

# Accounts and Reality

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# Preface

This book proposes a way to view the results that are obtained in academic disciplines. It is to see them as disclosing not how the world is, but what may and what must be said about the world. The aim is to avoid the question of realism, while keeping the evident epistemic value of disciplines explicable.

The approach is intended to apply across a full range of disciplines, from physics to history, even though the question of realism has traditionally been thought of as one kind of problem in the philosophy of the natural sciences and a different kind in the philosophy of the social sciences and the humanities.

Debts to other authors are recorded in the footnotes. There is also a great debt to the staff of the British Library and Cambridge University Library, to those who keep the world wide web running, and to those who create and maintain online repositories of academic papers. The author is entirely responsible for all defects in the book.

## *Preface*

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*Richard Baron*  
*Cambridge, 2021*



# References

References have been given by using chapter and section numbers, or chapter numbers and section titles, rather than page numbers, whenever reasonable precision can be attained in that way. This approach should be increasingly useful with the rise of the electronic text, in which page numbers are unstable or are not given at all. Roman numerals have been converted to Arabic numerals when they merely give volume, chapter or section numbers, rather than being parts of titles or numbers of prefatory pages.

Some of the books to which we refer exist in several editions. Material may appear, disappear or move around from one edition to the next. If a reference does not appear to point to the right place, the first step is to check the bibliography to see which edition to use.

Cross-references within the text are given by section number. A reference to a general line of argument is to the whole section. For example, a reference to section [2.2](#) is a reference not only to what comes immediately under the heading so numbered, but also to what comes under the headings numbered [2.2.1](#), [2.2.2](#) and so on. But when a reference is to some specific point, the point will be found in the material that comes immediately under the heading to which the reference points and before the next heading

or sub-heading.

The PDF file of this book at <https://rbphilo.com/> is searchable, so there is no index. Some software will not find a phrase in a PDF file when it runs over two lines, or a word when it is hyphenated over two lines. But a search for the start of the phrase or word will usually suffice.

# Chapter 1

## Introduction

### 1.1 The project

#### 1.1.1 Accounts and the value of disciplines

Our topic is the accounts that are given in academic disciplines. Accounts may be whole theories, as are proposed in the natural sciences and to a lesser extent elsewhere. They may also be descriptions, analyses or explanations of events of particular types, or of specific events. Accounts of all types may raise the question of realism about items within the extensions of the concepts used to give them. Are those items real, or are they merely posited?

Our project is to argue for a view of accounts which will allow this question of realism to be put to one side, without undermining our ability to explain the great epistemic value that disciplines evidently have. This will be an external view, recommended to philosophers. It is not intended to make any difference to the conduct of disciplines, where

questions of realism are in any case easy to ignore.

We shall not give any precise definition of the epistemic value of disciplines. We mean the fact that their pursuit allows researchers to make sense of the world, and where appropriate to make predictions which have a high success rate and devise interventions which tend to produce the desired results.

### 1.1.2 The question of realism about items

We shall consider a broad-brush form of the question of realism about items. There are several realist positions at large in the literature, not restricted to realism about items, and there would be much to be said about them.<sup>1</sup> But our concern is to put to one side the question of realism about items as a whole. If we succeed in that, we shall not need to inspect the various positions one by one.

The question arises because accounts use concepts which have extensions. Use of the concepts allows us to ask whether items within the extensions are real, rather than merely posited in order to allow accounts to be given. We shall give an affirmative answer the name of extension realism. We avoid the more traditional term “entity realism” for two reasons. The first is that it has in the hands of some authors acquired a restriction to realism about items which are open to manipulation.<sup>2</sup> The second is that it is deeply marked by its development within the philosophy

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<sup>1</sup> This is evident from a survey of a few publications, for example Saatsi (ed.), *The Routledge Handbook of Scientific Realism*; Agazzi (ed.), *Varieties of Scientific Realism: Objectivity and Truth in Science*; Manicas, *A Realist Philosophy of Social Science: Explanation and Understanding*; Sayer, *Realism and Social Science*.

<sup>2</sup> Egg, “Entity Realism”.

of physics, while we want to be more wide-ranging.

The question of extension realism is the question that will concern us. It is not by any means the only type of realism to be debated. But it does bring out issues of realism in an intuitive way that works across a wide range of academic disciplines. And as we shall explain in section 4.4.3, extension realism would be capable of bringing with it realism in the sense of a view that accounts were straightforwardly true.

Given our focus, we shall refer to the question of extension realism simply as the question of realism. We shall say when we have any other type of realism in mind. On another point of terminology, we shall refer to items rather than objects or entities. We shall do so in the interests of neutrality. Items will include abstract objects, properties and relationships, as well as concrete objects and their properties. We shall say more about this in sections 2.2.1 and 4.2.

Sometimes the question of realism is easy to answer in the affirmative. If for example a cosmological account refers to stars, or a sociological account refers to individual people, there is no doubt that such items are real – which is not to say that they are fundamental. But sometimes it is not obvious what the answer should be. For example, are social groups real in some sense that would make them more than mere sets of people? To make this example a bit more challenging, what should the answer be when the members of a group do not consciously identify either the group or any property they have in common with the other members?

We shall argue that where the question of realism arises and is not easily answered in the affirmative, it can comfortably be put to one side so long as we view accounts in a certain

way. This will be to view them as disclosing what can be asserted about the world. We shall call this the assertion view. It will be contrasted with the description view, under which accounts are viewed as disclosing how the world is.

What can be asserted will mean what can legitimately be asserted, with legitimacy being measured by reference to the standards of the relevant discipline. Thus we shall be able to see how the commitment of the research community to getting things right would still be endorsed from where we shall stand, outside disciplines.

In focusing on legitimate assertion, the assertion view gives a role to a species of the warranted assertion that is discussed by epistemologists. We shall comment on this concept in relation to our project in section 7.5. But for now we can say that we would not be able to accept all of the conditions for assertions to be warranted that have been proposed.

## 1.2 The argument

The stages in our argument will be as follows.

- In chapter 2 we shall first say something about academic disciplines, so as to define the field within which we shall work, and then say something about accounts.
- In chapter 3 we shall introduce the notion of mandatory accounts, accounts which have to be adopted. We shall set out tests to determine whether accounts should be regarded as mandated by virtue of the nature of the world, or as we shall say, world-mandated. Alongside this discussion we shall introduce the notion of concepts which should be

regarded as world-mandated. These are concepts which the nature of the world appears to make it mandatory to use.

- In chapter 4 we shall say something about what it is to be real and shall explore the question of realism.
- In chapter 5 we shall set out the assertion view and show why, if we adopt it, the question of realism can be put to one side and not answered at all whenever it is not easy to answer in the affirmative.
- In chapter 6 we shall say why taking the assertion view would not make it difficult to explain the epistemic value of disciplines, even though taking the view would make it difficult to apply any standard concept of knowledge.
- In chapter 7 we shall relate what we have said to other philosophical positions.

# Chapter 2

## Disciplines and accounts

### 2.1 Academic disciplines

#### 2.1.1 Our focus

We are concerned with work that is done within academic disciplines, not with cognition in everyday life. We shall therefore speak of researchers, and shall assume that the standards of academic disciplines will be observed. Moreover, our primary concern will be with the fruits of research as they are published. We shall have some concern with the processes by which accounts come to be given, but that will be secondary.

We shall not use any precise concept of a discipline, and we could equally well have spoken of fields of work.<sup>1</sup> The creature can be recognized well enough without sharp definition. But we shall allow for broad and narrow disciplines. Thus physics, biology, economics, and history

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<sup>1</sup>For some comments on definitions see Darden and Maull, “Interfield Theories”, section 1.



will count as disciplines, but so will Newtonian mechanics, cell biology, behavioural economics, and the social history of India.

One consequence of our focus on academic research is that we shall not explore conditions for investigating the world and making discoveries which would be specific to human beings. We shall for example not pursue the agenda of 4E cognition. (The four Es are embodied, embedded, enactive, and extended.) We shall not deny that embodiment and the rest may be vital. But nor shall we have any need to argue either for or against an alternative model in which the brain would be the scene of all the important action and would function merely as physical support for cognitive software, where the state of the software explained the outcomes and any high-performing software would be as good as any other.

The detached nature of academic disciplines, in which the first priority is to make sense of the world rather than to cope with it, contributes to allowing us to abstain from concern with the actual cognitive nature of human beings. That nature might influence the conclusions reached within disciplines, but not in a way that would be relevant to our concerns. And even if we were driven to conclude that some or all of the four Es were required, we could still leave unspecified what forms they might take. We might indeed allow for different forms in different species of rational being, members of all of which were capable of conducting what we would recognize as academic research.

## 2.1.2 A scale of disciplines

### 2.1.2.1 From physics to history

We shall be concerned with conclusions reached in a wide range of academic disciplines. We shall find it convenient to refer to a scale of disciplines which ranges from physics through chemistry, biology, psychology, economics, and other social sciences, and which ends in the humanities.<sup>2</sup>

We shall speak of the scale as rising from physics at the low end to disciplines like history at the high end. The direction of ascent is specified merely for convenience. It is not in any way evaluative, and if it were seen as evaluative it could be taken to praise physics as more fundamental than other disciplines.

One could debate the details of such a scale. There are however some clear trends as one goes up the scale. There is a trend from harder to softer. There is also a trend from the study of less complex things such as particles and molecules, the properties of which are precisely defined, to the study of more complex things such as human beings, many of the tractable properties of which are not precisely defined. Human beings do have some precisely defined properties that are tractable, for example their heights. They also have some precisely defined properties that are intractable in that they cannot be stated concisely or used in analyses of individuals, such as arrangements of cells. But properties such as aspects of personality, while tractable, are not precisely defined, either in general terms, for example what it is to be amiable, or in the form in which or the extent to which they are exhibited by specific individuals.

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<sup>2</sup> For this kind of scale see Baron, *Confidence in Claims*, sections 1.5 and 2.3.

### 2.1.2.2 Mathematics

Mathematics does not feature on our scale because our concern is with conclusions reached about the physical, biological, or human world. Mathematics is used in many disciplines in order to reach, set out and support conclusions. But mathematical statements do not in themselves, without the context of some other discipline, say anything about the world beyond mathematics. At least, it would be contentious to claim that they did.

One way to support that contentious claim would be to argue for some form of realism in relation to mathematics. A purely abstract form of realism, in which mathematical entities were real enough but only in their own world, would leave mathematical results detached from the physical world. It would therefore be necessary to argue for a realism which integrated mathematical entities into physics and perhaps into other disciplines.

Such positions are available. One was most famously advocated by Hilary Putnam.<sup>3</sup> But positions like that are not universally accepted.<sup>4</sup> And in any case they would still leave scope to draw a distinction between pure mathematics considered in itself and the same definitions, axioms and theorems put to work in other disciplines. This would allow there to be a discipline of pure mathematics to omit from our scale. And mathematics which was integrated with any other discipline could for our purposes be regarded as part of the relevant discipline. It would therefore not be omitted from our scale.

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<sup>3</sup> Putnam, "Philosophy of Logic".

<sup>4</sup> Arguments are covered in Colyvan, *The Indispensability of Mathematics*; Bangu, *The Applicability of Mathematics in Science: Indispensability and Ontology*.

Another and more radical way to support a claim that mathematical statements proposed things about the world would be to say that all things were themselves mathematical structures. This view has been presented by Max Tegmark. But the view would leave open the question of whether every mathematical discovery was a discovery about the real world, because it would not follow that all mathematical structures were physically instantiated. At least that would not follow in the universe with which we are familiar, although the structures might all exist in various universes within a generous multiverse.<sup>5</sup> And the view is in any case highly contentious.<sup>6</sup> Fortunately, we can stay out of debates over the view without limiting the range of our discussion.

## 2.2 The idea of an account

### 2.2.1 The world, items, and information

We are interested in accounts that concern the world. “The world” may refer to the whole universe or, more usually, some part of it (as in the discipline of history) or all instances of parts of it of a given type (as in the discipline of physics, where it is common to give accounts of systems of a given type which might exist almost anywhere). And accounts will be selective, rather than setting out every detail that could be given. We shall simply speak of

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<sup>5</sup> For the view as a whole see Tegmark, *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*. For the role that Tegmark would accord to a generous multiverse see chapter 12 of that book.

<sup>6</sup> For some critical comments see Hossenfelder, “Book Review: Max Tegmark ‘Our Mathematical Universe’”; Woit, “Our Mathematical Universe”. For a development of Tegmark’s approach see Hamlin, “Towards a Theory of Universes: Structure Theory and the Mathematical Universe Hypothesis”.

accounts, with it being understood that they concern the universe or some part or parts of it and that the detail they give will be limited.

Accounts may take various forms, including sets of propositions and diagrams. They will typically pick out various items and convey information about those items. Items picked out may be people, concrete objects, events, abstract objects, structures, relationships, influences, spatiotemporal regions which are in some way distinguished from their surroundings, and properties of any of the foregoing. In addition, kinds or classes of items of any sort, including kinds or classes of kinds or classes, and properties of kinds or classes, may be items in their own right. And structures may be built from, and relationships and influences may be between, other items of any sort, including other structures, relationships and influences. It is our desire to be so all-encompassing in one word that leads us to speak of items rather than entities and their properties.

It may seem ambitious to consider extension realism across such a wide range of items, when realists might well limit themselves to claiming the reality of concrete objects and a few other items. But our aim is to allow realism to be considered wherever it might arise, so as to argue that the question of extension realism in any of its forms could be put to one side.

Accounts must convey information. Appropriate items need to be brought into focus, and then appropriate qualities they have or relationships between them need to be set out. Setting out relationships may lead to the identification of new items, for example when setting out relationships between a number of concrete objects allows a mechanism that is made up of those objects to be identified.

### **2.2.2 The practices of disciplines**

The practice of each discipline will show which items should generally be identified. In physics and chemistry they may be particles, or fields, or energy levels, or bonds, or any of the many other items that physicists and chemists routinely mention. In biology items such as cells, membranes, and whole organisms will come to the fore, while more abstract items such as metabolic pathways will also be mentioned. In psychology, personality traits, abilities, habits of thought, worries, perceptions, patterns of misperception, and unusual mental conditions may be identified. In economics, individual people, firms, preferences, levels of demand and supply, interest rates, growth trends, economic shocks, and so on may be identified. In sociology, structures, networks, institutions, cultures, ethnic and economic categories, values, and pressures for change may be identified. In history, individual people and groups of them, major events, social trends, environmental pressures, geographical features that encouraged or constrained particular actions, and so on may be identified.

The practice of each discipline will also show that relationships of certain types and not others may be identified. The options for relationships will largely be determined by the options for items which may stand as *relata*. Particles can enter into relationships of certain types, organisms into relationships of other types, and people (viewed as more than organisms), social groups and historical events into relationships of yet other types.

The field of types of relationship will also be narrowed by a discipline's practice of identifying certain properties of items. For example, biologists and historians will both identify individual people as items, but biologists will tend to concentrate on their genetic relationships while historians will be more interested in their social relationships. Even

when relationships of interest can be viewed in two ways at once, as when family relationships are significant both genetically and because they facilitated particular alliances between princes, the ways in which the relationships are formulated and analysed will differ as between the relevant disciplines.

None of this means that the items which are the concern of a given discipline are fixed. Disciplines can evolve. Sometimes, and particularly in the natural sciences, evolution will follow from specific advances. Thus the discovery and theorization of quantized phenomena transformed large areas of physics and chemistry, leading to the routine identification of new items such as state vectors and electron densities. And an understanding of the workings of DNA led to the identification of genes in their various modern senses.<sup>7</sup> At other times evolution will result from new preferences as to how to explore the discipline's subject matter, along with the gathering of new evidence. Thus historians have created whole new fields of study, such as feminist history. They have also come to pay more attention than hitherto to everyday activities such as the hawking of food, leading them to do things like pick out items of street furniture as having their own significance and as standing in noteworthy relationships to human activities.<sup>8</sup> But despite the wide scope for evolution, there will be a reasonable degree of stability in any given discipline.

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<sup>7</sup>The concept of a gene is not as straightforward as popular presentations may suggest. For some history see Rheinberger and Müller-Wille, "Gene Concepts". For the fact that there is no single sense see Griffiths and Stotz, "Genes in the Postgenomic Era".

<sup>8</sup>Calaresu, "Food Selling and Urban Space in Early Modern Naples".

### **2.2.3 What accounts may do**

Accounts which interest us are ones that concern the world directly in that they cover items which are tied to particular places and times as in historical disciplines, items of specific types which may be found at all manner of places and times as in the natural sciences, items of specific types which may be found over a limited range of places and times as in some forms of the social sciences, or types or classes of worldly items where those types or classes are considered as items in their own right.

Accounts may identify some specific concrete items, or some unspecified concrete items which have certain properties. An item shall count as concrete if it has a spatiotemporal location. So physical objects are the paradigm case. Events may likewise count as concrete. Instances of thoughts may also count as concrete, because they are associated with particular people at particular times.

Accounts may also identify items such as structures, relationships, and causal or other influences. The structures, relationships and influences in question may be either such items in general or specific instances of them. And some specific instances will qualify as concrete. In addition, types of structures, relationships and influences may be abstracted from classes of such items and identified as items in their own right.

Accounts may also attribute various properties to specific instances of concrete or abstract items, or to all the members of specified classes of such items.

Finally for the purposes of our list of examples, but without any claim that it is a complete list, accounts may explain the occurrence of various phenomena. They will often do so by identifying structures, relationships and influences.



## 2.3 Conceptual schemes

### 2.3.1 Schemes

There are conceptual schemes as well as accounts. Schemes tend to be evaluated by their fruits. Do they provide tools with which to give accounts that are found to make sense of the world?

Our concern is with accounts that directly concern the world and with the concepts they use, rather than with conceptual schemes. We shall however be concerned with schemes which themselves propose something substantive about the world, so that they can be considered as accounts. We shall give some examples in section 2.3.2.

Our attitude to conceptual schemes has the useful side-effect that we need not worry about attacks on the notion of a conceptual scheme as something innocent of substantive views about the world.<sup>9</sup> We do not need to claim that there are any pure conceptual schemes. We simply consider the position of accounts which are of interest to us. Some of them may happen to be conceptual schemes which are not innocent of substantive views. Any schemes which were totally innocent would not be of much interest to us anyway. It will be no loss to our argument if there are no totally innocent schemes.

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<sup>9</sup>The seminal paper is Davidson, “On the Very Idea of a Conceptual Scheme”. For one response which challenges the view that Davidson achieved a general refutation of the idea of a conceptual scheme see Wang, “On Davidson’s Refutation of Conceptual Schemes and Conceptual Relativism”.

## **2.3.2 Schemes as accounts**

We can see how conceptual schemes may amount to accounts in their own right by considering examples in different disciplines.

### **2.3.2.1 The natural sciences**

In the natural sciences, sophisticated conceptual schemes predominate. And concepts within schemes tend to carry within themselves substantive views about the world.

Here are some examples. In fluid dynamics, the concept of a Reynolds number (a ratio of inertial to viscous forces) carries views about the nature of fluids and their behaviour. In chemistry, the concept of bond dissociation energy carries views about the principles upon which chemical reactions work. And in genetics, the concept of genetic drift carries views about how characteristics are inherited down several generations.

The tendency of concepts to carry views about the world facilitates the tight integration of results obtained within the natural sciences. Connections may be deductive or almost as strong. If a conceptual scheme is to allow such integration to be achieved, it will need to latch onto specific aspects of the results obtained. Then it will be far from innocent of substantive views about the world.

### **2.3.2.2 The social sciences**

In the social sciences concepts may also carry substantive views, but not on the whole to the same degree as in the natural sciences.

The leading examples may be seen in economics, and particularly in microeconomics. The very concepts of supply, demand, price, cost, competition (or the lack of it) and utility carry with them an understanding of how decisions about production and consumption are made. Adjustments for the fact that people do not have as much rationality as traditional economic theory would attribute to them amend that basic understanding, rather than supplanting it. Economic rationality is limited and modified, rather than dismissed.<sup>10</sup>

Macroeconomic concepts, such as those of aggregate demand, the fiscal multiplier and business cycles, likewise carry with them an understanding of how whole economies work. There should however be limited confidence in some inferences from the contents of concepts to how the world is generally thought to work. This is because there are wide ranges of views on topics such as the sources of economic fluctuations and the causes of economic growth.<sup>11</sup>

Turning to sociology, concepts can again carry substantive views about the world. Concepts of alienation, consumerism, the family, ideology, stigma, and citizenship are examples.<sup>12</sup> Such concepts are not always technical. But they still carry views on what may be expected to happen and on how phenomena should be explained.

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<sup>10</sup> This can be seen from textbooks, for example Cartwright, *Behavioral Economics*. And a classic paper predicted that the homo economicus of theory would evolve, rather than be replaced by a new breed discontinuous with the old one: Thaler, “From Homo Economicus to Homo Sapiens”.

<sup>11</sup> See for example the ranges of views covered in Romer, *Advanced Macroeconomics*.

<sup>12</sup> These are taken at random from Giddens and Sutton, *Essential Concepts in Sociology*.

### **2.3.2.3 The humanities**

In the humanities, sophisticated concepts which carry technical views about the world are not always needed. Many accounts can be given using resources provided by the everyday conceptual scheme that allows for the identification of times and places, events, people, motives, perceptions, and actions.

There are however occasions when something more sophisticated is needed. Two examples taken at random from a large range are the concept of a state of exception, put to work in analysing some aspects of the French Revolution, and concepts of different types of family.<sup>13</sup> Such concepts carry substantive views about the world which are more technical than those which everyday concepts carry.

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<sup>13</sup> Reed, “Power and the French Revolution: Toward a Sociology of Sovereignty”; Puschmann and Solli, “Household and Family During Urbanization and Industrialization: Efforts to Shed New Light on an Old Debate”.

# Chapter 3

## Mandation

### 3.1 Accounts of high quality

#### 3.1.1 Attitudes to accounts

In any discipline, accounts of high quality are preferred. At a minimum, an account should be helpful in getting to grips with the world. Then researchers may be willing to put it to work when appropriate. They may also think that an account must be adopted, so that a general refusal to put it to work would be an error. Then we shall say that the account is considered mandatory, whether or not the researchers use that terminology.

Our concern will be with a subset of the accounts that are considered mandatory. This subset will comprise the accounts that should be regarded as mandated by virtue of the nature of the world, or as we shall say, world-mandated. As we shall set out in section 3.1.3.5, this focus will reflect the fact that accounts regarded as world-mandated are the ones which press the question of realism.

In deciding whether to regard accounts that are considered mandatory as world-mandated, we shall have regard to the tests which researchers can be seen as having applied, explicitly or implicitly, in order to conclude that the accounts must be adopted. In doing so we shall not override any judgements of researchers, either as to whether accounts should be adopted or as to which tests should be applied. But the notion of world-mandation is our property as philosophers. We have created it in order to take us into the specifically philosophical question of realism.

(Sanford Goldberg introduces a notion of world-involving warrants for beliefs which is comparable to our notion of world-mandation. Goldberg's notion is however weaker. And Goldberg gives a high-level definition of his notion then uses it to give structure to a range of theories of epistemic propriety.<sup>1</sup> We on the other hand shall go into some detail on the conditions for it to be appropriate to regard accounts as world-mandated.)

If an account is not even helpful, never mind one which researchers think must be adopted, we shall still call it an account, but without any implication that there would be any justification for giving it. An account might be in such a poor way because it was simply erroneous. Then it should be corrected or discarded. Alternatively it might be misleading because although it had some appropriate content it omitted other content which, if included, would have put the content it did have in a different light. Then it should be expanded or discarded.

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<sup>1</sup>Goldberg, *To the Best of our Knowledge: Social Expectations and Epistemic Normativity*, section 1.7. Goldberg fills out his notion of warrant in chapter 4.

### **3.1.2 Helpful accounts**

An account may be helpful in getting to grips with the world. It may fit all the evidence, except evidence which may reasonably be disregarded for current purposes. (For example, accounts of the movements of bodies which are given within Newtonian mechanics fit the evidence except for evidence obtained by very exact measurements or under extreme conditions, and evidence of those types may be disregarded in everyday life.) It may imply that specific observations would be made in certain circumstances, or it may considerably narrow the range of observations that might be expected. And where it has practical applications, it may be useful in navigating the world. An account may be helpful either in all respects, or in selected respects such as fitting evidence or being of practical use.

Accounts may be read merely as saying something about immediate situations. An example would be an account which said that a given projectile would follow a certain path and that it would do so because of the combined effects of the initial impulse applied and a gravitational force. But they may also be read as having wider implications. Thus an account of the path of a projectile may be given within the conceptual scheme of Newtonian mechanics, and in such a way that it could not be given outwith that scheme. Then it would imply an account to the effect that objects existed in absolute space and time. That account too, used to support a general account to the effect that the world behaved in accordance with Newtonian mechanics, could be helpful, even though mistaken, because the predictions made in reliance on it were good enough in everyday circumstances.

An important type of helpful account is the model. Models are often acknowledged not to be based directly on the nature of the world, but to be stories that can be told to bring out important features of what goes on in the world.

Models of that nature are likely to be thought merely to be helpful. They are not likely to be considered mandatory.<sup>2</sup>

### 3.1.3 Mandatory accounts and concepts

#### 3.1.3.1 Considering accounts mandatory

An account will be considered mandatory if and only if researchers would say that it had to be adopted. By this we mean that they would see forswearing the account as a factual error rather than a legitimate choice. Forswearing amounts to saying that an account positively should not be given. It does not include mere failure to give an account on occasions when it happens to be of no interest. And it will be irrelevant whether researchers would use our terminology of mandation.

The dependence of the status of being considered mandatory on what researchers think means that possession of the status will depend on the current state of the discipline. An account may enjoy the status for the time being and lose it later.

The status of being considered mandatory will be open to being held in the eyes of some researchers and not others. We shall take an interest in accounts which some or all relevant researchers consider mandatory.

#### 3.1.3.2 Mandation and truth

We speak of researchers considering accounts mandatory when it might seem to be more straightforward to speak of considering them true. An account which simplified or was in some other respect thought not to reflect the nature

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<sup>2</sup> For a discussion of the uses and the limitations of models, written from the perspective of the description view to which the author was then inclined, see Baron, *Confidence in Claims*, section 5.7.3.



of the world would be thought of as not giving a full and correct picture of the world, and would correspondingly be considered optional. But if a researcher thinks an account is true, they will (in our terminology) consider it mandatory. It must be adopted, and not forsworn, on pain of holding a view of the world which the researcher would think mistaken or at least closing their eyes to what they took to be facts.

We do indeed use the notion of considering an account mandatory as a substitute for considering it true. If researchers consider an account true, we shall say that they consider it mandatory. We shall then conduct our discussion in those terms.

There is a reason for this shift in terminology. As we shall see in chapter 6, we shall have to do without attributions of truth when we come to explain the epistemic value of disciplines. We shall not say that researchers should cease to attribute truth. But we need a way to characterize their attitudes to accounts which does not import a notion of truth, so that we can conduct our argument without reliance on the availability of such a notion.

### **3.1.3.3 Tests and world-mandation**

If an account is considered mandatory by some researchers, that will give scope to raise the question of realism on the basis of their view. But it will not be enough to mean that the question is in fact raised. There will be a further stage of seeing how the account does on a range of tests. Satisfaction of those tests will be required for it to be appropriate to regard the account as world-mandated, as we shall set out in section 3.3.3. And as a preliminary filter, only accounts that are considered mandatory by at least some researchers will be eligible to be regarded as world-mandated.

The tests, which will include tests of evidence and coherence, will not be ones created or imposed by us. Instead they will be ones that researchers will already have applied, explicitly or implicitly, for their own purposes. How well an account does will govern researchers' views as to whether an account must be adopted, so that in our terminology it is considered mandatory. We shall simply re-use for our purposes the work that researchers will already have done for theirs.

The tests will make it unlikely that accounts which only a minority of researchers considered mandatory would be regarded as world-mandated. This is because if an account that is sufficiently appealing for some researchers to consider it mandatory also satisfies the tests, so that we may consider it world-mandated, it is very likely that the great majority of researchers will consider it mandatory.

The tests might not on their own have this effect when an account was considered mandatory by a minority on the basis of a general approach which only they favoured and which encouraged particular readings of evidence, assessments of coherence, and so on that would lead to satisfaction of the tests. Then the minority would think that the tests were satisfied. But there would still be two obstacles to regarding the account as world-mandated. The first obstacle would be that at the philosophical level, we might notice that only a minority thought that the tests were satisfied. Then we would not take it that the tests were satisfied, because a minority opinion would not be sufficient evidence of satisfaction. The second obstacle would be that the dependence on an optional general approach would stand in the way of regarding the account as world-mandated. We shall return to this point in section [3.4.4.4](#).

On a point of terminology, we shall sometimes speak of accounts and concepts which should be regarded as world-mandated, and sometimes of accounts and concepts which it would be appropriate to regard as world-mandated. The choice of “should” or of “appropriate” will be a matter of style, not substance. The two phrasings are intended to be equivalent. Thus we leave no room for accounts and concepts which it would be appropriate to regard as world-mandated with the option of not doing so.

#### **3.1.3.4 Concepts**

When an account is considered mandatory, the concepts it uses will likewise be considered mandatory. We shall speak of concepts being considered mandatory, as a short way to express their use being considered mandatory.

If an account should be regarded as world-mandated, use of the concepts with which it is formulated should also be regarded as mandated by virtue of the nature of the world. Then we shall say that the concepts should be regarded as world-mandated.

#### **3.1.3.5 The reason for our focus**

We focus on accounts that should be regarded as world-mandated because the question of realism is pressing in relation to the extensions of the concepts they use. If the world seems to require that items be mentioned, the question arises of whether those items are real or are merely convenient posits. And this will be a question to address with respect to the extensions of concepts in their own right, detached from the accounts in which they are used. If a concept is used in giving an account that is regarded as world-mandated, the concept will be regarded as world-mandated even if alternative concepts are used elsewhere,

or if its only other uses are in accounts that are considered optional or mistaken.

If on the other hand an account was not even considered mandatory but was thought to be optional, the question of realism would not be pressed by that account. The account would give no reason to think that reference had to be made to items within the extensions of the concepts used, although other accounts might give such reason.

Finally, if an account was considered mandatory but on closer inspection it seemed not to be world-mandated, we would not have reason to be concerned about the question of realism in relation to the extensions of the concepts it used unless they were also used by other accounts which should be regarded as world-mandated. The question of realism in the form that we have chosen concerns what is in the world, so we should only be concerned about the question to the extent that it appears to be the nature of the world that requires the use of concepts.

Moreover, it is important that their use be required and not merely encouraged. The contents of an account that uses the concepts must not merely be tied to the nature of the world. They must be forced into the account by that nature. Only if the contents of an account are forced in can we say that the world demands, rather than invites, consideration of whether items within the extensions of the concepts used are real. And if consideration were merely invited, the question of realism would not be a troublesome one. The metaphysical difficulties that the question would bring in its train, difficulties which will be our reason for wanting to put it to one side, could equally well be avoided by declining to bother with it.

### **3.1.3.6 Stages of work**

There are two stages through which we must go.

The first stage is to give substance to the idea of mandation. In section 3.2 we shall see how researchers may come to regard an account not merely as good but as one that must be adopted.

The second stage is to fill out the idea of world-mandation. We shall start to do so in section 3.3. Then in section 3.4 we shall set out a number of tests that researchers may apply, whether explicitly or implicitly, in order to decide whether accounts may or must be adopted. In going through the tests, we shall pay attention to ways in which satisfaction of them would be evidence that it was the nature of the world rather than other influences that encouraged or pressed for the adoption of accounts.

Finally, in section 3.5, we shall consider whether we should see some accounts as world-mandated only to a limited degree.

## **3.2 The idea of mandation**

We shall now turn to how an account may come to be considered mandatory, so that the concepts it uses are also considered mandatory. We shall first identify two types of account and concept, direct-apprehension and inference. Then we shall see what may happen in disciplines which are high up or low down the scale.

As already noted, researchers may not use the terminology of mandation. Nor do we suggest that it would be our place to challenge their conclusions as to which accounts had to be adopted. But we do need to understand how it

is epistemically legitimate for accounts to be thought of not merely as good, but as ones that must be adopted. There will be connections with how we may see it to be appropriate to regard accounts and concepts as world-mandated, and with the fulfilment of our project of keeping the epistemic value of disciplines explicable.

### **3.2.1 Types of account and types of concept**

Some accounts may be called direct-apprehension accounts. These are accounts that are given wholly or overwhelmingly using concepts which pick out items (including properties) that can be apprehended directly under the characterizations supplied by the concepts. We shall call such concepts direct-apprehension concepts. In higher disciplines such concepts are often in use in everyday life rather than their use being limited to academic disciplines. In lower disciplines they may often be more technical concepts.

The notion of direct apprehension is intended to cover more than sensory perception. But instances of sensory perception will generally fall within its scope. (We shall see in section 5.6.2.2.1 why we only say “generally”.) There will also be instances of direct apprehension in which sensory perception is but one link in a chain, as when an account is based on values of variables which are not directly perceptible but readings from instruments which measure the values are perceived.

Other accounts may be called inference accounts. These are accounts that are given with non-trivial dependence on concepts which pick out items that are not ordinarily apprehended directly under the characterizations supplied by the concepts, even by researchers in the relevant discipline. We shall call concepts like that inference concepts. Even

in higher disciplines they will often be the property of the relevant discipline or other disciplines, rather than being borrowed from everyday life.

### **3.2.2 Accounts that it seems must be adopted**

Some accounts strike people as having to be adopted once they have been formulated. Accounts of the basic and obvious contents of straightforward perceptions enjoyed under good conditions are examples. If it is daytime, there is a large tree 10 metres away, and people present formulate the account that there is a tree in the vicinity, they cannot refuse to adopt that account. And concepts such as those of a tree and of spatial vicinity have to be put to work.

We can find more sophisticated examples of accounts which strike researchers as having to be adopted both in higher disciplines and in lower ones. In section [3.2.2.1](#), we shall consider higher disciplines. Then in section [3.2.2.2](#), we shall consider lower disciplines. In each case we shall start with direct-apprehension accounts, and then move on to inference accounts.

#### **3.2.2.1 Higher disciplines**

##### **3.2.2.1.1 Direct-apprehension accounts**

The paradigm of a discipline in which accounts can be tied to perceptions, so that they are direct-apprehension accounts, is history. The perceptions are not actual perceptions of historical events. The past has gone. But they are perceptions which would have been possible and of obvious content. People are described as having acted in the ordinary way. Even when their lives were extraordinary, historians regard them as having spoken, listened, acted or

failed to act in the same ways that we do today. When political, social or economic forces are set out, the starting point is evidence of individual acts of meeting people, issuing orders, showing respect or friendship, discovering, making, buying and selling. These are acts of the same nature as those which modern human beings can be seen performing.

What is said at more abstract levels can be related back to those acts. This should be plain from reading any history book that is well grounded in the relevant sources, but a few examples in which abstract concepts are put to work may serve to show what is meant. When Geoffrey Elton argued for an administrative revolution (an abstract concept) in the government of England in the 1530s, he spent six long chapters going through detailed evidence in the sources and reaching conclusions about specific offices, processes and events, before pulling everything together and arguing for the applicability of the concept of a revolution to the period as a whole in chapter 7.<sup>3</sup> Miri Rubin, in an investigation of the acceptance of outsiders into communities, builds an account of the development of trust (an abstract concept) by reference to examples of how cities regulated the acceptance of strangers and what individuals did on the road to becoming accepted.<sup>4</sup> A final example is given by the work of Bas van Bavel. He builds an account of large-scale economic changes using abstract concepts such as those of power relationships and institutional organization, and does so by reference to details of what happened at specific places and times.<sup>5</sup>

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<sup>3</sup> Elton, *The Tudor Revolution in Government: Administrative Changes in the Reign of Henry VIII*.

