nearest foot, or tell a joiner the width of a table to the nearest thousandth of an inch?

No *single* ideal of exactness has been laid down; we do not know what we should be supposed to imagine under this head—unless you yourself lay down what is to be so called. But you will find it difficult to hit upon such a convention; at least any that satisfies you. (1967 Sec. 88)¹⁷

I have questioned whether we can give substance to the idea of 'fit' between a method of measurement and what it measures such that, for example, one method might be a better fit than another. Wittgenstein's discussion illustrates, and Sec. 11–13 will further explore, the difficulty of providing such substance, of turning a 'different kind of fit' into a 'better kind of fit', a 'more suitable appropriation'.

10. 'Impure Facts' I—How 'Projection' Differs from Falsification and Parochialism

Let us consider a third objection to my Heideggerian account, one which will take us back to the Kantian dilemma of Sec. 2. Since what 'pure beholding' would reveal would be 'pure facts', an emphasis on the 'praxis' of 'theoretical research' and on the 'internal-relatedness' of practices of measurement and the measured might be expected to cast doubt on the notion of 'pure facts' and my discussion has indeed drawn attention to the role of certain 'imposed' 'projections' or 'frameworks' in our making of some of the most mundane of scientific observations. Might that discussion then imply that forces of the sort that we would intuitively believe render scientific findings artefactual are actually to be found at work throughout the whole of science? And that all we have are artefacts? Or must we accept instead that science's explorations are confined to 'appearances' that are ineliminably informed by our subjective presumptions and renounce the notion that it reveals the world as it is in itself, a world we did not create? Indeed don't we have to restore an understanding of *Messzeug* and the measured as externally-related if we are to preserve the 'independence' of the latter?

We may indeed talk of 'projections' being 'imposed' on the world because we can certainly imagine our not using the *Messzeug* they inform and not attending to the particular kinds of facts that their use uncovers; moreover, Sec. 11–13 will identify a quite different sense in which the use of particular 'projections' might be said to be an 'imposition' that yields artefactual findings, though not a kind of 'imposition' that provides any comfort for the 'con-formist'. My concern here, however, is to uncover the confusion at the root of the worry set out in the preceding paragraph and the sense that it evokes of 'imposition', of 'confinement', of something somehow getting between us and how things are.

To begin to see the confusion, let us ask, if, having adopted the technology of measuring cups etc., I conclude that there are 5 litres of liquid in the container in front of me, what precisely the problematic 'presumption' might be. It cannot be that the measuring framework might be disguising the fact that the volume in question is, in fact, 4 litres or 6 litres, because those facts are articulated using precisely the same framework. The problem also cannot be that the volumes are *in litres*. There might well be an explanation of some sort—historical, cultural, biological even, as perhaps in the case of yards and feet—why certain units are adopted; but such explanations do not suggest that, so to speak, the subject matter itself demands that those units be adopted; in this sense, the choice of units is arbitrary.

Two more intuitions that might encourage the problematic 'imposition' thought have already been examined, firstly, the worry whether *our* way of measuring heights is the correct way—suggesting that it might turn out that heights (not any particular height but heights in general) are not as we supposed them to be—and, secondly, the worry that our methods of measurement might yet be 'improved'—so that our use of existing methods expresses a presumption

that the world reveals itself to those particular methods. I hope that I have, at least, weakened the power of these intuitions to doom those who use methods of measurement to the fate of finding no more than artefacts.

There remains, I suspect, the confused intuition that the use of our descriptive tools 'presumes', for example, that liquids have volumes full-stop! But what then is the contrasting way of things that this might occlude? That they have temperatures won't do, nor that they have geographical locations or perhaps owners, because none of these characteristics stand in any tension with the possession of a volume.¹⁸ The confused anxiety here would seem to be something like the worry that people might not have heights 'in and of themselves', that liquids might turn out not really to have volumes after all and instead ... Well, we don't know what to say.

