DISPOSITIONS

A DEBATE

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D. M. ARMSTRONG
C. B. MARTIN
U. T. PLACE

EDITED BY TIM CRANE

DISPOSITIONS

Whenever we try to explain why things happen as they do, we find ourselves appealing to the powers or dispositions objects have. Dispositions are central to our understanding of the world: we protect things that are fragile and valuable; we avoid things that are poisonous; and we admire and value people for their character traits.

But dispositions have many puzzling aspects which concern philosophers. Dispositions are real properties of objects—the fragility of a window is a real property of the window—but at the same time, dispositions are described in terms of things that would and might happen in future manifestations of the dispositions. To say a window is fragile is to say that it would break if it were struck, not that it has broken or that it is breaking. A window can be fragile without ever breaking. In what way, then, can the disposition be a real property of the object? How can an object genuinely have a disposition if it never manifests it?

Three eminent philosophers, D.M.Armstrong, C.B.Martin and U.T. Place, each reveal their own distinctive account of the nature of dispositions. These ideas extend to other issues such as the nature of mind, matter, universals, existence, laws of nature and causation.

The authors: **D.M.Armstrong** is Emeritus Professor of Philosophy at Sydney University. **C.B.Martin** is Professor of Philosophy at the University of Calgary. **U.T.Place** is Honorary Lecturer in the Department of Philosophy at the University of Leeds and in the Department of Psychology at the University of Wales, Bangor.

The editor: **Tim Crane** is Lecturer in Philosophy at University College London.

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DISPOSITIONS

A debate

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AUTHORS

David Malet Armstrong was born in Melbourne in 1926. He took an undergraduate degree in Philosophy at Sydney University 1947–1950 under Professor John Anderson which was crucial in his intellectual formation. He gained a B.Phil, degree at Oxford University 1952–1954, taught for a year at Birkbeck College, University of London, and from 1956–1963 was Lecturer/Senior Lecturer at Melbourne University where he also gained the Ph.D. degree. In 1964 he became Challis Professor of Philosophy at Sydney University, the chair formerly held by Anderson. He retired at the end of 1991 and is now Professor Emeritus. He has taught as a visitor at Yale, Stanford, the University of Texas at Austin, the University of Wisconsin at Madison and the University of California at Irvine. His major publications are *A Materialist Theory of the Mind* (1968), *Universals and Scientific Realism* (1978), *What is a Law of Nature?* (1983) and *A Combinatorial Theory of Possibility* (1989). He is currently working on a large scale metaphysical work to be called *A World of States of Affairs*.

Charles Burton Martin was born in Chelsea, Massachusetts in 1924, graduated B.A. with distinction in Philosophy at Boston University and obtained the degree of Ph.D. in Philosophy from Cambridge University in 1953 after study at Emmanuel College Cambridge under John Wisdom. After a year in Oxford, he was appointed Lecturer in the Department of Philosophy, University of Adelaide in 1954. At Adelaide he was quickly promoted to Senior Lecturer and then Reader. From 1966–1971 he was Professor of Philosophy at the University of Sydney, and since 1971 has been Professor of Philosophy at the University of Calgary. He has held visiting professorships at Harvard four times, at Columbia twice and at the Universities of Michigan and Rochester once each. His principal publications are *Religious Belief (1959),* 'Anti-realism and the world's

undoing' (1984) and 'Intentionality and the non-psychological' (with K.Pfeifer, 1986).

Ullin Thomas Place was born at Northallerton, Yorkshire, in 1924, was educated at Rugby School and Corpus Christi College, Oxford, graduated with Honours in Philosophy and Psychology at Oxford in 1949 and obtained the Diploma in Anthropology at Oxford in 1950. He was Lecturer in Psychology in the Department of Philosophy, University of Adelaide, 1951–1954, Clinical Psychologist, Central Hospital, War-wick, 1960–1964, and at Hollymoor Hospital, Birmingham, 1964–1966, Lecturer in Psychology, University of Aston-in-Birmingham, 1967, Lecturer in Clinical Psychology, 1968–1970, Lecturer/Senior Lecturer in Philosophy, University of Leeds, 1970–1982. He obtained the degree of D.Litt., University of Adelaide, 1972, and has held visiting appoint-ments in the Department of Philosophy, University of Chicago (1965), in the Department of the Methodology of Psychology, University of Amsterdam (1973–1974), and at the Neurosciences Institute, New York (1991). He is currently Honorary Lecturer in the Department of Philosophy, University of Leeds and in the Department of Psychology, University of Wales, Bangor. His best known publication 'Is consciousness a brain process?' appeared in *The British Journal of Psychology* in 1956.

INTRODUCTION

Tim Crane

This book is about the nature of dispositional properties, or dispositions. It is hard to give an uncontroversial definition of the notion of a disposition, since its very definition is one of the matters under dispute. But we can make a start with the following preliminary definition: a disposition is a property (such as *solubility, fragility, elasticity*) whose instantiation entails that the thing which has the property would change, or bring about some change, under certain conditions. For instance, to say that some object is soluble is to say that it would dissolve if put in water; to say that something is fragile is to say that it would break if (for instance) dropped in suitable circumstances; to say that something is elastic is to say that it would stretch when pulled. The fragility (solubility, elasticity) is a disposition; the breaking (dissolving, stretching) is the *manifestation* of the disposition.

The contemporary philosophical controversy over dispositions is the descendant of earlier disputes—for example, Aristotle's view of actualities and potentialities, and Locke's view of secondary qualities as 'powers'. The recent interest in dispositions arose in two main areas of philosophy: the philosophy of science and the philosophy of mind. The interest in dispositions in the philosophy of science resulted from the logical empiricists' worries about unobservables—how could the whole of physics be expressed in terms of propositions about sense-experiences if physics requires attribution of dispositional qualities, which need have no manifestation in sense-experience?[1] The interest in dispositions in the philosophy of mind largely arose through behaviourist definitions of belief and other mental states, according to which belief is a disposition to act and/or to speak. Among the questions with which the philosophy of mind grappled were: how should such dispositions be defined, and what explains the possession of such dispositions?

The three participants in the present *Debate* have all made substantial contributions to the philosophy of mind in the last fifty years. U.T.Place is well-known as one of the originators (with Herbert Feigl) of the mind-brain identity theory—and his work influenced other pioneers such as J.J.C.Smart. D.M.Armstrong was one of the first to develop in detail a causal theory of the mind. C.B.Martin had already been an early proponent of the causal theory of mind, and played a crucial role in the development of the philosophy of mind in Australia, which then spread throughout the rest of analytic philosophy's world. Part of Martin's role in influencing the shift from behaviourism to physicalism and functionalism was to insist on the importance of what came to be called the 'Truthmaker Principle': the principle that when a statement is true, there must be something (some fact or event or property) that makes it true.[2]

Each of these three philosophers has developed a distinct conception of the nature of dispositions, conceptions which are central in their thought on mind, matter and causation. In this Introduction I shall give a brief guide to the difference between them. In order to do this I need to say something (not wholly impartial) about the recent background to the debate about dispositions, and a little about how to characterise dispositional and categorical properties.

THE PROBLEM OF DISPOSITIONS

Dispositions seem to be essential to our characterisation of the world. We protect things that are fragile and valuable; we avoid things that are poisonous; we treat inflammable things with care; we gather food which is nourishing; and we admire and value people for their dispositions of character: loyalty, honesty, courage and humour.

These characteristics of the world—fragility, poisonousness, flammability, nourishingness, loyalty, honesty, courage and humour—are all dispositions. They are all characteristics whose nature can be described in terms of how things with those characteristics would behave in certain circumstances. (Whether this thesis is *always* true of every disposition, and whether their nature can *only* be characterised in these ways are moot points to which I shall return below.) For something to be fragile is for it to be such that it would break in certain circumstances; for something to be nourishing is for it to be capable of giving sustenance if someone were to eat it; and so on.

As well as being so familiar in commonsense thought, dispositions figure too in metaphysical theories of the mind and the world. As I mentioned above, many philosophers (and not just behaviourists) have

advanced dispositional theories of belief and other mental states. David Lewis's physicalist functionalism, and the functional role theories of intentional content advanced by philosophers such as Ned Block and Gilbert Harman both appeal to dispositions in their theories, explicitly or implicitly.[3] Another area of philosophy which needs dispositions is the propensity theory of objective probability, which views (for example) the half-life of a radium atom as a disposition of that atom to decay.[4]

In physics and other scientific theories too, properties are often characterised in a dispositional way. A clear example is the property of electric charge: 'that property of some elementary particles that *gives rise to an interaction* between them, and consequently to the host of material phenomena known as electrical'. Or consider valence: 'the *combining power* of an atom or radical, equal to the number of hydrogen atoms that the atom could combine with or displace in a chemical compound'.[5] Many physical *specifications* of properties are dispositional specifications; and it is natural to draw the conclusion that the physical properties themselves are dispositions.