<sup>4</sup> Rubin, *Cities of Strangers: Making Lives in Medieval Europe*, chapter 2.

<sup>5</sup> Bavel, *Manors and Markets: Economy and Society in the Low Countries 500-1600*.



Similar things may be said about other disciplines. Accounts in sociology and economics are often easily related to human actions of types that are directly perceptible. When zoologists portray species or family trees of species, accounts can again be related to directly perceptible individual animals. And so on.

The overall picture is this. Direct-apprehension concepts are often ones that are woven into our lives and our ways of perceiving the world, or for more technical concepts the ways in which researchers perceive the world. In consequence, what is said by direct-apprehension accounts is easily taken to be undeniable once a reasonable amount of work has been done to exclude error. This is so even when researchers have not actually perceived the relevant objects and events, so long as enough evidential traces have been left behind. It may take effort to exclude error. Researchers may have collected evidence carelessly, or missed some important evidence. But once enough checks have been made, any surviving direct-apprehension accounts are likely to be thought of as ones that must be adopted. And the direct-apprehension concepts that are used in giving those accounts will therefore be thought of as ones that must be put to work.

There is however a caveat to what we have said here. It concerns the abstract contents of accounts, such as the contents set out using concepts of revolution, trust, power relationships and institutional organization in the examples just given. While abstract contents may be proposed on the basis of evidence of everyday events, there is no guarantee that a particular abstract content is one that must be proposed. The inclinations of a particular author may lead to a preference for one possible abstract content over others. Those inclinations may even lead an author to be selective as to which pieces of evidence of everyday events they

put to work in preparing and defending the accounts they give. This was for example a concern about the work of Christopher Hill. It was alleged that he could find what he needed to support his interpretation of seventeenth-century England, simply because there was so much evidence from which to choose.<sup>6</sup>

A consequence of the lack of inevitability, and of the potential for selectivity, is that the abstract content of a given account may not be widely thought to be content that must be adopted. This would be consistent with what we have already said. In higher disciplines, it is likely that only accounts or parts of accounts which were limited to setting out concrete items (including events) and their manifest properties and effects would qualify as direct-apprehension accounts. Then it would be they and their concepts which it would not be at all surprising to find were considered mandatory. More abstract accounts would be less likely to qualify as direct-apprehension accounts. Then that easy path to being considered mandatory would not be open.

### **3.2.2.1.2 Inference accounts**

Going beyond direct-apprehension accounts and concepts, there may be specific inference accounts which it seems have to be adopted. Then it will seem that the concepts they use have to be put to work. We may also find that concepts appear to have to be put to work because while there is debate about which accounts to give, there are inference concepts that are used by all of the contending accounts.

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<sup>6</sup> Hexter, "The Burden of Proof. Christopher Hill: Change and Continuity in Seventeenth Century England". Hexter's attack on Hill has however been criticized in turn: Palmer, "The Burden of Proof: J. H. Hexter and Christopher Hill".

There is however more risk of disagreement among researchers on whether a given inference concept must be put to work than on whether a given direct-apprehension concept must be put to work. (Our concern here is directly with the use of concepts, rather than with the lack of inevitability of adoption of abstract accounts that we have just discussed.) The risk of disagreement reflects the fact that inference concepts are often not straightforward extensions of direct-apprehension concepts. Even when they appear to be straightforward extensions, they may not be. For example, macroeconomic concepts may appear to denote obvious aggregates of everyday transactions, and concepts of personality traits used by psychologists may appear to be almost the same as concepts used in everyday discourse that are plainly applicable on the basis of manifest conduct. But the actual definitions are prone to be sufficiently technical that the concrete world is neither merely summarized, nor described in terms that match everyday terms. The path from thinking direct-apprehension accounts must be adopted to thinking inference accounts built on top of them must be adopted is not as easy as it would be if the inference concepts were more closely tied to direct-apprehension concepts.

We shall now take a look at the examples just given.

### **Macroeconomics**

Consider an account of the workings of economies which is given in macroeconomic terms. Concepts of economic theory, such as those of the money supply and aggregate demand, will be used to construct a model. Data collected from actual events will be used to justify aspects of the model and to see whether it has explanatory power.<sup>7</sup> Would

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<sup>7</sup> A recent example of such work is Mierau and Mink, “A Descriptive Model of Banking and Aggregate Demand”.

researchers be likely to conclude that concepts such as those of the money supply and aggregate demand had to be used?

The answer would not be as obvious as it would be with concepts used to give direct-apprehension accounts. The intensions of inference concepts and the contents of accounts that use them are not especially closely tied to any form of direct apprehension. For example the concept of the money supply, in any form that would make it useful for economic analysis or for taking policy decisions, goes far wider than the notes and coin in circulation.<sup>8</sup> And individual accounts are apt to be contested, although that obstacle to thinking that certain concepts have to be put to work may be avoided when concepts must be put to work across the full range of accounts in contention.<sup>9</sup>

Although it might not be immediately clear whether certain concepts would have a good prospect of coming to be considered mandatory, it is on reflection hard to imagine avoiding the use of standard macroeconomic concepts when giving accounts. Direct-apprehension accounts of individual exchanges of goods and services for money, exchanges of money at one time for money at some later time, and payments in fulfilment of agreements made earlier, would themselves be considered mandatory. The direct-apprehension concepts of goods, services, exchange, money and agreement which are used in giving such accounts have to be used to describe actual events, the collective effects of which are theorized in inference accounts. In order to give any account worth giving at the macroeconomic level, it is likewise necessary to use inference concepts

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<sup>8</sup> Mankiw, *Macroeconomics*, tenth edition, chapter 4; Belongia and Ireland, "Interest Rates and Money in the Measurement of Monetary Policy".

<sup>9</sup> Mierau and Mink, "A Descriptive Model of Banking and Aggregate Demand", illustrates this. It presents a novel model but uses standard concepts which would be used across other models.

which are appropriate to capture the reality that could alternatively be captured by bundling up many detailed direct-apprehension accounts. The bundles thus created would however not constitute accounts worth giving, because they would make nothing comprehensible. The standard macroeconomic concepts appear to be the only ones appropriate to do the job. And if concepts that were not appropriate to capture the underlying reality were used, macroeconomic accounts would either conflict with the bundles of direct-apprehension accounts which set out events more concretely and therefore be wrong, or float free of the manifest evidence and therefore be worthless.

It can therefore easily come to seem, and it may well be, that the usual inference concepts would have to be used one way or another if any worthwhile macroeconomic accounts were to be given. There might be debate about which accounts to adopt, and different economists might favour different accounts, but economists would very often find that they were putting many of the same inference concepts to work alongside concepts that were not so widely used. Then the concepts used by all or nearly all economists would be very widely considered mandatory, even if no one account was widely considered mandatory.

Some economists might argue that some thoroughly heterodox approach to economics which did without the usual inference concepts had considerable merit, so that the currently favoured concepts did not have to be put to work. But this would be a minority view, and it could not reasonably be given significant weight on the strength of a hope that the heterodox approach would in due course gain general acceptance. That would be mere speculation, without anywhere near enough currently available evidence in its favour to make it reasonable to think it would happen. Even a fervent believer in a heterodox approach should not

predict that the approach would eventually triumph.

## Personality

In the study of human behaviour, it is common to give accounts that cite personality traits and personal values. The traits and values are defined systematically for this purpose, and the concepts of them are put to work in sophisticated ways.<sup>10</sup> The concepts are not simply appropriated from everyday language. And the use by psychologists of their concepts of traits and values is indeed so widespread that it would be perfectly possible for the concepts to be generally thought to be essential.

This is however an example where it would not be difficult for researchers, even those who were not markedly heterodox, to fail to agree that the concepts had to be put to work. A link from individual instances of behaviour, of which there may well be direct-apprehension accounts that would consistently be thought had to be adopted, to traits and values as defined by psychologists, is not so straightforward as a link from economic transactions to economic aggregates. It would therefore be reasonable to think that some alternative approach which dispensed with the currently popular concepts of traits and values might allow adequate accounts of patterns of behaviour to be given. There is certainly scope for debate about the soundness of the ways in which existing taxonomies have been developed.<sup>11</sup>

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<sup>10</sup> Parks-Leduc, Feldman and Bardi, “Personality Traits and Personal Values: A Meta-Analysis”; Skimina, Ciecuch and Strus, “Traits and Values as Predictors of the Frequency of Everyday Behavior: Comparison Between Models and Levels”.

<sup>11</sup> Uher, “Developing ‘Personality’ Taxonomies: Metatheoretical and Methodological Rationales Underlying Selection Approaches, Methods of Data Generation and Reduction Principles”.

### 3.2.2.2 Lower disciplines

#### 3.2.2.2.1 Direct-apprehension accounts

Direct-apprehension accounts have just as important a role to play in lower disciplines as they have in higher disciplines, but there are some differences.

In higher disciplines it is on the whole obvious that direct-apprehension accounts have to be adopted. And they tend to arise in the minds of those who work with the evidence without any need to think hard about which accounts to formulate. So they get formulated and then adopted as soon as researchers pay attention.

In lower disciplines, direct-apprehension accounts are often not given using everyday concepts. Instead, technical concepts are central. Examples of direct-apprehension accounts can be found in many scientific papers, usually in those parts of the sections headed “Results” which are limited to summarizing results rather than those parts which go on to draw conclusions.<sup>12</sup> It is however reasonably common to mix summaries of results and the drawing of conclusions in the same section, so some disentangling may be needed.

In lower disciplines, observations that promote the adoption of direct-apprehension accounts are likely to be in the

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<sup>12</sup> Given the widespread nature of the practice, there is no pressing need to list examples. But for readers who would like to be taken directly to some examples, here are three in which the practice is easy to see: Okorokov, “Magnetic Field in Nuclear Collisions at Ultra High Energies”; Ostertag, Scholz, Klein, Rebner and Oelkrug, “Pigmentation of White, Brown, and Green Chicken Eggshells Analyzed by Reflectance, Transmittance, and Fluorescence Spectroscopy”; Weber, Kabakci, Chaurasia, Brunner and Lehner, “Chromosome Separation During *Drosophila* Male Meiosis I Requires Separase-Mediated Cleavage of the Homolog Conjunction Protein UNO”.

form of readings from sophisticated instruments or results from extended and carefully controlled surveys. Adoption of the accounts is still, on the whole, unavoidable. But unavoidability follows not from common sense but from the common understanding of researchers in the relevant discipline. Skilled researchers can make observations and automatically interpret them, at least at a low level of abstraction which would be analogous to that of ordinary perception.

At this point, circularity might be feared. The common understanding that underpins adoption of particular direct-apprehension accounts, an understanding of features of the world which implies that certain observations should be taken in certain ways, is derived from inference accounts which are in turn supported by direct-apprehension accounts. If specific direct-apprehension accounts adopted by virtue of the common understanding were themselves the only support for those inference accounts, there would indeed be a circle. But fortunately there is not normally any risk here. The common understanding is a broad one. It is interwoven with and supported by wide ranges of inference accounts and direct-apprehension accounts, and it will typically have applications well beyond the interpretation of observations.

On the strength of this broad common understanding, the adoption of direct-apprehension accounts becomes to researchers as obvious a thing to do as adoption of the direct-apprehension accounts of everyday life is to people in general. Thus direct-apprehension accounts in lower disciplines are in just as good a position as those in higher disciplines. It can be just as easy for them to come to be considered mandatory, so that the concepts used in giving them would also be considered mandatory.



As we have noted, direct-apprehension accounts often need to be formulated on the basis of readings from sophisticated instruments or the results of extended and carefully controlled surveys, and with extensive computations being done before accounts can be given, rather than their being formulated on the basis of direct sensory perception. This means that while they can press themselves upon those who work with the evidence, those people need to be steeped in the discipline. And apprehension, while direct, may not be immediate.

### **3.2.2.2 Inference accounts**

#### **Thinking that accounts must be adopted**

Once evidence is in, direct-apprehension accounts have been formulated and identified as ones that must be adopted, and inference accounts have been formulated, it may seem to researchers that certain inference accounts must also be adopted. Then they would if asked say that the concepts used in giving those accounts had to be put to work. In our terms, the accounts and the concepts would be considered mandatory.

#### **Controls over thinking that accounts must be adopted**

In higher disciplines, common sense can often play a large role in controlling claims that inference accounts must be adopted. It is often plain which conclusions perception presses upon observers, even some conclusions at a reasonably abstract level.

In lower disciplines, common sense less often has a controlling role to play. Instead the general approach that researchers use, a general approach which will be technical in nature, takes the lead both in prompting thoughts among

researchers that certain inference accounts must be adopted and in controlling such thoughts. This is not surprising. We should expect expertise to be required to discover what to say about the reality that underlies everyday appearances but is not manifest in those appearances.

The role of expertise rather than common sense in exercising control is to be welcomed. A technical understanding is likely both to keep any urge to claim that accounts must be adopted on a tight rein, and to yield clear verdicts on such claims.

It is however right to ask about the status of a general approach which researchers use to decide whether inference accounts must be adopted. Such a general approach will play two vital roles. It will make available various inference concepts which can then be put to work in formulating accounts. And it will urge upon researchers inferential moves of certain types from evidence gathered to inference accounts which set out conclusions, thereby pressing for the adoption of certain accounts. If the status of a general approach were uncertain, there might be concern both about whether the inference concepts in use were ones that it was sensible to use, and about whether it was really appropriate to think that relevant inference accounts had to be adopted so that the inference concepts they used had to be put to work.

At any one time within a sufficiently narrow discipline or sub-discipline among the lower disciplines there will normally be only one general approach that is regarded as acceptable, or a small number of approaches that are seen as complementary rather than as rivals. (Approaches might be rivals either by virtue of their own substantive content or because they promoted the adoption of conflicting accounts.) There are however some cases of rivalry, which

we shall cover in section [3.4.4.4](#).

It will not be obvious to common sense that the accepted general approach or approaches should be favoured to the exclusion of rivals. Common sense will disclose that rivalry would have to be ruled out somehow. But technical arguments made from within an accepted general approach will be needed to support conclusions that the accepted approach or approaches deserve to be favoured and that other general approaches would in fact conflict with the accepted one or ones.

All of this may leave the status of any accepted general approach uncomfortably dependent on its own worth (or on the worth of other accepted approaches). But this does not mean that any claim that specific inference accounts had to be adopted should be regarded as unsupported. The accepted approach or approaches would not be bereft of external support. Its or their success in allowing researchers to make sense of the world and to manipulate the world productively would speak in its or their favour.

## 3.3 World-mandation

### 3.3.1 World-mandation and realism

If an account is considered mandatory, that must make us think about the question of realism. If it seems that certain concepts have to be used, then we have reason to wonder whether items within their extensions are real or are merely posited in order to allow accounts to be given. At least, we have reason to wonder that unless it is obvious that they are real – as it is obvious with individual people, animals, and everyday objects. (As we shall note in section [5.6.2.2.2](#), the fact that some items might be reducible need not in itself undermine their reality.)

Mandation alone would however not suffice to press the question of realism. It must be appropriate to think that there is mandation which is by virtue of the nature of the world.

World-mandation is of course the most interesting form of mandation when the objective of a discipline is to find out about the world. And it may be the only form of mandation that is likely to arise. Even mandation of an account by virtue of its being the only logically consistent account might be regarded as world-mandation, on the basis that the world had a nature which was not open to characterization in ways that would not comply with logic. Mandation by some Kantian constraint on ways in which the world might be intelligible would be a more difficult case. But so long as we would not be at risk of mistaking any such mandation for mandation by virtue of the nature of the world, the possibility need not concern us.

It will be appropriate to regard an account as world-mandated if and only if it is considered mandatory and there is good reason to think that the nature of the world would suffice to require its adoption. It will be appropriate to regard a concept as world-mandated if and only if it is used by an account which it is appropriate to regard as world-mandated.

(We deliberately word this as “is used by an account ...”, not as “must be used by an account ...”. Any account will bring the concepts it actually uses with it. If it were reformulated using different concepts, it would be a different account. The second account might however have the same content as the first. We shall explore the topic of equivalent accounts in section [5.6.1.4](#).)

### 3.3.2 Influences which qualify

We shall take a broad view of influences which qualify as aspects of the nature of the world, so that their sufficing to require the adoption of an account would mean that the account should be regarded as world-mandated. Not only evidence directly relevant to an account, but goodness of fit with other accounts, should qualify as acceptable influences on decisions to adopt accounts. We here anticipate the contents of some of the tests we shall set out in section 3.4, in particular the evidence test in section 3.4.1 and the coherence test in section 3.4.2.

We can go further. Given that our interest is in whether it would be appropriate to regard accounts as world-mandated, and not in determining decisively the presence of an objective status of world-mandation, it is reasonable to see the influence of a general approach, perhaps amounting to a conceptual scheme, which has been found to favour accounts that in turn survive debate and improve understanding, as channelling the influence of the nature of the world. The reason is that an approach which promotes the giving of robust and useful accounts may reasonably be thought to be in harmony with the nature of the world.

It would however be important that there was no conflicting general approach of comparable success, whether one that would conflict directly or one that would promote the adoption of accounts which conflicted with accounts promoted by the first general approach. If there were such a conflicting general approach, that would undermine a claim that the success of either approach was really rooted in a connection with the nature of the world.

We shall use the term “improper influences” for influences other than the nature of the world. It would not be appropriate to regard an account as world-mandated unless

even in the absence of any such influences, its adoption would still have been pressed upon researchers.

### 3.3.3 The uses of tests

Researchers will subject accounts to various tests when deciding whether they may or must be adopted. These will include tests of evidence and coherence. They may also include some less obvious tests. And the tests may be applied explicitly or implicitly.

Tests may well be couched in technical terms that are specific to the discipline. We can however set out tests in broad terms, and expect to capture the gist of the tests actually applied. For example, what counts as evidence in a given branch of physics will need to be specified in technical terms, but a general test of support by evidence will capture the gist of what physicists do when they consider whether there is enough evidence to support an account. Likewise there will be nothing in the ways in which we formulate tests that would exclude technical notions of coherence and other qualities.

The list of tests applied by researchers will not be constant from account to account. Some tests may not suit an account's subject matter, and researchers may take different views as to which tests are appropriate. We shall not expect that researchers would always apply tests that would amount to technical versions of all of the tests we shall list. But we shall say that if we can see as satisfied versions of all of the listed and appropriate tests, either because of work researchers did or because we can see that tests would have been satisfied if researchers had applied them, and in addition the account is considered mandatory, then it will be appropriate to regard it as world-mandated.

We shall justify this step to regarding accounts as world-mandated by the fact that satisfaction of the tests would indicate that it was the nature of the world that had pressed researchers to adopt the accounts. And on the other hand, failure to satisfy the tests would indicate that the contents of the accounts were not required by the nature of the world. Thus whether an account satisfied the tests would be a good guide to whether the question of realism should be regarded as pressing in relation to the extensions of the concepts used. Only accounts that are pressed upon researchers by virtue of the nature of the world press the question of realism.

As we noted in section 3.1.3.3, the tests will make it unlikely that accounts which only a minority of researchers considered mandatory would be regarded as world-mandated. We could go further and say that we would not regard accounts as world-mandated unless the generality of researchers considered them mandatory. But we have not done so because we want to keep open the possibility that the question of realism should be raised on the strength of a minority view. This will not expose us to any risk, because our project is not to establish a range over which realism would be appropriate. Instead it is to put the question of realism to one side whenever it is pressing but does not indubitably deserve an affirmative answer.

## 3.4 The world-tests

In this section we shall set out our range of tests. Our interest is in using researchers' application of their versions of the tests to indicate whether it is the nature of the world that has led to an account's being considered mandatory. We shall therefore call the tests as listed by us world-tests. Satisfaction of them would not establish beyond doubt

that an account which was considered mandatory should be regarded as world-mandated, but it would give good reason to think that it should be. And satisfaction will mean satisfaction in the eyes of researchers who conduct or are imagined as conducting the tests. It will not mean possession of any objective status of satisfaction which might be absent even when an account was thought to do well on the tests.

Some of the tests are directed at complete accounts rather than fragments. So accounts should be appraised as unities. If only specific elements within an account looked fit to be regarded as world-mandated, the thing to do would be to construct a smaller account which could be evaluated as a unity. That might require the supply of information to give the content of the smaller account an appropriate and well-specified sense. But if supplying this information would require making claims that were not fit to be regarded as world-mandated, it could be supplied in the form of mere notes to aid interpretation which were taken not to be parts of the account. At the other end of the scale, it would be important to allow for something as large as a complete theory of some substantial topic to be treated as a single account which was to be evaluated as a unity.

We shall set out tests ourselves, rather than simply relying on confirmation that accounts satisfy disciplinary standards, because we want to bring out the need to show that accounts are pressed upon researchers by virtue of the nature of the world. We must accept the consequent need to set out tests only in broad terms.

We shall word the tests as if they would be applied by philosophers, because that is a convenient way to state them. But as already indicated, we envisage that for the most part the work for philosophers to do would be limited



to checking that the tests had effectively been applied by virtue of researchers applying their own tests.

The selection of tests should come as no surprise. There is considerable overlap, although not identity, between satisfaction of the tests we propose and possession of characteristics which have been identified as virtues of scientific theories.<sup>13</sup>

We may therefore expect that accounts which satisfied the world-tests would nearly always satisfy the standards of the relevant discipline. That is, it would be unusual for a discipline to have some standard the gist of which was not captured somewhere in the list of world-tests. And this expectation would remain reasonable even in disciplines which were not ones in which scientific theories were routinely proposed. Moreover, accounts which satisfied the world-tests would be the best available accounts, at least as against their rivals, because the world-tests include a requirement to triumph over rival accounts (the competition test, section 3.4.3). And in the other direction, accounts which satisfied disciplinary standards and were regarded as the best ones available would nearly always satisfy the world-tests.

The existence of reasons to expect close alignment in both directions between the class of accounts which would satisfy the world-tests and those which researchers would regard as the best ones is helpful. It means that our identification of accounts which press the question of realism will not stray far from the traditional identification of current best theories as the proper arena for debates over realism.

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<sup>13</sup>For one catalogue of virtues see Keas, “Systematizing the Theoretical Virtues”.

There is however one exception where we cannot be very confident that there will be a disciplinary standard which would correspond to a world-test. This is the test that an account should improve understanding, a possible discrepancy on which we shall comment in section 3.4.5.1. Researchers might willingly adopt accounts, and even consider them mandatory, despite their not improving understanding of the world. This would lead to scope for divergence between on the one hand the class of accounts which both satisfied disciplinary standards and were regarded as the best ones available, and on the other hand the class of accounts which satisfied the world-tests. This should however be rare in practice, because researchers are most likely to work on accounts which hold out the promise of improving understanding.

The world-tests fall into two categories. Satisfaction of the tests of evidence, coherence, competition, and understanding would give direct reason to think that an account was mandated by virtue of the nature of the world. The tests of items and fullness, on the other hand, are imposed to give a good prospect of testing rigorously to decide whether it would be appropriate to regard an account as world-mandated. We shall work through the tests in this order.

The tests are open to being satisfied to varying degrees. We shall therefore speak of tests being satisfied rather than of their being passed. But when a decision was needed, it would be necessary to decide whether the degree to which an account satisfied a test was above some threshold that was judged to be appropriate. And we shall speak of an account's failing a test, meaning its not reaching such a threshold.

The tests could not be applied mechanically. Judgement would be required. There would therefore be scope for reasonable disagreement as to whether an account should be regarded as world-mandated. This should not however concern us. Our concern is not to test actual accounts but to have a standard which, if met, would mean that the question of realism was pressing. Then we shall use satisfaction of the tests to show that when the question was pressing, the epistemic value of disciplines could be explained even if it was not answered.

It might be feared that this line of argument would let us off the hook too easily. What if the question was pressing when several of the tests were not satisfied to an acceptable standard, so that their satisfaction was not available to support an explanation of the epistemic value of disciplines?

We respond in two ways. The first way is to say that failure to satisfy specific world-tests will, as we shall set out, often give positive reason to think that an account's contents are not closely tied to the nature of the world, and therefore positive reason to think that the account does not press the question of realism. The second way is to point out that the epistemic value of a discipline is to be explained by the fact that the generality of the accounts adopted within it meet high standards. It is not necessary that all accounts should do so.

### 3.4.1 Evidence

An account should only be regarded as world-mandated if it is well-supported by evidence. (Good support may be taken to mean having survived extensive testing, where such an interpretation is thought necessary to respond to falsificationist worries about the idea of positive support.) Support would not guarantee that an account was world-

mandated, but a requirement for good support would rule out many accounts which should not be regarded as world-mandated.

Accounts should also only be regarded as world-mandated if they do not clash with any evidence, except when a strong case can be made that it is the evidence which should be discarded as misleading, ignored as trivial, or reinterpreted. It would therefore be important that the researchers who adopted an account had carried out a thorough search for evidence that might be relevant, whether it would speak for or against the account. An account should not be regarded as world-mandated unless such a search had been carried out.

The general principle at work here is the obvious one that contact with evidence is a sign of contact with the nature of the world. If an account was adopted at least partly because it was supported by evidence, then its adoption would to that extent be by virtue of the nature of the world. If an account did not clash with evidence despite a thorough search, then its failure to be rejected would to that extent be by virtue of the nature of the world as not giving rise to contrary evidence.

The evidence test may not be easy to apply. Sometimes detailed enquiries into data are needed, as shown by cases in which scientific papers are at first published with no dishonesty on anyone's part but are then retracted because the data turn out not to have supported the conclusions.<sup>14</sup> But since our concern is only with whether accounts should be regarded as world-mandated, and not with any

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<sup>14</sup> An example is given by the retraction notice for Séralini, Clair, Mesnage, Gress, Defarge, Malatesta, Hennequin and Spiroux de Vendômois, "Long Term Toxicity of a Roundup Herbicide and a Roundup-Tolerant Genetically Modified Maize". The study was later republished.

objective status of world-mandation, we can rest content with regarding accounts as satisfying the evidence test so long as all the signs are that they do so.

## **3.4.2 Coherence**

### **3.4.2.1 The notion of coherence**

Accounts may cohere with one another, and they may be internally coherent or incoherent. There are negative and positive senses of coherence. Our test will only require negative coherence. It will be satisfied so long as an account coheres in that sense both internally and with other accounts.

#### **3.4.2.1.1 Negative coherence**

The minimal requirement for negative coherence is a lack of contradiction. We may add that there should be no serious conflict short of contradiction.

Conflicts may be more or less serious. So negative coherence defined as the absence of conflict may be more or less achieved. Only coherence defined as the absence of contradiction could be expected simply to be present or absent.

#### **3.4.2.1.2 Positive coherence**

There is also positive coherence. This exists when elements within an account relate well to other elements within the same account, or some accounts or elements within them relate well to other accounts or elements within them.

Relationships may be in the form of logical implication. They may also be of some weaker form, for example when an account or part of it reports events or actions and another

account or another part of the same account makes sense of what is thus set out by identifying causal relationships, conditions under which causes could be effective, or motives for actions reported.

If we were to include positive coherence in our test, satisfaction of the test would come in degrees to a considerably greater extent than it does by virtue of requiring negative coherence.

Positive coherence is important in some contexts. We shall say more about positive coherence in section 3.4.5.3.2, in the context of the understanding test.

### 3.4.2.2 The test

One part of the coherence test is that an account should be internally coherent in the negative sense. All the signs are that the world is one in which everything fits together. It is unlikely that the nature of the world would be such as to require adoption of an account that was not coherent in the negative sense.

The other part of the test is that an account should cohere in the negative sense with existing accounts of the same and related topics which are regarded as world-mandated, and should also cohere in the negative sense with general accounts of how the world works which prevail in the relevant discipline or in other disciplines and are themselves regarded as world-mandated, unless lack of coherence with either topic-specific or general accounts is amply justified.

General accounts might need to be ferreted out, because they might be implicit rather than articulated. And researchers would be likely to check for coherence with accounts that were considered mandatory, without thought of whether those accounts should be regarded as world-

mandated. But that would not be a concern. Coherence with all relevant accounts considered mandatory would suffice to cover coherence with all relevant accounts that should be regarded as world-mandated, because only accounts considered mandatory would be eligible to be regarded as world-mandated. The reason for our test being put in terms of accounts that should be regarded as world-mandated will appear in a moment when we explain the rationale for this part of the test.

The reason for requiring negative coherence with other topic-specific accounts and with general accounts of how the world works is as follows. If much of the existing content of a discipline is regarded as world-mandated, and the world is such that accounts which are mandated by virtue of its nature will generally cohere with one another, then a lack of negative coherence of an account of immediate interest with other topic-specific accounts should be a cause for concern. Likewise, a lack of negative coherence with general accounts of how the world worked would be a cause for concern if those general accounts were regarded as world-mandated.

In both cases, the background thought is that we cannot expect the nature of the world to mandate conflicting accounts. The assumption that this should not happen is supported by the intuition that if a world with a single nature were to mandate a range of accounts, those accounts should not be in serious conflict because they were all mandated by virtue of aspects of that one nature. (We shall give more detail on the issue in section 3.4.4.) Against that background, one obvious explanation of a lack of coherence would be that apparent mandation of the account of immediate interest was not world-mandation.

Further reassurance that the nature of the world is such that accounts which are world-mandated will generally cohere, both internally and with one another, may be given by the success of disciplines in making sense of aspects of the world by giving accounts which do cohere internally and with one another. And if the assumption that the nature of the world would not mandate internally or externally incoherent accounts were mistaken, it would sometimes be very hard indeed to make combined sense of any more than a narrow range of phenomena. There would have to be dividing walls, both to prevent the giving of accounts which covered enough ground to give rise to internal incoherence and to save us from having to hold in the head at one time conflicting members of a set of accounts of various phenomena.

Failure of an account of immediate interest to be world-mandated would not be the only possible explanation of a lack of negative coherence with other accounts. It might be that the other accounts needed to change to restore coherence. But such changes would need ample justification.

A connection may be made with Willard Van Orman Quine's image of a single fabric of beliefs, elements in which sometimes need adjustment to remove internal tensions or conflicts with experience.<sup>15</sup> Under this image, the project of any discipline is to present a fabric that is both as comprehensive and as free from internal tension and conflict with experience as possible. A new account should fit smoothly into the existing fabric, or should leave other parts of the fabric open to adjustment so that the end result is a fabric that is acceptably free from tension and conflict.

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<sup>15</sup> Quine, "Two Dogmas of Empiricism", section 6.



Finally, the test of negative coherence with other accounts and across disciplines can be severe in its application. Accounts of specific phenomena given within Newtonian mechanics would fail the test because of the conflict between the Newtonian understanding of the workings of the world and the better-attested relativistic understanding, even though Newtonian mechanics is the only sensible choice in everyday situations.

Such condemnations of enormously successful theories and of specific applications which rely on them may seem to be unreasonable. But we are concerned to find out which accounts will press the question of realism by virtue of their apparent world-mandation, not to pass wider judgements on accounts. We should not bring the question of realism down on ourselves when it need not arise. And if it were feared that we might let ourselves off too lightly by finding reasons not to consider accounts and concepts which might otherwise be troublesome, we can reply that the arguments we shall put forward in chapter 5 for putting the question of realism to one side will not have their workings determined by the details of accounts or concepts. So if we regarded any given account as not pressing the question of realism, our arguments could still be deployed if it were so regarded.

### **3.4.3 Competition**

#### **3.4.3.1 The test**

The competition test is satisfied if an account triumphs over rival accounts, meaning accounts that would conflict with it.

We may expect this test to be applied, at least implicitly and to some extent, by researchers themselves. In order for researchers to think that an account must be adopted, they will need to think that it triumphs over any rival accounts

that they review. There would be considerable intellectual discomfort in thinking that an account had to be adopted when there was an apparently better account that conflicted with it, or even a rival that seemed to be at least as good. And there would be even greater discomfort in adopting two or more rival accounts at the same time. But we should not expect to see much explicit application of the test by researchers, because they are unlikely to lay out a wide range of accounts for consideration.

At least in theory, an account should triumph over all possible rivals. And rivals would be brought to light by a review of all possible accounts of the same topic within the same discipline. (The discipline might need to be defined reasonably narrowly for this purpose, for example electrochemistry rather than chemistry or economic history rather than history.)

This would have the twin advantages that if there was any good account to be had at all, it would be somewhere among the accounts in contention so it would be found, and that if there was any better account than the one under consideration, it would be given a chance to triumph. These advantages will be significant when we cover how the epistemic value of disciplines is to be explained, as we shall see in section 6.6. We shall deal with the issue that in practice not all possible accounts will be considered in sections 3.4.3.3.2 and 6.6.3.

An account will be a rival if and only if it would conflict with the account of interest. There may be conflict when accounts contradict one another, or when there is some milder source of discomfort in giving two or more accounts together. We shall cover types of conflict in section 3.4.3.2.

An account will triumph over rivals so long as researchers would rather adopt it than any of the rivals, the rivals are either discarded or retained merely as helpful accounts, and any rivals that are retained are considered optional, perhaps because they are helpful simplifications or models, rather than mandatory.

The reason why researchers would require triumph is that the nature of the world could not make it mandatory to adopt two or more rival accounts unless that nature was inherently contradictory or was subject to some other internal conflict. And that would be most unlikely. We shall elaborate on this argument in section 3.4.4. For now the important point is that so long as it would not be sensible to consider two or more rival accounts mandatory, it would not be sensible to consider an account mandatory unless it was seen as superior to all rivals.

### **3.4.3.2 How accounts may conflict**

In this section, we shall explore how accounts may conflict or be complementary.

#### **3.4.3.2.1 Conflicting accounts**

Accounts may conflict by contradicting one another.

Accounts may also conflict without contradiction, when there would be considerable discomfort in offering them together.

For example, various historical accounts might explain some major event in different ways. Each might leave room for factors identified by the others to have played roles, but each might reserve a central role for the factors that it identified. Even if there was no explicit ranking of the importance of factors in any of the accounts, so that there was no outright

contradiction, there would be at least some combinations of accounts selected from the full range which it would not make sense to give together. An example is provided by the wide range of explanations that have been offered for the war between the United States and Great Britain that started in 1812.<sup>16</sup>

To take an example from the social sciences, there are several theories of the causes of poverty. They focus on various behavioural, structural and political factors. The use of different theories would lead social scientists to give different accounts of causes of specific instances of poverty. The various accounts of causes of a given instance would not exactly contradict one another. Indeed, different theories could be integrated into a single larger theory and accounts which put that theory to work would preserve elements of accounts given within the smaller theories. But different accounts of a given instance, based on the separate theories, could not comfortably be given together.<sup>17</sup>

We may expect that on the whole and with exceptions, the higher up the scale of disciplines one goes, and (a separate dimension) the further one ventures away from accounts which merely catalogue evidence and into accounts which interpret and explain, the more likely it is that conflicts will take milder forms than outright contradiction. Low down the scale there are likely to be quantification, sharply defined concepts, and relationships of implication that are deductive or almost as strong. All of these factors mean that conflicts can easily amount to contradiction. Such factors are proportionately less common higher up the scale. And as one moves from cataloguing to interpretation and explanation, there will be greater scope for different

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<sup>16</sup> Trautsch, "The Causes of the War of 1812: 200 Years of Debate".

<sup>17</sup> For theories and the scope for their integration see Brady, "Theories of the Causes of Poverty".

accounts to be seen as not in outright contradiction because they may to some extent talk past one another.

### 3.4.3.2.2 Conflict and detail

An account is a rival when and only when it is in conflict with the account that is of interest. The scope for there to be conflict depends on the level of detail in accounts. A conflict must be with something in the account of interest, so it must arise at a level of detail covered by that account. Thus if some other account only gives finer detail, it will not be able to conflict with the account of interest unless that fine detail has implications, although not necessarily logical implications, at some level of detail covered by the account of interest. And if some other account is more broad-brush than the account of interest, there will be no scope for conflict unless the account of interest has implications, again perhaps not logical implications, at an appropriately broad-brush level.