There would be a related confusion in construing the account of science I have offered as inviting a worry that pragmatist accounts often invite, namely, that the sciences are now limited to revealing not how things are in themselves but merely aspects of those things that are bound up with particular sets of human, and hence local and contingent, interests: 'We want to know the physical properties of these elements, not how we can use them to build bridges or indeed any broader, *mere* know-how'. Although there is something to this construal, we need to consider in more concrete detail what the envisaged 'limitation' of science looks like. According to the Heidegger I have presented, the 'local' interests in question are, for example, in the heights and weights of objects; but the dream of revealing objects not with respect to any such interest but 'in themselves' is precisely a dream and a confused one at that. To approach objects with these particular interests is not to place between them and us parochial interests; rather it is to ask of them a determinate question; the (confused and impossible) alternative is to ask them to tell us not only how they are but also which of their aspects we are investigating!¹⁹

I do not wish to imply that other intuitions could not emerge that would suggest that our methods of measurement could 'obscure' or 'fail to fit' the world, not only because I do not think one can delimit in advance the ways in which we may confuse ourselves philosophically,²⁰ but also because I believe there is a sense in which the use of particular descriptive frameworks might well constitute an artefact-generating imposition, though not one which the notion of con-formism will help us understand. It is to this kind of 'imposition' that I will turn next and out of this discussion will emerge a reading of (C5–6).

11. 'Impure Facts' II—Artefacts and Unintelligibility as Emptiness

I will begin this final phase of the paper by identifying a sense in which phenomena which we have 'arithmetised' by the construction of a technology of measurement may, all the same, 'resist arithmetically-informed description': these phenomena may sustain enumerations and additions, but only ones that are somehow *empty, trivial*. I will then argue that the necessary involvement in

science of technologies of measurement reveals not that all observations thus enabled are artefactual but rather that some such observations are and others aren't and deciding which are which is a question that one might describe as one of value, of self-knowledge, of the place of those observations within our life construed more broadly, or indeed, as I suggest in Sec. 13, of what Heidegger calls 'authenticity'.

Let us take an example: *liberté, égalité, fraternité*. Is this a list of three ideas? The intuition that it is would suggest that we can count this domain too, the domain of ideas. But might that intuition rest merely on the fact that we have three separate *words* before us, a fact that only really 'supports' the claim that we can count words. Let us press that worry further. Does it make sense, for example, to ask how many ideas there are in *Leviathan*, or whether there are more or less in *Das Kapital*? One could certainly *construct* or *force* opinions about such matters, sometimes very easily: for example, if asked the number of ideas in *Leviathan*, it would certainly seem wrong to say 'zero' or 'a billion'. But the arithmetical 'interpretation' of this domain seems simply too *ad hoc* for there to be any substance in these figures that we might generate or in any argument that might arise on their basis. Do we, after all, really have *compelling* criteria for when ideas are distinguishable, criteria by reference to which my saying that there are thirty ideas in *Leviathan* and your saying thirty-one would require that one of us had made an error? What would the relevant criteria of 'error' be here? The existence of such criteria—the availability of a 'measuring cup' for ideas—would seem to be a minimum requirement for arithmetic really getting a foothold and, in our present case, it is not clear what such criteria would be.

Moreover, the problems that we face when trying to analyse a text are precisely those which will hinder the establishment of a 'unit of measure' using which one might start counting and adding here too. Disagreement over the meaning of a text might well be characterised—if rather colourfully—as disagreement over when 'the same idea' has disappeared and then reappeared or when one has been discarded and 'another' introduced etc. Compare one plausible interpretation of the failings of the utilitarian dream of adding together volumes of happiness: in order to apply the proposed calculus, we need to have solved many of just the kind of evaluative puzzles that utilitarianism promised to solve because that is necessary if we are to establish what an 'equivalent amount' of happiness is and the weighting that such amounts should be given. Is it true, for example, that attending a football match generates twice as much happiness as attending an opera, but that the latter ought to be weighted as twice as worthwhile as the former? In order to establish this descriptive framework, that was meant to eliminate moral disagreement, we seem to need an established set of agreed moral judgments in the background.

Such questions and the issues that they raise have, of course, generated large literatures. I merely wish to raise the possibility that the difficulties encountered here—understood within parts of those literatures as those of working out a protocol whereby a computer, say, might analyse a text and working out a plausible and applicable 'felicific calculus'—may indicate cases of a descriptive

framework 'failing to fit'. But my suggestion is not that we have finally found the kind of failure that con-formism imagines; rather such cases should prompt us to think about what we take 'the applicability of a descriptive framework' to be and the precise meaning of one 'fitting' or 'being resisted'.