Yet despite their many and manifest uses, many philosophers view dispositions with suspicion. I have already mentioned that dispositions were viewed with suspicion by logical empiricists because of their unobservability (as opposed to the observability of their manifestations). Similar scruples lie behind Quine's worry that the notion of a disposition, like that of a subjunctive conditional, is 'pretty disreputable', and that if scientific practice does rest on such notions, 'it appears that science is rotten to the core'.[6] But others who are uncommitted to Quine's empiricism find problems with dispositions. Nelson Goodman claims that 'the peculiarity of dispositional predicates is that they seem to be applied to things in virtue of possible rather than actual occurrences—and possible occurrences are…no more admissible as unexplained elements than are occult capacities'.[7] And more recently, Simon Blackburn has claimed that the dispositional nature of properties gives rise to an apparent paradox for theorising in physics. Blackburn argues that since physics characterises properties dispositionally, it never discovers non-dispositional *causes:* 'we can head towards the engine room, but we never get there'.[8]

If it is possible to identify one general feature of dispositions which causes these difficulties, it is what we could call the 'possible absence of manifestation': an object can have a disposition without ever manifesting it. An object can be fragile without ever breaking; food can be nutritious without its ever nourishing anyone; a substance can be soluble without ever being put in water; and so on. There may be difficult cases where it is hard to judge whether we should ever *apply* a dispositional predicate—would we be entitled to call someone courageous who had never exercised this virtue in acts of

courage?[9] —but these epistemological difficulties do not affect the truth of the undeniable metaphysical claim that an object can have a disposition without ever manifesting it. We must reject, as a general thesis, the view that we are only entitled to attribute a disposition if the object has manifested it at some time (the doctrine of 'call no man mortal till he die').

This fact—the possible absence of manifestation—is presumably the reason why Goodman says that dispositional predicates are applied to objects 'in virtue of possible rather than actual occurrences'. However, this is a confusing way to put the point: since it is perverse to think that an *actual* object's *actual* solubility has anything to do with possible occurrences (if, indeed, there are such entities). D.M.Armstrong expresses this point by saying that we should not think of dispositional statements as made true by 'counterfactual states of affairs'.[10] And C.B.Martin says that

> dispositions are actual though their manifestations may not be. It is an elementary confusion to think of unmanifesting dispositions as unactualised *possibilia*, though that may characterise unmanifested manifestations.[11]

The problem is to say how it can be true that something has a dispositional property when the disposition 'points beyond' itself, and never manifests itself—without committing oneself to the idea that dispositions are not actual.

Perhaps the most orthodox response to this question (inspired chiefly by Armstrong) is to explain an object's possession of a disposition in terms of its possession of a non-dispositional or 'categorical' property. So for example, we might say that an object's possession of the property of solubility is explained in terms of its possessing a certain molecular structure. There are then two ways the explanation could go: one could either say (with Armstrong) that the categorical property is identical with the dispositional property. Or one could say that the categorical property 'realises' the dispositional property, though it is not identical with it.

For these responses to be clear, the distinction between dispositional and categorical properties has to be clear. But is it? How exactly should we formulate this distinction?

THE DISTINCTION BETWEEN THE DISPOSITIONAL AND THE CATEGORICAL

A common view, advocated here by U.T.Place, holds that the ascription to a thing of a dispositional property entails that certain conditionals (sometimes called variously 'subjunctive' or 'counterfactual' conditionals)

are true of it. So, for example, calling a vase 'fragile' entails the conditional 'if the vase were struck with sufficient force then it would break'.

One effect of adopting this criterion is to call into question the distinction between dispositions and categorical properties. For as Mellor and others have shown, what have commonly been taken as paradigmatic examples of categorical properties entail such conditionals too.[12] Take the apparently categorical property of mass. Newton's mechanics characterises mass in terms of what difference having a certain mass makes to a body's acceleration under a given force. In other words, ascription of the property of mass to a body entails a subjunctive conditional stating what a body with that mass *would* do if it *were* to have that force exerted upon it. As Goodman says (putting the point in terms of predicates rather than properties):

> more predicates than we sometimes suppose are dispositional… To say that something is hard, quite as much as to say it is flexible, is to make a statement about potentiality. If a flexible object is one capable of bending under appropriate pressure, a hard object is one capable of resisting abrasion by most other objects. And for that matter, a red object is likewise one capable of certain color-appearances under certain lights; and a cubical object is one capable of fitting try squares and measuring instruments in certain ways. Indeed, almost every predicate commonly thought of as describing a lasting objective characteristic of a thing is as much a dispositional predicate as any other.[13]

This last remark of Goodman's seems to move towards a dispositional characterisation of every property. However, Goodman does say that there are non-dispositional predicates—'those describing events… like bends, breaks, dissolves' —in other words, those describing the manifestations of the dispositions which the disposition predicates ascribe. And having made this distinction, Goodman goes on to assert that 'what we want is a criterion in terms of actual occurrences—that is, in terms of manifest predicates—for the correct assignment of dispositional predicates to things'. But this requirement has the consequence that we cannot make sense of ascribing a disposition which has no manifestations—which, as we have seen, is wrong. Mellor illustrates the absurdity of this consequence with the example of safety precautions at nuclear power stations, 'based on the fuel's known disposition to explode in circumstances which the precautions are designed to prevent. It is absurd to suppose that these precautions have no basis unless they are somewhere and sometime unsuccessful'.[14]

So there is unclarity in the very distinction between the dispositional and the categorical. There is also dispute about the role of conditionals in drawing this distinction. C.B.Martin has recently argued that the relation between conditionals and attributions of dispositions is not a straightforward matter.[15] Martin conceives of a case in which a conditional (characteristic of a certain disposition) is true, but it is not true in virtue of an object's having the disposition. Consider the following case: an electric current flows from a wire to a conductor whenever the wire and conductor touch. But there is a device (which Martin calls an 'electro-fink') which is responsible for making the wire live when and only when it is touching the conductor. When the wire is not touching the conductor, it is dead. So the truth of the conditional,

> If the wire were touched by a conductor then electric current flows from the wire to the conductor

cannot be sufficient to explain what it is for the wire to be live: the conditional can be true when the wire is dead. Dispositions cannot be *reduced* to the facts stated by the conditionals they often entail. (This argument, which would obviously be disputed by a defender of the conditional theory such as Place, is discussed further by Martin in chapter 11 of the current *Debate*, and I leave it to the reader to explore its ramifications.)

What should we conclude from these attempts to distinguish categorical from dispositional properties? One response would be pessimistic: that the distinction is unworkable because the notion of disposition is so disreputable, and ought to be abandoned. But there is another possible response: that dispositions are real properties, as real as categorical properties.

To say that dispositions are real properties, of course, is not to suggest a contrast between 'real' and 'unreal' properties. Such a contrast would be spurious: there are no unreal properties. What is meant is rather that a dispositional characterisation of a property picks out a property whose possession makes a real difference to the object which has it, and which can contribute to the causal interactions in which that object participates.

Some philosophers (influenced by Armstrong) resist this last move: they say that dispositions themselves are not causes.[16] Causation is the prerogative of categorical properties. Take the example of the property of being soporific. This is a disposition: for a substance to be soporific is for it to bring about sleep. But on this view *being soporific* is not what causes sleep; what is doing the causing is the chemical property (or properties) which 'realises'

the property of being soporific. Soporificity is a second-order property: it is the property of having some property which causes sleep.

Others claim that just as an object's possession of a disposition can itself be caused, so too can it have effects. Mellor offers the example of 'a rod so twisted that, when put in liquid helium to make it brittle, it breaks. Its becoming brittle is caused by the cooling, and in turn causes it to break'.[17] Need such cases of causation always be underwritten by non-dispositional properties? Armstrong and many others think so. But it is worth considering the alternative: that dispositions can have their causal powers in their own right, and not only by being realised by (or identical with) non-dispositional properties. A disposition might, perhaps, be realised by another disposition. Or—more extreme still—dispositions might (in Simon Blackburn's phrase) go 'all the way down'.[18]

Some might think that the fact that dispositions go all the way down is somewhat paradoxical or mysterious. The supposed mystery must be a consequence of the belief that underlying the non-dispositional features of reality must be something that cannot be characterised in terms of its power to manifest itself in any way at all: Locke's 'something, I know not what'. But to my mind, this 'something' is much more paradoxical and mysterious than the reality and causal efficacy of the dispositions *solubility*, *mass* or *belief*.

These issues, and many more, are dealt with in detail in the chapters that follow. It remains for me to briefly outline the shape of the *Debate*.

THE DEBATE

The participants in the present *Debate* offer three different perspectives on the nature of dispositions. D.M.Armstrong was one of the originators of the dispositional theory of mind. Armstrong was influenced, at an early stage in his philosophical development, by Gilbert Ryle's view that mental concepts are dispositional concepts. But Ryle's view about dispositions was that

> Dispositional statements are neither reports of observed or observable states of affairs nor yet reports of unobserved or unobservable states of affairs.[19]

It seems a consequence of this that dispositional statements are not reports of states of affairs at all! More cautiously, we could say that Ryle's view is that dispositional statements can be true without requiring them to be made true by the truth of any other statement (for example, a statement concerning categorical properties).