### 3.4.3.2.3 Complementary accounts

Accounts are not rivals if they are complementary, so that they may comfortably be given together.

There may be scope for complementary accounts when there are different but non-competing ways to approach the same phenomena. Examples are widespread. A chemical reaction may be described in terms of the reactants and the products, or in terms of enthalpy of reaction.<sup>18</sup> Some aspect of human psychology may be characterized phenomenologically or neurocognitively.<sup>19</sup> And historians

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<sup>18</sup> See any university-level chemistry textbook.

<sup>19</sup> Sass and Byrom, “Phenomenological and Neurocognitive Perspectives on Delusions: A Critical Overview”.

may give economic, political and ideological accounts of a given set of events.<sup>20</sup>

Complementarity can sometimes be subtle, and recognition that it rather than conflict exists can require careful thought. One example is provided by different accounts of the behaviour of a fluid as it flows while being constrained by some solid boundary.<sup>21</sup> Another example is provided by accounts of the development of cancer cells.<sup>22</sup>

It would be possible for several or even all members of a set of complementary accounts to be considered mandatory. This may seem to be an odd thing to say. One might think that if accounts were complementary, one account could do the same work as another in a different way, so no one account would have to be adopted. But that would not be so. Different but complementary accounts could cover different aspects of the same topic.

There might also be scope to combine some or all members of a set of complementary accounts into a larger account which might itself be considered mandatory. Sometimes such a combined account would be a simple union of the separate accounts. Sometimes it would be more integrated than that, for example when the contents of some accounts featured in explanations of what was set out in other accounts.

Integration would tend to be stronger in lower disciplines than in higher ones. This would reflect the greater role for laws of nature and for principles which, while they might

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<sup>20</sup> See for example the papers collected in Marrison (ed.), *Free Trade and Its Reception 1815-1960: Freedom and Trade, Volume 1*.

<sup>21</sup> Marrison, "One Phenomenon, Many Models: Inconsistency and Complementarity", section 2.

<sup>22</sup> Plutynski, "Cancer Modeling: The Advantages and Limitations of Multiple Perspectives", section 3.

not amount to laws, exhibited considerable precision and reliability. We can see this in the examples just given. Underlying chemical theory serves to knit together different ways to describe reactions, and to allow some descriptions to be deduced from others. Different characterizations of aspects of human psychology may be related to one another in the sense of noting co-occurrence of the applicability of specific characterizations, such as a specific phenomenological characterization and a specific neurocognitive one, but it would be rarer to show why specific instances of co-occurrence arose. And historical accounts of different types, while they may shed light on one another and be open to being combined to weave a richer and more explanatory tapestry, do not tend to be integrated to the extent of components of some providing sufficient explanations of components of others.

The ability to combine accounts may impose a limit on the extent to which there would be much to be gained by explicitly considering mandatory all the members of a set of complementary accounts. (It would still be legitimate, but not worth doing.) The simplest case, which would barely count as complementarity, would arise when some accounts were abbreviated versions of others, so that their contents stood in relationships of subsets (the contents of abbreviated accounts) and supersets. Then it would only be worth explicitly considering mandatory the largest account that had no content thought optional. Likewise, when accounts could simply be aggregated it would only be worth considering mandatory the fullest aggregate which did not go so far as to include content that appeared to be optional. It is when different accounts cannot simply be aggregated that it is likely to be worthwhile to consider several complementary accounts mandatory. An obvious example would be political and economic accounts of a single period in history. A less obvious example would be

different accounts of a chemical reaction. One might expect that researchers would consider mandatory only the most fundamental account, from which other accounts could be derived. But the very fact that they could be derived by a more interesting route than merely separating out components of an aggregative account would mean that it would be worth bringing out the implications of the fundamental account. This does not however mean that the derived accounts would be of as much interest to researchers as the fundamental account.

#### **3.4.3.2.4 Equivalent accounts**

Sometimes accounts will be equivalent, in the sense that they effectively say the same thing but do so in different ways. Equivalent accounts would not be rivals. This point will become significant in section [5.6.1.4](#). We shall say more about equivalence there.

#### **3.4.3.3 Seeing whether the test is satisfied**

##### **3.4.3.3.1 A hypothetical test**

The competition test will be hypothesized by philosophers to a greater extent than it will be applied explicitly by researchers. We do not envisage researchers laying out a wide range of accounts, identifying rivals to the account of immediate interest, and then choosing a winner. The closest to that we could expect would be that there would sometimes be a few rival accounts in play, and that researchers would debate their relative merits. So an account may be considered to satisfy the competition test if it would have triumphed in the eyes of researchers, had they laid out a suitably wide range of rivals and then chosen a winner.



### 3.4.3.3.2 The range of rivals

If we are to discuss a test of whether an account triumphs over rivals, we need some clarity as to the range of rivals to think of as considered. One extreme would demand consideration of all possible rival accounts. That is our theoretical rule, but it would be impractical. And it is perfectly reasonable to imagine consideration of a narrower range, even at the cost of leaving a conclusion that a given account satisfied the competition test with less force than it would otherwise have.

Specifically, the rivals imagined to have been considered do not need to include ludicrous options. Only reasonable accounts need be included. Moreover, the rivals could not include accounts which in the current state of a discipline were not available to researchers because the discipline had not progressed far enough. So the competition test is to be interpreted as requiring triumph over all rivals that are both reasonable and currently available.

Our adoption of a relaxed form of the competition test is made possible by our focus on whether accounts should be regarded as world-mandated. This is for the following reason. The only available way to establish the range of reasonable accounts and the range of available accounts would be to ask what researchers in the relevant discipline thought. If we asked whether an account was in fact world-mandated, it might not be possible to have full confidence in a positive conclusion. There might be accounts which would have had a chance of outclassing the account of interest but which the researchers had not considered or which were not yet available. But if we only ask whether an account should be regarded as world-mandated, then its triumph only over reasonable and currently available options will be good enough.

### 3.4.3.3.3 Evidence, methods, and circularity

Our focus on whether accounts should be regarded as world-mandated is not only helpful in connection with the practical need to narrow the range of rivals. It is also useful when we consider the role of evidence in the identification of winning accounts.

Evidence will play a leading role in the settlement of contests between accounts. Evidence must be collected and processed using appropriate methods before it can be seen as counting for or against any given account. And the methods would need to be ones which external philosophers could justifiably regard as giving the nature of the world a suitably strong influence on preferences between accounts, in order to allow confidence that triumph over rivals was really triumph by virtue of the nature of the world. This connection with the nature of the world will become significant in section 3.4.4 when we set out why the competition test matters, and in section 6.6.2 when we discuss the epistemic importance of how accounts come to be considered to win.

If the task were to decide whether accounts were in fact world-mandated, there would be a difficulty in establishing the qualities of methods. One might argue that the methods used to collect and process evidence were tried and tested, but there would be a degree of argument in a circle. The methods might reliably have favoured accounts which seemed to be world-mandated, but the identification of methods to regard as successful and that of accounts to regard as world-mandated would be mutually dependent. Even application of the full range of world-tests to decide between rivals would not remove this concern, because any test might be applied using inappropriate methods which rendered satisfaction of the test less valuable in the

specific work of identifying world-mandated accounts than one would hope.

The position would not be hopeless. It would be a strong argument in favour of a method for collecting or processing evidence that its use led to the adoption of accounts which helped to make sense of the world, especially if it did so over a wide field of study and reasons for its success could be given in reliance on accounts which fitted together well and were themselves helpful in contexts other than the analysis of methods. But the fact that success in drawing helpful conclusions from evidence could not be independently verified to discriminate between rival accounts in such a way as to prefer accounts which were really world-mandated would leave a shadow of doubt.

That shadow is rendered innocuous if one asks only whether it would be appropriate to regard accounts as world-mandated. Then the apparent good qualities of methods can be adduced in support of a claim that when those methods both make a case for an account in its own right and favour that account over any rivals, the account's satisfaction of the competition test should contribute to allowing it to be regarded as world-mandated. If the question is only one of what decisions should be made as to whether for the time being to regard an account as world-mandated, then a conclusion that it satisfies the competition test which is reached by using methods that appear to be good ones will suffice, so long as the other world-tests are also satisfied.

### **3.4.4 Why the competition test matters**

#### **3.4.4.1 The world and concepts**

The job of researchers is to find out about the world. So to the extent that they considered rival accounts,

they would require an account to triumph over rivals in order to consider it mandatory. If the adoption of two or more conflicting accounts appeared to be pressed upon researchers, it would not be safe to regard any of the accounts as telling them about the world. It would after all be very odd for a single world, as considered within a single discipline, to create pressure for the adoption of conflicting accounts. This is also why we impose the competition test before accounts can be regarded as world-mandated. It would not be safe to regard any of the accounts in contention as world-mandated unless one of them had triumphed over the others.

(We here only consider conflict within a single discipline. It is of course possible for accounts in one discipline to have implications for what should be said in another discipline. But conflicts which arose out of such implications would take one of two forms. The first form would be a simple implication of an account in one discipline for what should be said in a second discipline which was found to be unacceptable in the second discipline. That would count against the account in the first discipline, either as direct evidence against it or as reason to think that it would be a source of unacceptable cross-disciplinary incoherence. Then either the evidence test in section 3.4.1 or the coherence test in section 3.4.2 would be failed. The second form would be reliance in the first discipline on a conceptual scheme which would conflict with an established conceptual scheme in the second discipline. We shall consider such conflicts in section 5.7.3.)

We only say that it would not be safe to regard any one of two or more conflicting accounts as world-mandated, not that none of them would have any prospect of coming to be regarded in that way. But a consideration of ways in which a single world might appear to press for the adoption of

conflicting accounts should reassure us that the requirement for triumph over rivals is not an unreasonably severe one.

One possibility would be that the use of different general approaches within a discipline, perhaps amounting to different conceptual schemes, would lead to pressure for the adoption of conflicting accounts. This is particularly likely to occur in higher disciplines. We shall consider this possibility in section 3.4.4.4.

A second possibility would be that it was the use of inappropriate concepts which led to pressure for the adoption of conflicting accounts. In that case the remedy would be to recognize the defects of the concepts and use other concepts instead. This remedy would sometimes involve conceptualizing to a lesser extent than might be felt desirable – or from our philosophical point of view, only regarding as world-mandated accounts which did not conceptualize too much. One might for example limit the discourse to mathematical formulae and not try to give pictorial representations of the world. An example is given by attempts to interpret quantum mechanics which routinely outrage our intuitions. The problem lies not in a mixed-up world, but in a misguided attempt to use concepts appropriate to the macroscopic world to interpret equations which characterize the microscopic world perfectly well. Having said that, it may not be easy to leave interpretation to one side and concentrate exclusively on equations. And in quantum mechanics there is even some modest scope for debate over mathematical formulations, although if that debate came to be settled one would be back to mere differences of interpretation.<sup>23</sup>

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<sup>23</sup> Dieks, “Underdetermination, Realism and Objectivity in Quantum Mechanics”, section 3.

A third possibility would be that the difficulty lay in the nature of the world itself. If that were so, then in the relevant discipline (but not in other disciplines) the concept of world-mandation would have to be abandoned or rethought, with the consequence that our project could not proceed or would need to be re-shaped.

The reason why things would be as bad as that is as follows. Our discussions of realism in chapters 4 and 5 and of epistemic achievements in chapter 6 will only make sense on the assumption of a world which is such that accounts which were mandated by virtue of its nature would not be in conflict. This assumption will be needed because the traditional context for discussions of realism and of epistemic achievements is that of a single world which has a well-defined set of contents and about which facts can be established without their being beset by contradictory facts.

Fortunately, the necessary assumption does seem to be a safe one. It is supported by the intuition that if a world with a single nature were to mandate a range of accounts within a single discipline, those accounts should not be in serious conflict because they would all be mandated by virtue of aspects of that one nature. Having said that, we should still say a bit more about the strength of our argument for requiring satisfaction of the competition test in the context of disciplines that are lower or higher on the scale.

#### **3.4.4.2 Lower disciplines**

The argument for demanding that an account should satisfy the competition test if it is to be regarded as world-mandated is most straightforward low down the scale of disciplines, in the natural sciences and in some parts of the social sciences, where accounts that are accepted tend to be tightly bound to the available evidence. There, the

claim that the nature of the world should be expected not to lead to strong pressure to adopt conflicting accounts is particularly plausible. If there were such strong pressure, there would be a very good case for thinking that its source lay in existing approaches to the subject matter rather than in the nature of the world.

#### **3.4.4.3 Higher disciplines**

Higher up the scale, in other parts of the social sciences and in the humanities, there is more interpretation of evidence which is not required by the evidence in itself but is encouraged by general approaches to the subject matter. This would seem to open up scope for pressure to adopt various conflicting accounts, especially if the conflicts were milder than contradiction, as they often are in higher disciplines. But we would still need to avoid seeing conflicting accounts as world-mandated, so that our discussions of realism and epistemic achievements could make sense.

#### **3.4.4.4 General approaches**

In order to defend the legitimacy of our requirement for satisfaction of the competition test, we must enquire into how the use of different general approaches might make it seem that various conflicting accounts were world-mandated.

A given aspect of the world might be open to interpretation in several contrasting ways within a single discipline, issuing in conflicting accounts. If interpretation were not controlled by general approaches to the world, there might be no way to explain the range of accounts. But that is not the normal way of academic work. It is more likely that each account would be promoted by a combination of the nature of the

world and a general approach which might be specified in enough detail to amount to a conceptual scheme.

The scope to choose a general approach tends to be greater in higher disciplines. For example, Marxist, revisionist and other historians will give accounts of the French Revolution which could not happily be given together.<sup>24</sup> Or in sociology, modernist, postmodernist, constructivist and other general approaches can lead to different views of relationships between the environment and society.<sup>25</sup>

In lower disciplines, on the other hand, researchers are more likely to think that there is only one acceptable general approach within a suitably narrow area of work. Or if there are a few acceptable approaches they must not conflict, either by virtue of their own substantive content or by virtue of promoting the adoption of conflicting accounts.

Even in lower disciplines, the set of approaches is not always restricted enough to avoid conflict. There may be several competing approaches at the frontiers of research. One example is given by debates over the worth and even the scientific respectability of string theory in physics.<sup>26</sup> Another example is given by the debate in evolutionary biology over whether to move to a new synthesis, particularly one that would give a clear role to ecological factors, or indeed to have any grand synthesis at all.<sup>27</sup>

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<sup>24</sup> See for example the range of views analysed in Kates (ed.), *The French Revolution: Recent Debates and New Controversies*.

<sup>25</sup> White (ed.), *Controversies in Environmental Sociology*.

<sup>26</sup> Ritson and Camilleri, "Contested Boundaries: The String Theory Debates and Ideologies of Science".

<sup>27</sup> Gilbert, Bosch and Ledón-Rettig, "Eco-Evo-Devo: Developmental Symbiosis and Developmental Plasticity as Evolutionary Agents"; Müller, "Why an Extended Evolutionary Synthesis is Necessary"; Futuyama, "Evolutionary Biology Today and the Call for an Extended Synthesis"; Stoltzfus, "Why We Don't Want Another 'Synthesis'".



There may also be competing approaches to specific phenomena. These are worth noting even though the specificity of the phenomena might be thought to disqualify the approaches from being described as general. For example, there are competing approaches to modelling atomic nuclei.<sup>28</sup> Such cases should be noted here because the approaches are general in the sense of being applicable across the full range of the phenomena they cover – in this example atomic nuclei in general – and because of the centrality of some of the phenomena involved to the nature of the world. Such cases have encouraged the philosophical project of perspectivism, which we shall discuss in section 7.7.

Having noted these exceptions, it remains the case that in physics, chemistry and biology there is often one sensible general approach to the world, or a set of approaches which is limited enough to avoid conflict, in a given area of work. And the long-standing existence of various interpretations of quantum mechanics is not a counter-example. Such interpretations are given after the work to analyse the data and establish the equations has been done. They do not prompt the use of alternative sets of equations which would fail to be empirically equivalent other than in a very narrow range of circumstances.<sup>29</sup>

The fact that different general approaches, whether in higher disciplines or occasionally in lower ones, may encourage the adoption of conflicting accounts, would not undermine the case for insisting that one account should triumph over rivals before it could be regarded as world-

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<sup>28</sup> Morrison, “One Phenomenon, Many Models: Inconsistency and Complementarity”, section 3.

<sup>29</sup> For the very limited extent of failure of empirical equivalence see Dieks, “Underdetermination, Realism and Objectivity in Quantum Mechanics”, section 3.

mandated. The element of choice of general approach would mean that pressure to adopt any given member of a set of conflicting accounts should not be seen as arising solely from the nature of the world. It should be seen as arising from a combination of that nature and the choice of a general approach. So it would be right to hold back from regarding any of the accounts as world-mandated. If on the other hand only one general approach was regarded as sensible, pressure to adopt certain accounts could be regarded as arising solely from the nature of the world. This would be because the influence of that nature could be seen as channelled through the general approach as well as being seen directly in evidential and coherence-based support for specific accounts. We noted this channelling in section 3.3.2.

Having said all that, there are reasons not to be pessimistic about the prospects for establishing that accounts should be regarded as world-mandated, even in disciplines that are high on the scale. One reason is that accounts are only at risk from rivalry generated in the way discussed here when conflicts actually do arise out of the use of different approaches. A large number of straightforward accounts which do not venture beyond reporting events or actions, and some accounts which go further and interpret the world, will be safe. Another reason is that it may be clear that one general approach to the world is greatly superior to others. This could become clear from its success in allowing the giving of accounts which were applauded for their ability to make sense of the world as it was presented through evidence, while other general approaches were nowhere near as successful. That success could in turn be used to favour accounts of specific topics which were given under the influence of the favoured general approach. This could give an account enough of an edge to triumph over rivals given under the influence of other general approaches, so long as the account was also rated highly by virtue of its own

qualities. Then the triumphant account could satisfy the competition test, and thereby take that step on the path to becoming regarded as world-mandated.

### **3.4.5 Understanding**

#### **3.4.5.1 The test**

The understanding test is that an account should, perhaps in conjunction with other accounts, improve understanding of the world whenever that might reasonably be expected. We shall treat the test as satisfied vacuously when it would not be reasonable to expect any such improvement.

We shall for brevity say “improve understanding”, and shall take as read the qualification that other accounts may need to be involved. An improvement in understanding may reasonably be expected when an account offers analysis and explanation, rather than staying at the superficial level of reciting the content of relevant evidence.

Researchers might not pay much attention to the extent to which an account improved understanding. If they noticed that an account did not improve understanding, they might even still consider it mandatory on the basis of the weight of evidence in its favour. So this is a test that philosophers may have to think of as imposed by themselves, rather than as imposed by researchers.

In order to guard against the possibility of letting ourselves off too lightly by excluding accounts from world-mandation when the question of realism should still be seen as pressing because accounts were considered mandatory and came very close to satisfying conditions to be regarded as world-mandated, we must say that the question of realism might be pressing even when the understanding test was failed. Fortunately, the arguments we shall put forward in chapter

5 for putting the question of realism to one side could still be deployed. The only possible difficulty would be that when it came to explaining the epistemic value of disciplines, we could not assume that the understanding test was satisfied by every account that researchers considered mandatory. That would however not be a serious matter. What will matter when explaining the epistemic value conferred by a specific account will be its satisfaction of the competition test and all or most of the other world-tests, as we shall note in section 6.7. Satisfaction of every world-test will not be required. And what will matter when explaining the epistemic value of a whole discipline will be the fact that the generality of the accounts adopted within it meet high standards.

The understanding test is included because if an account did not improve understanding even though it might reasonably have been expected to do so, one quite likely reason would be that it did not actually get to grips with the world. Then it would be inappropriate to regard the account as world-mandated. Support for this claim will be given by what we say in section 3.4.5.3.

Our claim that an account's not improving understanding would be a cause for concern will only give reason to think that the test would be helpfully discriminatory, rather than one which would indiscriminately condemn all manner of accounts, if we can also claim that it is likely that an account which was world-mandated would improve understanding. This second claim will need two supports. The first is that the world is on the whole amenable to human comprehension, although that comprehension may often be imperfect. The second is that the methods used in disciplines will often allow researchers to find accounts to give which make the world comprehensible. In section 3.4.5.4 we shall give reasons why these supports should be

available.

### 3.4.5.2 The notion of understanding

The notion of understanding is one of grasping how the world works and why it works as it does. This is a vague notion. It is easier to recognize understanding than to define it precisely. But we can refer to some things that have been written on the topic.

Lynne Rudder Baker wrote of understanding as involving making reasonable sense of that which is understood, an achievement which may well require more than grasping all of the scientifically describable details.<sup>30</sup> Jonathan Kvanvig offers a notion of understanding that requires grasping how everything fits together.<sup>31</sup> Henk de Regt and Dennis Dieks propose that understanding is achieved when one grasps how a system works without making exact calculations.<sup>32</sup> Henk de Regt has also set out a general view of scientific understanding in which the possession of intelligible theories of nature is central.<sup>33</sup>

Debates about requirements for understanding and about its value continue. In particular, there are debates as to how far understanding requires correctness of belief and whether it requires coherence among the relevant beliefs that someone with understanding has. There is also continuing debate about the notion of grasping a

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<sup>30</sup> Baker, “Third-Person Understanding”, page 186.

<sup>31</sup> Kvanvig, *The Value of Knowledge and the Pursuit of Understanding*, chapter 8. The requirement is stated on pages 192-193.

<sup>32</sup> De Regt and Dieks, “A Contextual Approach to Scientific Understanding”, sections 4.1 and 4.2.

<sup>33</sup> De Regt, *Understanding Scientific Understanding*, particularly chapter 4. The idea of a grasp which does not require exact calculations appears again, featuring in the criterion CIT<sub>1</sub> in section 4.2.

situation.<sup>34</sup> Such debates do not however restrict us. They are indeed liberating. Their existence shows that it is at least not obvious that understanding would as a matter of conceptual necessity require correctness or coherence. We may therefore set up a test that requires a form of understanding which allows for such commitments not to be met without any specific reason to fear that the test would impose an incoherent requirement, even if possession of understanding of the form in question might turn out to be inadequate to support some epistemological conclusions. In particular, it is convenient to be able to think of understanding as not requiring correctness. This is because as we shall see in chapter 5, the assertion view is meant to get us away from seeing accounts as setting out how the world is.

How understanding is achieved varies along the scale of disciplines.

In physics and chemistry, it requires having equations that are about the mechanisms of the world. Often the most effective way to gain understanding is to reduce phenomena at one level to phenomena at a lower level. For example, the behaviour and effects of chemical bonds are best understood in terms of quantum mechanics. And the understanding that is gained by thinking in those terms rather than in the more easily grasped classical terms is not merely a gain in grasp of details. It is also a better overall comprehension.<sup>35</sup>

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<sup>34</sup> A convenient guide to all of these debates, along with some others, is provided by section 4 of Baumberger, Beisbart and Brun, “What Is Understanding? An Overview of Recent Debates in Epistemology and Philosophy of Science”.

<sup>35</sup> Some history is set out in Sutcliffe and Woolley, “Atoms and Molecules in Classical Chemistry and Quantum Mechanics”; Needham, “The Source of Chemical Bonding”. For a derivation of molecular properties from atomic properties which goes via quantum states see Vemulapalli, “Property Reduction in Chemistry: Some

In the life sciences, equations and reduction still have important roles to play. But an understanding of how the world works will also involve the use of high-level concepts which it would not make sense to try to replace with concepts of the physical sciences. We can see this from the fact that even in computational biology, processes are standardly analysed using relatively high-level concepts such as those of mutational burden and behavioural adaptation.<sup>36</sup>

In the social sciences and the humanities, the underlying reality is human beings and groups of them. Sense is made of people and groups not for the most part by reduction but by using concepts which pick out character traits and individual and group conduct, or which characterize the material and intellectual creations of human beings in terms that relate closely to ways of life described in human terms. Central to the understanding which converts a detailed catalogue of events into a revelatory account is the shared humanity of researchers and the people they study or who created the artefacts they study. This shared humanity confers an ability to grasp human life from the inside. A human idiom, the idiom of the intentional stance, comes to the fore, and *Verstehen* is achieved.<sup>37</sup>

There are however times in the social sciences and the humanities when something which looks more like work in the natural sciences, although not necessarily by being reductive, will have a role in conferring an overall understanding of people and not merely a grasp of details. Work

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Lessons". Any textbook of quantum chemistry will indicate the deep understanding that can be gained by thinking in quantum mechanical terms.

<sup>36</sup> Examples may be found in journals such as *PLOS Computational Biology*.

<sup>37</sup> For more on these topics see Baron, *Confidence in Claims*, sections 2.2.2 and 5.6.

in economics can be decidedly mathematical, and it may focus on the analysis of data in ways that could equally be used for scientific data which had nothing to do with human activity. There are also some comparatively new approaches in history which may turn out to be of considerable significance, although there is scope for scepticism about some of the results so far obtained. Cliodynamics seeks to use systematic analysis to identify patterns which may repeat across the histories of different times and places.<sup>38</sup> Neurohistory seeks to make use of work on the human brain when writing history.<sup>39</sup> And more broadly, there have been explorations of the use of scientific psychology to understand historical developments.<sup>40</sup>

### 3.4.5.3 Applying the test

Once we have a notion of understanding that suffices to recognize it, we can consider how the understanding test might be applied.

There are several indicators that an account improves understanding of the world. These are worth identifying both to show how the understanding test might be applied, and to fill out the notion of understanding. We shall consider some indicators in sections 3.4.5.3.1, 3.4.5.3.2 and 3.4.5.3.3, but without claiming to give a comprehensive list. One could for example expand the list to include other qualities that made for powerful explanations.<sup>41</sup>

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<sup>38</sup> For examples see articles in *Cliodynamics: The Journal of Quantitative History and Cultural Evolution*.

<sup>39</sup> Smail, *On Deep History and the Brain*, chapters 4 and 5.

<sup>40</sup> Tileagă and Byford (eds.), *Psychology and History: Interdisciplinary Explorations*.

<sup>41</sup> One list of qualities that make for powerful explanations is given in Ylikoski and Kuorikoski, “Dissecting Explanatory Power”.



If an account did not display the indicators we list here, that would give rise to doubt as to whether the understanding test was satisfied, although it would not mean that the test was definitely not satisfied. Conversely, while presence of the indicators would give good reason to think that the test was satisfied, it would not establish that conclusion.

The indicators will perform two roles, which we shall bring out in our comments. The first role will be to signal that understanding of something or other is achieved. Sometimes the indicators will merely signal, and sometimes their presence will itself constitute a form of understanding. The second role will be to signal that it is the world in its actual nature that is understood.

#### **3.4.5.3.1 Ability to predict**

Our first indicator is that an account confers an ability to make reliable sophisticated predictions.

We may divide predictions of observations that would be made into two classes, with a large grey area that forms the boundary. Straightforward predictions are based on mechanisms that common sense would lead one to expect to work. An example would be a prediction of rain on the strength of observation of clouds of certain shapes to windward. Sophisticated predictions, on the other hand, are based on mechanisms that only sophisticated theory would lead one to expect to work. An example is a prediction of how the behaviour of large molecules would change under the influence of specified changes within them.<sup>42</sup>

The boundary between the two classes will shift over time. For example, once a heliocentric model of the Sun and

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<sup>42</sup> Lytle, Chang, Markiewicz, Perry and Sing, “Designing Electrostatic Interactions via Polyelectrolyte Monomer Sequence”.

the planets became an article of common sense, apparent retrograde movements of planets became something one would predict by reference to a mechanism that common sense would lead one to expect to work. But at any one time, some grey area or other will form the boundary.

Reliable sophisticated predictions are only to be expected in any quantity in the natural sciences, and to a limited extent in the social sciences. So the argument we shall give in this section that the absence of scope to use an account to make such predictions would suggest failure to satisfy the understanding test should only be applied within those disciplines, and then only in appropriate parts of the disciplines. Elsewhere, a demand for such an ability would be unreasonable in any case.

We start our argument as follows. Straightforward predictions would not require any more than a superficial relationship to the subject matter. But reliable sophisticated predictions could not be expected without a relationship to the subject matter that went reasonably deep.

What is being claimed here is not that the account involved would be correct. We are not putting forward a variant of the argument that the success of science would be a miracle if the world did not match scientific theory. (We shall say something about this argument in section 4.4.2.1.2.) The account in question might still in due course be discarded, to be replaced by a better one which had a radically different ontology. But so long as an account survived, scope to use it to make reliable sophisticated predictions would be a sign that it improved understanding. It would be such a sign because the deep relationship to the subject matter that would be signalled would be a form of understanding in its own right. And it would be a sign that the world itself was understood because predictions would be checked against

straightforward observations, and would be unlikely to pass such checks unless the source of the predictions was a grasp of the actual world.

We now turn to the converse case. We could take the absence of ability to use an account to make reliable sophisticated predictions to indicate that the account did not improve understanding, but only when the account in question purported to be deep enough in its analysis that one might reasonably have hoped for such an ability. An account which stayed at a superficial level, such as the level of perceptible phenomena, would not give rise to such a reasonable hope. On the other hand, an account which offered to relate a superficial level to some non-obvious underlying level which was portrayed both as being law-governed and as giving rise to the superficial level, where the account did not correlate observations at the superficial level with claimed states of affairs at the underlying level in such a way that minimal differences at either level could easily correspond to large differences at the other level, would give rise to a reasonable hope.<sup>43</sup> In such cases, the supposition of connection with an underlying level would lead one to expect that the account should be usable to make accurate predictions of observations at the superficial level. The absence of such an ability, and in particular a tendency to make inaccurate predictions, would indicate that the account did not actually relate the superficial level to the underlying nature of the world.

We should however note that the epistemic value of an ability to make predictions is contested. We shall return to this point, alongside the related issue of ad hoc adjustments to theories, in section 3.4.5.3.3.

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<sup>43</sup> Compare the diagrammatic argument in List, *Why Free Will is Real*, chapter 4, section entitled “Why Agential Indeterminism Is Compatible with Physical Determinism”.

### 3.4.5.3.2 Relating well to other accounts

Our second indicator is that an account relates well to other accounts.

A good relationship may be with other accounts of the same or related aspects of the world given within the same discipline broadly construed, such as the discipline of political and administrative history. For example, accounts of developments in the practice of diplomacy and of technological innovation may be related to one another.<sup>44</sup> Or an account of attempts in France in and shortly after 1700 to find a way to make trade and noble status compatible may take financial pressures brought on largely by the expense of war to have been the proximate cause, so that the account relates well to accounts of relevant wars which set out how they led to ruinous expense.<sup>45</sup>

Alternatively the other accounts may be given in other disciplines, for example when accounts of political history are related to accounts of climate change.<sup>46</sup> Sometimes there will be a full-blown theory to relate work in one field to work in another.<sup>47</sup>

Relating well to other accounts would amount to accounts showing positive coherence with one another. We discussed a separate test that was based on negative coherence in section 3.4.2. Here our emphasis is on the positive coherence which we left out of that test.

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<sup>44</sup> Pamment, *British Public Diplomacy and Soft Power: Diplomatic Influence and the Digital Revolution*.

<sup>45</sup> Grassby, "Social Status and Commercial Enterprise under Louis XIV", section 2.

<sup>46</sup> Examples are given in Fan, "Climatic Change and Dynastic Cycles in Chinese History: A Review Essay".

<sup>47</sup> Darden and Maull, "Interfield Theories".

An account's positive coherence with other accounts would in itself allow the account to improve understanding, because one aspect of understanding is seeing how different aspects of a subject matter relate to one another. But it would also be a sign that the world in its actual nature was understood.

It would be such a sign because the world is a single world, without barriers that would create isolated networks of causal or other influences apart from the barriers that experimenters deliberately construct, and without isolated regions with their own laws of nature, so an understanding of the world is likely to bring positive coherence along with it. At least, the picture of a single world without isolated networks or regions is one that has been confirmed over and over again by success in relating accounts to one another, while there is no reason to think that it is a mistaken picture. And if the world is like that, then a very good explanation of the positive coherence of accounts would be that they all connected with the actual nature of the world. The next best explanation would be that some accounts had been formulated first and the contents of others had been inspired primarily by a desire to relate the new accounts to existing accounts rather than by a flow of new evidence. But the history of research, and particularly of the overthrow of old theories, counts against the plausibility of that picture on a large scale or over the long term, even if research may progress like that in narrow areas for short periods. In particular, there have been some breaks with previous theories which seem to have been too radical for it to be plausible that a desire to relate new theories to previous ones carried much weight at all.<sup>48</sup>

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<sup>48</sup> Kuhn, *The Structure of Scientific Revolutions*. For ways in which Kuhn modified his initial idea of incommensurability see Marcum, "The Evolving Notion and Role of Kuhn's Incommensurability Thesis".

### 3.4.5.3.3 Carving nature at the joints

Our third indicator is that an account carves nature at the joints.

This is a traditionally valued quality of accounts, and particularly of scientific theories. The metaphor is found in both Greek and Chinese traditions.<sup>49</sup> The idea is that a good account should identify natural kinds of things and of causal and non-causal influences, or natural properties of whatever the items of interest might be. The thought has been developed by several philosophers.<sup>50</sup>

We do not here seek or need to settle the technical questions that surround notions of natural kinds and natural properties. We can also allow that there may be degrees of naturalness, or that the joints in nature may be more or less easy locations at which to carve. And we should not expect to see directly that nature has been carved at the joints. Rather, we must look for a sign that it has been.

The sign we seek is that an account makes sense of the world as it is presented through evidence. The sense made should go beyond making superficial connections between pieces of evidence such as those which could be made merely by cataloguing similarities, and the analysis of the world that is put forward should be one in which objects, properties and relationships all fit together smoothly without the need to postulate unevidenced extra items in order to avoid friction. Making reasonably deep sense through an analysis in which

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<sup>49</sup> Plato, *Phaedrus*, 265e-266b; *Zhuangzi*, inner chapter 3, “Nourishing the Lord of Life”, section 2. (In the Burton Watson translation cited under “Zhuangzi” in the bibliography this is at the start of chapter 3, “The Secret of Caring for Life”.)

<sup>50</sup> See for example Campbell, O’Rourke and Slater (eds.), *Carving Nature at Its Joints: Natural Kinds in Metaphysics and Science*; Dorr and Hawthorne, “Naturalness”.

everything fits together smoothly is evidence that nature is being carved at the joints because it is unlikely that this could be accomplished if carving were in the wrong places, that is, if the objects, properties and relationships identified were not of natural kinds. And if objects, properties and relationships which show every sign of being of natural kinds are identified, that is a sign that the world in its actual nature is understood because an imaginary world would be unlikely to be open to smooth analysis unless it had been contrived or was manifestly too simple to be taken for the real world. As to the relationship to evidence, a good sign would be the absence of complications which seemed to be ad hoc adjustments to make an account fit the evidence. Any need for such complications would correspondingly be a sign that the account did not really make sense of the world as it was presented through evidence.

Turning to a failure to make sense of the world in a way that was deep and was implemented smoothly, such a failure would indicate a lack of understanding of the world in its actual nature whenever making deep sense could reasonably be expected. And it could often, but not always, reasonably be expected across the lower disciplines.

As with the ability to make predictions, carving nature at the joints is mainly a virtue of accounts in the natural sciences and to a limited extent in the social sciences. Other accounts in the social sciences and most accounts in the humanities have an obvious natural kind, people, and some less obvious kinds of more contestable naturalness, such as social groups and political doctrines. But the causal and non-causal influences that involve items of these obvious and less obvious kinds are variegated in their individual instances and unreliable in their operation. So the identification of objects, properties and relationships which are of natural kinds is not likely on its own to provide

an easy road to deep understanding, valuable though it may be in bringing some order to the evidence so that deep understanding can come within reach.