If 'arithmetic being applicable' just meant 'numbers can be stuck on',²¹ then arithmetic can be said to be universally applicable. But are the figures we generate *useful*? Can we do anything sensible with them? If 'arithmetic being applicable' meant *that*, then there *do* seem to be limits on the applicability of arithmetic. In discerning such limits, we need to focus less on whether 'arithmetically-compliant' results can be obtained and more on the price that we pay in order to obtain them, how much *construction, technology* and *triviality* we must import. By ignoring these 'mere' circumstances, including the 'mere' 'practical' implications of these cases of application, we will misunderstand this sense in which arithmetic really does need to *find* application.

From this perspective, the mundane observation that we 'ordinarily' apply arithmetic only where arithmetic can be applied *significantly* has a philosophical importance beyond that of an observation about the 'pragmatics' of applied arithmetic. Indeed, a proper appreciation of this fact casts doubt on there being a clear distinction between 'pragmatic considerations' and something one might call the 'bare applicability' of arithmetic, between the 'usefulness' of arithmetic and its 'useableness'. Two senses of 'sensible' seem to merge here. One might say that one *cannot* count ideas—suggesting something akin to a contradiction—or that one *will not* count ideas—suggesting a mere lack of practical utility. But here saying whether something has a number is something about which one might well say there is no real fact of the matter: clouds and ideas can be counted but only through the construction of a highly artificial framework, one which we can use to yield sets of figures but only figures in which no one really *believes*. One might say of the figures that it supports that they are not 'useful' or even 'useable'; but, ultimately, we simply say that they aren't *used*: we don't really understand what it would be to use those figures. They appear instead as patterns produced by what we might call a '*merely* projected' arithmetic, empty patterns lacking a significance of their own which instead merely echo the mode of description that one is, for some reason, *insisting* on using.²²

12. Psychology and Methodological Fetishism

Such an insistence threatens to degenerate into a kind of methodological fetishism. Consider what I have called elsewhere 'Pythagorean fetishism',²³ the tendency to treat enumerable differences as, in themselves, what matters: examples might include some bureaucratic or technocratic demands for mathematical measures of 'performance' and some of the phenomena that Marx identifies in his reflections on money and commodity-fetishism. In such cases, a certain descriptive (here mathematical) model is imposed in order to try to track factors—'health', 'value', etc.—that are not obviously capturable in those terms.

Psychology is perhaps the most vivid case of the advance of a science depending on the development of such measures, a case where the thought and labour involved is most apparent and where the *Messzeug* regularly come in for explicit criticism. Central to the psychological study of personality, for example, has been the attempt to develop scales upon which personalities may be plotted—extroversion/introversion, neuroticism, schizotypal personality, etc. A routine worry about such scales and the questionnaires used to measure them is whether the measures produced have ‘ecological validity’, whether they really say anything about how people are in their lives away from psychologists. This is not a worry over whether they might have filled in the form incorrectly: the scores may be factually correct in this sense. But the significance of such scores remains moot. Similarly, consider how in describing behaviour—say the attachment of a child to a parent—psychologists take them out of their homes, impose certain tasks on the child and certain behaviours on the parent, train observers extensively and only then elicit the repeatable observations that they seek. Are then the patterns observed the product of this “*technischen*” *Aufbau*, the unnatural settings, the contrived tasks and behaviours and the training of the observers?

My Heideggerian answer is: Maybe, maybe not. I have no *a priori* basis to offer on which such a judgment might be made and making such judgments is not a task reserved for the philosopher; reflection on the validity of measures is one of the engines of development of a science and is one of the ways in which scientists do good science. Despite the impression some of his work may give, the Heideggerian view I have sketched in no way denies that mathematics and science can indeed embody productive and illuminating ‘disclosures’ of reality; they only cease to be so when we forget that they are particular disclosures, presupposing particular ‘projections’ of reality: ‘the scientific truth is only *one* kind and possibility of making manifest of beings’ (EP 203). Key to (C5), I suggest, is the notion that if we allow scientific ‘projections’ to, as it were, ‘take on a life of their own’ and treat them as *the* way in which reality discloses itself, then they can indeed constitute a threat to our understanding. To adapt Heidegger’s later warning about technology’s ‘ordering’, fetishised modes of description ‘drive[] out every other possibility of revealing’, ‘threaten[ing] to sweep man away . . . as the supposed single way of revealing’ (QCT 27, 32).