C.B.Martin influenced Armstrong in stressing the importance of the previously mentioned 'Truthmaker Principle': the principle that if a statement is true, there must be something which makes it true. All parties to this *Debate* agree that this Truthmaker Principle is correct. But what is the 'truthmaker' in the case of truths about dispositions? Armstrong argues that the truthmaker for a dispositional statement is always the instantiation of a categorical property. Indeed, he argues that dispositions are literally identical to categorical properties.

To see how this works, let's take Armstrong's view of mental properties as an example. Armstrong holds a functionalist-physicalist theory of mind. His functionalism consists in the view that 'the concept of a mental state is the concept of a state of the person apt for bringing about a certain sort of behaviour'.[20] That is, mental states are dispositions. His physicalism consists in the view that, as a matter of empirical fact, the state of the person in question will always be a brain state (which either is, or is based on, some categorical state). So if the mental state is identical to the state of a person apt for bringing about a certain sort of behaviour, and this state is a brain state, then it follows that the mental state is a brain state. And this is the general pattern of Armstrong's arguments for identifying dispositions with categorical properties generally.

On Armstrong's view, then, properties may have dispositional characterisations; but they will always have other characterisations too. 'Pure powers' do not exist.

A different perspective is provided by U.T.Place, who believes that the dispositional is distinct from the categorical. The latter he characterises in terms of spatio-temporal relations between the bearers of properties. The dispositional is not reducible to the categorical: both are equally real. A central aspect of Place's theory of dispositions is that dispositions are *intentional* states. In this he is influenced by the observation, due to C.B.Martin and Karl Pfeifer, that the marks of intentionality (which Brentano thought was the essential characteristic of the mental) are actually the marks of dispositionality.[21] The central mark of intentionality which Place considers crucial to dispositionality is the 'directedness' of intentionality: the way in which intentional states like belief are directed upon an object or state of affairs which, as Brentano remarked, need not exist. Place sees this as just a special case of dispositionality. For dispositions are (in a sense) 'directed on' events that need not exist: their manifestations.

Armstrong and Place discuss their differences in the first four chapters. In the fifth chapter, they are joined by C.B.Martin, who holds a very different view of the matter. First, there is a difference in terminology.

Martin finds the term 'categorical' tendentious: the contrast between the dispositional and the categorical seems to carry with it the connotation that dispositions are not as substantial as categorical properties (see chapter 5). This could come close to begging the question against the view that the dispositional is as real as the (so-called) categorical, a view Martin shares with Place. Martin therefore employs the term 'qualitative' where others use 'categorical'.

So Martin and Place both resist the reduction of the dispositional to the categorical/qualitative. But Martin does not agree with Place that this means that there are two kinds of properties: dispositional properties and categorical/qualitative properties. Rather, his 'Limit View' is that no property is wholly dispositional or wholly qualitative; dispositionality and qualitativity are the two 'limits', the fixed points relative to which the nature of a property can be mapped. A property will be dispositional to the extent that it has (not necessarily manifested) 'potency' to bring something about. A property will be qualitative to the extent that it involves a 'potency-free pure act of being'. But no property is wholly either, and 'to separate one from the other as the really basic property is philosophical artifice and error'.

As we saw above, the notion of a disposition is closely linked to the notion of cause. Armstrong identifies dispositions with their categorical bases, and explains the apparent causal powers of dispositions partly in terms of how these properties (understood here as universals) participate in causal laws. Place is unhappy with Armstrong's account of universals, preferring a conceptualist theory of them, and he advocates a counterfactual account of causation. For Place, causation is a relation between concrete particulars, backed by the truth of causal counterfactuals, and these counterfactuals are made true by the presence of dispositions. Martin prefers to replace the notion of cause and effect with the notion (more appropriate to his metaphysics) of *reciprocal disposition partners for mutual manifestation:* when salt dissolves in water, the salt and the water are reciprocal partners. The salt and the water lend themselves to each other for mutual manifestation.

The interplay between these three positions—on dispositions and on causation—provokes the fruitful discussion which forms the substance of this book. The book as a whole forms a lively illustration that the subject of dispositions is central not just to the philosophy of mind, but to metaphysics as a whole. And if there is one agreement we can tease out of all the disagreement, it is this: an understanding of dispositions must be central to an understanding of the nature of our world.

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Tim Crane
University College London
July 1995

NOTES

1 For an influential empiricist account of dispositions, see R.Carnap, 'Testability and meaning' in H.Feigl and M.Brodbeck (eds.) *Readings in the Philosophy of Science*, New York: Appleton-Century-Crofts, 1953.

2 See U.T.Place, 'Is consciousness a brain process?' and J.J.C.Smart, 'Sensations and brain processes' in C.V.Borst (ed.) *The Mind-Brain Identity Theory*, London: Macmillan, 1970; D.M.Armstrong, *A Materialist Theory of the Mind*, London: Routledge, 1968; reprinted with postscript 1993; H. Feigl, *The 'Mental' and the 'Physical'*, Minneapolis: University of Minnesota Press, 1967; C.B.Martin and Max Deutscher, 'Remembering', *Philosophical Review*, 1967; for the Truthmaker principle, see Chapter 1 of the current volume.

3 For Lewis, see 'Psychophysical and theoretical identification' in D.Rosenthal (ed.) *The Nature of Mind*, Oxford: Oxford University Press, 1991. Block's 'Advertisement for a semantics for psychology' and Harman's '(Wide) Functional Role Semantics' are in *Midwest Studies in Philosophy*, 1986.

4 See D.H.Mellor, *The Matter of Chance*, Cambridge: Cambridge University Press, 1971; K.R.Popper, 'The Propensity interpretation of the calculus of probability, and the quantum theory' in S.Körner (ed.) *Observation and Interpretation*, London: Butterworth, 1957.

5 The definitions are from the *Oxford Dictionary of Physics*, Oxford: Oxford University Press, 1991. The emphasis is mine.

6 'Natural kinds' in *Ontological Relativity*, New York: Columbia University Press, 1969, p. 133. Quine adds that 'rot…is not the best model here. A better model is human progress.'

7 *Fact, Fiction and Forecast*, Cambridge, MA: Harvard University Press, 1965, p. 42.

8 'Losing your mind: psychology, physics and folk burglar prevention' in J. Greenwood (ed.) *The Future of Folk Psychology*, Cambridge: Cambridge University Press, 1991, p. 196.

9 See Michael Dummett, 'The Reality of the Past' in *Truth and Other Enigmas*, London: Duckworth, 1978.

10 This volume, Chapter 1.

11 C.B.Martin, 'Dispositions and conditionals', *Philosophical Quarterly*, 1994.

12 See D.H.Mellor, 'In defense of dispositions' in *Matters of Metaphysics*, Cambridge: Cambridge University Press, 1991.

13 N.Goodman, *Fact, Fiction and Forecast*, p. 41.

14 'In defense of dispositions' in *Matters of Metaphysics*, pp. 111–112.

15 'Dispositions and conditionals', *Philosophical Quarterly*, 1994.

16 See the influential paper by F.Jackson, R.Pargetter and E.Prior, 'Three theses about dispositions', *American Philosophical Quarterly*, 1982.

17 'In defense of dispositions', p. 116.

18 Simon Blackburn, 'Filling in space', *Analysis*, 1990. For an application of this idea to the case of mental causation, see Tim Crane, 'Mental causation and mental reality', *Proceedings of the Aristotelian Society,* 1992.
19 Gilbert Ryle, *The Concept of Mind,* London: Hutchinson, 1949, p. 125.
20 *A Materialist Theory of the Mind*, paperback edition, London, 1993, p. 82.
21 C.B.Martin and K.Pfeifer 'Intentionality and the non-psychological', *Philosophy and Phenomenological Research*, 1986.

Part I

THE ARMSTRONG-PLACE DEBATE

1

DISPOSITIONS AS CATEGORICAL STATES

D.M.Armstrong

AN ATTEMPT TO CHARACTERIZE THE DISPUTE

Let us consider a statement such as 'This glass is brittle' said truly of an unstruck glass. It is uncontroversial that this statement entails a counterfactual statement along these general lines: If this glass had been suitably struck, then this striking would have caused the glass to shatter. We need not worry about the *detail* of this statement. To do so would deflect attention from the more fundamental ontological issues that we wish to consider.

The authors of this discussion agree in accepting a principle which C.B.Martin originally dubbed the 'truthmaker principle'. According to this principle, for every true statement, or at least for every true contingent statement, there must be something in the world which makes the statement true. 'Something' here may be taken very widely. Gustav Bergmann spoke not of a truthmaker for true statements, but rather of an ontological ground for their truth. It seems to be the same idea.[1] The principle appears to us to be fairly self-evident, although we are aware that a number of philosophers whom we respect do not accept it. We think that, putting it in moral terms, the truthmaker principle, or principle of an ontological ground, keeps one ontologically honest.