Finally, the concept of prediction that we used in section 3.4.5.3.1 and the concept of ad hoc adjustment both remain topics of debate, both as regards their precise meanings and as regards the value of an ability to make predictions and of absence of the ad hoc.<sup>51</sup> The topics of prediction and the ad hoc do need to be considered together, because they are linked by the concept of accommodation of evidence. But under any of the reasonable views in play prediction and the ad hoc could still be recognized, albeit with scope for debate over borderline cases, and the presence of an ability to make predictions and the accommodation of evidence without ad hoc adjustments could still be seen as indicators of understanding. Moreover, debates have largely been around whether the presence of an ability to make predictions and the absence of ad hoc adjustments give special reasons to think that particular theories are correct. That concern is not the same as our concern here. Here we simply want to identify indicators of understanding, so as to facilitate application of the understanding test.

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<sup>51</sup> On prediction and on accommodation, some views (listed in date order) can be found in Barnes, *The Paradox of Predictivism*; Harker, “On the Predilections for Predictions”; Douglas and Magnus, “State of the Field: Why Novel Prediction Matters”; Worrall, “Prediction and Accommodation Revisited”; Carrier, “Prediction in Context: On the Comparative Epistemic Merit of Predictive Success”. On the ad hoc in its own right, some views (listed in date order) can be found in Worrall and Mayo, “Theory Confirmation and Novel Evidence”; Hunt, “On Ad Hoc Hypotheses”; Schindler, “A Coherentist Conception of Ad Hoc Hypotheses”.



#### **3.4.5.4 Comprehensibility and the quality of methods**

Two supports give reason to think that the understanding test and the indicators set out will be helpfully discriminatory. The first support is that the world is on the whole amenable to human comprehension, although that comprehension may often be imperfect. The second support is that the methods used in disciplines are such as will often allow researchers to give accounts which will make the world comprehensible. This second support is needed because without it lack of understanding might best be explained by methods leading to the adoption of accounts under the influence of the nature of the world while those accounts happened to do little to improve understanding even though they were for other reasons, such as fidelity to evidence, still worthy of adoption. Then refusing to regard accounts as world-mandated because they failed the understanding test would be overly cautious.

In this section we shall say why the second support is available. Its availability would imply availability of the first support, so there will be no need for a separate argument for its availability.

The argument in favour of availability of the second support is simply this. The success of a wide range of academic disciplines in making sense of their subject matter would make its non-availability implausible.

This should reassure us that imposition of the understanding test would not be unreasonably severe. But there may be a concern on the other side, about the assumption that satisfaction of the test is a positive sign and not merely the absence of a negative one.

The concern is that accounts which appeared to help researchers to comprehend the world might in fact only help them to comprehend some illusory substitute for the world or some radically misleading presentation of the world.

Our response to the concern about an illusory substitute for the world is that while we cannot be absolutely certain that the methods used in disciplines are such as will often allow researchers to give accounts which make the world itself comprehensible, we can be satisfied beyond reasonable doubt. The very idea of an illusory substitute interposing itself is a hypothesis that comes out of thin air with no positive evidence for it, even if once the hypothesis has been put in place arguments for its plausibility can be put forward.<sup>52</sup>

The concern about a radically misleading presentation of the world is not so easily dismissed. But fortunately, risks of that type which have been proposed do not have much purchase in the context of academic disciplines. We shall consider this topic in section 5.6.2.2.3. The context there is perception, but what is said there could equally be applied here.

Returning to the general success of disciplines, our claim is only the plausible one that they do well. It is not the implausible one that they achieve perfection. We do not claim, or have any need to claim, either that the methods available to researchers allow perfect comprehension to be achieved now or that perfect comprehension will ever be achieved. Currently favoured accounts may in due course be replaced by better ones. And it may be that there

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<sup>52</sup> One argument which would imply a deliberately manufactured illusory substitute is given in Bostrom, “Are We Living in a Computer Simulation?”; Bostrom and Kulczycki, “A Patch for the Simulation Argument”. For criticism see Hossenfelder, “The Simulation Hypothesis is Pseudoscience”.

will always be some things beyond human comprehension, despite any future development of methods.

This last prospect could take one of two forms. The first and less disturbing form would be that while at any one time there would be some things beyond human comprehension, any specific things would eventually be comprehended. This would be like listing positive integers in order. There would always be some unlisted, but any specific one would be listed in due course. The second and more disturbing form would be that there were some specific things, whether or not identified, which would never be comprehended. But even that would not need to stand in the way of thinking that the world was on the whole amenable to human comprehension.

### **3.4.6 Items**

An account will identify some items in the world. They may as usual be concrete or abstract, and may be objects, properties, classes, kinds, influences, or relationships between other items. In order to satisfy the items test, those items must be ones that it is appropriate to identify within the relevant discipline.

The items will need to be of the same types as items that are customarily identified, or be of types such that it can reasonably be hoped that items of those types will come to achieve customary identification. This last provision is inserted to recognize the scope for innovation, but any appeal to it must be controlled by a test of reasonableness of hope.

The reason for the test is this. If an account identifies appropriate items, it can then be fitted into its discipline. And this will be so, if perhaps only to a limited extent, even if the account breaks new ground through identifying items

of new types, so long as future customary identification is a reasonable hope. An account's fitting into a discipline will give researchers access both to tried and tested ways to appraise the account, and to a context of other accounts. Then those who wish to see whether an account should be regarded as world-mandated will be able to rely on researchers having had available to them the discipline's usual ways to formulate accounts properly, to assess each account's evidential support, coherence and ability to improve understanding, and to decide between rival accounts.

Requiring accounts to fit into the context provided by an existing discipline would leave out of consideration some truly radical innovations, at least until after their proponents had succeeded in reshaping disciplines or establishing new disciplines around the innovations. Examples are the introduction of the BCS theory of superconductivity and the rise of epigenetics.<sup>53</sup> We do not mean to denigrate radical innovations. It is just that it would be difficult to assess the world-mandation of accounts when the innovations were first made, so it would be safer not to regard the relevant accounts as world-mandated.

The items test will almost always be satisfied, and it will usually be obvious that it is satisfied. But it is worth including in our catalogue of tests, just to detect the occasional outlier.

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<sup>53</sup>For the BCS theory see Tinkham, *Introduction to Superconductivity*, second edition, chapter 3. For epigenetics see Carey, *The Epigenetics Revolution: How Modern Biology is Rewriting our Understanding of Genetics, Disease, and Inheritance*.

### 3.4.7 Fullness

Accounts should not lack important pieces of information. The fullness test is satisfied if and only if an account does not suffer from any such lack.

An account of some part of the world does not need to cover everything which might be said about that part within the scope of the relevant discipline. Indeed, saying everything would be likely to obscure patterns and make it difficult to convey clear messages. But there should not be any significant lacunae. So for example an account of a chemical reaction that failed to mention the temperature at which it was conducted or the apparatus used would not satisfy the fullness test. Nor would an account of a period of history that failed to mention events which were significant given the approach of the account, such as a political or an economic approach.

A piece of information will count as important if it would be reasonable for someone who was aware that it could be given and who was considering an account which lacked it to require that it be incorporated in order to allow the account to be assessed. This is vague but the exercise of judgement, governed by the standards of the relevant discipline, should suffice to make it tolerably precise in specific cases. For example, in an account of fluid flow the viscosity of a fluid would be important but its colour would not be. Or in an account of the processes by which people interpreted some images, levels of ambient light in which images were viewed would be important but the body mass indices of people viewing them would not be. Or in an account of the spread of rumours through a society, the extent of use of social media would be important but the language in which each rumour was initially formulated would probably not be important unless there was more than one language in widespread use in the society.

Sometimes, what should be included will depend on the immediate use being made of the account. For example, sometimes study of an urban rail network will only require an account of the stations and the connections between them but sometimes the journey times between stations will also be needed.

The requirement not to lack important pieces of information may seem strange. Even if some information is missing, it would seem to be proper to give a limited account. But we are not trying to regulate the giving of accounts. Our concern is to allow a good prospect of only regarding an account as world-mandated when doing so would be appropriate. The justification for the fullness test is that if too little information is given, deficiencies may pass unnoticed. The inclusion of additional information might reduce coherence. Or it might put the information that was originally given in a different light, limiting any improvement in understanding. Such concerns mean that the fullness test is one we may expect researchers themselves to apply, at least implicitly through being concerned that lacunae might lead to deficiencies passing unnoticed.

It is important not to apply the fullness test inappropriately. Reasonably broad-brush accounts may be generally accepted in the relevant type of work. They are for example acceptable in the writing of histories of long periods. Broad-brush accounts should not be excluded from being regarded as world-mandated because of their lack of detail. But the test should not be ignored. Instead the test should be amended to say that it should be possible to fill out an account with a reasonable amount of detail and find that it still satisfied the other world-tests, where the selection of details should be natural and not contrived to help satisfy those other tests.

This amendment is however only to be made when an account is conspicuously broad-brush. It is not suggested that all accounts should be filled out with extra detail before applying the other world-tests. When an account is already reasonably detailed by the standards of the discipline, that level of detail should allow the other world-tests to give appropriate control over a decision on whether to regard the account as world-mandated.

## **3.5 World-mandation to a limited degree**

It might seem that accounts which triumphed over rivals should sometimes be regarded as world-mandated to a limited degree, in the sense that they did not do quite well enough on the competition test to be accorded that status to a maximal degree. In fact that would not be appropriate.

In this section we shall discuss situations in which it might be tempting to regard accounts in that way. We shall assume that the accounts would also satisfy the other world-tests to a standard necessary to make it possible to regard them as world-mandated, although we shall discuss satisfaction of those world-tests to varying degrees.

### **3.5.1 The theoretical case**

We shall start with the theoretical case in which all possible rivals are seen as considered. There are two aspects to consider, victory in respect of parts of content but defeat in respect of other parts, and victory on some world-tests but defeat on others.

### 3.5.1.1 Victory only in respect of some parts

Some accounts might be superior to rivals in respect of some parts of their content while being inferior in respect of other parts, but with no overall winner.

This would not arise often in the theoretical case. Whatever content an account had, there would be some potential rival to set against given parts of the content while agreeing with other parts. If the best accounts that were initially formulated were each superior in respect of different parts of their content, an account which took the best parts from all of those accounts and which therefore won on all parts should be somewhere among the rivals to consider.

One exception to the availability of rivals would arise when it was not possible to set out an account that would be a rival in respect of some specified parts of the content of a given account while preserving agreement in respect of the other parts, because such a rival would be logically contradictory within itself. Contradictory accounts would be excluded from coming forward as rivals. And that would be a reasonable exclusion because the success of disciplines in making sense of the world within the constraints of logic is evidence that the world does not call upon researchers to give accounts which do not comply with logic. It is very rare for there even to be a temptation to change logic in order to facilitate the giving of satisfactory accounts. The leading example is in quantum mechanics, and even there the idea of changing logic is contentious.<sup>54</sup>

The non-availability of some rivals for reasons of logic might mean that the assembly of components from individual accounts that were winners in different respects could not be

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<sup>54</sup> Dalla Chiara and Giuntini, “Quantum Logics”; Maudlin, “The Tale of Quantum Logic”.



used to construct an account that would win in all respects. But then the correct approach would be to accept that no one account should be regarded as world-mandated, not to regard any of the accounts as world-mandated to a limited degree. It might however be found that smaller accounts created from the winning parts of some of the accounts should be regarded as world-mandated.

### **3.5.1.2 Victory only on some world-tests**

We have just considered partial orderings of rival accounts with no single top member where the ordering is by reference to parts of the contents of accounts. But ordering might also be by satisfaction of the world-tests other than the competition test, even when all the contending accounts satisfied all of those tests to an acceptable degree. And it might be that no account would be a clear winner on all three of evidential support, coherence, and improvement in understanding. It would seem that a partial ordering with no single top member could arise for that reason.

This could indeed happen. But one would then have to say that as there was no clear winner, there would be no account which it would be appropriate to regard as world-mandated. There would be a temptation to resist this conclusion by ranking the other world-tests, and discarding tests from the lower end of the ranking until a clear winner emerged. Thus if the ranking was evidence-coherence-understanding, the understanding test would be discarded first, and then if there was no clear winner both on evidence and on coherence the coherence test would be discarded and the winner on the evidence test would be regarded as triumphing over all rivals. But that would be a risky move within disciplines, and one which we could not endorse from our external viewpoint.

### 3.5.2 The practical case

We now turn to the practical case in which only a restricted range of rival accounts would be considered. The concerns just raised in the theoretical case would still arise, but there would be a new one to add.

A restriction to reasonable and available rivals would allow for cases in which some of the content of an account had not been fully tested. This could happen because the account had not been pitched against all possible rivals, so not all combinations of options for all parts of the content had been considered. But a winning account might still be seen as satisfying the competition test to a standard necessary to allow the account to be regarded as world-mandated, so long as one both had sufficient confidence in the process which led to the exclusion of some accounts as not even worth considering and was also confident that the discipline was not so underdeveloped that the non-availability of unforeseen accounts presented a serious risk.

The correct reading of such a situation in relation to an account which also satisfied the other world-tests would not be that the account should be regarded as world-mandated only to a limited degree. Rather, it would be that the failure to consider all possible rivals might lead to some uncertainty as to whether the account should be regarded as world-mandated. There might however be full confidence that some more limited account which did not include elements that might be feared not to have been fully tested should be regarded as world-mandated.

### 3.5.3 Other influences on confidence

Another influence on degree of confidence, both in the theoretical case and in the practical case, would be the decisiveness with which evidential and other considerations

ruled out rival accounts. It might be thought probable, but not certain, that a rival was defeated. In such cases, there should again be a reduction in confidence that the apparently winning account should be regarded as world-mandated.

Likewise, the extent to which the other world-tests were satisfied might reduce confidence that the nature of the world sufficed to lead to an account's being considered mandatory without any need for improper influences. There would be a corresponding reduction in confidence that the account should be regarded as world-mandated.

# Chapter 4

## Reality

In this chapter we shall consider the question of extension realism, which we shall continue to call the question of realism. The question is this. Are items within the extensions of concepts used in giving accounts real, rather than merely posited in order to allow accounts to be given?

We shall start by saying something in section [4.1](#) about the notion of an item's being real. Then in section [4.2](#) we shall add something about the types of item in relation to which the question may be posed. We shall give the structure of our argument in section [4.3](#). Finally, we shall explore the question in section [4.4](#). Within that section, we shall say in section [4.4.3](#) how extension realism can be connected with another form of realism.

## 4.1 Being real

### 4.1.1 The reference mark

We shall not define the reality of items. It is arguable that the status of reality is a basic one, not to be defined in other terms. Rather, we shall identify a characteristic of items which they would have if they were real and would not have if they were mere posits.

The characteristic is that reference to the items will always remain respectable, regardless of either actual or merely possible future changes of accounts or conceptual schemes (so long as schemes would still leave reference expressible). Thus if electrons in physics or rates of inflation in economics are real, it will always be respectable to refer to them even if theories change. It might not remain useful to refer to them, but it would not become a disreputable thing to do. By contrast it is no longer respectable to refer to phlogiston, so we can be confident that it is not real. It was only ever a posit of a theory of combustion which has now been discarded.

We shall call the characteristic we have identified the reference mark. And we shall say that it is borne by items rather than by concepts or names of those items. Thus for example a kind, rather than the concept of it, may bear the reference mark.

### 4.1.2 The mark and reality

The reference mark would be borne by any item that was real in any sense strong enough to satisfy realists. While an item exists, reference to it will be respectable simply by virtue of its existence. And if an item ceased to exist, it would remain respectable to refer to it in the context of

accounts of the time at which it existed.

If on the other hand an item were not real, there would be no reason to think that reference to it would always be respectable. Posits come and go as theories and other accounts change. In particular, if it were merely helpful to refer to an item, that helpfulness could cease. Even while helpfulness remained and on that basis it was asserted that reference was respectable despite accounts which referred to the item ceasing to be considered mandatory, it could not safely be predicted that reference would remain respectable through changes of accounts and conceptual schemes. Helpfulness depends on the state of a discipline as a whole, and can be lost as a discipline develops.

So if an item is real in any worthwhile sense it will bear the reference mark, and if it is not real it will not bear the mark.

### 4.1.3 Reduction

Items may be respectable referents and yet either be reducible to other items already, or at some future time turn out to be reducible. Could they then bear the reference mark?

We answer that they could. If items were reduced to other items, that would not undermine their reality or the respectability of reference to them because they would survive as transparent shells within which the items to which they had been reduced sat. It is not necessary to be fundamental in order to be real in the sense that we intend. Indeed it is wiser for us to allow that non-fundamental items may be real, so as to ensure that we do not make the task of arguing that nothing important would be lost by failure to consider the question of realism too easy for ourselves.

It is in any case not necessary for us to settle the question of whether reducible items could bear the reference mark. If one thinks that items are real one will think they bear the mark. And if one thinks they are not real, whether because one thinks that reducibility takes away reality or for any other reason, one will think they do not bear it.

(It is convenient to speak as if current talk of items is legitimate enough for us to be able to say that they do not bear the mark, rather than fearing that such talk might be illegitimate because “they” would not point to anything. But since our interest would be in the question of whether it was or was not the case that there were items which fitted certain descriptions and also bore the reference mark, nothing will be lost by our choice of this way of speaking.)

We shall return to the topic of reduction in section [5.6.2.2.2](#). And we may note that survival as a transparent shell would not be available with some forms of reduction. For example, radically disjunctive reduction would make continuing reference to the old items disreputable or at best render it merely helpful. The latter would not suffice for the items to bear the reference mark.

#### **4.1.4 The mark and world-mandation**

There are some points of contrast between the notion of bearing the reference mark and the notion of the world-mandation of accounts and concepts.

First, if it is thought that items within the extension of some concept bear the reference mark, it will be thought that they will continue to do so through any changes of theories. But when an account is regarded as world-mandated, one is open to the possibility that it will at some time cease to be regarded in that way.

Second, reference to items which bear the reference mark is only to be thought of as obligatory when an account which includes reference to them is considered mandatory. Otherwise reference is merely to be thought of as permitted. Having said that, we shall only be interested in whether items bear the reference mark when there are accounts which refer to them and those accounts are considered mandatory. This is because our concern is with the question of realism, which we take to be pressing only when concepts are world-mandated.

Third, we have deliberately concentrated on whether accounts and therefore concepts should be regarded as world-mandated, rather than on possession of an objective status of world-mandation, but now we speak in terms of an objective status of bearing the reference mark. When we discuss particular items we shall speak of its seeming that they bear or do not bear the mark, to reflect the actual position of people thinking about items. But we shall see people as wondering about possession of an objective status, not about whether it would be appropriate to think of items as bearing the mark.

We have to speak of its seeming that particular items bear the reference mark because we know from experience that views may change, as they have with phlogiston. Reference to items which were thought to bear the mark might still be rendered disreputable by the development of future theories, but only if current theories were considered to be mistaken in ways that had this consequence. Not all types of mistake would have it, nor would mere inadequacy in the depth to which current theories carried reductive analysis. And there would be no current expectation that current theories were in fact mistaken, only a fear that this could turn out to be so which would be based on awareness of the fate of previous theories. So for the time being there would



be an expectation that the respectability of reference would continue.

There is also a state in between confidence in current theories and a general fear that theories can in due course fail. It may be clear that there is something wrong, even though there is no general agreement on what the next step might be. The known difficulties in handling the implications of Bell's theorem would be an example.<sup>1</sup> But when that was the position, one would expect people who were in general inclined to realism to hold back from any realist commitment.

Our thought of an objective status of bearing the reference mark will not create the difficulties that pursuit of objective world-mandation would create, because our aim is not to set up a question derived from the question of realism that we could see our way to answering in specific cases. It is to show that the question of realism, if based on a notion of reality that realists would find satisfactory, would lead on to the question of whether the reference mark was borne, then to show that the mere imagination of giving either possible answer to that latter question in a specific case would lead one into philosophical difficulties.

## 4.2 Items and kinds

Throughout our discussion, we shall continue to refer to items rather than objects or entities. Items include abstract objects (including structures, relationships and influences), classes, kinds, and properties of items of any sort, as well as concrete objects and events. The question of realism may arise in respect of abstractions such as inflation rates in

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<sup>1</sup> Bell and Gao (eds.), *Quantum Nonlocality and Reality: 50 Years of Bell's Theorem*.

macroeconomics, quantum states in physics, and apparently natural groupings such as groups of chemical elements, just as easily as it may arise in respect of items such as electrons which we are inclined to regard as individual objects.<sup>2</sup>

In some disciplines, including chemistry and several higher disciplines, discussions tend to be conducted using the terminology of natural kinds rather than the terminology of realism, but in broad terms the issue is sometimes the same.<sup>3</sup>

We only say that the issue is sometimes the same, not that it is always the same. It depends on the concept in question and on how the items are regarded. Take for example chemical elements.

If the concept in question is that of a particular element, such as carbon, the question of natural kinds can be taken to be one about the quality of a theory. Is chemistry done better if the concept of carbon is put to work than if it is not? The answer is obviously yes, both now and for the foreseeable future. Such a question is not a question of realism in our sense. If on the other hand we were to consider individual atoms of carbon, the question in our sense would immediately be answered in the affirmative. Those atoms clearly do exist, and it is very hard to imagine reference to them ever ceasing to be respectable.

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<sup>2</sup> On abstractions in macroeconomics see Hoover, “Microfoundations and the Ontology of Macroeconomics”. On quantum states see Myrvold, “On the Status of Quantum State Realism”. On groups of elements see Scerri, *The Periodic Table: Its Story and Its Significance*, second edition, chapter 13. On electrons see Egg, “Entity Realism”.

<sup>3</sup> On the question of natural kinds in chemistry see Bhushan, “Are Chemical Kinds Natural Kinds?”

There is however a way to find questions about kinds which do interest us and do not have obvious answers. We can ask whether the kind known as carbon is itself real, and we can start to answer the question by thinking about whether the kind bears the reference mark. More generally, are the kinds which are picked out by the concepts of the various elements real? And if a list of elements is structured by setting out groups of those elements, as is done by drawing up a periodic table, then a further question is that of whether the kinds picked out by the concepts of such groups, for example the concept of a halogen, are real.

(To bring questions about such kinds explicitly within the scope of the question of extension realism we need only note that an item, such as the kind that corresponded to the concept of carbon, would be a member of the extension of the concept of a chemical element. There would be a separate concept of atoms of carbon, within the extension of which actual atoms would fall.)

Affirmative answers to such questions would only be worth considering if a theory which made use of concepts that picked out the kinds was successful. Indeed, the theory would need to be one that it would be appropriate to regard as world-mandated. Even then, there would still be scope to argue that no reality should be attributed to anything other than the individual atoms which were labelled with the names of elements.

The question of realism would have no obvious answer, and a negative answer would be an option, because whether the kinds in question were of elements, groups of elements or anything else, being real would not for kinds mean being physical in the everyday sense. Nobody has ever tripped over a kind, natural or otherwise, in the street.

At this point an understanding of what is meant by naturalness can come to the rescue. To say that a concept should be regarded as picking out a natural kind is at the very least to say that the nature of the world is such that we should group together the items within the extension of that concept. The realist will take a step further and say that while natural kinds are not physical, they are nonetheless real. Then when the concepts of those kinds are put to work appropriately, researchers who use them implicitly say something true about the world simply by using them.

Realism about natural kinds which was of sufficient strength to make the question of realism troublesome and worth putting to one side would not however need to involve a mind-independent existence which would strike some as implausible.<sup>4</sup> It could be limited to a belief that the concepts of kinds currently in use not only had to be used now but would continue to feature in any future theories.

### 4.3 The argument

The first stage in our argument will be to show that when the question of realism is not easily answered in the affirmative, it is worth avoiding if that can be done without serious loss. An answer to the question of realism in relation to any specified items would imply an answer to the question of whether those items bore the reference mark, at least unless the notion of reality in play was so weak that most realists would not be satisfied with it. And any answer to that latter question would create philosophical difficulties. So the question of whether items bore the reference mark would be good to avoid, and therefore the

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<sup>4</sup> Crane, “Two Approaches to Natural Kinds”, section 4.2, argues that mind-independent existence is more appropriate to projects in the philosophy of language than to those in the philosophy of science.

question of realism would be good to avoid. We shall cover this first stage in section 4.4.

The second stage, covered in chapter 5, will be to argue that there would be nothing much to be gained from deciding whether to regard items as real when reality was not in any case obvious. (When it was obvious, realism would not create any philosophical difficulties.)

In this second stage we shall step back from the question of whether items bear the reference mark to an unspecified notion of reality. The reason for stepping back is that while any item that was real in a sense sufficient to satisfy realists in general would bear the reference mark, real items would in the eyes of many realists have additional attributes. We shall need to show that it would be possible to forgo an answer to the question of whether items had any such additional attributes without serious loss.

## **4.4 Exploring the question**

### **4.4.1 The origin of the question**

#### **4.4.1.1 An independent nature**

It is easy to suppose that there is a certain nature of the world and that this nature is independent of studies of the world, although it could only be set out by giving specific accounts. Indeed, our notion of accounts having to be adopted by virtue of the nature of the world relies on this supposition. The concept of disciplined research would also be hard to sustain without the supposition.

We shall accept that there is such an independent nature. Concepts may be social constructs, as may be the status that is accorded to epistemic achievements such as formu-

lating accounts of high quality. But we shall take no interest in lines of thought which would say that the nature of the world was a social construct and would thereby open the door to relativism. In this we side with Paul Boghossian.<sup>5</sup>

We must take some care over the idea of an independent nature. There are various possible claims.

#### 4.4.1.1.1 The metaphysical claim

One possible claim is that the contents of the world are independent of our thoughts. This is a claim that would be made by realism in the broad metaphysical sense. It is a claim that we shall take for granted. Even our thoughts are independent of thoughts about them.

#### 4.4.1.1.2 The extension realism claim

A second possible claim is the claim of extension realism. It is a claim that we do not take for granted. (There are further possible claims which would capture other forms of realism, particularly in the philosophy of science.)

This second claim is that items which are claimed to be instances of concepts actually exist and are pretty much as they are supposed to be in accordance with the concepts' intensions. Thus if the concept of an electron is in use, purported members of its extension mentioned in an account will be implicitly claimed to exist and to have pretty much the properties and propensities given by the concept's intension. Minor deviations may be allowed, on the basis that accounts may disclose roughly how the world is even if they suffer from small errors, but that is all. Similarly, if a historical account claims that economic

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<sup>5</sup> Boghossian, *Fear of Knowledge: Against Relativism and Constructivism*.

pressures led to the downfall of a government, it will be claimed that there actually were pressures which had the properties and propensities given by the intension of the concept of an economic pressure.

Mere claims of correspondence to intension would be made by anyone who claimed that the relevant accounts were appropriate. But the realist would go further and add the claim of reality. The minimal content of the extension realist's claim would be that the items, as instances of the concepts, bore the reference mark. It would be taken that it would always remain respectable to refer to the items that were currently regarded as falling within the extensions of the concepts, and to go on bringing them under those concepts without serious conflict between the items and the concepts' current intensions.

Our interest is in putting to one side the question that would be given one possible answer by making extension realist claims.

#### **4.4.1.2 Nature and discovery**

Given the supposition of an independent nature, the task of research in a discipline would seem to be to set out the nature of the world in a way that was appropriate to the relevant discipline. Then the conclusions reached would be seen as having every prospect of disclosing the true nature of the world as it was studied within the discipline.

Such a view of the world and research would make intuitive sense. It would project our everyday practice of establishing mundane facts into the enterprise of research in each discipline.

The view would however face a difficulty. It would imply that if an account succeeded in disclosing the nature of

the world, items within the extensions of the concepts used in setting out the account were real at least to the extent given by the extension realism claim we set out in section 4.4.1.1.2. Alas, there would be objections to that conclusion. And there would also be objections to the standard way to avoid it. We shall now explore the options and objections to them.

## 4.4.2 Realism and anti-realism

Regarding items as real might seem to be perfectly acceptable, as well as natural. But we shall see in section 4.4.2.1 that there are reasons in lower disciplines not only to favour that realist view, but also to favour denial of it. And in section 4.4.2.2 we shall see that there is also scope for debate over realism in higher disciplines.

The assertion view will allow us to put the debate between realism and anti-realism to one side, as we shall see in chapter 5. But before we get that far, we need to see that the debate is serious enough that it is worth putting to one side. That is our task here.

### 4.4.2.1 Lower disciplines

#### 4.4.2.1.1 The debate

In the philosophy of the natural sciences, and particularly in the philosophy of disciplines at the low end of the scale – physics and reasonably fundamental forms of chemistry – there are debates as to whether items to which theories refer should be regarded as real, as well as about other questions of realism. These are philosophical debates, not scientific ones. They do not pose risks to currently accepted theories, nor will they pose risks to new theories which may in due course supplement or replace them. But the debates still matter if we think that some theories disclose how the



world is, and also want a philosophically satisfactory way to regard the contents of theories.

It is standard in the philosophy of science to say that questions of realism concern how to view current best theories. Our concern is with items within the extensions of concepts that are appropriately regarded as world-mandated. The difference should not concern us, in that what we say about the troublesome nature of the question of extension realism would still apply if we spoke of current best theories. And one important point carries over from standard treatments without difficulty. This is that when a debate is over the reality of items, it can be couched in terms of what the attitude should be to items in general which meet the condition of being referents in current best theories or the condition of being referents in accounts appropriately regarded as world-mandated. If items meet whichever condition is used, should they then be regarded as real or even as bearing the reference mark? That is, it is a question about what follows simply from meeting the chosen condition. We are not here concerned to get down to specific items and ask whether they should be regarded as real or as bearing the reference mark by virtue of a combination of meeting the chosen condition and other qualities they may have.

Thinking in the more general terms will suffice for our purpose of showing that the question of extension realism is best avoided. It will suffice because we can have no reason to think that difficulties in deciding whether to regard items as real or as bearing the reference mark could in general be avoided by examining additional qualities of items, even though that might sometimes help. It will also allow us smoothly to accommodate items that do have additional qualities, such as perceptibility, which make the question of realism easy to answer in the affirmative.

We shall now look at a few of the things that have been said in debates over realism. We shall not cover this topic comprehensively, either in breadth or in depth. Our aim here is merely to record that there are difficulties, so as to support our claim that the question of extension realism is worth avoiding if that can be done without serious loss.

#### 4.4.2.1.2 In favour of realism

The leading argument in favour of realism is the no-miracles argument. If science did not report the true state of the world, its success would be a miracle. There are no miracles, therefore science reports the true state of the world. More broadly, the best explanation of the success of science is that most of it is at least approximately true. Sometimes an argument along these lines is accorded the title of the ultimate argument for scientific realism. But while such arguments are superficially plausible, they are mired in controversy.<sup>6</sup>

Another argument is based on the fact that scientists can go beyond observing the world and can intervene in it, manipulating things in order to achieve desired results. The argument is that scientists could not manipulate things which were not real.<sup>7</sup> This argument would however be

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<sup>6</sup> For an introduction to the arguments and their history see Psillos, *Scientific Realism: How Science Tracks Truth*, chapter 4. For a recent analysis which views the line of argument from a particular standpoint but includes references to the literature more generally see Sprenger and Hartmann, *Bayesian Philosophy of Science*, Variation 3. For a recent round in one important aspect of the controversy see Dawid and Hartmann, “The No Miracles Argument without the Base Rate Fallacy”. Another controversial aspect is discussed in Dellsén, “Explanatory Rivals and the Ultimate Argument”.

<sup>7</sup> Hacking, *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*, chapters 1 and 16; Miller, “What is Hacking’s Argument for Entity Realism?”; Egg, “Entity Realism”. For criticism see Gelfert, “Manipulative Success and the Unreal”.

limited to supporting a realistic attitude to items that were open to manipulation, unless it was supplemented by an argument that reality was contagious across the items to which scientific theories referred.

Both the no-miracles argument (when read as concerning items rather than merely concerning truth) and the argument based on intervention would argue for items bearing the reference mark, as well as perhaps arguing for the applicability of some stronger concept of reality. So denial that items mentioned in theories bore the reference mark would be philosophically problematic.

#### 4.4.2.1.3 In favour of anti-realism

The leading argument in favour of anti-realism is the theory-change argument, also known as the pessimistic induction and the pessimistic meta-induction. Theories have changed in the past, not always merely in detail but sometimes in the large claims they make about the nature of the world. The argument may be put forward as one about the truth of theories, but it can also be read as an argument about the reality of items. Read in that way, it offers a strong challenge to extension realism.

For example, the Einsteinian concept of spacetime is fundamentally different from Newtonian concepts of space and time. The immense success of the Newtonian concepts would have led any realist to say that the world included Newtonian space and time, at least until the work of James Clerk Maxwell and others made it possible to give definite form to worries.<sup>8</sup> And yet the world does not include those items.

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<sup>8</sup> For the actual history, as distinct from what we can in retrospect see as having opened up scope for specific worries, see Darrigol, *Electrodynamics from Ampère to Einstein*.

Only an acceptance that the items mentioned in even the most successful theories might not be real, so that there would be scope for reference to them eventually to cease to be respectable even if it happened to remain respectable for some time after a change in theory because it was still helpful, could accommodate changes like that one. And we have no reason to hope that the pattern of drastic changes of theory will not continue into the future.<sup>9</sup>

A view that it was in general appropriate to affirm that various items actually bore the reference mark (as distinct from a view that it was often appropriate to affirm that it was currently reasonable to think that they did) would fly in the face of the theory-change argument. One simply should not make such claims, given that theories are always in danger. Thus affirmation that items mentioned in theories bore the reference mark would be philosophically problematic, just as denial would be.

#### 4.4.2.2 Higher disciplines

Analogous debates can be found higher up the scale, although the degree to which issues and arguments have been made precise tends to diminish as one goes up the scale. One reason for lack of precision is that the standard arguments in the philosophy of science do not easily carry over in full. The no-miracles argument relies on epistemic success which is indisputably massive in the natural sciences, but more debatable in the social sciences and the humanities. It is also often difficult to apply the argument based on intervention higher up the scale. And the boundaries of theories and the definitive termination of use of concepts are less obvious higher up the scale, making

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<sup>9</sup> For a survey see Wray, “Pessimistic Inductions: Four Varieties”. For criticism of the argument see Mizrahi, “The Pessimistic Induction: A Bad Argument Gone too Far”.

the theory-change argument difficult to carry over without some weakening. Having said that, we can give examples of debates. We shall start at the upper end of the scale of the natural sciences.

In biology, there is a long-standing debate as to whether species are real. Several different solutions have been proposed over the years. Some of them avoid simply deciding for realism or anti-realism. For example, there is realistic pluralism. This maintains that there are several different concepts of species, each appropriate to a particular purpose, but that they should all be regarded in a realist way. This does however tend to encourage anti-realism if straightforward extension realism is meant, because while nature may have joints, they cannot plausibly be too close together or link overlapping bones.<sup>10</sup>

In political science there are debates over whether social groups have some reality in their own right, making them more than mere assemblies of their members, and whether ideas are real.<sup>11</sup> Such debates, ostensibly about the reality of items, can however easily shade into debates over the quality of theories. The path between debates of the two types, a path which can have a similar effect in disciplines right up and down the scale, is opened up by the fact that it is natural (although perhaps sometimes mistaken) to think that reality and causal efficacy go together. The connection in the direction from reality to efficacy is captured in Hegel's dictum "Was wirklich ist, kann wirken".<sup>12</sup> And it is at least as natural to assume the other direction and say "Was

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<sup>10</sup> The debate is surveyed and a particular solution is proposed in Reydon and Kunz, "Species as Natural Entities, Instrumental Units and Ranked Taxa: New Perspectives on the Grouping and Ranking Problems".

<sup>11</sup> Hay, "Political Ontology", sections 4.1 and 4.3.

<sup>12</sup> "What is real, can have effects": Hegel, *Wissenschaft der Logik*, part 1, book 2, section 3, chapter 2.B., section 1.

wirkt, ist wirklich”.<sup>13</sup> Thus social groups and ideas may most easily be thought of as real if there are theories which give them causal roles and those theories seem to be of high explanatory quality.