The notion that psychology *must* pursue mathematical measures in order to be a ‘real’, ‘exact’ science played an important role in the emergence of behaviourist psychology and the previous paragraph’s warning chimes with a familiar diagnosis of the perceived failures of that movement. In one sense, behaviourism succeeded in describing human conduct using variables that could be handled mathematically. The sense in which it failed was that the variables it used captured aspects of conduct in which no one was interested: what we could measure quantitatively repeatedly turned out to be no more than weakly associated with what we wanted to have measured. This realisation took a *long* time to emerge and its precise significance is still disputed. But such a methodological commitment in the face of insubstantial returns—quantification

was achieved but only with measures of negligible validity and thus at the price of triviality—might, I suggest, be a case of Pythagorean fetishism. The behaviourist psychologist generated figures that were, one might say, perfectly accurate but were also useless, meaningless. According to this diagnosis, his commitment to 'disclosing' psychological phenomena by pursuing an 'exact', 'mathematical science' makes him comparable to the man in the joke who searches for his keys not in the park where he dropped them but under the street light where he 'can see better'.²⁴

13. Emptiness and Inauthenticity

How do we make judgments of validity? How successfully a quantifiable measure tracks the important events in the 'life' of the non-quantified factor that interests us cannot itself be mathematically-established, unless by other measures of whose validity we are somehow confident. That a measure provides the basis for accurate predictions is often offered as grounds for its validity; but this presupposes that the terms in which we describe the predicted outcomes themselves have ecological validity.

One might say then that the scientist, understood as the doer of yet more experiments, is not in a position to evaluate the validity of the terms that he uses; to return to (C6), such a figure experiences what one might indeed call a certain 'forgetfulness of Being', concerned, as he is, with improving his capacity to predict certain events but untroubled by the question of the significance, the meaning, of those events.²⁵ A reservation I have about such a picture is, as I have indicated, that it overlooks the reflection on the validity of measures in which practising scientists do engage; nevertheless, such judgments certainly pose a peculiar challenge which cannot be assimilated to yet more experimental testing, which a certain kind of positivism might present as 'what scientists do'. I will suggest instead that this challenge bears comparison with that which Heidegger calls the challenge of 'authenticity'.

It is characteristic of the cases we have considered to present precisely in an ambiguous manner. For example, it is not at all obvious that one cannot measure happiness or when one cannot describe human conduct quantitatively and informatively. This, however, is exactly what one ought to expect: to say of such cases that a favoured descriptive tool—mathematics, say—is struggling to find application is, of course, another way of saying that we are unsure how to describe such cases. Our predicament is one in which our descriptions do not become false but empty, our descriptive vocabulary losing import.

One might well say that, in the situations sketched, our words continue to make sense—the sense that they make, so to speak—in that neither they nor the measures involved recoil, as it were, from the reality to which they are applied, exposing themselves as incoherent, contradictory, non-con-forming. Our web of judgments becomes threadbare, purely decorative but does not tear.²⁶ Similarly, the language of capitalism can, in one sense, describe everything that can happen

in our world and a bureaucracy may have a description for every element of this heterogeneous life that passes before it. The worry—the worry that (C5) articulates—is rather that these modes of ‘measurement’ only measure what they measure. For that to be something we might be failing to note the failure would seem to be a kind of *self*-obscurity, a misunderstanding not ‘of the world’ but of what *we* are trying to do: a loss of an overarching sense of where what we are doing fits within the rest of what we are doing. To avoid this fate in our scientific investigations would seem to require that those investigations be guided by some overarching sense of what matters to us about the domain investigated; where that sense is weak, methodological fetishism may arise.

Perhaps a good name for this overarching sense is ‘conscience’ and for its possession ‘authenticity’. For Heidegger, to be inauthentic is, among other things, to be captivated by the existing modes of understanding and action in which one finds oneself. Under this ‘dominance of the public way in which things have been interpreted’, *Dasein* fails to appropriate these modes for itself and treats them as given or self-evidently significant; as a result, they are ‘decisive even for . . . the basic way in which *Dasein* lets the world “matter” to it [and] determine[] what and how one “sees”’ (BT 213). In such a condition, ‘[w]hat is talked about . . . is meant only in an indeterminate emptiness’; ‘[w]hile the matter being talked about slips away, what is said as such—the word, the sentence, the dictum—continues to be available’ and ‘can be repeated and passed along without proper understanding’; one’s talk descends into an empty, ‘idle talk’ and one’s hearing into ‘hearing *mere talk as talk*’ (HCT 269). One is in the grip of what Heidegger calls ‘curiosity’—a concern ‘with seeing, not in order to understand what is seen (that is, to come into a Being towards it) but *just* in order to see’ (BT 216)—and what he calls ‘ambiguity’—in which ‘[e]verything looks as if it were genuinely understood, genuinely taken hold of, genuinely spoken, though at bottom it is not’ (BT 217). These proposals, it seems to me, capture well the phenomenology of methodological fetishism, the manner in which we unwittingly cling to particular modes of description beyond the point at which our use of those modes does for us what we take it to do.