We now apply the truthmaker principle to the counterfactual truth about the glass. What makes this truth true, what is its ontological ground? It is vital to realize that, by itself, the principle does not mandate any particular answer. One very bad answer that would, nevertheless, satisfy the principle would be to postulate that the world contains a *counterfactual state of affairs or fact: viz.* the state of affairs that if, contrary to fact, the glass had been suitably struck, then this striking would have caused the glass to break. On this view, the counterfactual

statement has a form that pictures rather directly the form of a certain portion of *reality:* the counterfactual state of affairs.

It seems to all of us, however, that it is more attractive to look for the truthmaker among the *properties* of the unstruck glass. But just what properties? It is here that we come to a parting of the ways. One of us, Armstrong, holds that the truthmaker for the true counterfactual should be sought in purely categorical properties of the glass: such things as the molecular structure of the glass. Another, Place, thinks that categorical properties are not enough by themselves. We must postulate both categorical properties and non-categorical properties: dispositions or powers. C.B.Martin[2] has an important formulation here. He thinks that the divisions of properties into categorical and non-categorical is ultimately spurious. Our truthmakers should be a *single* property that nevertheless, like all properties according to Martin, has two 'sides' to it: a categorical side and a dispositional or power side. Thus the truthmaker for the counterfactual may be a certain sort of molecular structure, which is categorical, but the property of having this structure is *also*, and equally, a passive power in the object to shatter when suitably struck.

PRELIMINARY STATEMENT OF ARMSTRONG'S POSITION

There is an obvious preliminary argument that seems to favour the view that things have categorical properties only (or have properties that are one-sided only and that side is categorical). This is the great economy of the view. If the dispositions and powers of things merely supervene on their purely categorical properties, then our ontology appears greatly simplified. Ockham's razor therefore bids us see whether we can give an account of the world in purely categorical terms.

In any case, however, irreducible dispositions and powers have some strange, and, it may be thought, objectionable, features. To postulate them is to put something like intentionality into the ultimate structure of the universe. For suppose that a thing has, in addition to its purely categorical features, active and passive powers and dispositions. It is obviously not a necessary truth, indeed it is not true at all, that every active and passive power of a particular is always manifested at some point in the existence of the particular. Consider, then, an object that has a particular power, but does not manifest it at any time. Given that this power is a non-categorical property, or is the non-categorical side of the property, then the power 'points' to a categorical manifestation of the power, but the manifestation

never exists. Armstrong is reluctant to believe that properties can point beyond themselves to what does not exist. Mental states have this property, but it is to be hoped that this intentionality of the mental is analysable logically, or, more likely, empirically in terms of purely categorical properties.

These two points, while obviously not conclusive, do motivate the attempt to give an account of the world using categorical properties alone. But, of course, one then owes an account of why we are nevertheless entitled to attribute unrealized powers, potentialities and dispositions to the objects. My suggestion is that we should do this by appealing to the laws of nature. The idea is this: given the state of the glass, including its microstructure, plus what is contrary to fact—that the glass is suitably struck—then, *given the laws of nature are as they are*, it follows that the glass shatters.[3] Using the convenient, if metaphysically misleading, terminology of possible worlds, in all worlds that have the same laws of nature as our world, and where the boundary-conditions are the same as our world, including the microstructure of the glass, but with the addition to the boundary-conditions of a suitable striking of the glass, then in all these worlds the glass is caused to shatter. This is what it *is* for the glass to be brittle, and it does not involve anything but categorical properties of the glass.

A question immediately arises: what account is to be given of laws of nature? 'Laws of nature' are not here to be taken as true statements of law, but rather as whatever it is that makes such true statements true: their truthmaker. From an Ockhamist standpoint, the simplest account is the Humean account, that on the side of the objects (as opposed to our cognitive attitudes), laws are nothing but regularities in the behaviour of things. Unfortunately, this account is open to a number of serious objections, one of which is directly relevant to the topic of dispositions. As the case of the brittle but unstruck glass shows, laws of nature are thought to have potential application beyond those cases which constitute the positive instantiations of the law (the Fs that are Gs). But if laws are mere actual regularities, then the warrant for extending them to cases that are potential only seems to fail. (J.L.Mackie[4] made the ingenious suggestion that the warrant was inductive. This idea is criticized in Armstrong's *What is a Law of Nature?*.[5])

It is here that the economy achieved by restricting properties to categorical ones has to be paid for, though the price is, arguably, worth paying. We need to postulate 'strong' laws which entail corresponding regularities without reducing to such regularities. I think the way to do this is in two steps. First, one should identify properties with universals.

This need not involve postulating a 'realm of universals', which would be a major offence against economy. This can be avoided if one recognises none but actually instantiated properties, instantiated in the past, present or future. One can further have what David Lewis calls a 'sparse' theory of universals, postulating no more than those properties (and relations) required *a posteriori* for a satisfactory scientific account of the world.

Second, given this as a foundation, one can identify laws of nature with relations between universals, in particular with relations between properties. This seems a natural view, if one is looking for a realist theory of such laws. In the theoretically simplest case, the possession of one property by an object ensures (or probabilities) the possession of another property by the same object. This ensuring or probabilification, it is suggested, is a contingent matter, thus respecting the rather widespread intuition that the laws of nature are contingent. But if it obtains then it seems *analytically* to entail a corresponding regularity, or in the case of a merely probabilistic law an objective probability, that anything with the antecedent property will have the consequent property.

Here then is a scheme, at this point in the debate adumbrated rather than fully spelt out, which tries to provide a truthmaker for true dispositional statements while allowing that particulars have nothing but occurrent or categorical properties (and relations).

NOTES

1 See G.Bergmann, *Realism: a Critique of Brentano and Meinong*, Madison: The University of Wisconsin Press, 1967; index entry *Ontological: ground.*

2 C.B.Martin, 'Anti-realism and the world's undoing', *Pacific Philosophical Quarterly*, 1984.

3 Armstrong is not committed to the view that the categorical basis of the disposition *has* to be microstructural. His view is that it often is, and it gives an agreeably realistic flavour, some feeling for physics as it actually is, to talk in terms of microstructure. Armstrong therefore does not think that anything of philosophical consequence follows from using the examples of microstructural properties.

4 See J.L.Mackie, 'Counterfactuals and causal laws' in R.J.Butler (ed.) *Analytical Philosophy*, Oxford: Blackwell, 1962, pp. 66–80.

5 D.M.Armstrong, *What is a Law of Nature?*, Cambridge: Cambridge University Press, 1983, Ch. 4, Sec. 4, pp. 50–52.

2

DISPOSITIONS AS INTENTIONAL STATES

U.T.Place

COUNTERFACTUAL STATES OF AFFAIRS

Armstrong begins his account of the dispute between us with the claim that it is common ground between us that to say

> This glass is brittle

entails

> If this glass had been suitably struck, then this striking would have caused the glass to shatter.

While not disputing this claim, it should be added that the statement This glass is brittle' also entails the prediction

> If at any time in the future (so long as it remains brittle) this glass is suitably struck, then this striking will cause the glass to shatter.

Armstrong then says that there is a similar agreement between us

- that every true contingent statement requires the existence of some state of affairs or the occurrence of some event whose existence or occurrence makes the statement in question true (Martin's truthmaker principle),
- that, in the case of a counterfactual statement such as that entailed by 'This glass is brittle', there is no 'counterfactual state of affairs' whose existence makes the statement true, and
- that, on the contrary, such statements are made true by the existence of some property of the entity or entities concerned.

On this view, the issue between us is a matter of whether the property or properties whose existence makes the statement true are categorical, as

Armstrong holds, non-categorical, as held by Place, or part categorical and part non-categorical, as held by Martin.

From Place's standpoint this formulation dismisses rather too quickly the proposal that the 'truthmaker' for a dispositional statement is 'a counterfactual state of affairs'. Armstrong describes a counterfactual state of affairs as

> the state of affairs that if, contrary to fact, the glass had been suitably struck, then this striking would have caused the glass to break. On this view, the counterfactual *statement* has a form which pictures rather directly a certain portion of *reality*.
>
> (pp. 15–16)

This, I agree, is absurd.[1] What the counterfactual statement depicts is a (pp. 15–16) *fictional* event (in which the glass is struck and caused to break) which is in no sense part of reality. But this is precisely the difference between a simple categorical statement of the *the cat is on the mat* variety and the case of counterfactuals, subjunctive conditionals, law statements, etc., where what the statement depicts and the actually existing state of affairs which makes the sentence true are two different things; necessarily so, because in these cases the event or state of affairs depicted does not exist, has not existed and may never exist, whereas *ex hypothesei* the state of affairs which makes the counterfactual true most certainly does.