In history, there is again scope to raise questions of realism like those which arise in the social sciences. Should ideas, or relationships of power, or other items without obvious physical presence, be thought of as real? There is also scope, available throughout the social sciences and the humanities but particularly conspicuous in history, to ask about the reality of some of the items which group events together and which researchers mention in order to give worthwhile accounts of the past.<sup>14</sup> If historians mention specific people or battles, there is no reasonable scope to question their reality once enough evidence is in. (This point is meant to resist any attachment of ontological significance to anti-realism which is grounded in the fact that a body of historical evidence will be a complex web, open to growth and fresh interpretation, that is never absolutely decisive, a form of anti-realism which can take its rise from Michael Dummett’s advocacy of the central position in a theory of meaning of justifiers for claims.<sup>15</sup>) But when historians identify items like the Hundred Years’ War, or the Scientific Revolution, there is plenty of scope to ask whether such things existed in reality or are merely posited by historians to facilitate understanding.<sup>16</sup>

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<sup>13</sup> “What has effects, is real”.

<sup>14</sup> Černín, “Historical Antirealism and the Past as a Fictional Model”.

<sup>15</sup> Pataut, “Anti-realism About the Past”.

<sup>16</sup> On the complex historiography of the Hundred Years’ War see Curry, *The Hundred Years War*, second edition, chapter 1. On the Scientific Revolution see Heilbron, “Was There a Scientific Revolution?”

As with lower disciplines, all such debates would remain live and troublesome even if one thought only in terms of items bearing or not bearing the reference mark rather than in terms of some stronger notion of reality.

### 4.4.3 The version of realism we discuss

#### 4.4.3.1 Semantic and other options

We have limited ourselves to extension realism, the view that accounts should be interpreted to the effect that items within the extensions of concepts used are real, and to the anti-realist view that such an interpretation of accounts would be inappropriate. This is the most natural sort of realism to put up for debate, in two ways.

The first way is that it is a semantic realism, a claim about how accounts should be interpreted, so it is natural in that it is directly about the specific fruits of research which prompt the question of realism. There are other ways to read realist claims.<sup>17</sup> There is the metaphysical reading that there is a mind-independent world. And there is the epistemic reading that accounts, and particularly scientific theories, aim to identify what is really in the world and to a large extent succeed in that task. But we take realism in the terms of the metaphysical reading for granted, as set out in section 4.4.1.1. And the semantic reading leads on to the epistemic reading, in that if accounts considered mandatory are interpreted in a realist way then we can provisionally take them to have succeeded in finding out what is really in the world. So to think in terms of a semantic reading is no restriction within the scope of our project. We can therefore refrain from exploring the other options.

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<sup>17</sup> Miller, “What is Hacking’s Argument for Entity Realism?”, section 2.

The second way in which this is the most natural form of realism is that it focuses on items within extensions. This is natural because the question of realism is most easily taken to be a question of whether items are real.

#### **4.4.3.2 Extension realism and truth realism**

Extension realism can both be implied by and imply another form of semantic realism, the view that the contents of accounts are true of the world – a view we shall call truth realism.

The breadth of our notion of items will be significant here. As we noted in section 4.2, all sorts of abstract classes, relations, and so on count as items. An implication from truth realism to extension realism would need to cope with the breadth of the notion. And an implication from extension realism to truth realism would require that breadth.

To see how the mutual implication can arise, we shall consider an example. Suppose that an account claims that C caused E.

##### **4.4.3.2.1 From truth realism to extension realism**

We shall start with the scope for an implication from truth realism to extension realism.

Under one form of truth realism, the claim that C caused E would only be true if there were not merely items C and E, but also a causal relationship which had those items as relata and which pointed in the correct direction. Then truth realism would lead to extension realism, even with our broad notion of items. Items like causal relationships would not be left without reality. The reality of such items



would not be the same as the reality of physical objects. But it would at least amount to their bearing the reference mark.

Under another and more modest form of truth realism, the truth of the claim that C caused E would only require the reality of C and E. The causal relationship would be analysed in some way which did not imply that it would be an item to which any term referred. Truth realism of that form would only imply a limited extension realism.

#### 4.4.3.2.2 Truth realism without reference

There is an argument that one can have truth realism without the terms in a scientific theory successfully referring to items in the world.<sup>18</sup> But the argument depends on removing referring terms and replacing them with variables which stand in an appropriate structure to capture the content of the theory and which are existentially quantified. So while the requirement to have terms refer successfully may go away, it is replaced by an assumption that there are items which would make the quantifications come out true. And to that extent extension realism would still follow from truth realism.

The objective of the argument is indeed not to avoid having items with more or less appropriate properties, but to ensure that any failure of terms themselves to refer would not prevent recognition of the approximate truth of a theory. It achieves this result by saying that the items which make the quantifications come out true do not have to be the items designated by the theory, so long as they are items which can stand in appropriate places in the structure.

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<sup>18</sup> Cruse and Papineau, “Scientific Realism Without Reference”; Papineau, “Realism, Ramsey Sentences and the Pessimistic Meta-Induction”.

But if we take the reality of items to mean the reality of whatever may stand in a given structure, such a use of Ramsey sentences to express the scientifically significant contents of theories would make no difference to us. If we were seeking to defend realism we would want to enquire into whether what was offered was a significantly different kind of extension realism, for example because it allowed for substantial disrespect of the intensions of concepts. But that is not our concern. All we need for our project is that what was offered would still be a sufficiently troublesome kind of realism for it to be worth seeking a way to put the question of realism to one side.

#### **4.4.3.2.3 From extension realism to truth realism**

We shall now turn to the scope for an implication from extension realism to truth realism. We may note that for extension realism to be appropriate the three items in our example of a claim that C caused E, that is, C, E, and the causal relationship, would have to be pretty much as described in the claim, as we set out in section [4.4.1.1.2](#). And that would be enough to yield the truth of the claim, so extension realism would lead to truth realism. Here the breadth of our notion of items is important. It ensures that the causal relationship would be deemed to be real under extension realism, alongside C and E.

This dependence on the breadth of our notion of items does mean that the implication would not go through, or at least would require the choice of a modest form of truth realism for it to go through, if one were to start with a more modest form of extension realism, for example one that only covered concrete objects and natural kinds. But as our aim is to put the question of extension realism to one side, this need not concern us.

#### 4.4.3.2.4 **Doing without truth**

Having noted this connection between extension realism and truth realism, we must anticipate a problem. If we are to find a way to put the question of extension realism to one side, where will that leave the truth of accounts? Must we also put ourselves in a position in which we cannot attribute truth? This would seem to follow even if truth realism took a modest form under which, for example, a cause and its effect had to be real but the causal connection did not. If we forswear extension realism completely, even a truth realism that would only imply a limited form of extension realism must be rejected.

We shall indeed have to give up attributions of truth. And in section 6.4.2.2 we shall give another reason why this is so. But we shall argue in section 6.8.2 that it will not matter. We may also note now that the loss of extension realism and truth realism will relate only to accounts which do more, or other, than report the perceptible. When accounts only report the perceptible, extension realism will be inevitable. As we noted in section 1.1.2 and shall spell out in section 5.6.2.2.2, the perceptible must be taken to be real. Extension realism will then bring truth realism along with it so long as all required items, including for example causal relationships, are perceptible. We should however acknowledge that the step from extension realism to anything more than a modest form of truth realism might be obstructed, if for example one only allowed that concrete objects could be perceptible.

Finally, other authors have also argued for the connection between what we have called extension realism and truth realism. In particular, Michel Ghins does so and makes an explicit connection with the correspondence theory of

truth.<sup>19</sup>

#### 4.4.4 Unexplored options

Realism about entities, which we have elaborated into extension realism, is not the only option available. In particular, structural realism has been gaining ground in recent years. This has been so mainly in the philosophy of the physical sciences, but also to some extent in the philosophy of the biological sciences. Emphasis is placed on the reality of structures rather than of objects.

We can however safely leave structural realism to one side. Some such position might provide a way out of the difficulty of settling the question of extension realism. Structures may be argued to be real enough to explain the success of science while also being relatively immune from having to be discarded when theories change. But structural realism is not an uncontroversial family of positions.<sup>20</sup> So the option of putting the question of realism to one side would still have enough appeal to be worth pursuing.

The same may be said in relation to those forms of perspectivism which seek to save realism from some of its difficulties. It is not clear that they could do the job. In particular, realism might need to be reconceived in a way that many realists would find unacceptable in order for it to be something that perspectivism could sustain.<sup>21</sup> So the availability of perspectivism does not render pointless the

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<sup>19</sup> Ghins, “Selective Scientific Realism: Representation, Objectivity and Truth”, section 3.

<sup>20</sup> For a survey of structural realism see Frigg and Votsis, “Everything You Always Wanted to Know about Structural Realism but were Afraid to Ask”. Frigg and Votsis cover some objections and responses to them in sections 3.3, 3.4, 3.5, 4.1 and 4.2.

<sup>21</sup> Teller, “What Is Perspectivism, and Does It Count as Realism?”

search for a way to put the question of realism to one side. We shall return to perspectivism in section [7.7](#).

# Chapter 5

## The assertion view

### 5.1 What academic disciplines do

We want to find out about the world. And we expect academic disciplines to satisfy us on that point. We would like to think that to the extent that researchers succeeded in their work, their conclusions would disclose how the world was. That is, we instinctively want to take the description view rather than have recourse to the assertion view.

Sticking with the view that the fruits of research disclosed how the world was would however be vulnerable to philosophical attack unless we also found a satisfactory way to handle the question of realism. As we noted in chapter 4, there is no generally agreed answer to the question.

The assertion view offers us a way out of this difficulty. In section 5.2 we shall set out the view. In section 5.3 we shall say something about relationships between the description view, the assertion view, and realism, and in section 5.4 we shall set out the range of application of the assertion view.

In section 5.5 we shall set out how the question of realism may be put to one side. Then in section 5.6 we shall show how, if we take the assertion view, the question becomes unimportant. Finally, in section 5.7, we shall tackle an issue raised by the fact that different disciplines use different conceptual schemes.

## 5.2 The view

### 5.2.1 Niels Bohr

It is natural to think that academic disciplines disclose how the world is. We expect them to tell us the nature of physical reality, or how organisms work, or what really happened in human history. But there is an alternative view. This was set out in the following words attributed to Niels Bohr:

“It is wrong to think that the task of physics is to find out how nature is. Physics concerns what we can say about nature”.<sup>1</sup>

The thought was formulated in relation to fundamental physics. That is a discipline which can sometimes be impeded rather than advanced by demands to go beyond computations and say how the world is. It is also a discipline in which almost the entire contents of results are given in mathematical formulae. Such formulae are in a sense form rather than content. They set out the structure of the world, but without saying what there is in the sense of what the items involved might be.

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<sup>1</sup> Petersen, “The Philosophy of Niels Bohr”, page 12. For reasons to be unsure whether these were Bohr’s words see Mermin, “What’s Wrong With This Quantum World?”

Merely setting out structure would not be the same as not saying how the world was. It would amount to saying how the world was structured, and the structure could be accorded a degree of reality. There is also some contact between fundamental physics and perception, as when both relativity and quantum mechanics say what would be observed, or what the possible observations and their probabilities would be, in given situations. Nonetheless, saying everything in mathematical terms does put a distance between what is said and what people would ordinarily regard as saying how the world was. It also limits the extent of contact with perception. For example, Richard Feynman said that while physics would for the purposes of the theory of electromagnetism assign six numbers to each point in space, he could not imagine that.<sup>2</sup>

### 5.2.2 Going beyond Bohr

We shall develop the thought attributed to Bohr into the assertion view, and apply it more widely than the original thought would suggest.

The assertion view is that accounts should only be seen as disclosing what can be asserted about the world.

“Can” means “can legitimately”. The mere fact that words, formulae or diagrams could be produced to make a particular assertion would not be enough to make the assertion one that could be made. We need not concern ourselves with precise standards of legitimacy. In practice they will be given by the epistemic standards of the relevant discipline, against a background of those standards meeting general epistemic standards such as paying due regard to evidence. Our concern is only to find a way to view

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<sup>2</sup> Feynman, *The Feynman Lectures on Physics*, New Millennium Edition, volume 2, chapter 20, section 20-3.



whichever accounts are taken seriously enough for the question of realism to be troublesome.

We can ignore for our current purpose a distinction between accounts and their adoption which might otherwise be significant. One might say that it was not an account itself but the fact of its adoption which disclosed what could be asserted. Our concern is however with concepts that are considered mandatory, so we can limit our attention to accounts that are considered mandatory. The adoption of those accounts would be not merely reasonable but expected. We can therefore say, across the range of accounts with which we need to deal, that they disclose things which it would seem can and indeed must be asserted about the world. The fact of their adoption need not be noted separately or given a role in our discussion, because all of the accounts that concern us will be assumed to have been adopted.

The description view, under which accounts are seen as disclosing something of how the world is, is to be abandoned except when there is no point in taking the assertion view. There is for example no point when accounts report manifest features of the everyday world. We shall say more about situations like that in section 5.4. In such situations, the question of realism is easily answered in the affirmative.

We should note a difference from the thought attributed to Bohr. That thought related to the task of physics, at least in the first sentence and arguably by implication in the second. The task set was for physicists to find out what they could say. Our concern is with the finished results of work. The assertion view proposes a view of the accounts that are adopted, rather than of the work done to arrive at those accounts.

### 5.3 Description, assertion and realism

In stating the description view, we rely on a notion of saying how the world is. This is a vague notion, but we can give it a tolerably specific intuitive sense. The intention is not merely to exclude statements that would be mistaken, as when a theory which postulates four quarks in a proton fails to disclose how the world is because there are only three. Mistaken statements like that would be condemned under either the description view or the assertion view. Seeing accounts as saying how the world is involves more than seeing them as avoiding mistakes. It involves seeing them in a way that presses the question of realism, and indeed encourages a realist reading. Seeing the contents of accounts as able to be asserted, on the other hand, does not press the question of realism.

We should however not define the description view and the assertion view as views which do or do not press the question of realism. If we did that, we would run the risk of a merely circular argument that there was a view which plunged us into the question of realism and a view which was to be preferred because it avoided the question, without giving substance to those views beyond where they placed us in relation to the question.

Fortunately, we do not have to define the views in that way. There is an intuitive notion of saying how the world is, beyond the notion of avoidance of error. It is captured in words like “really”. The notion is vague, and the question of realism might need to be adumbrated in order to make the notion more precise, but there is at least some alternative to a formal definition of the description view in terms of being plunged into the question. We can therefore have a

reasonable sense of the commitments of the description view which we can set out more or less independently of the question of realism.

Likewise there is an intuitive notion of assertion which gives some sense of the commitments of the assertion view, although the sense given is less stable because it is not easy to hold in mind the idea of an assertion which is not to be regarded as asserting how things are.

On this last point, we can be saved by the fact that we shall not conflate the attitudes of researchers to the accounts they give with how we should think of those accounts. An account will simply be an attempt, successful or unsuccessful, to say something appropriate. And it will usually sound as though it is saying how things are. It will not contain within itself either a message that we should take the description view, or a message that we should take the assertion view. It will be for us to add the message that the assertion view should be taken, and we shall do so outside the account. So the account will have its own existence and stability, which will not be undermined by our taking the assertion view.

It might seem that this move could not be made, because the required combination of how an account was viewed on its own terms and how it would be viewed from outside its discipline could not be sustained. The apparent obstacle would be that any account worthy of attention would purport to state that the world was in a certain way. It would seem that this was integral to the notion of an account which was fit to be given within an academic discipline. (We regard the deliberate writing of fiction as a cerebral activity, but not an academic one.) An account would need a target, the world, and without this identified target there would be no way to regard the account as

worthy of attention. So how could any account be viewed from outside its discipline in the way we propose without its ceasing to be seen as an academic account?

In fact the need for a target does not undermine our project. It does not do so because taking the assertion view does not involve any claim about what accounts are in themselves. It only involves a claim about what they should be seen as achieving. Accounts in themselves propose things. And the fact that their target is the world is not among the things they say, so they do not say they contain claims that the world is in a certain way. The fact that their target is the world is instead an aspect of the way in which they are used. They are used with assertoric force in the context of practices of making sense of the world. So what they say does not contradict a reading of them as disclosing only what can be asserted. They disclose what can be asserted about the world, which is indeed their target, even though from a point of view internal to the relevant disciplines they are regarded as saying how the world is.

The target is the world as a whole. From our external viewpoint, we do not want to think in terms of accounts having specific objects within the world as their targets. Doing so would threaten to drag us back to realism, or at least to having to find some creative answer to the question of realism which avoided forcing us to take a realist attitude to the objects in question.

Correspondingly, our formulation of the assertion view refers to what can be asserted about the world and not to what can be asserted about specific things. It does not see researchers as identifying things existing in the world then attributing certain properties to them. Researchers will very often assert that certain things exist and have certain properties. But under the assertion view, their doing

so will be taken to disclose that it is possible to assert that the world is populated by certain things with certain natures. “The world is populated” is within the scope of “it is possible to assert that”. The assertions will not be taken to disclose that certain things exist. To do that would be to take us to an affirmative answer to the question of realism, when our objective is to avoid the question.

To generalize the point, it is the notion of the world as a whole as being the target of accounts which allows us to say that under the assertion view accounts are seen as disclosing what can be asserted about the world, without any need to see them as describing the world.

## **5.4 The range of application of the view**

As already stated, the motive for taking the assertion view is ontological. Taking the view will allow us to put the question of realism to one side, while taking the description view would not allow us to do so.

There are however times when there is no point in putting the question of realism to one side, the description view might as well be taken, and indeed it would be bizarre to reject the description view in relation to the accounts concerned.

Suppose that an account includes claims which state or imply that certain items exist or existed. And suppose that the existence claims could in principle be or have been checked perceptually, assuming observers at the right places and times. Thus an account may claim that specified people lived at certain times, or that a specified person wrote a particular letter on some given date (implying

that the letter existed on that date), or that a certain number of animals of a given type currently exist in a given locality, or that water vapour is routinely produced when fire encounters ice (implying that fire, ice and water vapour exist). In such cases it would be senseless to take anything other than the description view of the claims made, whether existence claims or claims of the course of events.

Fortunately, there would also be no need to put the question of realism to one side. It would be easy to answer in the affirmative. People, letters, animals, fire, ice and water vapour are undoubtedly real.

We shall at various points note the relevance of such displacement of the assertion view by the description view. We shall say more about links with the question of realism in section 5.6.2. In section 5.6.2.2 we shall say more about perception and its significance. And in section 6.2 we shall see how, where the description view is appropriate, we can if we wish see the assertion view as merging into it rather than as being displaced by it.

It may seem to be too much to claim that the question of realism is easy to answer in the affirmative. What if items within the extensions of concepts are reducible to other items? In fact we can respond to such concerns. We shall do so in section 5.6.2.2.2.

## 5.5 Putting the question of realism to one side

If we only see accounts as disclosing what can be asserted, we can see them as doing everything that is required within disciplines even if no conclusion is reached on whether items within the extensions of the concepts used are real. We

must now go further and show that regarding accounts as world-mandated, which would involve attributing a strong relationship to the nature of the world, still would not require us to pose the question of realism.

If we do not think about such a strong relationship, it is easy to see how accounts may be regarded as disclosing what can be asserted without any implication that they set out how the world is. Accounts may simply be helpful in systematizing observations or in working out what would happen if certain actions were taken. To take an obvious example, accounts within Newtonian mechanics, given within a conceptual scheme that includes absolute space and time, are very helpful. They are rightly used in a great many areas of scientific and engineering work. And in those areas there is no reason to be concerned that items within the extensions of concepts that are central to Newtonian mechanics are not real.

That would however be too easy for our purposes. Our interest is in accounts which are appropriately regarded as world-mandated. Can we still put the question of realism to one side?

We answer that we can. If an account should be regarded as world-mandated, that does not require us to regard the account either as disclosing that items within the extensions of the concepts it uses are real or as disclosing that they are not real. Realism assigns the status of existence to various items. Anti-realism refuses them that status. But such assignments or refusals are only required at all if one takes the description view, regards accounts as disclosing how the world is, and then asks to what such disclosure amounts. If we take the assertion view, we can simply decline to consider assignments of the status of existence.

A review of the tests to decide whether one should regard an account as world-mandated is reassuring here. There is no test, the application or the satisfaction of which would require a conclusion on the existence of items within the extensions of concepts used. Those tests are the tests of evidence, coherence, competition, understanding, items, and fullness. Only the evidence test and the competition test might give rise to concern.

The evidence test might be thought to require conclusions on existence. But in fact it does not do so. There may be ample evidence to support adopting an account without any requirement for a realist reading. Anti-realists can easily accommodate well-supported accounts. They do not suppose that scientific theories float free of evidence. And evidential support would also be fully compatible with a realist reading. So there is nothing in the evidence test to require a choice between realism and anti-realism, and there is therefore no requirement even to play the game of assigning or refusing the status of existence.

Application or satisfaction of the competition test likewise would not require a conclusion on the question of realism. Accounts can be seen as better or worse than one another without asking about the extent to which they disclose how the world is. At least, that can be done unless one has already committed to taking the description view.

## 5.6 The unimportance of the question

We can now set out why, under the assertion view, the question of realism would not be worth answering.



The argument treats separately concepts that are regarded as world-mandated and concepts that are regarded as optional or as mandated but not by the world.

When a concept is appropriately regarded as world-mandated, answering the question of realism in the affirmative would add nothing so there would be no point in doing so. There would also be no loss in not giving a negative answer.

When a concept is appropriately regarded as optional or as mandated but not by the world, there would be no justification for giving an affirmative answer and there would be no loss in not giving a negative answer.

We shall give our main argument in section 5.6.1. Then we shall consider the significance of the availability or unavailability of perception in section 5.6.2, and address two subsidiary topics in section 5.6.3.

### **5.6.1 No gain from establishing realism**

We shall now give our argument that there is no reason to fear we would lose anything by putting the question of realism to one side. In section 5.6.1.1 we shall consider concepts which it is appropriate to regard as world-mandated. Then in section 5.6.1.2 we shall consider other concepts. In section 5.6.1.3 we shall consider the challenge, important in discussions of realism, of new concepts that supplant old ones. And in section 5.6.1.4 we shall consider the issue of alternative sets of concepts which can be put to work to give equivalent accounts.

### 5.6.1.1 Concepts regarded as world-mandated

Suppose that some concepts are appropriately regarded as world-mandated. Then we would learn nothing from an affirmative answer to the question of realism which would be of significance beyond the question itself.

The question of realism is standardly posed in relation to the extensions of concepts which are put to work in setting out the best available theories. Those are the theories which researchers must adopt if they are to adopt any theories at all. In that context, with the option of not adopting theories and instead remaining agnostic about the workings of the world, the question may at least seem to be one to which an answer which affirmed the reality of items within extensions would be most welcome. Such an answer would encourage adoption of the theories. The encouragement would not come from a circular argument that since (according to some philosophers) the best theories should in general be regarded as identifying real items, those best theories were probably correct because it was real items that they identified. Encouragement would instead come from the fact that it was perfectly plausible to regard the items as real, in that there was no absurdity or reckless venture beyond the evidence in doing so. On that basis of plausibility one could say both that a realist interpretation was permissible, and that the fact of its permissibility gave comfort as to the quality of the theories.

The case for regarding such encouragement as respectable might not be strong. In particular, criteria for assessing an argument that there was no absurdity or reckless venture beyond the evidence in regarding relevant items as real might be unclear. But we note this kind of argument to show that an affirmative answer to the question of realism might have significance beyond curiosity about the question itself. We also note that it is not an argument which would

be likely to appear often, because there would usually be a background assumption that current best theories were good enough to remove any temptation to be agnostic about the workings of the world.

While this kind of argument might occasionally have some interest when discussions centred on current best theories, the context in which there is an option of not adopting any theory is not our context. We are interested in accounts which in the view of researchers must be adopted. Agnosticism is then excluded. It is not excluded because we can expect that researchers will always have an account that must be adopted. That would be foolish. There are times when it is right to say that there is not enough information to reach conclusions. Rather, agnosticism is excluded because our context is one of accounts which researchers consider mandatory. Tests of evidence and so on have already been satisfied to a degree which means that there is enough information to say something.

In that context, encouragement from a realist view would be immaterial. The current best accounts should of course be examined and challenged, even if they are considered mandatory by practically all researchers and also appear to be world-mandated. If they fell to challenges, they would lose their appearance of being world-mandated because they would cease to be considered mandatory. Then those accounts would no longer press the question of realism in relation to the extensions of the concepts they used. Surviving accounts would still press the question. But an affirmative answer would not really add anything in an evidential sense. It would only supply a psychological push to adoption of the relevant accounts. And that push would be redundant because those accounts were already considered mandatory.

An affirmative answer might still supply a push in relation to accounts which used the same concepts while being regarded as optional. But since it would be accepted that those accounts did not have to be adopted, it would be questionable whether researchers should be influenced by such a push. And if an account was considered mandatory but was not from the philosophical point of view regarded as world-mandated, any push would again be redundant because the account was already considered mandatory.

Turning to the possibility of a negative answer to the question of realism, it would be of philosophical interest but it would make no difference to the fact that concepts regarded as world-mandated were so regarded. And a negative answer would not be of concern under the assertion view. Accounts may state that items within the extensions of concepts exist, but when the implications of such statements are investigated, the assertion view leads one to an analysis which would not be affected by a negative answer. The accounts would still, at the external philosophical level, only be regarded as disclosing that it could be asserted that certain items existed. Taking the description view, on the other hand, would yield implications that would sit uneasily with a negative answer to the question of realism. It would do so because under that view, accounts are supposed to disclose how the world is.

None of this is to deny the philosophical interest of the question of realism. The argument here is only that in the context of accounts and concepts which are regarded as world-mandated, neither a positive nor a negative answer would have either useful or dangerous implications.

### **5.6.1.2 Concepts not regarded as world-mandated**

When the use of a concept is not regarded as world-mandated, either because researchers consider it optional

or because while the concept is considered mandatory, this seems not to be by virtue of the nature of the world, there can be no pressure to give a positive answer to the question of realism. If the concept need not be used, the world would not appear to insist that items within its extension be recognized. And if it must be used but not by virtue of the nature of the world, it should again not be thought that the world would require recognition of those items.

Moreover, in both cases a negative answer to the question of realism, while tempting if one got as far as seeing the question as worthy of attention, would be of no particular interest. It might give philosophers some modest concern over use of the concept, concern which would be ignored by researchers, but that would be all. If the concept was regarded as optional, philosophers could handle the concern by saying that as the concept did not need to be used, work in the relevant discipline would not depend on the nature of the concept's links to reality anyway. And if the concept was regarded as mandated but only by virtue of something other than the nature of the world, they could say that there was no reason to think that sources of mandation such as restrictions on ways in which human beings could comprehend the world would justify a claim that items within the concept's extension were real.

Optional concepts are particularly likely to be found in the social sciences. For example, the concept of a frame is put to work when studying social movements and has been found to be very useful, but it is nonetheless presented as a concept which can be used or not.<sup>3</sup> To take an example from economics, the concept of total factor productivity is

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<sup>3</sup> Oliver and Johnston, "What a Good Idea! Ideologies and Frames in Social Movement Research"; Lindekilde, "Discourse and Frame Analysis: In-Depth Analysis of Qualitative Data in Social Movement Research".

sometimes used but has also been argued to be optional or even useless.<sup>4</sup>

It is not surprising that it should be particularly easy to find optional concepts in the social sciences. The desire to systematize the subject matter is stronger than in the humanities, and this desire encourages a search for concepts which are potentially more penetrating than those of everyday life. On the other hand, two constraints on adventurous thinking which are generally strong in the natural sciences are on the whole weaker in the social sciences. The first constraint is that one should be able to show that the evidence demands new concepts, rather than merely invites their introduction because they hold some promise of use. The second constraint is that new concepts should be defined with great precision, so that measurements can determine their applicability.

Examples of concepts which seem to be mandated but not by the world are harder to find. The obvious place to look is the concepts of mathematics. But there we must draw a distinction between pure and applied mathematics.

Concepts of pure mathematics are required in order to conduct that discipline and discover more about the mathematical world. But that is not the real world, at least not unless one takes a view along the lines that Max Tegmark proposes.<sup>5</sup> We therefore have examples of concepts which are mandated but not by the world. And that fact of mandation's not being by the world would mean that the question of realism in our sense would not arise. There are debates in the philosophy of mathematics about realism,

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<sup>4</sup>Felipe and McCombie, *The Aggregate Production Function and the Measurement of Technical Change: "Not Even Wrong"*, chapter 6.

<sup>5</sup>Tegmark, *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality*. We discussed this view in section 2.1.2.2.

but they are different debates.

Turning to the application of mathematics, all sorts of concepts of pure mathematics, such as groups and periodic functions, seem to have to be put to work. Their use does appear to be mandated, and by the world. Then the question of realism could arise. Philosophers could ask whether specific items within the extensions of concepts such as those of a symmetry group or a sine wave were real. And that would be a question of realism in our sense. But because mandation would be by the world, we could deploy our argument in section 5.6.1.1 that the question of realism could be put to one side.

### 5.6.1.3 **New concepts that supplant old ones**

Suppose that an account is appropriately regarded as world-mandated. Then at some later time another account is formulated, is recognized to cover at least the same ground as the earlier account, and is considered to be superior. Furthermore, suppose that some of the concepts used to formulate the old account are not used to formulate the new one, and are not used in any other accounts which at the later time are considered mandatory. They would in the view of researchers no longer be needed, although they might continue to be used as optional concepts.

The unneeded concepts would have been thought to have been world-mandated. But there would no longer be any reason to think that they were. And since humanity's grasp of the world evolves all the time, concepts currently thought to be world-mandated would always be at risk of ceasing to be needed. So a claim that any specific inference concepts were world-mandated would seem to be risky. (Direct-apprehension concepts should be safer, even if not absolutely safe.) This would be our version of the

theory-change argument which is deployed against scientific realism, and which we noted in section 4.4.2.1.3.

The clear examples of unneeded concepts tend to be ones which now strike us as laughable. They are for example supplied by accounts of the propagation of light through empty space which required use of the concept of the luminiferous aether, and accounts of combustion which required use of the concept of phlogiston. But we should not assume that the risk has gone away. There is for example room to be concerned about the biological concept of a species, which has long been fundamental to accounts of the evolution and the current taxonomy of organisms but which has come to be seen as problematic and is according to some biologists best splintered into different concepts for different purposes.<sup>6</sup> Another example is the economic concept of cardinal utility, which gives the impression of being perfectly sensible and not at all laughable. It was originally fundamental to accounts of the choices that people make and hence to accounts of prices and quantities. But it has been found to be replaceable across large areas of economics by the concept of ordinal utility. Even though the concept of cardinal utility can still do a bit more than its replacement in some aspects of welfare economics, it is surely at risk of ceasing to be needed at all.<sup>7</sup>

Given that concepts currently regarded as world-mandated are at this risk, would it not be worth pressing the question of realism in relation to the extensions of those concepts?

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<sup>6</sup> Nathan, “Pluralism is the Answer! What is the Question?”; Reydon and Kunz, “Species as Natural Entities, Instrumental Units and Ranked Taxa: New Perspectives on the Grouping and Ranking Problems”.

<sup>7</sup> Screpanti and Zamagni, *An Outline of the History of Economic Thought*, second edition, sections 6.5, 8.2.3 and 10.2.3; Becchetti, Bruni and Zamagni, *The Microeconomics of Wellbeing and Sustainability: Recasting the Economic Process*, chapter 8.



An affirmative answer would perhaps give additional reassurance that the risk was remote. At least, it might give that reassurance in a non-circular way so long as it reflected not merely a general argument for realism but an examination of each particular case which showed that the items in question could be regarded as real without absurdity or reckless venture beyond the evidence.

We offer two responses to this argument.

The first response is that it is not clear how evidence of an empirical nature could be used to support an affirmative answer to the question of realism in relation to the extensions of concepts used by an account, other than simply by supporting adoption of the account in ways that were independent of any answer to that question. To use evidence in the same way as it was used to support adoption independently of the question of realism would be to add support only by reading the evidence in a new way which would not add to its content, but only to the range of conclusions that were drawn from it. And it would not even be clear that any new conclusions were drawn independently. Rather, it could be argued that it was the solidity of evidential support for the account that purported to support an affirmative answer to the question of realism. Moreover, an argument that there was no absurdity or reckless venture beyond the evidence in regarding relevant items as real might be of doubtful worth because there might be no clear way to tell whether absurdity and recklessness were absent. For such reasons, we may doubt that an affirmative answer would actually provide any reassurance.

The second response is as follows. Our claim is only that it is appropriate to regard certain concepts as world-mandated. What was appropriate in one year could cease to be so in

some later year. And that would not retrospectively make the earlier view of the concepts inappropriate at that earlier time. A view can be appropriate at a given time without any guarantee that it is correct. Thus the risk that accounts and concepts might cease to be regarded as world-mandated is not a risk that we might in due course have to regard our current thinking as irrational. That helps to make it a tolerable risk.

To supplement this response, the fact that it is at some time appropriate to regard certain concepts as world-mandated suffices to put the question of realism to one side at that time, in that neither answer to the question would add anything worth having. And if certain concepts ceased to be regarded as world-mandated, there might be other concepts which would come to be regarded in that way. The newly demoted concepts might also survive as optional ones. Then for any concepts newly regarded as world-mandated, and all concepts which maintained that status through the time of change, the question of realism could be put to one side. For concepts newly regarded as optional, and all concepts which maintained their optionality through the time of change, there would be no good case for realism and no particular interest in a denial of realism, all for the reasons already set out. And for any demoted concepts which were discarded completely, there would be no reason to pose the question of realism at all.

#### **5.6.1.4 Equivalent accounts**

We now turn to what we should say when there are equivalent accounts of the same situation. We must ask whether our argument could be applied across all such accounts, and whether a question of relative reality would arise and be problematic.

#### 5.6.1.4.1 Accounts

It is possible for two or more accounts to be equivalent even though they identify different items, often by using different variables and constants. For example, in physics there are Lagrangian and Hamiltonian formulations of classical mechanics.<sup>8</sup> And in economics, accounts of transport costs can be formulated in different but equivalent ways.<sup>9</sup>

The differences in concepts between equivalent accounts may appear only at a reasonably high level. There may be a single set of concepts at a basic level, from which higher-level concepts are constructed in different ways. But given that the question of realism can arise even in relation to the items open to reduction which we described in section 4.1.3 as surviving as transparent shells, and given that as we shall note in section 5.6.2.2 there is support in the work of Lynne Rudder Baker for continuing to talk of items which may be reducible to others, we would even in such cases need to consider what to say when there were equivalent accounts.

There also might or might not be sets of concepts used in giving equivalent accounts which implied views of the world that had very little overlap. John Worrall has argued that the empirical equivalence of any theories worth considering would require not merely matching predictions

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<sup>8</sup> Barrett, *On the Structure and Equivalence of Theories*, chapters 3 and 6. As that work makes clear, the definition of equivalence is a technical business. Barrett also covers a debate as to whether there really is equivalence in this example. The debate was previously played out in North, “The ‘Structure’ of Physics: A Case Study”; Barrett, “On the Structure of Classical Mechanics”.

<sup>9</sup> Brancolini and Wirth, “Equivalent Formulations for the Branched Transport and Urban Planning Problems”.

of observations but also some shared theoretical claims.<sup>10</sup> If that conclusion is correct, one would expect reasonably substantial overlap between the implied views of the world.

#### 5.6.1.4.2 Equivalence

We have in mind a general notion of empirical equivalence. We shall not try to be precise about the notion, still less try to find a notion which could be used on its own to decide whether accounts were in fact equivalent without some tailoring to the specific natures of individual cases. We do not need to be precise because our aim here is to show that the equivalence of accounts under some general notion which would be open to being made precise in a variety of ways would not give rise to difficulties for our argument that the question of realism could be put to one side. All we need is a notion of equivalence which will indicate how the question might seem to return to demand an answer when there were equivalent accounts, so we can say why the question could still be put to one side.