If so, Heidegger’s discussion of inauthenticity may help us understand the virtue, intellectual or otherwise, that we must display in order to avoid intoxication or enchantment by modes of description; it may, for example, suggest that a certain ‘historical’ self-awareness must inform our scientific work.²⁷ But such a comparison may also help us recognize inappropriate expectations about authenticity too. For example, Heidegger has been criticised for failing to provide clear criteria by reference to which one might establish whether one is or is not authentic. But the absence of such criteria is to be expected if there is indeed a continuity between inauthenticity and methodological fetishism, since we have seen that we cannot expect equivalent criteria using which we might determine whether we have succumbed to the latter. But I must leave these as undeveloped suggestions for now.

I will end with one more such suggestion: from the perspective I have offered, con-formism and the competing realisms and idealisms that it inspires

collectively constitute a comforting and distracting myth of the real difficulty of talking, acting and living meaningfully. The latter feat demands of us a kind of self-awareness, a kind of self-disciplined attention to what we do and to its place within our lives as a whole and within the 'lives' of the communities to which we belong. It is such self-awareness that we must achieve if, for example, we are to ensure that our scientific practices illuminate what matters to us rather than embodying an empty, *mere* 'projection' of reality. Con-formism caricatures this responsibility of ours, comfortably projecting it on to a match or mis-match between the 'form of the world' and the 'form of thoughts', the latter understood in abstraction from the lives of thinkers who think them. In this way, in our quest to understand the difference between meaningful and meaningless lives and the character of the feat of living the former, we are left chasing a will-o'-the-wisp, looking in the wrong directions for the wrong kind of difference and the wrong kind of feat.²⁸

Denis McManus
 Department of Philosophy
 University of Southampton
 Southampton, SO18 1PH
 UK
 mcmanus@soton.ac.uk

NOTES

¹ Cf., e.g., the works cited in Glazebrook 2001: 397 n.12.

² McManus 2004b uses this same map in presenting a reading of the early Wittgenstein's understanding of solipsism and scepticism; McManus 2006 extends this treatment to the other major themes of the *Tractatus*.

³ Sec. 8 will explain the caution manifest in my scare-quoting 'practical' here and elsewhere in this paper.

⁴ Cf., e.g., Beck 2002, Blattner 1996, Dreyfus and Spinoza 1999, Haugeland 2000 and the work of Rouse (cf. e.g. his 1985 and 2000).

⁵ References to works by Heidegger are given using the abbreviations explained at the beginning of the bibliography. The abbreviations are followed by page numbers.

⁶ Thus while Dreyfus' notion that Heidegger presents a kind of 'plural realism' (cf. Dreyfus 1991: 262) seems to me to be on the right lines, we will not get a full appreciation of Heidegger's view of scientific knowledge as long as we try, as Dreyfus has (or at least until relatively recently, cf. his 2000a and 2000b), to keep Heidegger's discussion of authenticity at arm's length.

⁷ There are, of course, other sources for this fundamental thought. Cf., e.g., Aquinas, *Summa Theologica* II¹ Q. 94 art.2 (quoted at BT 22): 'An understanding of Being is already included in conceiving anything which one apprehends as an entity'.

⁸ How have these forms of realism and idealism manifested themselves in the thinking of particular philosophers? And how do these forms of realism and idealism relate to the diverse other views to which philosophy has given those same labels? Though Heidegger's historical writings give us plenty of clues, I won't address these questions

here. Nor will I worry over whether the discussion just plucked from the first *Critique* covers all the forms that realism or idealism might take: convincing contemporary realists and idealists that the critical perspective set out here is relevant to them would require a demonstration that they are committed to something like con-formism, a task that would have to be undertaken on a case by case basis. One also ought not to expect, I think, to find con-formism espoused—certainly in contemporary philosophical work—as an explicit commitment but instead to find it operating on what Goldfarb has called the ‘proto-philosophical level’, as a ‘way of looking at things that we tend to adopt at the start, without noticing that a step has been taken’, but which serves to establish ‘an agenda of further questions’, ‘to be asked and answered by philosophical theorizing’ (1997: 78). (Cf. also his 1983.)