The issue in dispute here concerns the interpretation of this state of affairs whose existence makes the counterfactual and subjunctive conditional true. On Place's view and, it would seem, on Martin's, the state of affairs that makes the counterfactual true is simply the possession by the entity in question (the glass) of the dispositional property or passive causal power of being shattered when struck sufficiently hard. On Armstrong's view it is a categorical state of the microstructure of the entity that possesses the property. Neither Place nor Martin would deny the importance of the role played by the state of the microstructure here. But whereas for Armstrong the dispositional property, and the state of the microstructure, are one and the same thing, for Place the state of the entity whereby it possesses the dispositional property, and the corresponding state of the microstructure, are two distinct states of affairs, such that the state of affairs whereby the entity possesses the dispositional property stands as effect to the state of its microstructure as cause.

But if, as Place claims, the possession of a dispositional property and its basis in the microstructure are two distinct and causally related things rather than one and the same thing, in what does the possession of the

dispositional property consist? On this Rylean view,[2] it is a matter, not of anything that is happening or is the case in the here and now, but of what would happen or, in the counterfactual case, would *have* happened, if certain conditions were to be or had been fulfilled.

If that is correct, there is nothing more to the truthmaker of a causal counterfactual than what may quite properly be called a 'counterfactual state of affairs', a state of affairs whereby certain predictions and counterfactual retrodictions of which the counterfactual in question is one are true of the owner of a dispositional property.

THE 'CATEGORICAL/NON-CATEGORICAL' DISTINCTION

Armstrong believes that the microstructural basis of a dispositional property is purely 'categorical'. It follows that, by identifying dispositional properties with their microstructural basis, he can represent dispositional properties as purely categorical, thereby eliminating the non-categorical from his ontology. Viewed from this standpoint, Place's contention that a dispositional property and its microstructural basis are two distinct entities such that the microstructure stands as cause to the possession by the bearer of the dispositional property as effect would seem to imply

- that dispositional properties are non-categorical, and
- that a non-categorical dispositional state stands as effect to a categorical state, the microstructure of the property owner, as cause.

However, this formulation misrepresents Place's position in two respects. It assumes, contrary to fact, that he accepts

- the reality of the distinction between 'categorical' and 'non-categorical' properties, and
- that, in so far as the distinction is a meaningful one, structural properties are purely categorical.

Place has two reasons for doubting the reality of the 'categorical/non-categorical' distinction as applied to properties:

- The primary application of the predicate 'categorical' is to statements, not to entities referred to in them.
- In so far as sense can be made of the predicate when used in this way, a 'categorical property' is one which consists entirely in what exists at the moment or period of time to which reference is made, to the

> exclusion of anything that might exist or have existed at some other point in time. Place is inclined to doubt whether *any* property satisfies this definition.

In this latter respect Place's view is very close to the view which Armstrong attributes to Martin. If he differs from Martin it would be in the direction of questioning whether properties have *any* categorical aspect other than the fact that there is a currently existing prospect of something existing in the future, whether they are not otherwise wholly a matter of how things would or might turn out. On this view the only things that are 'purely categorical' are the existence of the property bearer and the spatio-temporal relations between its parts and between it and other substances.

On this interpretation, what creates the illusion that there is something peculiarly 'categorical' about the microstructural basis of a dispositional property is the fact that the property bearer's possession of its microstructure involves *the existence of the parts* of which the microstructure is composed. But the 'categorical' existence of those parts is not a 'categorical property' of the property bearer, the whole whose parts they are. It is not just that, as Kant points out in his refutation of the Ontological Argument for the existence of God, existence is not a predicate, i.e. a property. The property bearer's possession of its microstructure (which *is* a property), though it entails the existence of the parts is not 'a purely categorical property' in the relevant sense. For the property bearer's possession of its microstructure is not just a matter of what exists *now*. It is very much a matter of what might have existed in the past, but didn't, and may yet exist in the future.

Despite these reservations about the use which he makes of the distinction between 'categorical' and 'non-categorical' properties in his exposition of Place's position, it should be said that Armstrong is entirely right to suggest looking for the truthmaker for the counterfactual amongst the properties which an entity (such as the glass in his example) possesses and in diagnosing a difference between us over whether the property whose possession constitutes the truthmaker with respect to the counterfactual is categorical or non-categorical. For him, dispositional properties reduce to categorical properties of the microstructure. For Place and, perhaps, for Martin, dispositional properties are emergent[3] properties of wholes which depend on, are partly explicable in terms of, but are *not* reducible to the parts composing the microstructure and *their* dispositional properties.

A CRITIQUE OF ARMSTRONG'S PRELIMINARY STATEMENT

Armstrong begins his defence of 'the view that things have categorical properties only (or have properties that are one-sided only and that side is categorical)' with the argument that this view leads to greater ontological economy in the spirit of Ockham's razor. It turns out, however, that in order to account for the counterfactual and subjunctive conditional entailments, he finds that these need to be deduced from a universal law statement; and *that* in turn requires a truthmaker in the form of a law of nature *qua* state of affairs in the world. So apart from the fact that his laws of nature *qua* states of affairs are likely to be fewer in number than the various states of affairs whereby certain counterfactual and subjunctive conditionals are true on the alternative account, his view is no more ontologically economical than its rival.

Indeed, unless he can succeed in collapsing laws of nature and universals all into one which, I suspect, he will find considerable difficulty in doing in a convincing fashion, the alternative conceptualist ontology seems likely to prove the more economical. Conceptualism, as advocated by Place, is Ockham's view which holds that all that exist are concrete particulars, their properties and the relations, including those of resemblance, between them. Universals, on this view, are generated by minds which abstract them from resemblances between particulars. They exist only in so far as they are used by minds to sort instances into classes. This ontology requires no laws of nature *qua* states of affairs over and above the possession by particulars of intentionally interpreted dispositional properties, no possible worlds and no universals over and above their instances and the classificatory propensities of human beings and other living organisms.

Armstrong's second argument for his position consists in an objection to the alternative position which, he claims, is committed to building into the constitution of the universe a kind of intentionality that points at the non-actual. This argument cuts no ice with Place. He finds nothing objectionable in the notion that intentionality *is* built into the very fabric of the universe. There are two reasons for this:

- He is persuaded by the arguments of Burnheim[4] and Martin and Pfeifer[5] that intentionality is not, as Brentano thought, the mark of the mental, but rather the mark of the dispositional.[6]
- He holds with Hume[7] and Mackie[8] that causal necessity is a matter of the truth of a counterfactual to the effect that if the cause had not

occurred or been the case, the effect would not have occurred or been the case.

The conclusion that he draws from these two doctrines, when taken together, is that the intentionality of dispositional properties whereby, in Armstrong's words, they 'point beyond themselves to what does not exist' is, in Hume's phrase, the very 'cement of the universe' without which there would be no causation, no change, no time, no space, no universe.

But even if we accept that there is something disreputable about building a pointing towards the non-actual into the fabric of the universe, it is a crime of which Armstrong himself is equally guilty. For what is he doing when he postulates laws of nature *qua* states of affairs corresponding to the universal law statements whose truth is demonstrated by empirical science, if not building a pointing towards the non-actual into the fabric of the universe? And if one is going to have pointings to the non-actual at the very heart of one's universe, is it not better that they should consist in the particular dispositional properties of particular concrete substances, rather than in a set of universal states of affairs which are linked to actual space-time only at the point of their otherwise unconnected instantiations?

Armstrong recognises that he is compelled to introduce the states of affairs which he refers to as 'laws of nature' in order, as he puts it, to provide 'an account of why we are nevertheless entitled to attribute unrealised powers, potentialities and dispositions to objects.' However, he tries to persuade us that, by postulating independently-existing universals and laws of nature *qua* states of affairs in the world, we can explain how it is that we are entitled to make predictions and retrodictions of how it would or would not have behaved in circumstances which are either counterfactual or as yet unrealised, without postulating anything over and above the current existence of categorical states of affairs. In order to do that he has to persuade us that there is nothing disreputably non-categorical about universals and laws of nature *qua* states of affairs in the world. He seeks to do this by proposing

- to identify universals with actually instantiated and, presumably, categorical properties of some entity; and
- to identify laws of nature *qua* states of affairs in the world with relations between such properties.

Armstrong admits that, as described here, this does not add up to a fully worked-out theory. He has discussed both laws of nature and universals extensively elsewhere.[9] But, as it stands here, I submit, it doesn't even begin to address the problem.

In the first place, why restrict universals to properties and relations? Why can't there be—indeed don't there have to be on *any* account—universals in the category of substance, property bearer types as well as property types, types of *relata* as well as types of relations?[10] The suggestion that laws of nature be construed as relations between properties seems reasonable enough. But why should the properties have to be categorical? It seems that the Laws of Nature (here in the sense of linguistic/mathematical formulae devised by scientists) invariably involve causal relations between dispositional properties on the one hand and possible as well as actual events on the other. Ohm's Law, for example, describes a causal relation between two dispositional properties —the potential difference between two ends of a conductor, and its resistance—on the one hand and the magnitude of an event—the flow of current within it—on the other. Its purpose is to make possible predictions and retrodictions about non-actual current flows. But even if it is granted that the properties in question are to be construed as in some sense 'categorical', if the relation between those properties is a causal one, it follows, on the Hume/Mackie view of causation, that the relation itself involves the truth of a counterfactual. In other words, causal relations on this view involve an essential non-categorical hypothetical element.