It is not that any notion at all would do. We need the notion to be broad enough to capture the cases in which difficulties might arise, yet narrow enough to allow our argument to go through. But a general notion will do the job. So we do not need to concern ourselves with differences between varieties of the notion of empirical equivalence.<sup>11</sup>

#### 5.6.1.4.3 Using our arguments

As we noted in section 3.4.3.2.4, equivalent accounts should not be regarded as rivals. So there would be no clear way to

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<sup>10</sup> Worrall, “Underdetermination, Realism and Empirical Equivalence”.

<sup>11</sup> For some varieties and a context in which differences do matter see Johannesson, “Realism and Empirical Equivalence”.

prevent the members of all of the sets of concepts used to formulate the accounts having some claim to be regarded as world-mandated. And we do not here rule out the members of more than one set succeeding in that claim, although one might argue against it on the basis that once one account was adopted there would be no pressing need to adopt any of the others.

Given that the concepts used by any of the equivalent accounts might be regarded as world-mandated, would it be possible to put the question of realism to one side in relation to the extensions of all of the concepts used by the various accounts? We answer that it would be, because the arguments we have given so far could simply be deployed in relation to each account and the concepts that were used to formulate it. Each account in turn could be tackled on all three of the bases that it was world-mandated, that it was optional, and that it was mandated but not by virtue of the nature of the world, so as to cover all possibilities.

#### **5.6.1.4.4 Relative reality**

There is still a concern to address. If the world has a single nature, it might seem that one member of a set of equivalent accounts should do best at capturing that nature. Then the others would be accorded some lesser status. So the question of realism would seem to arise in the relative form of asking which account's set of concepts had extensions, the items in which were the most real. (We shall assume for the sake of argument that reality could come in degrees. That is dubious, but we are about to dismiss the issue of attributions of relative reality anyway.)

In fact, that relative form of the question could still be put to one side. If answering the question of realism in its absolute form would not add anything useful, answering it

in its relative form would not do so either.

Moreover, the question would have to be put to one side because there would be no way to answer it. If there were equivalent accounts, there would be no grounds to favour the concepts used to give one account over the concepts used to give another which would be strong enough to justify attributing greater reality to items within the extensions of some concepts rather than others.

Turning first to evidential grounds, the very equivalence of accounts would mean that evidence for one account would be equally good evidence for the others.

There might be non-evidential reasons to prefer some accounts to others, but such reasons would not suffice to justify a conclusion that members of the extensions of some concepts were more real than members of the extensions of others. For example, a preference for the concepts which allowed the simplest accounts to be given would not be enough to support a realist conclusion because there would be insufficient reason to suppose that nature was in general simple, although there might be sufficient reason in relation to specific aspects of nature. There are arguments, not tied to specific aspects of nature, that there is good reason to prefer simple accounts, particularly when choosing explanatory accounts. But the justification for that preference can be argued to be that it will reduce the amount of backtracking that is necessary in the search for the best accounts, rather than that simpler accounts are more likely to be correct.<sup>12</sup>

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<sup>12</sup> A straightforward presentation is given in Kelly, “Simplicity, Truth, and the Unending Game of Science”. A more technical presentation is given in Kelly, “Simplicity, Truth, and Probability”. An extension to stochastic methods is given in Kelly and Mayo-Wilson, “Ockham Efficiency Theorem for Stochastic Empirical Methods”.

A negative answer to the question of realism in respect of the extensions of all of the concepts involved, on the other hand, could not be justified by reference to the existence of equivalent accounts. The existence of those accounts would only justify a claim that it would not be possible to decide in relation to the extensions of which concepts realism was appropriate. To convert that inability to decide into an argument against realism would require the adoption of an approach of the sort that mathematicians would call constructivist. Under a constructivist approach, the possibility or even the necessity of realism in relation to the extensions of the concepts used to give some account or other would count for nothing if one could not specify which account. And if it counted for nothing, a negative answer to the question of realism might seem to be appropriate across all of the concepts. While there would be scope to argue for a constructivist approach and for its application in that way, it is very doubtful whether the arguments would be strong enough to require such an approach or to justify that particular use of it. If that line were not pursued, there would remain only general philosophical arguments in favour of anti-realism. And those arguments are far from universally regarded as conclusive.

In conclusion, there would be no prospect of justifying attributing greater reality to items within the extensions of concepts used to give some accounts than to items within the extensions of concepts used to give others. Nor could a negative answer to the question of realism across all the concepts used be justified. So the question of realism in its relative form would have to be put to one side.

## 5.6.2 Realism, perception and information

Despite all that we have said, there may remain a lingering feeling that putting the question of realism to one side would mean losing more than an answer to that question. In this section we shall argue as follows. In section 5.6.2.1, we shall propose that what lies behind this feeling is a view that there is more to be conveyed about the world than could be conveyed simply by supplying information in the form of a file of data where all that was of any significance was the bits assembled into bytes. (For brevity we shall simply speak of information, without always mentioning a file of data.) We shall link this view to perceptual experience. In section 5.6.2.2 we shall claim that to the extent that perceptual experience is available, the question of realism causes no difficulty because it can receive an affirmative answer. Finally, in section 5.6.2.3 we shall argue that to the extent that perceptual experience is not available, there is no reason to think that there is anything important to be had beyond information. Then the lack of an affirmative answer to the question of realism would not matter.

### 5.6.2.1 Information and beyond

An account may simply convey information, or it may do more (or at least seem to do more). The extra would consist in showing how the relevant part of the world would be experienced by a human being. Then mere information might very well seem to omit something important.

Consider for example some area of land. A file of information about the locations and sizes of natural features might be the best possible file for a given level of detail, and be such that considered as an account it would satisfy all the tests to be regarded as world-mandated. But in perceptual terms it would be nothing like the terrain. Now consider



a printed map. It too would differ from the terrain. It would be smaller, flatter, and less detailed. But human beings would regard it as going considerably beyond the information contained within the file. To human eyes, it would in a certain sense look like the terrain. People could imagine printing the map on an acetate sheet, rising into the sky, looking down on the terrain through the map, and finding that marks on the map lined up with features on the ground. That fact about maps would give a straightforward link to perception, a link that would be absent with the file of information.

### **5.6.2.2 When the question of realism is easily answered**

#### **5.6.2.2.1 The scope of perception**

We are about to argue that the availability of perception can have a large effect on how questions of realism should be handled. We must therefore say what will count as perception.

We mean to include the use of instruments such as those microscopes, telescopes, amplifiers, and recorders of waves with frequencies outside the visible or audible ranges which can be regarded as enhancing perception rather than supplanting it. We include enhancement by virtue of elaborate processing of immediate data, so long as what came before that processing could be seen as a form of perception.

Consider for example a visual representation of the structure of a crystal that had been deduced from X-ray diffraction, where the representation matched what would be seen directly if atoms were larger and bonds took some visible form. We would count viewing such a representation as a form of perception of the crystal because the pattern

would have been generated by aiming X-rays at the crystal and seeing how they emerged from it. This would be analogous to shining a light at an object and seeing what photons came back, although the X-ray process would have been implemented in a more sophisticated fashion and elaborate calculations would have been required to translate the diffraction pattern into a visual representation of the crystal's structure.<sup>13</sup>

The analogy with ordinary perception would be weaker with the output from a particle accelerator. The emphasis would be on distributions of detected events over time, rather than on anything like a picture at a particular time. And the detected events could only be related to the particles of interest by virtue of an elaborate theory, undermining any idea that the processes by which the events were generated was analogous to observing the particles.<sup>14</sup> So we would not count the reading of such output as a case of perception of the particles of interest.

We exclude from perception of the world the viewing of graphs, diagrams and the like which portray the world in ways that would not be directly perceptible even with instruments that enhanced ordinary perception. We would for example exclude a portrayal of a physical system as tracing a path through some appropriate phase space without any suggestion that such a path, or the phase space as a whole, would be visible in the world.<sup>15</sup>

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<sup>13</sup> This can be seen from any textbook, for example Massa, *Crystal Structure Determination*.

<sup>14</sup> See for example papers which reported evidence of the Higgs boson: ATLAS Collaboration, "Observation of a New Particle in the Search for the Standard Model Higgs Boson with the ATLAS Detector at the LHC"; CMS Collaboration, "Observation of a New Boson at a Mass of 125 GeV with the CMS Experiment at the LHC".

<sup>15</sup> See for example the use made of phase spaces in Nolte, *Introduction to Modern Dynamics: Chaos, Networks, Space and Time*.

The boundary we draw here sets quite strict limits to the perceptible. Two conditions must both be satisfied. The first is that any instruments required should enhance everyday perception, whether by enhancing sensory organs or by enhancing our powers to process data. The second is that the portrayal of the world must be of a sort that would in principle be accessible by direct perception.<sup>16</sup> It would be possible for only one condition to be satisfied, although in many cases either both or neither would be satisfied. There is however no harm in our being reasonably strict, because we are about to draw a connection from perception to indisputable reality. And we should not be too generous in identifying the range of cases in which we have no need to put the question of realism to one side because it would have to be answered in the affirmative. Having said that, we should not be too strict either. In section 5.6.2.3 we shall argue that where perception is not available, there is no reason to think that there is anything important to be had beyond information. If we were too strict as to what counted as perception, there would be a risk of opening up space for accounts which were neither perceptual by our standard nor to be thought of as limited to conveying information.

In setting out the scope of perception, we are more generous than some would be. For example, we side with those who would include the use of microscopes, including electron microscopes, as a form of perception which should drive us toward or at least permit realism about the objects perceived. This sets us against those who would

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<sup>16</sup> Our second condition may be compared with the discussion of “observable in principle” (OP) properties in Ghins, “Selective Scientific Realism: Representation, Objectivity and Truth”, section 4. However, Ghins has a somewhat narrower focus than us. He concentrates on properties. He then tests satisfaction of his condition by asking whether particular properties would be perceptible directly if they were of an appropriate magnitude. Properties such as length and velocity would qualify.

deny a realist conclusion on the ground that the process of perceiving through microscopes, whether optical or electron, is theory-laden.<sup>17</sup> The argument from the role of theory can be answered by pointing out that the theory which supports the use of microscopes is well-integrated into science as a whole and has many applications in fields other than microscopy. And while the discussions we have cited concern microscopes, similar arguments could be used to respond to challenges to regarding, for example, X-ray crystallography or radio astronomy as perceptual processes.

One consequence of our choice of a broad sense of perception is this. Some accounts which captured perceptions in our sense would not qualify as direct-apprehension accounts as defined in section 3.2.1. This is because once we stray beyond everyday forms of perception, it is common for direct apprehension to depend on having special abilities which come with being steeped in the relevant discipline. Precisely which accounts qualified as direct-apprehension accounts would depend on the extent to which researchers had the skill to which we alluded in section 3.2.2.2.1 of looking at results (whether numerical data, graphs or pictures) in which most of us would see nothing and directly apprehending the messages conveyed. The greater the reach of that skill, the greater would be the proportion of accounts which captured perceptions in our sense that also qualified as direct-apprehension accounts.

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<sup>17</sup> For the view that perception through microscopes qualifies as proper perception see Alspector-Kelly, “Seeing the Unobservable: Van Fraassen and the Limits of Experience”. For counter-arguments see Kusch, “Microscopes and the Theory-Ladenness of Experience in Bas van Fraassen’s Recent Work”.

#### 5.6.2.2.2 Perception can require realism

Perception lies behind the view that there is more to be conveyed about the world than can be conveyed simply by supplying information. And to the extent that perception is available, we do not worry about the question of realism. If items seem to be perceived (in our extended sense of perception), and there is no reason to think that the appearance of perception arises on account of some illusion or other source of error, the only reasonable option is to regard the items as real in a sense that betokens an existence which is safe from future changes of theories. That is, one has to think that the items at least bear the reference mark. Doubting their reality would require philosophical argument that would be implausible simply by virtue of its conclusion. And not merely existence, but existence with at least some of the properties that are perceived, will be beyond reasonable question.

Given that items in our terms include properties, we need to be clear about the ontological commitment that is intended here. One may see a set of three perceptible objects, bound together in some way and thereby separated from other objects of the same kind, and see that the set has the property of threeness. Or one may see that a wave in some perceptible medium has the property of being sinusoidal. The intended commitment is only to the reality of the individual occurrences of properties to which the corresponding mathematical concepts of threeness and of being sinusoidal are applicable. It is not to the reality of associated abstract objects, such as the number 3 or the sine function, nor to the reality of the properties in general, divorced from individual occurrences.

We must at this point impose a restriction on items, the perceptibility of which will make the question of realism easy to answer in the affirmative. Physical objects are included, as are physical events. Properties in the sense of individual occurrences are also included so long as it is not successfully argued that the possibility of their perception depends on the nature of perceivers. Thus angles in crystalline structures are included, and so are propensities of objects to reflect light within certain ranges of wavelengths. Moreover, all of these included properties will be perceived as properties of the appropriate objects. There is no plausible risk of ending up with perceived objects and perceived properties floating around separately from one another, so that properties might not be attached to the right objects. Sets and relationships which are defined in terms of anything included are also included. And relationships which reflect the workings of the world as made manifest in anything included, such as perceptible causal relationships between perceptible objects and events, are included. On the other hand, colours characterized in the ways in which human beings normally characterize them would be exposed to arguments of dependence on the nature of perceivers. This would make it doubtful whether they could be said to be straightforwardly out there in the perceived world.

What we have just said may strike some as too easy a dismissal of Berkeley and other ontological idealists, as distinct from epistemological idealists in the tradition of Kant. While they may not deny the reality of items in the world, they can only preserve their reality by radically reconceiving what it is for something to be real, a reconception which would make our use in argument of the fact of perception dubious because idealism would give the mind a role on a par with that of the world. But in a universe bereft of gods and known to have existed for

billions of years before there were any thinking beings, such idealistic positions have no plausibility. At least, they have no plausibility so long as our restriction on items which may for example exclude colours is imposed.

In addition, we might dismiss the concerns of ontological idealists on the basis of the commitment we made in section 4.4.1.1 to take for granted the existence of a thought-independent world with its own nature. This would however not impress the idealists. It would in their eyes amount to a mere assertion that they were mistaken.

Finally, the inclusion of some causal relationships as perceived rather than as imputed by the mind would fly in the face of Hume, but we are happy to include a certain amount of perhaps pre-conscious reasoning which may allow the mere act of perception to include the perception of causation.

Given the role that perception can play in requiring realism, it is no surprise that debates in the philosophy of the natural sciences over realism about entities centre on imperceptible items such as the quantum states, groups of chemical elements, and electrons we mentioned at the start of section 4.2. Whether particular items should be regarded as imperceptible can be a topic of sophisticated argument.<sup>18</sup> But there must at least be scope for doubt about perceptibility for a debate over reality to arise.

It is true that even when items are perceptible, there may be scope to doubt whether a concept that picks them out is useful in given situations. There may for example be instances in which although social groups in the sense of sets of people all of whom can be observed to have some distinctive property in common are perceptible, it

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<sup>18</sup> Fox, “Why Quarks Are Unobservable”.

is more useful to think in terms of individuals. And it might be thought inappropriate to attribute motives or other psychological features to groups as wholes. But the items within the extension of the concept of a social group would still unquestionably be real in the minimal sense that one could refer to a group as a unit, list its members, and set out some of the features of the members and some basic features of the group.<sup>19</sup>

Moreover, we can sustain the view that perceptible items are unquestionably real in the sense we require without relying on the constitution view which Lynne Rudder Baker put forward, although we are not debarred from adopting it.<sup>20</sup> The support which the constitution view offers may be needed to make everyday things real in the sense that reference to them is not to be eliminated, nor are they to be reduced to microscopic components in a strong sense that would in our terms lead one not even to recognize their survival as transparent shells along the lines we set out in section 4.1.3.<sup>21</sup> But we do not at this point in our argument need to guard against those threats. Rather, our concern is to argue that the question of extension realism in the sense we set out in section 4.4 presents no challenges in connection with perceptible items to which reference is in any case currently legitimate because the answer is automatically affirmative so long as perceptual error is not suspected.

We can say that the question presents no challenges when items are already perceptible, because we cannot currently imagine how future theories could come to deny that reference to them was respectable. It might come

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<sup>19</sup> Thomasson, “The Ontology of Social Groups”, section 1.

<sup>20</sup> Baker, *The Metaphysics of Everyday Life: An Essay in Practical Realism*.

<sup>21</sup> Baker, *The Metaphysics of Everyday Life: An Essay in Practical Realism*, chapter 2.



to be thought that reference to them was no longer useful, for example because reductive proposals led to their preservation merely as transparent shells, but that would not amount to denial of respectability.

This is so even in relation to various items, including but not limited to artefacts, which Baker identified as only being what they are because of the intentions of the people who make, use or (for actions) perform them.<sup>22</sup> The existence of those items as the things that they are to those who make, use or perform them, for example artefacts that play specific roles in people's lives, is not independent of those intentions. And we should consider the items as being what they are, and not simply as physical things or bodily movements, because their roles will be among their perceptible properties. The existence of such role properties may depend on social realities. But the perception of them will not depend on the nature of the perceiver in the way that perceptions of colours seem to depend. The respectability of reference to the items as what they are has no imaginable prospect of being lost. Even if their uses change or they go out of use altogether, historical reference to them which sets them in the social environment of their creation, use or performance will remain respectable.

Questions of whether talk of certain perceptible items should be eliminated, or whether certain perceptible items should be reduced to microscopic components in a strong sense which would lead one not even to think of them as transparent shells, differ from the question of realism as it concerns us. Eliminativist and strongly reductionist views, which Baker sought to block from undermining our ordinary view of the world, would not deny that the relevant

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<sup>22</sup> Baker, *The Metaphysics of Everyday Life: An Essay in Practical Realism*, chapter 1, section "ID Phenomena", and chapter 3. "ID" stands for "intention-dependent".

perceptible items should be regarded at least as bearing the reference mark if one thought about them. Rather, such views would debar thoughts about those items in the first place. That would in turn imply an anti-realist view of the targets of elimination or reduction, but one which would go further than the sort of answer which anti-realist philosophers of science tend to give. It would not merely be a claim that the targets were theoretical constructs. It would be a claim that they were theoretical constructs, thoughts about which were superfluous and foolish.

How eliminativist and strongly reductionist challenges should be answered is beyond the scope of our project. We take it that it may well be possible to answer such challenges in ways that would allow the question of realism still to arise in respect of items which might be thought open to strong reduction and talk of which might be thought open to elimination. Then we say that to the extent that the question of realism might in principle arise in relation to perceptible items, it could simply be given a realist answer. But in any areas in which eliminativism and strong reductionism were not defeated by arguments such as Baker's, our approach might be rendered redundant.

### **5.6.2.2.3 Perception that would be misleading**

It may be objected that the mere perception of items and exclusion of grounds to suspect perceptual error would not be enough to show that the items were real. One might have to conclude that there was something out there, but still be concerned that whatever was out there might be radically different from what perception indicated. Then the perception of properties, and even of numbers of concrete objects, could be completely wrong. Appearances might systematically deceive us about the nature of the world while more accurate accounts, which would be within

our comprehension, were simply not suggested by our perceptions. Then the question of realism could not be answered in the affirmative on the basis of the argument set out so far. Instead the question would return in relation to the extensions of the concepts that would be used in giving the more accurate accounts. Even if those accounts were not formulated, the threat that they might be would mean that the question of realism could not be ignored. And if our perceptions were radically misleading, there would be no easy route to an affirmative answer in relation to the extensions of the more appropriate concepts.

The concern that our perceptions might be radically misleading could be based on either one of two approaches.

The first approach would take its rise from a Kantian view that there was or might be a permanently inaccessible reality behind the apparent reality, with the two being either two aspects of one world or two worlds.<sup>23</sup> We disregard this view because, as the dispute over the number of worlds shows, the Kantian metaphysic is still far from being settled enough for one to have confidence that all of its difficulties will ultimately be resolved. We may also note that Kant's view would need substantial modification in order to allow access to the world as it was in itself. A Kantian gesture toward the noumena in order to indicate that we should not hope to venture beyond the world of appearances would not suffice. It would indeed rule out a verifiably accurate account of the world as it was in itself. And there might not be any coherent modified Kantian view that would allow for a verifiably accurate account.

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<sup>23</sup> Walker, "Kant on the Number of Worlds"; Oberst, "Two Worlds *and* Two Aspects: on Kant's Distinction between Things in Themselves and Appearances".

The second approach would be the one set out in the work of Donald D. Hoffman, and specifically in his interface theory of perception.<sup>24</sup> Hoffman regards contents of perceptions as being like icons for programs and files which appear on computer screens. They signal what is there so we can act appropriately, but they do not look anything like the things they represent. On this theory, perception should not be expected to be any guide to the nature of what is perceived. We should take our perceptions seriously, in that they draw our attention to real needs and real opportunities to act. There is an objective reality behind them, and there is scope for a science of that objective reality. Hoffman is explicit that this is not a version of Kant's metaphysic.<sup>25</sup> But we should not take our perceptions literally.

It might seem that Hoffman's theory would bring back the question of realism in relation to perceptible items. We could after all be getting the properties of perceptible items drastically wrong, so that perception should not be allowed to lead us straight to an affirmative answer to the question of realism because the concepts we used to describe items as perceived could be the wrong concepts. The question would then arise in relation to the extensions of the concepts that would allow accurate accounts to be given.

In fact, we need not be concerned. The qualities we attribute to items on the basis of everyday perception may not reflect how items are, but that gives no reason to think that the properties of items which are identified in academic accounts misrepresent the items in any way which would mean that our arguments might be aimed at the extensions of the wrong concepts. A historical figure may be said to

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<sup>24</sup> Hoffman, *The Case Against Reality: How Evolution Hid the Truth From our Eyes*, chapter 5.

<sup>25</sup> Hoffman, *The Case Against Reality: How Evolution Hid the Truth From our Eyes*, chapter 5, pages 82-83.

have taken certain actions. A species of animal may be said to exhibit certain patterns of behaviour. And so on. Even though it is perception that signals the applicability of concepts, what will matter in academic accounts will be non-phenomenal contents of those concepts. It will not be how items might be described in phenomenological terms. And it is misrepresentation of a phenomenological sort that is Hoffman's concern. Even when human perceptions play vital roles in accounts, as for example when a study in the history of art describes changing fashions in the use of particular colours, there is nothing to fear. Maybe the colours are not shown by perception to be real, but what will matter will be something else. It may be people's thoughts about the colours, making any failure to perceive reality irrelevant. Or it may be the practicalities of manufacturing pigments, in which case any failure to perceive reality would again be irrelevant because what mattered would be how easy it was to induce particular responses in the visual systems of people who looked at works of art. To the extent that human actions, patterns of behaviour, thoughts about colours and processes of manufacturing are perceived in our broad sense of perception, the question of realism is easily answered in the affirmative, and is answered in relation to the extensions of appropriate concepts.

We also need not be concerned about some more radical possibilities. Hoffman argues that we could be dividing up the world into separate and interacting items in a way that was our invention, rather than one which matched objective reality. Objects themselves, distributed in spacetime, could be the misguided invention of our minds. And our notions of spacetime and of physical causality within it are themselves in serious trouble, in Hoffman's view.<sup>26</sup>

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<sup>26</sup> Hoffman, *The Case Against Reality: How Evolution Hid the Truth From our Eyes*, chapters 3 and 4 for objects, and chapters 6 and 7 for spacetime and causality.

Here our response starts with the concerns about spacetime and causality. The kinds of trouble Hoffman identifies are specific to certain parts of physics and of some disciplines close to physics. We should not be concerned in relation to the higher disciplines in which perceptions can straightforwardly ground conclusions about the world. There is no reason to doubt the correspondence to reality of concepts of distance, lapse of time, and causality across spacetime in those higher disciplines, or indeed in the physics that suffices for everyday life. As soon as the extreme conditions and the extremely sensitive items with which certain areas of physics must deal are both left behind, any concerns about lack of correspondence drop away.

Likewise, concerns about individual objects drop away. It can be a mistake to try to make sense of fundamental physics by thinking in terms of individual objects which are laid out in spacetime and which interact causally on the pattern we see among macroscopic objects. It does not follow that it would be a mistake to think of the world of perceptible items in that way – although it might be a mistake for some items which only qualified as perceptible by virtue of our extension of the notion of perception. Indeed, Hoffman acknowledges that our concepts may in fact be the right ones for understanding reality.<sup>27</sup>

In fending off concerns raised by Kantian approaches and Hoffman's arguments, we have not made use of an argument which the assertion view would seem to allow. On the assertion view accounts are not expected to say how the world is. That would seem to immunize accounts against any concerns of the sort discussed in this section. But this would not be a good defence. As we remarked in section 5.4,

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<sup>27</sup> Hoffman, *The Case Against Reality: How Evolution Hid the Truth From our Eyes*, chapter 5, page 91.

it is pointless to maintain the assertion view in preference to the description view when there is scope for perception. When there is such scope, there would indeed be something wrong with sticking to the assertion view in order to claim that consequences of taking the description view could be ignored. And one consequence would be that what was said should be taken as disclosing how the world was. So concerns raised by Kantians and by Hoffman need to be addressed with arguments other than a mere resort to the assertion view.

### **5.6.2.3 When there is nothing important at stake**

Perception is not always available to require realism. Even in disciplines in which items of interest can routinely be perceived directly or could be if one were appropriately located, disciplines from zoology to history, some of the most interesting and important accounts rely on concepts, items within the extensions of which would not be perceptible. Such concepts include the examples we mentioned in section 4.4.2.2 of species in general (within the extension of which particular species, rather than individual animals, fall), ideas, and relationships of power. The perceptibility of specific animals, people and documents does not make doubts about the reality of items within the extensions of the more abstract concepts absurd. Turning to some disciplines low down the scale, including a good deal of physics and chemistry, nearly all of the accounts worth considering will use concepts which are such that perception would not be available to require realism in relation to their extensions. And where there are perceptual interpretations of those accounts, for example interpretations of fundamental particles as very small billiard balls or as waves supported by a medium in the way that ripples in a lake are supported by water molecules, the interpretations may be grossly misleading.

We therefore need to argue that in such cases, the lack of an answer to the question of realism would not be a serious matter. We shall do so by arguing that to the extent that perceptual experience is not available, there is no positive reason to think that there is anything important to be had beyond the information that accounts provide where that information could all be captured in a file of bits. This is subject to the qualification that a file of bits on its own, with no context of the discipline or the topic of the account, would not capture what an account said. That much context would be required, and it would need to include enough information to decode the bits into appropriate statements about the world. But since the question of realism arises once we have identified a discipline, a topic, and accounts of that topic, we should not be perturbed by such a need for context.

We shall argue that an affirmative answer to the question of realism would add nothing that mattered, and shall swiftly dismiss concern about failure to consider a negative answer. It is worth noting that we are concerned with whether anything important would be lacking in cases where perceptual experience was not available, not whether anything at all would be lacking. Our argument here reiterates the point that realism is not worth pursuing. It is not a refutation of arguments for realism. The argument is as follows.

Human sensibility may give reason to suppose that there is something important to be conveyed about the world which would not be conveyed merely by supplying information. But arguments based on human sensibility cannot be assumed to apply when perception is not involved, at least not in cases of the sorts that we envisage, whether in higher or especially in lower disciplines.



The relevant feature of these cases is that there can be no presumption that perception which would give reason to think there was anything important to be conveyed beyond information would ever be available, or would ever be available to fill gaps where ordinary perception ran out. It might be that no perception of any kind would ever be available. Or perception of some kind or other might in due course become available, but it might well not have the same effect as ordinary perception of giving reason to think that there was something important to be conveyed beyond information. And if arguments based on human sensibility could not be extended, there would be no other reason in prospect to think there was anything important to be conveyed apart from information. Then there would be no reason to think that an affirmation of realism would contribute anything of importance, because affirming the reality of items would not add to the information conveyed. Finally, if information was the only important thing there was, giving or not giving a negative answer to the question of realism would make no difference. The information would be the same either way.

It might be thought that there would always be something missing from an account which supplied only information in our sense. What would be missing would be an indication of what the items mentioned in the account actually were, in some sense that went beyond what could be supplied in a file of bits and also went beyond what was supplied by the context of the discipline and the topic. Perhaps there would be something missing. There are arguments that objects have their haecceities and properties their quiddities.<sup>28</sup> But it is hard to see how such things could be important when the quest was to learn about the actual world. Haecceities and quiddities would not appear to be of interest beyond

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<sup>28</sup> Cowling, “Non-Qualitative Properties”; Smith, “Quid Quidditism Est?”

philosophical debates as to whether there were such things and the implications for modality and other metaphysical matters. We do not scorn such debates. But they do not matter in our context. Nor would we need to be concerned that we would not know which world was under discussion, in the way that in logic someone who worked with a theory that had more than one model might be concerned that they did not know what the objects represented by referential terms were. The spatiotemporal and causal relationships of researchers to the world they studied, underwritten by their own presence in that world, would rule out such concerns.

It would be tempting to assimilate the treatment of cases in which nothing beyond information mattered to structural realism, either ontic or epistemic. There are certainly connections to be made. But it would be rash to make such an assimilation. In relation to ontic structural realism a good deal would depend on the ontology of structures, although ontologies which would make the assimilation reasonably easy have been proposed.<sup>29</sup> And we may ignore, rather than resist, the temptation because our project is to put the question of realism to one side. It is not to find an appealing variety of realism.

There would remain another possibility. This would be a Kantian argument that we had no access to the world as it was in itself. Such an argument would imply that there could be more to the world than the information that was or would ever be available to human beings. But it would, by the Kantian argument itself, be something more which could not be conveyed with any confirmation that the right content had been conveyed. (We do not here consider any substantial and possibly incoherent modification of Kant's metaphysic to allow access to a verifiably accurate

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<sup>29</sup> See for example French, *The Structure of the World: Metaphysics and Representation*.

account of the world in itself, a modification of the sort we mentioned in section 5.6.2.2.3.) The Kantian argument would prevent us not only from justifiably thinking we had discovered the actual hidden content, but also from justifiably thinking we had discovered its general nature. So we could never justifiably think that whatever was missing from our accounts had been supplied to us at all. It would follow that realism could not justify any thought that it had been supplied.

We shall return to cases where there would be no reason to suppose that there was more than information to be had, and present another way to look at such cases, in section 6.8.2.1.

### **5.6.3 Provisionality and indispensability**

We have given arguments which should suffice to put the question of realism to one side when it is not easily answered in the affirmative. We shall now address two subsidiary topics.

#### **5.6.3.1 Provisionality**

Any view of the inevitability of adoption of an account is bound to be provisional, even when it is beyond our current mental powers to imagine that adoption might come to be seen as optional or inappropriate.

Such provisionality does not however matter. If accounts are currently regarded as world-mandated, then the question of realism threatens to arise in relation to the extensions of the concepts used. Either the question can easily be answered in the affirmative, or our arguments can be deployed to put it to one side. If all of the accounts that used a concept ceased to be regarded as world-mandated, either because researchers no longer considered them mandatory

or because views on their satisfaction of the world-tests changed, then the question of realism would fall away. It would do so because, as we noted in section 5.6.1.2, there would no longer be any pressure to give a positive answer or interest in a negative one. And if new accounts came to be regarded as world-mandated, our arguments could be deployed afresh.

### 5.6.3.2 Indispensability arguments

In section 2.1.2.2, we mentioned arguments for realism in relation to mathematics. One line of argument is based on the apparent indispensability of various mathematical items in order to make sense of the world. It is argued that if something is indispensable it must be in some sense real.<sup>30</sup>

We might have been expected to use a similar argument in relation to the extensions of concepts regarded as world-mandated. Then instead of putting the question of realism to one side, we could have said that it should be answered in the affirmative whenever concepts were so regarded.

We have not done so, for two reasons.

The first reason is that indispensability arguments are far from uncontentious, even when used only in relation to mathematical items.

The second reason is that the reality of mathematical items is not the same as the reality of other items. Mathematical items have their existence claimed and their nature defined entirely within logical constructions, whether theories or models of those theories. Real-world items have a more independent life. The extension of indispensability arguments

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<sup>30</sup> Arguments like these are discussed in Colyvan, *The Indispensability of Mathematics*; Bangu, *The Applicability of Mathematics in Science: Indispensability and Ontology*.

beyond mathematics would therefore be exposed to fresh difficulties.

Specifically, a claim that some items with certain properties must be assumed would be vulnerable both to theory-change arguments and to a risk that while there might need to be items in the world with certain properties, they might not be the items to which the current understanding of the world which demanded their presence pointed. Instead they might be other ones with additional properties that would make a substantial difference to their nature.

In mathematics, these risks are absent. Mathematics is not subject to theory change in the sense of established theories being discarded as mistaken, except in the rare cases in which long-standing inadequacies come to light. (Such inadequacies can however be very serious. They may betoken fundamental misunderstandings. An example is given by the non-rigorous foundation of analysis which persisted until the nineteenth century.<sup>31</sup>) Old mathematical approaches may be discarded as no longer useful, but that is not the same as their being discarded as mistaken. And if a mathematical theory points to certain items, it cannot point to the wrong items because the items in question simply are the ones picked out by the theory's definitions.

Given these difficulties, we have decided not to give indispensability arguments for realism. If the question of realism can simply be put to one side, that will be safer.

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<sup>31</sup> Lützen, "The Foundation of Analysis in the 19th Century".

## 5.7 Schemes for disciplines

### 5.7.1 The concern

Different disciplines use different conceptual schemes. This gives rise to a concern about putting the question of realism to one side. The world most plausibly has one nature and not several natures. So one could ask which scheme best captured that one nature. Then the question of realism would seem to arise in the relative form of asking which scheme's concepts had the strongest case for the reality of items within their extensions.

In order to respond to this concern we need to consider how conceptual schemes may relate to one another. They may interact positively, conflict, or not interact at all. We shall first argue that there is no reason to raise the question of relative reality when schemes interact positively, then note that the other possibilities should be rare.

In our discussion here we shall suppose one scheme for each discipline, for the sake of simplicity of exposition. Adjustments could be made to allow for more than one scheme for a discipline.

We shall also not deploy the arguments we have given for putting the question of realism to one side, because they did not directly tackle questions of relative reality like the question that seems to arise here.

### 5.7.2 Positive interaction

We may first consider conceptual schemes which interact in a positive way. A scheme for a higher discipline may be seen as an extension of schemes for lower disciplines. It may borrow concepts drawn from the lower disciplines' schemes,

and add new ones. For example, conceptual schemes used in biological sciences borrow concepts such as those of energy and time from physics, and add new concepts such as that of an organism. Conceptual schemes for psychology and sociology in turn borrow the concept of an organism but develop it into the concept of an individual agent. Even in a discipline as high up the scale as history we find use being made of concepts which are also used well down the scale, such as those of physical distance and causation. We do not claim that these basic concepts are used right down at the level of fundamental physics, a level at which our everyday intuitions give out. But they do come into play in disciplines at many points on the scale, although not always in ways that are untouched by conceptual debate.<sup>32</sup>

In such cases of extension of conceptual schemes for lower disciplines, there would not seem to be any need to raise the question of greater or lesser reality. There would be no conflict of concepts, and therefore no need to identify winners and losers. It would be perfectly reasonable to allow equal reality at all levels, assuming one were interested in assigning reality at all (which we are not, save when reality is indisputable).