⁹ Cf. EP 185–90 and PICPR 21–23.

¹⁰ I would suggest that there is a fourth use of the term which is perhaps more fundamental than any of the other three according to which the *Vorhanden* represent not so much a conception of a kind of Being but a pseudo-kind of Being that corresponds to an attitude on our part that takes the Being of entities to be self-evident and unproblematic (cf. BT 363, 364, 441, 497 and FCM 275); in other words, it corresponds exactly to what Heidegger calls the ‘forgottenness’ of ‘the Question of Being’.

¹¹ I would like to thank Adam Beck for use of his translations from EP.

¹² Rouse argues ‘not only that science does not discover things present-at-hand, but that there is no genuine phenomenon corresponding to presence-at-hand’ (1985: 200). Cf. also Rouse 2000 and Blattner 1995.

¹³ Roughly speaking, ‘*Dasein*’ refers to us, we who talk to each other and sometimes ask philosophical questions; Heidegger invents this term because he feels others come with philosophical baggage that needs to be scrutinised: in using ‘*Dasein*’ instead of ‘subject’, for example, Heidegger has not ‘simply posited another word for the same thing’ but is trying to ‘make the subjectivity of the subject into a problem’ (EP 72).

¹⁴ Whether we are still dealing merely with arithmetic here is obviously questionable but not an issue I will worry over here.

¹⁵ The present section and parts of Sec. 11–12 draw on a discussion in McManus 2003 of related issues in connection with the work of Wittgenstein.

¹⁶ Some of the claims I make here echo claims made by Barad (in her 1996). Barad does not connect her work to that of Heidegger but Rouse has (2000: 351). It is unclear to me though whether Rouse draws the further conclusions that I wish to draw about our talk of the ‘intelligibility’ of thought and world. The broader question that my work poses is whether sense can be assigned to talk of ‘account[ing for] intentionality’ (Rouse 2000: 7) and for ‘things hav[ing] a place and mak[ing] sense’ (Rouse 1985: 201–2). (Ihde is another reader of Heidegger who has emphasised the role that instrumentation might play in our understanding of science (cf. his 1979 and 1991); but I will not discuss his work here.)

¹⁷ Can we find such a thought in Heidegger? We certainly see him challenging the notion that the physical sciences provide a relevant model of rigour for all sciences (cf. OHF 56–57, WM 83; on psychology, cf. HCT 15, 118, WDR 157; on history, cf. BT 195, EP 42–44, IPR 74, WM 83; on biology, cf. n. 24) and he claims that the kind of ‘relativity of truth’ to *Dasein* that he points out ‘does not endanger objectivity, but on the contrary makes possible precisely the wealth and diversity of objective truth’ (EP 155).

¹⁸ This peaceful coexistence also helps explain why the projection that a practice of measurement embodies can be called ‘non-objective’—since it does not rule out the possibility of many other kinds of ‘projection’ articulating a ‘wealth and diversity’ of other objective truths—without that implying that the projection is ‘subjective’—acknowledging

this coexistence in no way 'endangers the objectivity' of the truths that it articulates (cf. n. 17).

¹⁹ For related reasons, I see (C4)'s connecting of scientific truth to particular practices as closer in intent to Mulhall's proposal that 'there can be no question of a judgment's corresponding (or failing to correspond) with reality without a prior conceptualisation of that reality' (1996: 99) than to pragmatist conclusions such as Rouse's that 'science is an example of Dasein's everyday concerned absorption in the world' (1985: 206, cf. also his 2000: 24–26) or Blattner's that science is an 'attempt to respond to the pragmatic demands of the world, considered independently of science' (1995: 327). Heidegger himself rejects at EP 181–85 a construal of science's objects as emerging through 'a mere widening of practical-technical expertise' beyond 'profitable use and working of the soil' and 'building houses and bridges' to 'where our business doesn't reach at all'. (Cf. also PICPR 18–19.)

²⁰ For an excellent discussion of another such intuition, cf. Diamond 2001.

²¹ Cf. the remark by S.S. Stevens, quoted in Mitchell 1999: 162: 'Measurement is the business of pinning numbers on things'.

²² Clearly this may have some bearing on the extent of what Wigner 1960 called 'the unreasonable effectiveness of mathematics'.