It looks suspiciously as though the talk of laws of nature being relations between 'categorical' properties is simply a ruse for smuggling in modality by the back door. The properties have to be categorical; but the relations between those properties can be as hypothetical, intentional or modal as you like.

PRELIMINARY STATEMENT OF PLACE'S POSITION

As already indicated, the alternative to Armstrong's position advocated by Place is a version of the traditional conceptualist theory of universals, discussed and rejected by Plato in the *Parmenides* (132–3), advocated, according to the best modern authorities,[11] by Aristotle and following him by a line of medieval philosophers down to and including William of Ockham. According to this view, as interpreted here, everything that exists, everything that the universe contains, belongs to one or other of four basic categories. It is either

- a *concrete particular* (a physical object, entity or substance),
- a *feature of* (a property of or relation between) one or more *concrete particulars*, or

- a *situation* (event or state of affairs) whereby properties of or relations between two or more concrete particulars are located and extended in time.
- a *feature of* (a property of or relation between) one or more *situations*[12].

On this view there are no independently existing abstract objects, such as numbers, universals, sets, or laws of nature (considered as states of affairs in the world rather than as formulae describing what is common to the properties of and relations between concrete particulars). Nor do universals exist *in rebus*, in the particulars which instantiate them, as Armstrong holds, following Boethius' incorrect (as Place would like to think) interpretation of Aristotle's view[13]. According to the conceptualist, universals exist in two distinct senses:

1 in the sense that instances of them exist, and
2 in the sense that some living organism is disposed to classify some particulars in a certain way and, in the human case, in so far as that classification is incorporated in the semantic conventions of a particular natural language.[14]

Universals on this view are abstracted by animal and human minds on the basis of resemblances between concrete particulars, their features and the situations in which they are involved. A relation of resemblance exists between two or more particulars in so far as they both possess what, when viewed in the light of the system of universals incorporated in human language, is the same property or set of properties, though, needless to say, each possesses a different instance of that property.

On the view to which Armstrong subscribes, but about which, as we have seen, Place has some reservations, properties can be subdivided into

- *categorical properties*, such as the shape, size and material composition of a concrete particular, which do not extend beyond what is actually the case or actually happening at some moment in time, and
- *modal (dispositional) properties* which extend beyond what is actually happening or actually the case at some moment of time to what would happen or be the case, if certain contingencies should arise in the future, or to what would have happened or been the case if those contingencies had arisen in the past.

The possibility of reducing modal (dispositional) properties to categorical properties or of reducing modal (causal) relations to categorical (temporal) relations is denied by Place. It is accepted, however, that it is usually, if not invariably, possible to *explain* the existence of the dispositional properties of the whole in terms of

- the categorical relationship of its parts to one another, and
- the dispositional properties of the parts in their interaction with one another.

For reasons which have presumably to do with the fact that the existence of a relation presupposes the prior existence of the things between which the relation holds, Place's reservations concerning the application of the categorical/modal distinction to properties do not extend in the same way to its application to relations. Indeed, the suspicion that there may not be *any* genuine cases of categorical properties stems in part from the observation that the leading candidates for that status, the external shape and internal structure of a concrete particular, appear to reduce on analysis to spatial relations between the concrete particulars which make up the whole. But as well as categorical and modal relations between concrete particulars, there are categorical and modal relations between situations. Examples of categorical relations between concrete particulars are spatial relations and the genetic relations between individual organisms. Examples of modal relations between concrete particulars are the social relations between individual organisms of the same or different species. The modal character of such relations appears when we consider that they are a matter of the way the interactions between individuals are constrained both by their reciprocal dispositions and by those of others towards their relationship. In the case of relations between situations, it would seem to be a necessary truth both that all such relations are relations between the times at or over which the situations occur or exist, and also that all temporal relations are relations between situations. Temporal relations as such are categorical. A modal element is added when a causal relation is asserted between two consecutive events.

The motivation for this ontology derives from another aspect of Place's position. This is a version of the picture theory of the meaning of sentences which holds that there exists, in the case of any meaningful and non-analytic sentence, an isomorphic mapping relation between the structure of the sentence and the structure of that segment of actual or prospective reality which it represents. Although the picture theory is usually associated with Wittgenstein's exposition of it in the *Tractatus*,[15] it can be traced back to Aristotle's doctrine whereby the substance/ property distinction in nature corresponds to the subject/predicate analysis of sentences. Apart from certain reservations about the possibility of adequately formalising the two halves of the isomorphism in the way they propose, the present version of the picture theory resembles the 'Situation Semantics' proposed by Barwise and Perry[16] from whom the term 'situation', used for the extra-

linguistic counterpart of the sentence, is derived. On this version of the theory, linguistic representations of extra-linguistic reality rely on a correspondence between the ontology described above and Frege's[17] function and argument analysis of the structure of sentences which he introduced in place of the classical subject-predicate analysis in order to accommodate relational or multi-place predicates. Thus in a simple or atomic sentence like *The cat is on the mat*

- *concrete particulars* are represented by the noun phrases *the cat* and *the mat* occupying the argument places generated by the function (the verb phrase *is on*),
- *features of concrete particulars* are represented by the function or multi-place predicate expression (in this case the verb phrase *is on),*
- *situations* are represented by the complete simple sentence *(The cat is on the mat),* while
- *features of situations* are represented by compound sentences (e.g. *The cat is sitting on the mat without moving a muscle. It's irritating that the cat is always on the mat. Dawn has broken and the cat is on the mat. If the cat is on the mat, it will be fed.*).

It is a consequence of this version of the picture theory of the meaning of sentences that

- an imperative is complied with in so far as the listener creates a situation which *conforms to* that specified by the sentence,
- an indicative or declarative is contingently true in so far as there exists a situation which *corresponds to* that specified by the sentence.

It is also part of this view that we can distinguish, following Frege,[18] between the sense *(Sinn)* of an expression and its referent *(Bedeutung)* in such a way that the sense of an expression is the kind of concrete particular, feature or situation which, if it existed, would constitute the referent of the expression in question. Equally, the referent of an expression is that actually existing concrete particular, feature or situation, or class of such actually existing concrete particulars, features or situations to which a speaker who uses the expression in question is able to draw the attention of a listener; provided, of course, that the listener understands the expression in the way prescribed by the conventions of the relevant language or code, and has the necessary background knowledge required to disambiguate the indexical and other purely referential aspects of the expression. It is a consequence of this view that if an indicative/declarative sentence expresses a synthetic/contingent statement and that statement is

true, the sentence has a referent in the form of the actually existing situation which it specifies and whose existence makes the statement true.

The central issue in the present debate concerns the way in which that principle, the principle that for every true contingent statement there exists a situation which is both the referent and the truthmaker with respect to that statement, is to be applied in the case of dispositional statements (statements ascribing a dispositional property to a concrete particular). The problem arises because of the fact, which is not disputed, that dispositional statements, unlike statements ascribing a categorical property (or in-relation standing) to a concrete particular, entail a subjunctive/counterfactual conditional statement to the effect that if the concrete particular in question were to interact or had interacted with another concrete particular of a given kind, certain consequences would occur or fail to occur, or would have occurred or failed to occur.

These subjunctive/counterfactual conditionals which dispositional statements entail present two problems for the view that the truth of a contingent statement requires the existence of a situation which is both its referent and its truthmaker. These are

- the fact that we want to claim that the subjunctive/counterfactual conditional is true despite the fact that neither the situation specified by the antecedent of the conditional, nor that specified by the consequent, actually exists, and
- the fact that some of us, at least, are tempted to follow Ryle[19] in claiming that to assert the relevant subjunctive/counterfactual conditional is to assert all that is asserted by the superficially categorical assertion that the concrete particular in question possesses a particular modal/dispositional property; whereas the subjunctive/counterfactual apparently makes no existential claim, apart from the implied existence of the concrete particular in question.

Both problems are dealt with on the present view by proposing that the claim that the subjunctive/counterfactual conditional is true can only be sustained in so far as there exists or existed at the relevant time an actual state of the concrete particular in question such that the subjunctive/counterfactual is true.

This state of the concrete particular exists and is both the referent of the subjunctive/counterfactual conditional statement as a whole (as distinct from its parts which have no referent) and its truthmaker. It is not, however, as Armstrong believes, the same state of affairs as the state of the microstructure of the concrete particular in question on whose existence, on this view, it depends in a causal sense. For although the existence of

the state of the microstructure is the ultimate truthmaker for the subjunctive/counterfactual conditional, in the sense that it stands as cause to the immediate truthmaker, the dispositional property, as effect, it is not the state of affairs to which that statement refers.