There would be a question as to which member of a set of schemes should be regarded as the most fundamental, and the answer would very likely be the scheme for the discipline closest to the bottom of the scale. But such an answer would not be a determination of degree of reality unless one imported a notion of fundamentality, perhaps based on reducibility, into the notion of reality. And that would be contestable, for example on the basis of the work of Lynne Rudder Baker that we discussed in section 5.6.2.2.2. Greater

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<sup>32</sup> On causation in a range of disciplines and some debates that arise see Beebe, Hitchcock and Menzies (eds.), *The Oxford Handbook of Causation*, chapters 31 to 37.

fundamentality could be argued not to show greater reality of items within the extensions of concepts, but merely to justify greater confidence in their reality (assuming one had decided to try to answer the question of realism at all). So the question of relative reality would still not need to arise.

The same argument against needing to raise the question of relative reality could be deployed when the case was not one of a higher scheme borrowing from lower ones without borrowing in the reverse direction, but a more complicated relationship. For example, two schemes might borrow from each other and at the same time both borrow from a third scheme.

### 5.7.3 Conflict

At the opposite extreme, a conceptual scheme for a higher discipline may conflict with a scheme for some lower discipline. This would be rare. Researchers would not often let it happen. But there are a few examples. One is Rupert Sheldrake's scheme for viewing the development of organisms, with its concepts of morphic resonance and formative causation. These concepts are in outright conflict with standard conceptual schemes of mainstream physics and chemistry, because their use would imply that information could be passed on without either a material substrate or cultural interaction. Indeed, Sheldrake acknowledges that his theory needs to go beyond material paths of biological inheritance.<sup>33</sup>

In such cases, the schemes of lower disciplines are very likely to win the contest. Results in lower disciplines are in general both expressed more precisely and tested more rigorously than results in higher disciplines, so both those results and

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<sup>33</sup> Sheldrake, *The Science Delusion: Freeing the Spirit of Enquiry*, chapter 6.



the schemes which are used to give them are better bets when one has to decide. In that way, conflicts would be resolved and we would no longer need to be concerned with how to handle them. It might also be possible to rescue some parts of a losing scheme, if the parts which conflicted with the scheme for a lower discipline could be pared away and what was left was a coherent whole.

In this section we have talked about conflicts between higher and lower schemes, rather than conflicts between accounts. We do so on the basis that concepts within schemes often carry substantive views about the nature of the world. We noted this in section 2.3.2. The implicit presence of those substantive views would often suffice to give rise to the relevant conflicts. But to the extent that more explicit content was needed, accounts in lower disciplines which were considered mandatory could also be adduced to challenge the use of concepts in higher disciplines whenever those concepts carried substantive views which conflicted with the accounts taken from lower disciplines.

#### 5.7.4 No interaction

A final possibility is that a conceptual scheme for one discipline may not interact with schemes for other disciplines. Conflict might be avoided, but there would be another concern. If a scheme for a higher discipline did not make reasonably extensive connections with schemes for lower disciplines, for example by re-using concepts, the scheme for the higher discipline could be argued to drift loose from the nature of the world. It would be the scheme for the higher discipline that would be most likely to be under suspicion, for the same reasons that schemes for higher disciplines tend to lose contests with schemes for lower disciplines. Results in lower disciplines are in general both expressed more precisely and tested more rigorously than results in

higher disciplines.

Fortunately, we may expect such lack of connection to be very rare. It would be difficult to formulate any conceptual scheme for a higher discipline which did not at least make use of concepts as basic as distance and causation. And once one rises into the social sciences and the humanities it becomes just as hard to avoid using other concepts which have their places in lower disciplines, even though such use will often be implicit. An example would be when a historian considered who was aware of what and thereby implicitly used the concept of information.

Given the rarity of cases of unresolved conflict and of no interaction, we conclude that it will suffice to address the concern about relative reality in relation to cases of positive interaction. We did this in section 5.7.2. A few cases would be left over, but they should not be a serious concern.

### **5.7.5 Conceptual freedom**

We may note here an advantage of the assertion view. It will offer an easy route to the freedom of disciplines to use different conceptual schemes, even if one were to think that there was one way the world was so that there should be one ideal conceptual scheme and all others should be regarded as inferior. Routes to conceptual freedom might well be available under the description view too, but the assertion view makes the argument especially easy. At least, it does so when there is reason to take the assertion view in preference to the description view, that is, in cases other than those we discussed in section 5.4 in which the description view might as well be taken.

An easy route is available because the assertion view declines to see the fruits of research as disclosing how the world is, and sees them only as disclosing what can be asserted. Researchers within different disciplines can therefore speak of the world in different ways, without any fear that some such ways would give inadequate representations of the world because they did not use some ideal conceptual scheme. This is not a radical thought. Even those who believe that ultimately everything depends entirely on basic entities which are governed by fundamental laws can accept that it is important to allow researchers to speak in different ways.<sup>34</sup>

While the assertion view's way to view the fruits of research is only put to work when one stands back and decides from outside a discipline how to view those fruits, that is soon enough. It is only when one reviews disciplines side by side that one is faced with the challenge of their different conceptual schemes. When one works within a single discipline, the challenge is invisible.

When there are two or more conceptual schemes within a single discipline, the same sort of thing can be said. Working within any one scheme, researchers can ignore the others. Only when one stands back does the question of how to handle the existence of more than one scheme become pressing.

This fact that one has to stand back in order for the question to become pressing does helpfully mean that we can deploy our arguments in sections 5.7.2, 5.7.3 and 5.7.4 in cases in which a single discipline has two or more schemes. In such cases of more than one scheme within a discipline, positive interaction might well be of a form which did not place

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<sup>34</sup> Anderson, "More is Different: Broken Symmetry and the Nature of the Hierarchical Structure of Science".

the schemes concerned in a hierarchy. For example, two or more schemes might borrow from one another. There will be scope for cases of conflict of the type that we noted in section 3.4.4.4, reflecting choices of general approaches or of models. But such conflicts, when not in any case open to resolution through the triumph of one approach over others, do not tend to raise questions of relative reality. Either the general approaches are too loosely defined to include concepts with well-defined extensions about which the question of reality would arise, or the conflict is between models that are recognized to be optional.

# Chapter 6

## Epistemology

### 6.1 Introduction

Whether we regard the fruits of research as disclosing what can be asserted about the world or as disclosing how the world is, we want disciplines to supply us with information about the world. They obviously do so, and taking a philosophical position which is less traditional than the description view is not going to change that. But a philosophical position may make it more or less straightforward to explain the evident epistemic value of disciplines.

(As we said in section 1.1.1, the concept of the epistemic value of disciplines is not defined precisely. We mean the fact that their pursuit allows researchers to make sense of the world, and where appropriate to make predictions which have a high success rate and devise interventions in the world which tend to produce the desired results.)

The question here is not which one of the description view and the assertion view is correct, or closer to correct. They are philosophical views, to be debated at one remove from the state of the world. They are satisfactory or unsatisfactory, rather than correct or incorrect.

This does not make the issue unimportant. We advocate taking the assertion view because it allows us to put a major philosophical question, the question of realism, to one side without serious loss. If taking the assertion view would make it difficult or impossible to explain the epistemic value of disciplines, while taking the description view would not have that disadvantage, we would need to think again about the assertion view's value.

We have a concern to address because under the assertion view claims made by researchers could not be seen as stating truths about the world, so standard concepts of knowledge could not be applied and researchers could not be seen as attaining knowledge. In this chapter, we shall argue that the epistemic value of disciplines could still be explained perfectly well.

In section 6.2, we shall start by setting aside perceptual cases in which there is no reason to take the assertion view in preference to the description view. These are the cases we discussed in section 5.4. In such cases there is no reason to be concerned that ordinary concepts of knowledge would be unavailable, and consequently no reason to think that our approach would give rise to any new difficulty in explaining the epistemic value of disciplines.

What follows in sections 6.3 to 6.8 will relate to cases in which there is reason to take the assertion view in preference to the description view. We shall argue that what we can see disciplines as achieving if we take the assertion view

allows just as good a way to explain their epistemic value as does the achievement of knowledge which we can see if we take the description view.

In section 6.3 we shall set out the concern that arises. In section 6.4 we shall set out the difficulty there would be in seeing disciplines as affording knowledge of the world. Then in section 6.5 we shall set out our approach to the problem. In section 6.6 we shall set out the relevance of the triumph of accounts over rivals. In section 6.7 we shall note the relevance of satisfying the disciplinary standards that are reflected in the other world-tests. And in section 6.8 we shall set out why taking the assertion view puts us in just as good a position as taking the description view. What disciplines can be seen as achieving when accounts are considered mandatory and also satisfy standards that are reflected in the world-tests will suffice to explain the epistemic value that disciplines evidently have. Within that section, in section 6.8.2.1, we shall cover cases in which information is what is at stake. In such cases, knowledge can be seen as available even under the assertion view.

Section 6.9 will have relevance both to cases in which there is no reason to take the assertion view in preference to the description view, and to cases in which there is reason to do so. There we shall consider a particular kind of knowledge that we can see disciplines as affording even under the assertion view, knowledge that an account is helpful.

## **6.2 When the assertion view is not needed**

We narrowed the range over which it was important to take the assertion view in preference to the description view in section 5.4. Then in section 5.6.2.2 we set out the

significance of some claims of existence being in principle open to being based on perception. Where perception could in principle play that role, the question of realism would have to be answered in the affirmative and should not be put to one side. When items within the extensions of concepts are perceptible or would be perceptible if an observer were appropriately situated, there is no scope to think that they are merely posited in order to allow accounts to be given.

A consequence will be that claims can be straightforwardly true, so the concept of knowledge with its requirement for claims to be true can be used. It is therefore perfectly possible to see disciplines as affording knowledge of the world. And the evident epistemic value of disciplines is therefore not made any harder to explain by the availability of the assertion view, because there is no need to take it in preference to the description view. So long as we have a clear understanding of when the assertion view is needed and when it is not, there is no difficulty in bringing it into play selectively.

One might hesitate to take a view selectively. It would be tidier to take it across the board and find that it only caused difficulties some of the time. Fortunately, that option is also open to us. When the assertion view is not needed, it can still be taken but can be seen as merging into the description view. We shall now set out how this is so.

Suppose that an account satisfies all relevant disciplinary standards. And suppose that it claims that some specified perceptible items exist. Then the account's disclosing that it must be said that those items exist amounts to the same thing as the account's disclosing that they exist. When it comes to perceptible items, there is no coherent position from which the one disclosure would be seen as made without the other being seen as made. Researchers can



therefore be seen as stating truths when they assert that the items exist, and there will be no difficulty in seeing them as having knowledge of the world.

Similarly, disclosure that perceptible items must be stated to possess their various perceptible properties amounts to the same thing as disclosure that they have those properties. (We here limit our attention to properties the perception of which can be thought to be independent of the nature of perceivers, as we did in section 5.6.2.2.2.) So again, researchers can be seen as stating truths and there will be no difficulty in seeing them as having knowledge of the world.

Both claims as to existence and claims as to properties might of course be mistaken. But any such mistake would lead both to a failure to disclose what had to be said about what existed or had which properties, and to a matching failure to disclose what actually existed or had which properties.

## **6.3 The concern**

We now turn to cases in which there is reason to take the assertion view in preference to the description view, so that the easy route to the avoidance of difficulties in explaining the epistemic value of disciplines we have just set out is not available.

The first thing to say is that taking the assertion view should have no effect on how things seem from within the practice of a discipline. If an account is considered mandatory, it will be thought to state facts about the world. Those facts will be taken to be known. And nothing we shall say in this chapter will give reason for researchers to change that attitude.

Things look different when one steps back. When one stands outside the relevant discipline, taking the assertion view will lead to the view that what is known is what can or must be asserted. And when there is reason to take the assertion view in preference to the description view, this will not amount to knowledge of the world except to the extent that what there is to be known is information, a situation we shall cover in section 6.8.2.1.

There would be no difficulty in connection with an account that was considered optional. Recognizing the optionality of what was said, we should simply say that what had been established was that the world was open to being characterized in a certain way. And even under the description view, there would be no justification for claiming the contents of the account as knowledge of the world. Under either the assertion view or the description view, one might legitimately claim knowledge that the account was helpful in making sense of the world. But that would be harmless. As we shall see in section 6.9, there would be nothing in the assertion view to place such a claim to knowledge out of reach.

There would also be no difficulty in connection with an account that was considered mandatory but which it would not be appropriate to regard as world-mandated. We could say that the account disclosed how it was necessary to think. And there would be no pressure to show how awareness of the account's being considered mandatory could be regarded as amounting to knowledge of the world.

The difficult cases would be accounts that it would be appropriate to regard as world-mandated. Researchers within a discipline, who would consider such an account mandatory, would see its contents as stating facts about the world. But under the assertion view those contents would

only be seen as disclosing what had to be asserted, which would not appear to be as good. And while this discrepancy would not and should not concern researchers, it should concern those who take the assertion view when considering a discipline from the outside. This is the concern to which we must respond.

If we were to take the description view, the concern would evaporate. Accounts regarded as world-mandated would be regarded as disclosing how the world was, so that researchers would automatically be seen as stating facts about the world. Then they could be seen as having knowledge of the world.

Under the assertion view we must instead argue that when researchers are driven to adopt accounts which satisfy the discipline-specific epistemic standards that are reflected in the world-tests, adoption puts them in a position which is just as good for explaining the epistemic value of disciplines as knowledge of the world would be.

We shall first say something about the concept of knowledge and why we must avoid simply putting it to work. We shall cover that topic in section 6.4. We shall do the rest of the work that needs to be done over the course of sections 6.5 to 6.8.

## **6.4 The concept of knowledge**

### **6.4.1 The tradition**

Knowledge was traditionally defined as justified true belief. That definition is now generally regarded as inadequate. But confirmation that the three elements in it are present is still widely regarded as necessary for knowledge to be attributed, at least unless one makes knowledge a basic

concept rather than analysing it.

Our problem is therefore as follows. If results established in disciplines are regarded as disclosing not how the world is but what can be asserted about the world, can conditions for researchers to have knowledge of the world be taken to be satisfied? Or can we avoid any difficulty by shifting to a position in which analyses are rejected and knowledge is taken to be a basic concept? Or should we abandon attempts to apply the concept of knowledge when the assertion view is to be taken in preference to the description view? In the end, we shall choose this last option.

Since one might for other reasons either resist or prefer a position under which knowledge was not analysed, we shall explore the topic under two headings. We shall first consider whether taking the assertion view would make it unacceptably difficult to apply an analytic concept of knowledge, and then consider whether a non-analytic concept might come to the rescue.

### **6.4.2 An analytic concept**

The two conditions which might give us cause for concern in all analyses that are based on the traditional analysis are belief and truth. Justification should not be a source of difficulty because evidence to support accounts, coherence, and so on are required under any view in order for there to be pressure to adopt an account. So we have no reason to consider arguments that knowledge does not require justification.<sup>1</sup>

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<sup>1</sup>For such arguments see Kornblith, “Knowledge Needs No Justification”.

### **6.4.2.1 Belief**

The condition of belief is not in fact a source of difficulty. Within a given discipline the claims within an account can simply be believed, in the ordinary sense in which belief in propositions involves belief that they are true. It is only outside the discipline that they will be regarded as showing only what can be asserted about the world. Indeed the assertion view, in seeing the fruits of research as disclosing what can be asserted, encourages seeing what the researchers within disciplines do as making assertions, and we may expect people who make assertions in good faith to believe that the assertions are correct.

That much covers the psychological state of belief. It does not however cover the contents of beliefs. Those contents will be claims about the world. In order for analytic concepts of knowledge to be usable, it must be possible for us as outside commentators to see those claims as true. We shall now turn to truth.

### **6.4.2.2 Truth**

If we think of an account as disclosing what may be asserted and not as disclosing how the world is, can we see the assertions in the account as true so that they might be regarded as known?

We must give a negative answer here, to join the negative answer we gave in section 4.4.3.2.4 that was based on the connection between extension realism and truth realism. Even when we turn to the accounts that are in the strongest position, accounts which it is appropriate to regard as world-mandated, what is seen as disclosed is what must be asserted given the current state of the relevant discipline. That is not enough because the disclosure of truths about the world must involve disclosure of how the world is.

Information about what must be asserted is valuable. But it is not information about how the world is, save in cases of perception or mere information. And while researchers within disciplines may take claims within the accounts that they are driven to adopt to be true, the position is not like that of the condition that knowledge requires belief. There is no difficulty in researchers and external commentators having different beliefs. Belief is a psychological state which can differ as between people in different contexts. Truth, on the other hand, needs to be the same for everyone. Philosophers standing outside disciplines cannot say that the contents of accounts are true for researchers but not for themselves. They can only say that the researchers regard them as true while they as external philosophers do not so regard them. They do not regard them as false either. They simply decline to ascribe truth values.

It is therefore not possible for philosophers who take the assertion view to see researchers as gaining knowledge of the world if the relevant concept of knowledge imposes a condition of truth about the world, as analytic concepts generally do, and in addition the philosophers hold a correspondence theory of truth or any other theory which requires that true statements say how the world is. Since that is the case for all but the most eccentric theories of truth, we have a serious difficulty here. We shall return to theories of truth in section 6.8.2.

### 6.4.3 A non-analytic concept

An alternative approach is to say that knowledge is a basic concept, rather than one to be analysed. The leading example is supplied by the work of Timothy Williamson, who equates someone's knowledge with their evidence.<sup>2</sup>

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<sup>2</sup> Williamson, *Knowledge and its Limits*, section 9.1.

It would be tempting to exploit this kind of approach to allow us to see disciplines as affording knowledge of the world even though we could not see accounts as disclosing truths. This option would however not be open to us. While the views we note here do not analyse knowledge as justified true belief plus some other conditions, there is a clear assumption that what is known will be true of the world. Indeed, Williamson is explicit on this point.<sup>3</sup> We should not exploit the absence of an analysis which mentions truth in order to ignore the assumption of truth.

#### 6.4.4 Conclusion

We conclude that neither an analytic nor a non-analytic concept of knowledge can be invoked to allow those who take the assertion view to see disciplines as affording knowledge of the world, at least not unless they hold a theory of truth which does not require that true statements say how the world is – a somewhat challenging requirement. We must therefore show that under the assertion view researchers can be seen as obtaining results of sufficient quality to make the epistemic value of their disciplines easy to explain, even if they are not seen as obtaining knowledge of the world.

## 6.5 Explaining epistemic value

We need to explain why disciplines have their epistemic value on the basis that they put forward various accounts which the generality of researchers consider mandatory. These are the accounts which should be the source of epistemic value. We cannot sensibly look to accounts which only minorities of researchers consider mandatory.

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<sup>3</sup> Williamson, *Knowledge and its Limits*, section 1.1.

The epistemic standards of disciplines are too varied in their details for us to conduct a general discussion by direct reference to them, so we shall use the broad-brush characterizations of standards that are reflected in the world-tests we set out in section 3.4. We shall however here regard them as standards imposed by researchers in order to decide whether to consider accounts mandatory, rather than standards we would impose in order to decide whether it was appropriate to regard accounts as world-mandated. Any account that is generally considered mandatory may make a contribution to the epistemic value of its discipline, even if we would not regard it as world-mandated.

We shall consider the benefits which may be expected from an insistence that accounts triumph over rivals in section 6.6, and note the benefits which may be expected from imposition of the standards that are reflected in the other world-tests in section 6.7. We shall complete our argument that the epistemic value of disciplines remains explicable in section 6.8. In particular, in section 6.8.2 we shall say why we can explain epistemic value without regarding the fruits of research as true.

There is an important connection we shall need which we can only make by relying on intuition of a common-sense kind. This is the connection between the qualities of accounts that are recognized in the world-tests and the ability of accounts to contribute to the epistemic value of disciplines. It is good if an account can be seen to be superior to its rivals. It is also good if an account has the qualities that the other world-tests recognize, qualities such as being supported by evidence and being coherent. But why are these things good? We can say that their goodness is evident to someone with the common-sense intuitions that are widespread among humanity. We can add that these are also the intuitions of researchers in various



disciplines, and that the wisdom of having these intuitions is indicated by the evident success of disciplines. So the epistemic value of disciplines can remain easy to explain even if we take the assertion view. But we must allow that if beings who did not share the human culture that encourages our particular form of common-sense intuition took the assertion view, they might find the epistemic value of disciplines harder to explain than it would be if they took the description view.

## 6.6 Triumph over rivals

An account's triumph over rivals, which we may expect researchers to demand (at least implicitly) before they consider themselves driven to adopt an account and which we demand for our own purposes through the competition test, will have particular relevance. Our argument in this section will start from the fact that at least in theory, an account will be pitched against all possible rivals. And a list of rivals will be generated by a review of all possible accounts of the same topic within the same discipline (with the discipline being defined reasonably narrowly). Moreover, the winner of a competition between rival accounts will be one that would deserve to win. This will be because selection of the winner will be made on the basis of such sound criteria as evidential support and fit with existing accepted accounts.

There are several issues to address here. In section [6.6.1](#), we shall consider whether we can expect that accounts which really deserved to win would be available. In section [6.6.2](#), we shall address the question of whether the ways in which winning accounts were selected would allow us to take it that the winner in a given competition would be a deserving winner. And in section [6.6.3](#), we shall consider

the significance of the fact that in practice only a limited range of rival accounts would be considered.

### **6.6.1 The availability of accounts**

There will usually be a wide enough range of accounts for it to be unsurprising that disciplines which expected accounts to triumph over available rivals should be of high epistemic value. The reason for this optimistic view that there would be a wide enough range to include accounts with appropriate qualities is the conjunction of two facts.

The first fact is that disciplines are successful in making sense of the world. This does not mean that all accounts found to be helpful will be of high quality. Nor is it a version of the no-miracles argument for realism in the philosophy of science. Our point here is prevented from being a version of the no-miracles argument by the fact that we are not working with a notion of correctness such as would be needed to deploy that argument. Our first fact is simply an observation that human beings have been successful at the task of making sense of the world. This shows that there is often scope to give accounts which would make the epistemic value of a given discipline unsurprising.

The second fact is that if enough rival accounts, including all the reasonable contenders, were to enter into competition, we might reasonably expect one or more accounts of high quality to be among them.

### **6.6.2 Mechanisms of selection of winners**

#### **6.6.2.1 Respectable mechanisms**

Mechanisms by which winning accounts are selected from among rivals must be respectable for our argument to go through. (We shall write as if explicit selections take place,

even though application of the competition test will often be implicit.) Respectability means that a mechanism would be likely to lead to the selection of accounts which would have qualities such that adopting the accounts would put researchers in a good epistemic state.

Sometimes respectability is manifest. For example, statements given in everyday terms of who did what at some historical event will be made on the basis of evidence, so it is evidence that will determine the selection of accounts at such a basic level. Only accounts which include supported statements and exclude unsupported ones will have any hope of triumphing over all possible rivals. And the selection of winners among accounts which go further and include more abstract elements, for example in order to give explanations, will likewise be respectable to the extent that selections are made by reference to concrete statements that are supported by evidence.

To take another example, sociologists and economists may investigate the consequences of a given income distribution. They will have to start with an account of the actual distribution within the relevant society. And any account, whether concrete or abstract, will have to be consistent with data that have been collected. A decision as between rival accounts will be respectable at least to the extent that it is determined by the data.

Considerations of evidence will not always narrow down the choice of accounts to only one. And if the surviving accounts are in fact rivals and no criteria other than evidence suffice to settle their rivalry, this may be an obstacle to finding a single account which triumphs over all rivals. But considerations of evidence will usually narrow the field sharply. And they will sometimes resolve rivalries completely, particularly when the accounts in contention do

not stray far beyond setting out concrete information.

Moreover, whatever narrowing is achieved in this way is respectable. It is achieved by allowing the nature of the world to have direct influence on the selection of winning accounts. There is no reasonable way to regard narrowing of the field that is achieved by consulting evidence as suspect, unless there are specific concerns that evidence may be unreliable or may have been selected or interpreted tendentiously. Any such concerns should be addressed by going over the collection and interpretation of evidence again, and then repeating the process of narrowing down the initial range of rivals.

There are however cases in which it is not obvious that mechanisms of selection of winning accounts are respectable, or even that respectable mechanisms are available. We shall now consider groups of disciplines in turn.

### **6.6.2.2 The natural sciences**

In the natural sciences, it is common for mechanisms of selection to be respectable but not obviously so. Technical accounts, for example those which set out mechanisms by which particles interact or which identify instances of different types of epistatic mutation in genetics, can be tested rigorously. And because those tests make proper use of evidence, the mechanisms of selection of winning accounts are thoroughly respectable. It is just that the ways in which the processes of testing work are not apparent to non-researchers. So people who are not researchers must often take on trust claims that mechanisms of selection are respectable.

As already noted in general terms, the options may not be narrowed down to just one account. In particular, when accounts which amount to theories rather than being merely

accounts of individual instances of phenomena are involved, there is a risk of the underdetermination of theory by evidence.<sup>4</sup> And such a failure of evidence to narrow the options down to a single account might mean that no account could triumph over all rivals.

It might however not mean that. There might be some other ground, apart from evidence, on which to narrow the options down to one. The different extents to which different accounts satisfied versions within disciplines of other world-tests could be used to narrow down the options. We introduced our tests as ways to obtain reassurance that accounts were favoured by virtue of the nature of the world, rather than only by virtue of some improper influence. But a high degree of satisfaction of tests would also give reason to prefer an account to other accounts which only satisfied them to some lower degree. (We here allow tests other than the test of evidence to do more work than we allowed considerations of simplicity to do in section 5.6.1.4.4. But there we were concerned with attributions of reality. Here we are only concerned with the success of disciplines, to which the world-tests and discipline-specific versions of them have direct relevance.)

### 6.6.2.3 The social sciences and the humanities

In the social sciences and the humanities, we may find examples where it is not clear that any respectable mechanism would be available to go further than reducing the number of rivals to a handful. This is especially so among accounts that engage in interpretation and explanation. The source of the difficulty is not technicality, but the role of approaches. It can seem that there are conflicting views on which accounts are appropriate and that researchers

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<sup>4</sup>For a survey of this problem see Stanford, *Exceeding Our Grasp: Science, History, and the Problem of Unconceived Alternatives*.

make different choices of accounts because they adopt different general approaches. There is also no apparent scope to adjudicate between those general approaches from an Archimedean point, even though researchers give reasons for preferring the approaches that they do.

One example is supplied by different views on sources of economic instability which are held by adherents of various Keynesian, monetarist, and other schools of thought.<sup>5</sup> Another example is provided by controversy over whether to group together certain events in the British Isles in the mid-seventeenth century under a label such as “the English Revolution” or “the Wars of the Three Kingdoms”. There is no consensus as to which label if any should be used, and correspondingly no consensus as to some of what should be said about the events in question.<sup>6</sup>

### 6.6.3 A limited range of accounts

In practice, not all possible accounts will ever be considered. We noted in section 3.4.3.3.2 that only reasonable accounts need be considered, and only accounts that are available given the current state of the discipline can be considered. Researchers will think in the same way, not spending any time on accounts which do not meet basic standards of reasonableness. Moreover, not even all of the reasonable and available accounts will occur to researchers. Where does this leave our argument that satisfaction of the researchers’ requirement that accounts should triumph over rivals which corresponds to our competition test is of considerable significance in explaining the epistemic value of disciplines?

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<sup>5</sup> Djuraskovic, Radovic and Radonjic Konatar, “The Controversies of Modern Macroeconomic Theory in the Context of the Global Economic Crisis”.

<sup>6</sup> For this disagreement see Bennett, “The English Revolution and the Wars in the Three Kingdoms, 1638-1652” (a review of a book of that title by Ian Gentles).

In fact, the failure to consider all accounts is tolerable. In particular, the exclusion of accounts which would not be considered reasonable can be justified. The success of academic research suggests that the standards and principles which lead researchers to think that some accounts are not even worth considering are perfectly good ones. There will be times when accounts excluded on such a basis would in fact have been worth considering. And standards and principles may change over time. But it is reasonable to accept decisions made on the basis of current standards and principles.

This argument may seem to be circular. We seek to make explicable the high epistemic value of disciplines. Then we call upon their success and their methods of selective attention to accounts in order to argue for the significance of the requirement for triumph over rivals in making their value explicable, even when the requirement has its attenuated form in which not all possible accounts are considered. But in fact we should not fear circularity. Our argument is not at risk from the potential circularity considered here when the requirement has its full form in which all possible accounts are considered. All we say here is that the argument can still be deployed even though not all possible accounts are in practice considered. The bases on which accounts succeed or fail in competition, or in getting to be considered at all (so long as they are available), are the manifestly respectable ones of evidence and the other considerations that are reflected in the full range of world-tests.

## 6.7 Standards and the other world-tests

The requirements imposed by the other world-tests we set out in section 3.4 correspond to tests which researchers would normally apply before considering an account mandatory, in addition to their (perhaps implicitly) checking for satisfaction of the competition test. This correspondence might not be immediately apparent, because researchers will typically set out their tests and the results of applying them in terms that are specific to the subject matter of accounts. But normally a little reflection will bring the correspondence to light. A physicist who demands that emissions of particles from a given experiment fall within a certain range if a hypothesis is to be accepted, demands that the evidence test be satisfied. A historian who refuses to accept an account on the strength of reports that documents existed and insists on seeing the documents themselves, makes the same demand. An economist who does not accept an account because it assumes unconstrained profit-seeking while also implying that opportunities for arbitrage would go unexploited, demands satisfaction of the coherence test. And so on.

If an account satisfied disciplinary standards corresponding to both the competition test and all or most of the other world-tests, and one also took a view that would allow disciplines to be seen as disclosing how the world was (which we do not once we move beyond perceptual and information-only accounts), claims to knowledge in respect of the account's contents would be regarded as well-supported. Indeed, it is not clear what additional demands could reasonably be made by someone who took the description view when considering whether to regard the contents of an account as known.



It would be possible to sustain this conclusion under a wide range of standards for the justification of specific beliefs which are to be found in theories of knowledge. People of a broadly foundationalist inclination who simply expected evidential support for propositions, and merely asked that the evidence and its significance be such as could be accepted without having to rely on dubious justifications for doing so, would be happy because of the demand for evidence. Fully fledged foundationalists who demanded foundations in the form of beliefs which could be known, or at least justified, without any dependence on other justifiable beliefs would at least be satisfied that the demand for evidence encouraged a search for propositions which could be believed more directly than the propositions of immediate interest. Coherentists would be happy that coherence was demanded. In a search for justification they would probably demand the positive coherence which our coherence test does not itself require. But the understanding test could cover that point. Foundherentists would welcome the combination of demands for evidence and coherence. Reliabilists would welcome the fact that checking that the demands reflected in the world-tests were met would be a good way to steer researchers toward claims which should be made and away from those which should not. Virtue epistemologists of a reliabilist sort would be pleased with the demands because someone who checked properly that they were met would exhibit the faculties to be expected of a virtuous enquirer. And virtue epistemologists of a responsibilist sort would be likely to accept that someone who was firm that the demands had to be met had at least some of the character traits needed to be a virtuous enquirer.

The benefits of meeting the demands of standards corresponding to world-tests carry across to the assertion view. But what does not carry across is a sense that

claims disclose how the world is, so that knowledge can be attributed to researchers. Our next task is to show that this does not matter.

## 6.8 The assertion view is just as good

In this section we shall set out why taking the assertion view puts us in just as good a position as taking the description view, when our task is to explain the epistemic value of disciplines.

In section 6.8.1 we shall set out why researchers can achieve the best available epistemic state by identifying accounts which are considered mandatory and also satisfy standards that are reflected in the world-tests. In section 6.8.2 we shall argue that while taking the assertion view restricts us from regarding the fruits of research as true, nothing of importance is lost thereby. In section 6.8.3 we shall remind ourselves that we put the question of realism to one side, rather than refuting realism. And in section 6.8.4 we shall consider the issue of accounts, only parts of the contents of which are considered mandatory.

### 6.8.1 The best available epistemic state

Suppose that the generality of researchers consider an account mandatory, and they also grasp that the account satisfies disciplinary standards.

In such cases, the epistemic state of a researcher in relation to the content of the account could not be improved at the current time. There would be every sign that the relevant part of the world insisted that certain things be said about it. Recognition of the provisionality of the epistemic state

would remain, as it always would whether one took the description view or the assertion view. New evidence or new reasoning might at any time lead the community of researchers to discard currently accepted accounts. But there would be no reason to be in the ordinary state of current doubt, under which one hesitates to be confident of a conclusion. At least, there would be no reason to be in such a state of doubt which would not also apply under any epistemological view.

That accounts should be considered mandatory is important here. If an account satisfied disciplinary standards but was nonetheless considered optional, its identification as such an account would not be as good as possession of knowledge. Consideration as mandatory is the assertion view's translation of researchers' belief in the truth of an account, as we set out in section 3.1.3.2. And it is up to researchers to decide which accounts to consider mandatory, as we set out in section 3.1.3.3.

## 6.8.2 The fruits of research and truth

As we noted in section 6.4, it is central to most concepts of knowledge that knowledge is only achieved when what is believed is true. Here is a potential difficulty for the assertion view. Even if researchers are put in the best available epistemic state by their identifying accounts which they consider mandatory while being aware that those accounts satisfy all relevant standards, the assertion view's refusal to read the fruits of research as showing how the world was would be an obstacle to those fruits being regarded as true.<sup>7</sup>

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<sup>7</sup>We here only draw attention to the issue. A great deal of work has been done on the connection between concepts of truth and ontological views. See for example Cameron, "Truthmakers"; Shieh, "Truth, Objectivity, and Realism".

At least there would be an obstacle here if one held a theory of truth which made essential use of a notion of truthmakers that were or bore an intimate relationship to facts about the world, or a theory which equated truths with facts about the world or with how the world was. This is a range which would encompass correspondence and identity theories of truth. It would also encompass deflationary theories, at least on their natural reading that the truth of a proposition consists merely in its stating how the world is. It is not that under the assertion view, the contents of accounts would be regarded as false. The question of whether they should be regarded as true simply could not be asked, because the contents would not be seen as hitched up to truthmakers or as being statements of how the world was. But if the contents of accounts could not be regarded as true, how could the epistemic value of disciplines be explained?

There would be no point in trying to resolve the difficulty at the level of disciplines. There would indeed be nothing that researchers working within disciplines could do which would take them from the epistemic state that was achieved by adopting accounts which they both considered mandatory and were aware satisfied all relevant standards, to some other state which was allegedly rendered superior by its permitting external commentators to label the contents of those accounts as true.

This would however not matter, because nothing more would be worth doing. When it comes to explaining the epistemic value of disciplines, if researchers can be seen as finding out what they must say about the world, that is as good as seeing them as establishing truths about the world. Epistemic value is constituted by success in making sense of the world, in making predictions, and in manipulating the world. It does not matter whether that success springs from finding out how the world is or from finding out what

to say about the world.

Attributions of truth to statements about the world thus become rather like answers to the question of realism in relation to the extensions of concepts. In discussions about fruits of research which are considered mandatory and which researchers are aware satisfy epistemic standards, such attributions are of no significance beyond the question of whether to attribute truth.

This does not mean that attributions of truth should be avoided within disciplines. Our theorizing should have no effect on how researchers within disciplines see the accounts they produce. They can regard the accounts they think they must give as stating how the world is, regard the contents of those accounts as true, and therefore regard those contents as known. Indeed, there are arguments that use of the concept of truth is of considerable importance in regulating the conduct of disciplines.<sup>8</sup>

The final stage of claiming knowledge may or may not be significant to researchers. They want to find out about the world. They would not gain anything by adding the accolade of knowledge. They can therefore be unperturbed by any effect our argument might have on the scope to attribute knowledge. But if they do want to attribute knowledge they may do so because they, unlike philosophers who take the assertion view, can avail themselves of the concept of truth. Those philosophers will however be bound to say that in doing so the researchers are mistaken, even if the mistake is harmless.

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<sup>8</sup> Price, "Truth as Convenient Friction". For a view which presents something of a challenge see Horwich, "Is TRUTH a Normative Concept?"

### 6.8.2.1 Information and description

We now turn to some cases in which the assertion view causes no difficulties and can be seen as merging into the description view, so that disciplines can be seen as affording knowledge even under the assertion view.