²³ Cf. McManus 2003, which explores possible political implications, and a number of other possible examples, of such methodological fetishism.

²⁴ Compare Heidegger's scepticism about the possibility of a mathematically exact biology: '[L]iving beings permit a certain mathematical determinability as extended bodies, but the unlimited realisation of this possibility would fail in the purpose of determining and understanding the organism as such' (EP 43).

²⁵ One might well object that all Heidegger means when he says that scientists are 'forgetful of Being' is that they lack that perspective on the ontology that their talk presupposes that a certain kind of 'fundamental' or 'meta-ontology' would provide. To address this objection properly would take us into the tricky and much broader problem of how the formulation and dissemination of Heidegger's fundamental ontology and the achievement of authenticity relate to the 'forgetting of Being' and to each other, which I have called elsewhere (2004a: 344) the problem of BT's 'two answers'.

²⁶ That the scientist is responsible for the 'mode of experience and interpretation'—the 'projection of Being'—in which he works is a claim I share with Haugeland 2000. Where we differ is that whereas a crisis of responsibility arises for Haugeland's scientist when 'discovered impossibilities' arise that cannot be eliminated through 'careful and persistent double checking' (p. 72), on my understanding, such a crisis can have engulfed us without our knowing it, with our findings and the theories based upon them descending into a non-contradictory emptiness. But a proper account of how my own view differs from Haugeland's (and from other important readings of Heidegger's remarks on science such as those offered by Rouse and Blattner) will have to be left to another occasion.

²⁷ This chimes with Beck's recent, fascinating interpretation of Heidegger's remarks on relativity theory as both revolutionary and as a revivifying interpretation of the notion of natural laws as universal, as 'a repetition of the initial scientific projection founding modern mathematical natural science' (Beck 2002: 180). Beck too links such a possibility to the notion of the science's 'authenticity': 'The question of science's possible authenticity or inauthenticity [is] a question of whether science is capable of appropriating once again what is most essential to it, that is to say, the scientific projection of the Being of the beings in question.' (pp. 185–86).

²⁸ For useful comments on earlier versions of this paper and work out of which it has emerged I would like to thank Maria Alvarez, John Divers, Sebastian Gardner, Simon

Glendinning, Cressida Heyes, Joanna McManus, Stephen Mulhall, David Owen, Dawn Phillips, Aaron Ridley, Graham Stevens and, in particular, Adam Beck and John Preston, as well as members of audiences at the Universities of Amsterdam, Bristol, Cambridge, Durham, Paris I, Reading and Southampton. I would like to thank the University of Southampton and the Arts and Humanities Research Board for periods of research leave during which this paper was written.

REFERENCES

Works by Heidegger

- BPP—*The Basic Problems of Phenomenology*, trans A. Hofstadter. Indianapolis: Indiana University Press 1982.
- BT—*Being and Time*, trans J. Macquarrie and E. Robinson. Oxford: Blackwell, 1962.
- EP—*Einleitung in die Philosophie*. Frankfurt am Main: Vittorio Klostermann, 1996.
- FCM—*The Fundamental Concepts of Metaphysics*, trans W. McNeill and N. Walker. Indianapolis: Indiana University Press 1995.
- HCT—*History of the Concept of Time*, trans T. Kiesel. Indianapolis: Indiana University Press 1985.
- IPR—*Introduction to Phenomenological Research*, trans D. O. Dahlstrom. Indianapolis: Indiana University Press 2005.
- OHF—*Ontology—The Hermeneutics of Facticity*, trans J. van Buren. Indianapolis: Indiana University Press 1999.
- PICPR—*Phenomenological Interpretation of Kant's 'Critique of Pure Reason'*, trans P. Emad and K. Maly. Indianapolis: Indiana University Press 1997.
- QCT—*The Question Concerning Technology and Other Essays*, trans W. Lovitt. New York: Harper Torchbooks 1977.
- WDR—'Wilhelm Dilthey's Research and the Struggle for a Historical Worldview', trans. C. Bambach, in M. Heidegger, *Supplements*, ed J. van Buren. Albany: State University of New York Press 2002. pp. 147–76.
- WM—'What is Metaphysics?', in *Pathmarks*, ed. and trans W. McNeill. Cambridge: Cambridge University Press 1998. pp. 82–96.