There are two arguments which favour the view that dispositional states and the corresponding state of the microstructure are two distinct and causally related states rather than two descriptions of one and the same state. The first argument we may call 'the argument from ordinary usage'; while the second argument may be described as 'the epistemological argument'.

The argument from ordinary usage may be illustrated by contrasting a typical dispositional state such as an engine's having a certain horsepower with a state of the engine's microstructure such as the cubic capacity of its cylinders. It is true that quoting the engine's horsepower and quoting the cubic capacity of its cylinders are, for some purposes, alternative ways of indicating how powerful the engine is; but, as we ordinarily understand the matter, to say that an engine's cylinders have a certain cubic capacity is not to say the same thing about it as saying that is has a certain horsepower. It would seem more natural to say that the cubic capacity of the engine's cylinders is one amongst a number of features of the engine's microstructure on which the horsepower it regularly produces, or is capable of producing under standard conditions of operation, depends in a causal sense. And, as Hume has taught us, causal relations hold only between distinct existences. Hence, a dispositional property and its microstructural basis are two things, not one.

The epistemological argument consists in pointing out that the way we ascertain the state of the microstructure of a concrete particular is quite different from the way in which we determine the corresponding dispositional state. We ascertain the state of the microstructure of a concrete particular by taking it apart and examining its parts, where necessary and feasible, by means of a microscope. We determine the corresponding dispositional state by subjecting the concrete particular in question, or a specimen similar to it in all relevant respects, to an appropriate test. In such a test the conditions specified in the antecedent of the conditional are fulfilled, so that the consequence specified in the consequent can be compared with what actually happens. It is contended that this epistemological difference is unintelligible on the assumption that both procedures serve to ascertain the existence of the same state.

NOTES

1 Armstrong suggests that it is implausible rather than absurd.

2 G.Ryle, *The Concept of Mind*, London: Hutchinson, 1949, pp. 121–135.

3 An emergent property is simply a property of a whole which a mere collection of parts does not possess. An engine, for example, has a horsepower. A collection of parts which when assembled correctly form an engine does not.

4 J.Burnheim, 'Intentionality and materialism', unpublished paper presented to the Department of Philosophy, University of Sydney, c. 1969.

5 C.B.Martin and K.Pfeifer, 'Intentionality and the non-psychological'. *Philosophy and Phenomenological Research*, 1986, XLVI: 531–554.

6 This statement needs some qualification in the light of the distinction drawn by the late Professor William Kneale (*Proceedings of the Aristotelian Society, Supplementary Volume* XLII, 1968, 73–90) between Intentionality (spelt with a t), which is a property of extra-linguistic and, as it now turns out, dispositional states, and Intensionality (spelt with an s), which is a feature of sentence constituents (typically noun phrases and embedded sentences in the direct or indirect object argument place). Once this distinction is drawn, it becomes apparent that it is only intentionality (spelt with a t) that is the mark of the dispositional. Intensionality (spelt with an s) coincides with Frege's 'indirectly referring' and Quine's 'referentially opaque' expressions which arise when a phrase or sentence is used to quote what someone has said or might be expected to say. See U.T.Place, 'Intentionality as the mark of the dispositional', *Dialectica* 50, 1996, fasc.2.

7 D.Hume, *An Enquiry concerning Human Understanding*, Section VII, Part II, Paragraph 60.

8 J.L.Mackie, 'Counterfactuals and causal laws' in R.J.Butler (ed.) *Analytical Philosophy*, Oxford: Blackwell, 1962, pp. 66–80. and J.L.Mackie, *The Cement of the Universe*, London: OUP, 1974.

9 See D.M.Armstrong, *What is a Law of Nature?* Cambridge: Cambridge University Press, 1983 and *Universals: An Opinionated Introduction*, Boulder, Colorado: Westview Press, 1989.

10 Though this would not seem to be an issue between the participants in this debate, it is perhaps worth pointing out that universals in the category of substance, or 'second substances' as Aristotle calls them, are universals such as 'human being', 'tree' and 'pile of stones', kinds of entity whose instances are extended, within determinate limits, in three dimensions of space and one of time. Instances of these universals, Aristotle's 'primary substances', are the bearers of properties, whether these are thought of as property instances (tropes) or as property universals; but it is a mistake to suppose that predicates such as 'is a human being', 'is a tree' or 'is a pile of stones' stand for properties of the object of which they are predicated. Their function is rather to specify the substance universals under which those objects fall. They specify properties only in so far as there are properties which are essential to being a substance of that kind.

11 See A.C.Lloyd, *Form and Universal in Aristotle*, Liverpool: Cairns, 1981 and M.Frede and G.Patzig, *Aristoteles 'Metaphysik Z': Text, Überzetzung und Kommentar*, 2 Vols, München: Beck, 1988.

12 There are also features of features, where the features of which the former are features can be features either of situations or of concrete particulars. For example, syntactic relations within a sentence are relations between words; and words consist in certain formal properties of either an event (a vocal utterance) or a concrete particular (marks on paper). I have not listed features of features as a separate category, however, since things like words, sounds, shadows and rainbows are treated in language as if they were concrete particulars, and their features as if they were features of such particulars.

13 See W.Kneale and M.Kneale, *The Development of Logic*, Oxford: Clarendon Press, 1962, p. 196.

14 The timescale over which a universal can be said to exist in these two different senses is often very different. Assuming that current theories are correct, the universal 'quark' has had instances and has thus existed in sense 1 ever since the 'big bang'. But in sense 2, i.e. considered as a concept, it has existed for little more than thirty years at the time of writing.

15 L.Wittgenstein, 'Tractatus logico-philosophicus', *Annalen der Naturphilosophie*, 1921. As *Tractatus Logico-philosophicus* with second English translation by D.F.Pears and B.F.McGuiness, London: Routledge and Kegan Paul, 1961.

16 J.Barwise and J.Perry, *Situations and Attitudes*, Cambridge, MA: MIT Press, 1983.

17 G.Frege, *Begriffschrift*, 1879. English translation by P.T.Geach, in P.T. Geach and M.Black (eds) *Translations from the Philosophical Writings of Gottlob Frege*, Oxford: Blackwell, 1952.

18 G.Frege 'Über Sinn und Bedeutung', *Zeitschrift für Philosophie und philosophische Kritik*, 1892, 100:25–50. English translation as 'On sense and reference' by M.Black. In P.T.Geach and M.Black (eds) *Translations from the Philosophical Writings of Gottlob Frege*, Oxford: Blackwell, 2nd Edition, 1960.

19 *op. cit*. pp. 127–128.

3

PLACE'S AND ARMSTRONG'S VIEWS COMPARED AND CONTRASTED

D.M.Armstrong

SOME AGREEMENTS IN FUNDAMENTALS

Place and Armstrong have some fundamental agreements in ontology. Both accept the categories of

1 particulars;
2 features of these particulars which subdivide into properties and relations;
3 situations (which subdivide into events and states of affairs) 'whereby', as Place puts it, 'properties of or relations between two or more concrete particulars are located and extended in time'.

Armstrong would like to suggest that category 3—situations—be thought of as a *super-category,* involving the two categories of particulars and features. (Should property and relation be thought of as sub-categories because they are different sorts of features and features form a category?) Situations, or in Armstrong's terminology, states of affairs, are always and only a matter of a particular having a property or of two or more particulars standing in a relation. Armstrong suggests further that we have no good reason to postulate *bare* particulars—that is, particulars that lack properties—or to postulate properties and relations that float free of particulars, that are not features of particulars. Place may agree.

If these things are assumed, then it can be said that the world is a world of situations or states of affairs. Others have spoken of the world as a world of *facts* and have seemed to mean something very similar.[1] Place's attitude to this further thesis—the world as a world of states of affairs—

is not quite clear from his text. He might be read as saying that situations are located (in space, presumably) and extended in time. This reading would involve him recognising space and time or space-time as entities or an entity additional to his situations. Perhaps, however, he would accept Armstrong's suggestion that space-time is itself to be thought of as a huge situation or state of affairs, consisting of a conjunction of innumerable simpler situations.

Armstrong holds that we should be very cautious in deciding just what features—properties and relations—particulars have. In particular we should not take the fact that certain monadic predicates apply to a particular as an automatic guide to its properties, or the application of polyadic predicates as a guide to its relations. Rather, he holds, it is for total science to tell us just what are the true properties and relations of particulars.