We have already discussed, in section 6.2, one set of cases. Those were the ones in which claims concerned the existence of perceptible objects or their having perceptible properties, realism was inevitable, and knowledge of the world was straightforwardly available.

Here we shall cover cases like those we discussed in section 5.6.2.3 in which perceptual experience would not be available, but there was no reason to think there was anything significant at stake in the question of realism because there would be no reason to think there was anything important to be had beyond information which could be given as a file of bits supplied within the context of the discipline and the topic of the account.

(The non-availability of perceptual experience would be in respect of particular aspects of the part of the world that was the topic of an account. Perceptual experience might be available in respect of other aspects of that part of the world. For example, a zoologist might at the same time study both individual animals, which would be perceptible, and functions to represent population dynamics, which would not be perceptible.<sup>9</sup>)

In section 5.6.2.3 we argued that there would be no reason to think there was anything important to be had beyond information. Here we limit our attention to the epistemic

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<sup>9</sup>For such functions see textbooks, for example Iannelli and Pugliese, *An Introduction to Mathematical Population Dynamics: Along the Trail of Volterra and Lotka*.

state of researchers in relation to information. We disregard their epistemic state in relation to anything else, whether or not it would be important.

To the extent that information is all that is of concern, we can see the assertion view as merging into the description view as follows. When only information is at stake, disclosure of what information must be said to be in the world amounts to the same thing as disclosure of what information is in the world. There is no coherent position from which the one disclosure would be seen as made without the other being seen as made. Researchers can therefore be seen as having knowledge of the information in question. They might of course make mistakes. But any such mistake would lead both to a failure to disclose what information had to be said to be in the world, and to a matching failure to disclose what information actually was in the world.

This argument for the availability of attributions of knowledge is however limited to what must be asserted. It does not extend to what may but need not be asserted.

### **6.8.3 Realism is not refuted**

When considering whether the position in which the assertion view leaves us is satisfactory, we do well to remember that the aim is not to refute realism but to put the question of realism to one side. This is particularly important when we consider research in the social sciences and the humanities. If the natural sciences are viewed without the benefit of realism, then even before arguments such as we have offered are put forward they can still be regarded as secure and of evident epistemic value because of their huge experimental success. In the social sciences and the humanities, that source of reassurance is not available.

This is not because of any remediable defects, but because those disciplines do not traffic in situations that even come close to being precisely reproducible.

Concern at the possible consequences of forsaking realism is one motive for the production of elaborate accounts of how research works in the social sciences and the humanities, accounts which defend the claim that such research gets to grips with the world as it really is and does not amount to the Procrustean application of researchers' own conceptual schemes to the world.

This is illustrated in the work of Isaac Ariail Reed.<sup>10</sup> By not seeking to refute realism, but instead only ignoring it as an option, we avoid an outright clash with such work. And while taking the assertion view in order to put the question of realism to one side would deny us the supposed benefit of adoption of a realist position that Reed identifies, we do not in fact suffer any loss thereby. In Reed's view, the benefit of realism is that it affirms that theories concern a reality about which we can have concrete evidence, so that for example claims about causes and effects can be seen as related to actual mechanisms. But disciplinary standards that are reflected in the world-tests do just as much as any presumption of realism in that direction. Indeed it is arguable that it would need to be considerations of evidence, coherence and the like that would support any presumption of realism. In that case a presumption of realism would not contribute any value independently, as we noted in section 5.6.1.3 in relation to the use of evidence. And as we noted in section 5.6.1.1, it is entirely possible for realism to supply encouragement to adopt a theory when that encouragement is of questionable value.

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<sup>10</sup> Reed, *Interpretation and Social Knowledge: On the Use of Theory in the Human Sciences*, chapter 2, section 1.



### **6.8.4 Accounts with optional details**

An account may be detailed to the point where researchers would not consider it mandatory in its entirety. At the same time, an account that was restricted to giving the same main elements and some non-optional details would be considered mandatory in its entirety. But the optional details may routinely be included because they have become the standard way to round out the picture.

We could then regard researchers as being in the best available epistemic state in relation to an account that was limited to the main elements and details that were considered mandatory. But we should not regard them as being in the best available epistemic state in relation to an account that included optional details.

## **6.9 Knowledge that an account is helpful**

Among the things researchers may discover is that a particular account is helpful, where helpfulness is as set out in section 3.1.2. An account will be helpful as a consequence of the nature of the world. So researchers will be able to make a claim of the form “The world is such that this is a helpful account”. Indeed, such a claim may very well be one that researchers consider mandatory. Experience may show the account to be so helpful that the claim becomes irresistible.

Such a claim can be regarded as an item of knowledge, because it can be regarded as straightforwardly true. There is no reason to apply the assertion view to claims about accounts, because there is no question of realism of the sort that has exercised us that needs to be answered or put to

one side when accounts are mentioned and properties, for example the property of helpfulness, are attributed to them.

The reason why there is no need to tackle a question of realism is that the primary relationship of accounts is to researchers who study the world. We may draw a contrast with the texts (in the sense of contents rather than physical copies), myths, and ideas that historians and social scientists identify and study. Their primary relationship is to the world that is studied.

# Chapter 7

## Other positions

In this chapter we shall explore relationships between the assertion view and other positions that have been prominent in the recent philosophical tradition.

### 7.1 Verificationism

The doctrine of verificationism is broadly that the meanings of statements (other than logical and mathematical ones) are given by their methods of verification, or at a minimum that their possession of meanings depends on their having methods of verification. This doctrine, which is associated with logical positivism, is largely out of fashion now, but it is not forgotten.

Verificationism as a view of statements made within disciplines would not bear any relationship to the assertion view which it would not equally well bear to the description view. Both views concern how to see accounts which are already accepted as meaningful and as having survived encounters with evidence, whether by garnering support

from evidence, escaping refutation by evidence, or both.

There is however a connection with implications of the two views. The assertion view should be more appealing to the verificationist than the description view because the former does not encourage taking any position on the question of realism, while the latter encourages a realist view. Realist and anti-realist claims in relation to the imperceptible both seem to go beyond anything that could be established from evidence, making them unverifiable. They seem to take us into the realm of the metaphysical.

## 7.2 Dummett's anti-realism

In this section we shall take note of anti-realism of the kind set out by Michael Dummett, rather than the anti-realism that is pitched against realism in the philosophy of science.

Dummett's thought is subtle, it evolved over his career, and it cannot be summarized briefly without distortion. It would be misleading to call him an anti-realist and leave it at that. But we can isolate the idea that is of most significance for the purpose of indicating the relationship between his thought and our work. It can be sketched, without any claim to exegetical fidelity, as follows.<sup>1</sup>

Realists in the sense that is relevant here start with the idea that each claim about the world is either true or false. Its meaning is then derived in terms of what would make it

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<sup>1</sup> Four works by Dummett which are particularly relevant here, and which between them make clear that his thought evolved, are "Truth"; *The Logical Basis of Metaphysics*; *Truth and the Past*; *Thought and Reality*. An exposition of Dummett's thought in this area which brings out some difficulties of interpretation is given in Gifford, *Exploring Realism and Truth*, chapters 3 and 4.

true. But there is an alternative position on meaning which leads on to a particular form of anti-realism.

This alternative gives a vital role to justifiers for the making of claims. It is argued that a theory of meaning must give a role to justifiers because the grasp of meanings that users of a language possess needs to be capable of manifestation in their behaviour. Specifically, their manifestation of a grasp of meanings comes in the form of an ability to attribute truth values to claims in reliance on justifiers. And it is right to speak of reliance, with its implication of a potentially conscious mental process rather than merely automatic responses, because attributions of truth values need to manifest awareness of the connection between the contents of claims and the nature of the world. Such awareness is needed in order for knowledge of a language to be, as Dummett argues it is, actual (implicit) knowledge and not merely a practical skill like one that an animal might acquire through training.

Once justifiers are given a central role, a problem arises for any realism that is more than an empty gesture toward a world that is supposedly fully populated with truth values. The problem is that some claims have no justifiers, and nor do their negations. Consider for example Jones, who is now deceased and cremated. He never faced danger and never had the state of his brain or his mind investigated beyond the imprecise impressions people might form through ordinary social interaction. There could be no justifier for the claim that Jones was brave, or for the claim that he was not brave.<sup>2</sup> To take another example, a claim may be made about the density of hydrogen atoms in some distant region that will soon drop permanently out of reach by virtue of the expansion of the universe, making it

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<sup>2</sup>Dummett gives this example in "Truth", although we have elaborated it a little.

impossible to send a mission out now and get information about the region sent back. (The impossibility would be a matter of physical law, not merely a consequence of the limits of our technology.) Again, there could be no justifier for the claim or for its negation.

Claims of this nature provide an argument for an anti-realist position. In the absence of a justifier for a claim or for its negation, people could not sensibly attribute a truth value to the claim. So if as sometimes happens there is no possibility, even in principle, of our accessing a justifier either for a claim or for its negation, it could never be appropriate to say either that the claim was true or that it was false. Indeed, meaning is just as much out of reach as truth values. We do perfectly well understand what it would have been for Jones to have exhibited bravery, or for some distant region to have been found to contain a million atoms of hydrogen per cubic metre. But a consequence of the role of justifiers in meaning is that we cannot understand the factual claim that Jones was brave, or the factual claim that the region contains a million atoms of hydrogen per cubic metre.

The dependence of the availability of actual truth values and of the comprehensibility of indicative propositions on what human beings could discover is the anti-realism in question. The world out there, taken independently of our actual or potential epistemic relationship to it, cannot be seen as doing all the work we might hope it would do in the way of fixing assignments of truth and falsity. The range of the discoverable determines the range of conceivable truth and that of comprehensible factual assertion.

Fortunately, the anti-realism in question is at a safe distance from our concerns. Taking the assertion view does not require us either to deny or to affirm the sense of truth

beyond our grasp, nor does it require us to take a position on whether the world as it may be independently of our actual or potential examination of it should be seen as doing a complete job of fixing assignments of truth and falsity. Instead, taking the assertion view holds us back from thinking about truth and points us toward thinking about the acceptability of saying. If there is nothing that can legitimately be said about some topic, this merely sets a current (and possibly permanent) boundary to the work of a discipline. It neither sets nor denies any limit to reality or to our conception of reality. Nor does it set or deny any limit to the range of accounts that could be meaningful.

Finally, there are the situations of actual or potential perception we covered in section 5.4 in which there is no reason not to take the description view. Those are situations (but not the only ones) in which truth and justifiers are within our grasp, so that no conflict between Dummett's anti-realism and its realist contrary would arise. In such situations we should not have any concern that Dummett's anti-realism might impinge on our own project. Nor indeed would Dummett have had any reason to be anti-realist.

## 7.3 Constructive empiricism

Constructive empiricism has been put forward by Bas van Fraassen.<sup>3</sup> For the constructive empiricist, empirical adequacy is enough for science. If we discard realism there is no serious loss to our understanding of science, and much metaphysical trouble may be avoided. There is therefore some overlap with our project. There are however some differences.

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<sup>3</sup> Van Fraassen, *The Scientific Image*.

The first difference springs from the fact that constructive empiricism is a form of anti-realism by virtue of its claiming that acceptance of a theory amounts only to acceptance of its empirical adequacy.<sup>4</sup> We by contrast propose a way to avoid the question of realism, rather than to deny realism and accept anti-realism.

Another difference is this. Constructive empiricism places overwhelming emphasis on the empirical adequacy of theories as the criterion of their acceptability. Empirical adequacy is certainly vital under any sensible view of science. It also connects directly with standard methods of testing theories by reference to evidence. But we do not restrict ourselves to that criterion. The world-tests include but are not limited to fit with the evidence. Van Fraassen allows that the appeal of a theory to researchers may depend on a wide range of factors. But at the level of external philosophical reflection he says that empirical adequacy is the aim of science, even if it is not the only aim of scientists.<sup>5</sup> We on the other hand incorporate the desirability of a range of features of accounts into the external philosophical view that we propose. We do so by taking satisfaction of the relevant world-tests to give good reason to regard as world-mandated an account that is already considered mandatory, as we set out in section 3.3.3. We also say nothing to exclude recognition at the philosophical level of aspirations beyond empirical adequacy. What can or must be said by virtue of the nature of the world may include accounts which speak of deep structures in the world, well below the superficial level of the empirical, even when there is no need to go so deep in order to systematize and explain observations.

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<sup>4</sup> Van Fraassen, *The Scientific Image*, chapter 2, section 1.3 and section 3.

<sup>5</sup> Van Fraassen, *The Scientific Image*, chapter 2, section 1.3, chapter 3, section 8 and chapter 4, section 4.



This difference is far from being a great gulf, either in relation to the difference itself or in relation to details of the criteria. On the difference itself, there is considerable overlap of goals. Van Fraassen wants to characterize the aim of science in such a way as to show it to be a rational activity, and to do so without falling into metaphysical difficulty. We seek to make the evident epistemic value of disciplines explicable, also without falling into metaphysical difficulty. Turning to details, among the world-tests the tests of evidence, coherence and fullness could all be seen as tests of particular aspects of empirical adequacy. But the test of understanding would be harder to fit entirely into that category. And the competition test is somewhat different in nature, being concerned with the relative merits of accounts. (We can leave the test of items aside here, since it would usually be trivial to satisfy.)

The final difference is this. Constructive empiricism is proposed primarily as an approach to the natural sciences. We intend our approach to be of wider application.

There is also a significant feature that constructive empiricism and our project have in common. Both of them allow researchers to think differently from philosophers who consider disciplines from the outside. As we have just noted, van Fraassen does not expect scientists to think only in terms of empirical adequacy. And he has no qualms about their thinking in realist terms.<sup>6</sup> But he does not consider that such thoughts need percolate up to his philosophical view. Likewise, we do not consider that any views of researchers on the question of realism need percolate up to our view.

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<sup>6</sup> Van Fraassen, *The Scientific Image*, chapter 4, section 2.4.

## 7.4 Pragmatism

### 7.4.1 Pragmatism in general

Pragmatism has taken many forms over the past two centuries. But it does have a recurring theme. This is that we should not see researchers as discovering the state of the world in a disinterested way and with a mind furnished with a conceptual scheme that is fixed in advance. Instead we should see researchers as feeling their way into the world, influenced in so doing by continual feedback as to what works and what does not work, not overly influenced by reasons to prefer some accounts to others which cannot be characterized in such terms, and with the ever-present potential to modify the concepts in use.

In research, the measure of what works is whether the results obtained allow us to understand and cope with the world. Results may for example bring what has happened or what generally happens into focus and make sense of it, allow reasonably successful prediction, or disclose the likely consequences of various actions.

William James put it this way:

“‘The true,’ to put it very briefly, is only the expedient in the way of our thinking, just as ‘the right’ is only the expedient in the way of our behaving. Expedient in almost any fashion; and expedient in the long run and on the whole of course; for what meets expediently all the experience in sight won’t necessarily meet all farther experiences equally satisfactorily”.<sup>7</sup>

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<sup>7</sup> James, *Pragmatism: A New Name for Some Old Ways of Thinking*, page 222.

This is however not the only option, and it was not the only option in James's time. Charles Sanders Peirce regarded beliefs which would never be doubted as true.<sup>8</sup>

One consequence of a pragmatist approach of the sort put forward by James is that we can never be confident of finality in conclusions about the world, although we may hope for stability in conclusions after enough enquiry.

Another consequence is that the notion of objective truth is called into question. This does not imply a relativist free-for-all. Interactions with the world can still push researchers firmly toward some conclusions and away from others. There would still be plenty of scope to say that someone was on the wrong track, and to reject any claim they might make that their readings of evidence were legitimate even though those readings were not widely accepted. Indeed, there is emphasis in the pragmatist tradition on an ongoing conversation through which understanding of the world is developed. The continuation of any such conversation would require the participants not to wander too far from the common ground over and around which the conversation ranged – a common ground of approaches as well as of specific claims.

The assertion view certainly echoes elements within the pragmatist tradition. If a conclusion about the world is regarded as a conclusion about what to assert, it would seem to be regarded in a pragmatist light.

The assertion view does however have some features which mean that it should not be regarded simply as a form of pragmatism. There is nothing in it to limit support

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<sup>8</sup> On this contrast between James and Peirce and on other pragmatist concepts of truth see Misak, "The Pragmatist Theory of Truth".

for accounts to researchers' pragmatic experience – at least, not unless pragmatism is taken to encompass the whole of empiricism. The tests that researchers apply, as characterized in broad terms in the world-tests, need not be seen in a quasi-practical way. It is not that the assertion view is incompatible with pragmatism. It could be incorporated into a pragmatist approach. But it can be taken without adopting pragmatism. The extent to which it might be seen as diverging from pragmatism would depend on the extent to which the substitution of a notion of mandation for a notion of truth, a substitution we introduced in section 3.1.3.2, was seen as preserving the flavour of truth in a traditional non-pragmatist sense.

Finally, we do not make the initial commitment to a classical pragmatist way of thinking that David Hildebrand has argued to offer a way to go beyond debates about realism.<sup>9</sup> We prefer to stay within a theory-led philosophical tradition.

## 7.4.2 Richard Rorty

Turning to developments in pragmatist thought over the past few decades, the assertion view is not a version of the representationalism that Richard Rorty opposed in the course of defining his pragmatism.<sup>10</sup> The assertion view does not characterize an account's contents having to be asserted as their being a way in which the world must be represented. We do not say that what must be asserted is to be defined in terms of what is true. And our refusal to say that is in itself consistent with a common pragmatist view that the concept

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<sup>9</sup> Hildebrand, *Beyond Realism and Antirealism: John Dewey and the Neopragmatists*.

<sup>10</sup> Neither representationalism nor Rorty's (or any other author's) anti-representationalism is amenable to statement in a form that would be both concise and precise. But there is a useful survey in Salis, "Varieties of Anti-Representationalism".

of truth, in its traditional form and as something detached from and potentially at variance with justification, is not of any great interest.<sup>11</sup> Moreover, we argue for the assertion view precisely because it will allow us to put to one side the question of realism, a question which is entwined with the representationalism that Rorty opposed.

The assertion view is also not a version of Rorty's own anti-representationalism. It is not such a version because under the assertion view accounts are seen as being about the world, and their contents may be things which can, must, or cannot be asserted about the world, depending on how the world itself actually is.

Having said all this, we have adopted a practical approach to the task of working out what must be asserted by virtue of the nature of the world. We have made the task feasible by transforming it into the task of working out what it is reasonable to think must be asserted by virtue of the nature of the world. One effect of this relaxation is to accommodate a view of researchers as being in much the same position as is envisaged by Rorty, with no guidance from outside humanity but only the guidance provided by the ever-evolving consensus and other influences of the community. The community may however include all manner of cultures, in order to minimize the dangers of

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<sup>11</sup> For Rorty's view of relationships between realism, anti-realism, representationalism and anti-representationalism see Rorty, "Introduction: Antirepresentationalism, Ethnocentrism, and Liberalism". Rorty considers realism and anti-realism primarily in Michael Dummett's sense, but also in a sense reasonably close to what is found in the philosophy of science. For how a pragmatist may see the roles that concepts of truth may play in debates in this area see Rorty, "Representation, Social Practise, and Truth"; Rorty, "Is Truth a Goal of Enquiry? Davidson vs. Wright".

ethnocentrism.<sup>12</sup>

Finally, a serious question is posed by our positioning ourselves in relation to Rorty in this way. If being something that must be asserted is not characterized as being a way in which the world must be represented, and if we do not define what must be asserted in terms of what is true, to what does the status of being something that must be asserted amount?

The answer we give is that this is a fundamental status, not to be defined in other terms but to be accorded to accounts by reference to the standards and consensus of the relevant discipline. If we want to know whether a statement in physics must be made, we must see what physicists say. The same would go for statements in other disciplines. Of course consultation with researchers can only show us what it is reasonable to regard as something that must be asserted. But fortunately that is the focus of our interest. We concentrate on accounts, the contents of which are currently regarded as things that must be asserted. We do however take this approach without claiming either that there is, or that there is not, anything more to be had than whatever total accepted discourse in disciplines there may be from time to time.

### 7.4.3 Henrik Rydenfelt

Just as we do not decide for anti-realism, we do not seek to hang on to any kind of realism by means which pragmatists might allow, for example by setting much store by the word “realism” in the name of the hypothetical realism that Henrik Rydenfelt builds on the pragmatist tradition. Rydenfelt proposes realism as a hypothesis on the basis

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<sup>12</sup> Rorty, “Introduction: Antirepresentationalism, Ethnocentrism, and Liberalism”, page 2.

of which science is conducted, rather than as a settled conclusion.<sup>13</sup>

We do go along with Rydenfelt's view that it is possible to see enquiry as trying to track reality without also falling back into what we have called the description view. But we do not see any case for regarding our position as amounting to or yielding any kind of realism, not even hypothetical.

#### 7.4.4 Huw Price

We also pursue a somewhat different project from one that Huw Price pursues.<sup>14</sup> Price's concern is to make sense of language, the world, and the relationships between them in a way that will accommodate scientific, ethical and other accounts without unsatisfactory side-effects which might follow from certain conceptions of representation. Those side-effects could include the relegation of non-scientific accounts to a position in which their relationships to the world were either obscure or only pretended.

Price's approach involves distinguishing between two forms of representation, one within accounts and the other looking outward to track the natural world.<sup>15</sup> We on the other hand restrict our attention to fruits of research which are manifestly intended to be factual rather than ethical, aesthetic, or anything else. Moreover, as already noted, we have no particular interest in forms of representation. The status of being something that must be asserted is not defined in such terms.

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<sup>13</sup> Rydenfelt, "Realism without Representationalism". His proposal is given in section 3.

<sup>14</sup> Price, Blackburn, Brandom, Horwich and Williams, *Expressivism, Pragmatism and Representationalism*.

<sup>15</sup> Price, Blackburn, Brandom, Horwich and Williams, *Expressivism, Pragmatism and Representationalism*, chapter 2, sections 5 to 7.

## 7.5 Warranted assertion

The notion of warranted assertion comes up a good deal in epistemology. And there is much debate over conditions for an assertion to be warranted. We must indicate the scope of that debate, then see how it may relate to our project.

Several possible conditions have been proposed. One is that the assertion should be among the claims that the person making it knows.<sup>16</sup> Another is that the assertion should be true.<sup>17</sup> A third is that the assertion should be rationally credible to the person making it.<sup>18</sup> A fourth is that the asserter's attitude to the assertion should be appropriately responsive to evidence.<sup>19</sup>

It will be clear from what we have already said that when there is reason to take the assertion view in preference to the description view, some of these conditions are not ones we could adopt in order to decide whether an account, considered as a set of assertions, was one that could legitimately be given. We could not accept demands for knowledge or truth. (We might however be able to accept demands that assertions would have been regarded as known, or as true, if the description view had been taken.) Fortunately, an inability to accept demands for knowledge or truth would not matter in our context. We can see this by considering the two main uses of notions of warrant.

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<sup>16</sup> Williamson, *Knowledge and its Limits*, chapter 11, argues that knowledge is necessary. For an argument that knowledge is sometimes not sufficient for assertion see Lackey, "Assertion and Isolated Second-Hand Knowledge".

<sup>17</sup> Whiting, "Stick to the Facts: On the Norms of Assertion". There is a discussion of Whiting's argument in Littlejohn, "Know Your Rights: On Warranted Assertion and Truth".

<sup>18</sup> Douven, "Assertion, Knowledge, and Rational Credibility".

<sup>19</sup> Maitra and Weatherson, "Assertion, Knowledge, and Action".



The first use centres on a notion of warranted assertion in the sense that comes closest to our sense of legitimacy of assertion. This use is to fill out a pragmatist approach to our epistemic relationship to the world. The concept of warranted assertion is the foundation of the epistemology of John Dewey.<sup>20</sup> We have already remarked on the relationship of our project to pragmatism. Pragmatists may speak of knowledge and truth, but when they do so they redefine those concepts for their purposes.<sup>21</sup> We prefer abstention to redefinition. That is our way to avoid commitment to concepts of knowledge and truth in the more traditional forms in which they would create difficulties for us.

The second use of notions of warrant is to bring into epistemology a notion of the responsibility of those who make assertions to their epistemic communities.<sup>22</sup> People should not make assertions inappropriately, because other people may rely on the assertions. It is in the context of this use that conditions of knowledge and truth are most likely to be proposed. Indeed, members of an epistemic community of researchers in a given discipline may well see such conditions as entirely appropriate.

Fortunately, that need not concern us. We noted in section 6.8.2 that researchers may take accounts to be true even while external philosophers take the assertion view. Likewise, researchers may demand that assertions be in their view true. Moving on from truth to knowledge as a condition for assertion to be warranted, we also noted in section 6.8.2 that the accolade of knowledge may or may not be significant within the practice of a discipline. Being

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<sup>20</sup> Dewey, *Logic: The Theory of Inquiry*.

<sup>21</sup> Dewey, "Propositions, Warranted Assertibility, and Truth".

<sup>22</sup> See for example Goldberg, *Assertion: On the Philosophical Significance of Assertoric Speech*, particularly chapter 3.

right is what matters most of all. But if researchers can think in terms of truth, they can also think in terms of knowledge. And they may well demand that people do not make assertions without having strong reasons for doing so of the kind that would, outside the context of our project, suffice to meet any reasonable requirement that known propositions be justified. From our position outside disciplines we can still take the assertion view as a way to read the fruits of research, without any need to insist that our reading be accepted within disciplines. And because the assertion view is merely a way to read those fruits, there is no need for requirements such as truth and knowledge which may be generated by readings of those fruits prevalent within disciplines to percolate up to the view.

## 7.6 Active scientific realism

Hasok Chang has proposed an alternative conception of realism. It goes by the name of active scientific realism, sometimes shortened to active realism.<sup>23</sup>

Chang does not argue for a realism which sees the task of science as essentially theoretical, accepts that the world has a certain nature, and then argues that theories may straightforwardly get that nature right through observation and analysis. Instead he starts from the world's resistance to our desires, and specifically to our desire to find out about it. This is the world's reality. If we want to find out about the world, we have to work to achieve our goal. And if we do not work in appropriate ways, we will not achieve the goal.

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<sup>23</sup> Chang, *Is Water H<sub>2</sub>O? Evidence, Realism and Pluralism*, section 4.2; Chang, "Realism for Realistic People". Chang will develop his position further in a forthcoming book, *Realism for Realistic People: A New Pragmatist Philosophy of Science*.

Scientific knowledge tells us how to work. But this does not reduce that knowledge to a mere bag of tools for use on different tasks in different workshops. Coherence across the piece plays an important role. What is real, and which statements are true, should be assessed by looking at which objects are identified in the course of, and which statements must be accepted in order to engage in, a harmonious set of actions which between them overcome the world's resistance to our finding out about it.

We have not followed a path like Chang's. His approach may well be appropriate to the task of characterizing the actual progress of science. Indeed, it was initially formulated in the context of a study in the history of science.<sup>24</sup> And his path does offer a way to avoid the metaphysical difficulties of realism, by offering a substitute for more traditional forms of realism. But we would rather put the question of realism to one side than offer a new form of answer to it.

## 7.7 Perspectivism

### 7.7.1 The approach and its range

In the philosophy of the natural sciences, perspectivism has been gaining ground as an approach to questions of realism and of the validity of models.<sup>25</sup>

Perspectivism recognizes that phenomena may be approached from different perspectives within the same discipline. For example, a liquid flowing through a pipe may be regarded as a continuous fluid or as a collection

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<sup>24</sup> Chang, *Is Water H<sub>2</sub>O? Evidence, Realism and Pluralism*, section 4.2.

<sup>25</sup> A foundational text is Giere, *Scientific Perspectivism*. For discussions of several aspects see Massimi and McCoy (eds.), *Understanding Perspectivism: Scientific Challenges and Methodological Prospects*.

of molecules, and under the fluid model different parts of the flow, close to or far from the pipe wall, may be treated mathematically in the same way or in different ways. To take another example, the nucleus of an atom may be characterized using any one of several models. These include a shell model, a liquid drop model and a quark model.<sup>26</sup>

In such examples we see different ways to model the same reality. Some models may make it more feasible than others to carry out computations. Some may explain phenomena at one level in terms of phenomena at another level, for example when a molecular model of a gas explains the phenomenon of pressure in terms of the movement of molecules. And some may make comprehensible to the human mind features of reality which others leave very hard to grasp.

There are limits to the range of application of perspectivism.

Sometimes the differences between perspectives will be too great for them to count as different perspectives within the same discipline. If for example a person is seen as a rational animal who thinks, plans and acts, and is also seen as an organism in which metabolic processes convert the chemical energy of food into forms needed to do those things, the two perspectives will belong to different disciplines.

Other differences will be too small to count as different perspectives, in the sense that no truly different models are proposed. Equivalent accounts as discussed in section 5.6.1.4 may be like this. For example, within classical mechanics, the traditional Newtonian formulation and Lagrangian and Hamiltonian formulations would not count

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<sup>26</sup> Morrison, “One Phenomenon, Many Models: Inconsistency and Complementarity”, section 2 (liquids) and section 3 (the nucleus).

as different perspectives because they all capture what goes on in terms of kinetic and potential energy, or in terms of masses, forces and velocities which bear direct mathematical relationships to those kinds of energy.

### 7.7.2 **Complementarity and inconsistency**

Models may be complementary. One can see how they fit together, and can set out a single underlying nature of the world which could be related to all of the models and which would make all of them usable side by side without inconsistency. Suppose for example that a body of liquid is modelled as a vast number of molecules, between which there are forces which tend to hold the body together but are also weak enough to allow easy rearrangement of the molecules. Then the origins of macroscopic properties which may be identified when the body is modelled as a continuous fluid, properties such as viscosity, become clear. The models fit together. And one can relate them to a single underlying nature as set out in a quantum understanding of molecules and forces. One can say this even though it would never be practical to compute the macroscopic behaviour of a particular body of liquid by reference to a disposition of molecules. One can say it even though statistical mechanics, which sees an ensemble of molecules, and fluid mechanics, which sees a continuum, are markedly different. And one could say it even if one took it that the path from a quantum understanding to a view of molecules as sticky fragments would not be such as to make it appropriate to see the quantum understanding as a reductive analysis of phenomena like the flow and the diffusion of liquids.<sup>27</sup>

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<sup>27</sup> Teller, “Twilight of the Perfect Model Model”, sections 4 and 6. Any textbook will make clear the different mathematical approaches of statistical mechanics and fluid mechanics.

Complementarity is however not always to be found. Models can be inconsistent in the sense that there is no single underlying nature of the world which could be related to all of the models so as to make all of them usable side by side. This is for example how things are with the many models of atomic nuclei.<sup>28</sup>

The work that would be done by setting out an underlying nature would be to allow all of the models to be seen as modelling that nature, so that they could be seen as consistent in the sense that they would not be regarded as proposing conflicting things about the nature of the world. And for that work to be done, it would be important that the models did not go far in adding material which could not be related to the underlying nature. If they added much, inconsistencies could still arise.

The qualification that a single nature should be capable of being related to all of the models is important. One could say that whatever fitted the unmodelled equations would be the underlying reality. But one would then have to acknowledge that for even a very modest system, mathematical complexity would rule out identifying solutions to the equations or even stating the equations in full. And a gesture toward insoluble or unspecified equations would be merely an expression of hope that the models were consistent by virtue of being models of the same reality, rather than evidence that they were consistent in that sense. (The concern here is with relationships between models. There is no concern that reality itself might not be open to logically consistent characterization.)

When models are inconsistent, perspectivism is argued to come to the rescue. Researchers can adopt different

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<sup>28</sup> Morrison, “One Phenomenon, Many Models: Inconsistency and Complementarity”, section 3.

perspectives on the subject matter, and within each perspective the corresponding model is valid and yields perfectly good results. We shall now consider how successful perspectivism may be in reconciling realism with the existence of inconsistent models.

### 7.7.3 **Perspectivism and realism**

When there were inconsistent models, it would be hard to say that the items they identified were all real. To say that would be to challenge the widespread and natural view that the world had a single nature, any accurate characterization of which (including any conjunction of accurate characterizations) would comply with logic. Perspectivism can respond to the difficulty created by inconsistent models, all of which seem to be worth retaining because of their various benefits, in either one of two ways.

The first way, which is not the prevalent one among perspectivists, is to say that all or all but one of the models are merely helpful. Then no claim is made that the world actually is as the merely helpful models present it. The difficulties which a claim to realism would generate are avoided because realism is not claimed, or is not claimed widely enough to be problematic.

This way suffers from the disadvantage that when models are very successful, it may be puzzling how they could be no more than helpful. The concern is pressing because in the natural sciences, and particularly in reasonably fundamental areas of physics and chemistry, models give precise characterizations of the world. Definitions and equations have none of the vagueness that we may see higher up the scale of disciplines. So the no-miracles argument would continue to push for a realist interpretation of each model, while belief in a single world would make realism

across more than one of a number of inconsistent models decidedly uncomfortable.

Perspectivism has therefore been used in a second way. This is to say that one first adopts a perspective, and then considers what may be said about the world on the basis of the model that the perspective enjoins. Inconsistencies between models can be handled on one of three bases.

The first basis is only of limited application. It is to note that perspectives are sometimes related in ways that allow some to be seen as limiting cases of others.<sup>29</sup> Then apparent conflicts may be dissolved.

The second basis is to say that relational properties are attributed through saying “The properties of the items of interest are from this perspective such-and-such”, rather than simply “The properties are such-and-such”.<sup>30</sup>

The third basis is to say that while what can be achieved does deserve the title of realism, it is not realism in the sense of the straightforward reality of the items mentioned in accounts. Rather, it is a recognition of the epistemic standing of the fruits of research. Research is inevitably conducted from some perspective or other, and its fruits are the best information about the world we have. So we can claim that so far as we can tell, those fruits state truths about a mind-independent world where their standing as truths is itself independent of perspective. And that is a realist claim of a sort, even if it is not the metaphysical claim to which many realists would aspire.<sup>31</sup>

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<sup>29</sup> Rueger, “Perspectival Realism and Incompatible Models”.

<sup>30</sup> Rueger, “Perspectival Models and Theory Unification”, page 586.

<sup>31</sup> The scope for some form of realism is discussed in Giere, *Scientific Perspectivism*, chapter 4; Massimi, “Perspectivism”; Teller, “What Is Perspectivism, and Does It Count as Realism?”; Saatsi, “Realism and Explanatory Perspectives”.



### 7.7.4 The assertion view

The assertion view offers a different way forward. Inconsistent models would amount to rival accounts. Even if they all had great merit, at most one of them could satisfy the competition test. So at most one of them could be regarded as world-mandated, or even be considered mandatory by researchers. The other models would rank merely as helpful accounts. And in relation to the one (if there was one) which it was appropriate to regard as world-mandated, we could deploy our usual arguments that the question of realism could be put to one side.

There is another point on which we should compare perspectivism and the assertion view. As we noted in section 7.7.1, there are differences in perspectives and models which are too great for them to count as options within a single discipline. Rather, they belong to different disciplines. Philosophers of perspectivism have so far not on the whole focused on cross-disciplinary conflicts. They have therefore not tended to deploy perspectivism to address those conflicts, although there may be some scope to do so. We on the other hand would give some weight to such conflicts through application of the coherence test that we set out in section 3.4.2.2, and through consideration of the ability of accounts to relate to other accounts that we mentioned in section 3.4.5.3.2.



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There has been some standardization of capitalization. Quotation marks have been standardized as double marks for the outer layer, then single marks for the inner layer.

For the purposes of alphabetical order, the space is treated as the first character and the hyphen as the second character. Characters with diacritics are treated as if they did not have them. Thus “ö” is treated as “o”, not as “oe”. Apostrophes are treated as if they were not there, so that “O’Rourke” is treated as if it were “ORourke”. Works by a single author are placed before works by that author and others. Works by one author and others are arranged by the first author’s surname and then by the second author’s surname.

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