Works by Others

- Barad, K. (1996), 'Meeting the Universe Halfway: Realism and Social Constructivism without Contradiction', in L. H. Nelson and J. Nelson (eds.) *Feminism, Science and the Philosophy of Science*. Dordrecht: Reidel, pp. 161–94.
- Beck, A. (2002), *Heidegger and Science: Nature, Objectivity and the Present-at-hand*. Ph.D dissertation, Middlesex University.
- Blattner, W. D. (1995), 'Decontextualisation, Standardisation, and Dewey Science', *Man and World*, 28: 321–39.
- Diamond, C. (2001), 'How Long is the Standard Metre in Paris?', in T. G. McCarthy and S. C. Stidd (eds.) *Wittgenstein in America*. Oxford: Oxford University Press, pp. 104–39.
- Dreyfus, H. L. (1991), *Being-in-the-World*. Cambridge, Mass.: The MIT Press.
- (2000a), 'Could Anything be More Intelligible than Everyday Intelligibility? Reinterpreting Division I of *Being and Time* in the light of Division II', in J. E. Faulconer

- and M. A. Wrathall (eds.) *Appropriating Heidegger*. Cambridge: Cambridge University Press.
- (2000b), 'Responses', in Wrathall and Malpas 2000a.
- Dreyfus, H. L. and Spinoza, C. (1999), 'Coping with Things-in-themselves: A Practice-Based Phenomenological Argument for Realism', *Inquiry*, 42: 49–78.
- Glazebrook, T. (2001), 'Heidegger and Scientific Realism', *Continental Philosophy Review*, 34: 361–401.
- Goldfarb, W. (1983), 'I Want You to Bring Me a Slab: Remarks on the Opening Sections of the *Philosophical Investigations*', *Synthese*, 56: 265–82.
- (1997), 'Wittgenstein on Fixity of Meaning', in W. W. Tait (ed.) *Early Analytic Philosophy*. Chicago: Open Court.
- Haugeland, J. (2000), 'Truth and Finitude: Heidegger's Transcendental Existentialism', in Wrathall and Malpas 2000a.
- Ihde, D. (1979), *Technics and Praxis*. Dordrecht: Reidel.
- (1991), *Instrumental Realism*. Indianapolis: Indiana University Press.
- McManus, D. (2003), 'Wittgenstein, Fetishism, and Nonsense in Practice', in C. J. Heyes (ed.) *The Grammar of Politics: Wittgenstein and Political Philosophy*. Ithaca: Cornell University Press, pp. 63–81.
- (2004a), 'Critical Notice: *Inheritance and Originality*, by Stephen Mulhall', *Philosophical Books*, 45: 340–50.
- (2004b), 'Solipsism and Scepticism in the *Tractatus*', in McManus (ed.) *Wittgenstein and Scepticism*. London: Routledge, pp. 137–61.
- (2006), *The Enchantment of Words: Wittgenstein's Tractatus Logico-Philosophicus*. Oxford: Oxford University Press.
- Mitchell, J. (1999), *Measurement in Psychology*. Cambridge: Cambridge University Press.
- Mulhall, S. (1996), *Heidegger and Being and Time*. London: Routledge.
- Rouse, J. (1985), 'Science and the Theoretical "Discovery" of the Present-at-Hand', in D. Ihde and H. J. Silverman (eds.) *Descriptions*. Albany: State University of New York Press.
- (2000), 'Coping and its Contrasts', in Wrathall and Malpas 2000b.
- Sellars, W. (1956), 'Empiricism and the Philosophy of Mind', in H. Feigl and M. Scriven (eds.) *Minnesota Studies in the Philosophy of Science*, vol. 1. Minneapolis: University of Minnesota Press.
- Wigner, E. P. (1960), 'The Unreasonable Effectiveness of Mathematics', *Communications in Pure and Applied Mathematics*, 13: 1–14.
- Wittgenstein, L. (1967), *Philosophical Investigations*. Ed G. E. M. Anscombe and R. Rhees, trans G. E. M. Anscombe. Oxford: Blackwell.
- (1978), *Remarks on the Foundations of Mathematics*. Ed G.H von Wright, R. Rhees and G. E. M. Anscombe, trans G. E. M. Anscombe, third edition. Oxford: Blackwell.
- Wrathall, M. A. and Malpas, J. (eds.) (2000a), *Heidegger, Authenticity and Modernity*. Cambridge, Mass.: The MIT Press.
- and —. (eds.) (2000b), *Heidegger, Coping and Cognitive Science*. Cambridge, Mass.: The MIT Press.