For this reason, while very sympathetic to Place's version of the picture theory of the meaning of sentences, Armstrong would add a warning note. It must not be assumed that when monadic and polyadic predicates are applied *and truly applied* to particulars, the situations which make the application true—the truthmaking situations—always correspond to the form of the sentence in a perspicuous manner. Examples abound. The 'surface structure' of *Jack is a father* attributes a property, not a relation, to Jack. But the situation or situations that make it true that Jack is a father involve various relations to various other persons (mother or mothers, child or children). *The man is healthy, the food is healthy, the urine is healthy* are made true by situations of quite different sorts. In all these cases just mentioned mere conceptual analysis can reveal a complexity in the world that is not pictured in the sentence. But it is to be expected that empirical research also will reveal unexpected failures of picturing. For instance, we are now inclined to believe that simultaneity should be pictured by a three-place rather than a two-place predicate.

THE DISPUTE ABOUT UNIVERSALS

Place and Armstrong have an important disagreement about the nature of properties and relations. Place takes them to be particulars and so unrepeatable, Armstrong takes them to be repeatable and so universals. Less importantly, they also disagree on a point of scholarship: *contra* Place, Armstrong takes Aristotle to have accepted *in re* universals, and cites as authorities Gail Fine[2] and Martin Tweedale.[3]

The metaphysical dispute between Place and Armstrong can in some degree be finessed, provided Place is prepared to recognise an objective (that is, not mind-dependent) relation of exact resemblance holding

between features (properties and relations). Exact resemblance is a symmetrical, and, unlike inexact resemblance, transitive relation. It may also be said to be reflexive. As a result, equivalence classes of exactly resembling classes of particularised properties and particularised relations can be formed. The further consequence is that, in just those situations which an upholder of universals would analyse as a number of (ordinary) particulars each instantiating the *same* property (or a number of *n*-tuples each instantiating the *same* relation), the upholder of features as particulars can assert that the ordinary particulars each have an exactly resembling feature. He can even speak of these features as 'the same' feature, explaining as he does so that he uses 'the same' not strictly, but in what Bishop Butler spoke of as identity (sameness) 'in a loose and popular sense'.[4]

Of course, resemblance, even resemblance of mere features, is normally less than exact. With ordinary particulars—sticks, stones, storms— inexact resemblance and degree of resemblance are notoriously relative and sloppy affairs until 'respects' are introduced; but with respects one is coming, at least, close to features. The *inexact* resemblance of features, therefore, becomes a critical topic.

Upholders of universals are familiar with the fact that not only do particulars resemble more or less closely, but so also do universals themselves. Two identical twins resemble quite closely, but so do the colours crimson and scarlet. Properties and relations, it appears, fall into various dimensional orders of various sorts: the colours, the masses, the shapes, angular distances, etc. These orders are naturally seen as resemblance orders, with the 'nearer' universals along some particular dimension resembling the more closely the nearer they are. What is more, these orders appear, for the greatest part at least, to be objective orders, orders that the mind finds rather than constructs.

It turns out, however, that these orders among universals are equally available to those who, like Place, admit features (properties and relations) but take them to be particulars rather than universals, and who further put their trust in resemblance as an objective basis for sorting and classifying.

To see that this is so, consider two theorists, one a believer in universals, the other a denier of them, but who both accept the existence of properties and relations, *and who have further co-ordinated their views on what properties and relations are to be found in the world*. By such co-ordination is meant that:

- For each universal the realist accepts, the nominalist accepts a corresponding class of exactly resembling properties and relations.

For instance, suppose that a number of things in the world have a rest-mass of 1 kilogram exact. For the realist each thing will instantiate the one universal. For the nominalist, however, the same class of things, an equivalence class, will have no more than exactly resembling mass-properties.

- Suppose also that for each class of things with exactly resembling properties or relations that the nominalist accepts, the realist recognises instead a single universal, instantiated by each thing in the class.

These two conditions, let us say, constitute a 'co-ordination' of the realist's and the nominalist's view of properties and relations.

The realist's universals will be ordered in dimensional arrays, and 'distance' in such arrays appears to constitute a measure of resemblance (never *exact* resemblance in the case of universals). Co-ordinated with each universal will be the nominalist's equivalence classes of exactly resembling properties. Let the nominalist now form a new class by selecting just one (any one) member from each of his equivalence classes. His new class will exactly picture the class of all the universals. The universal *1 kilogram exact* he will picture by one of the particularised 1-kilogram-exact properties, and so for all other universals. And here finally is his pay-off. The particularised properties in his new class will resemble to exactly the same extent and degree that the universals resemble. In the resemblance of universals of hue, for instance, any determinate shade of orange lies between any shade of red and any shade of yellow in the resemblance order. Make these properties three particulars rather than three universals, and the same resemblance order holds.

How to *interpret* the resemblance of universals is something of a puzzle for the realist. There are a number of options, which will not be explored further here. But the nominalist can rather happily take the resemblance of properties and relations, and degrees of resemblance, as primitive—at least in the simple one-dimensional cases.

By embracing (particular) features, then, and appealing to what is obvious—the different degrees of resemblance between features—the nominalist can provide a quite attractive and objective basis for the sorting and classing of the ordinary things, ordinary particulars, that have the features. Sorting and classing can be 'tighter' or 'looser', depending upon the degree of resemblance involved, with exact similarity of feature giving the tightest classification of all (all the 1-kilogram mass features, say). There are, however, some disadvantages in such a scheme, disadvantages which, perhaps, tip the balance in favour of universals. Later in this chapter one such disadvantage will be mentioned. But it is submitted that the

nominalist scheme here sketched serves Place's interest rather better than the one he actually adumbrates. It is not, or is certainly not intended to be, a Greek gift!

Consider what Place himself says. He maintains that universals, in the only sense that he will admit them, are dispositions to classify

> on the basis of resemblances between concrete particulars, their features and the situations in which they are involved.
>
> (p. 26)

Concrete particulars are here said to resemble, features of concrete particulars are said to resemble, the situations in which concrete particulars are involved are also said to resemble. (By the last of these types of resemblance Place perhaps means the resemblance of relational features of the concrete particulars.) So there are at least two species of resemblance mentioned here: the resemblance of concrete particulars and the resemblance of features. How are they related? Is one sort of resemblance to be analysed in terms of the other, and, if so, which?

Place does go on to say that

> a relation of resemblance exists between one or more particulars in so far as they both possess what, when viewed in the light of the system of universals incorporated in human language, is the same property or set of properties, though, needless to say, each possesses a different instance of the property.
>
> (p. 26)

This formula of Place's would apparently not allow for resemblances unnoticed by any mind. But in any case, since these universals have just been said in the previous quotation to be abstracted on the basis of *resemblances* between concrete particulars, etc., this explanation of resemblance appears to be viciously circular.

Nominalists who wish to use the notion of resemblance in explaining why classing and sorting is not merely arbitrary, but really carves the beast of reality along at least some of its joints, must give an account of the nature and extent of objective resemblance.

ARE DISPOSITIONS IRREDUCIBLE?

To come now to the central issue in dispute between Place and Armstrong: should we, or should we not, postulate an irreducible distinction between

categorical and modal (dispositional) properties? Place urges 'that dispositional states and the corresponding state of the microstructure are two distinct and causally related states rather than two descriptions of one and the same state.' Consider a particular: let it be a certain brittle glass tumbler. The glass will have a certain microstructure —a certain arrangement of its molecules and so on—which, as we sometimes say, 'makes it brittle'.

Place's proposal, we may say, is to take that phrase 'makes it brittle' literally. The microstructure actually *causes* the glass to have the non-categorical property of brittleness; and since effects are distinct from their causes, the brittleness is a distinct property from the microstructural property of the glass. (It may be noted in passing that the possibility is left open that in other tokens of brittle things a different sort of microstructural property brings into existence the very same dispositional property of brittleness.)

Suppose now that the glass is suitably struck. This 'initiating cause', as we may call it, *plus* the microstructure of the glass, *plus* the brittleness of the glass, *plus* (perhaps) further attendant circumstances—the sort of environment in which the glass is set—bring about the shattering of the glass, or, as we may call it, the 'manifestation' of the disposition. The microstructure and the brittleness are here presented as different parts of the total cause, and this is not a very easy idea. Perhaps C.B.Martin's idea would be better: that we think of the microstructure and the disposition as two 'sides' of the one property, the categorical and the dispositional side.[5] Still better might be to think of the disposition as a (contingently attached) property of the microstructural property (one of the latter's powers). Both these emendations would seem to leave the centre of Place's position intact.

Going along with Place's analysis, however, it appears that brittleness being what it is—a disposition to shatter when suitably struck—the assembling of all the causal factors, that is

1 the initiating cause,
2 the microstructure,
3 the brittleness,
4 many required attendant circumstances,

taken all together, *logically necessitate* that

5 the manifestation occurs.

This seems a bit peculiar. Should an assemblage of causes, however complete, necessitate their effect? Is not the connection between cause and effect contingent?

It may be objected at this point that the laws of nature are not necessarily deterministic. Perhaps no assemblage of causal factors ever does anything except render a certain outcome probable, very probable in many cases, but in no case ineluctable. The probability of a particular outcome is always less than strictly one. The dispositional property will then be no more than a *propensity* and the assembled causal factors will not necessitate a certain effect.

With this point, however, there need be no quarrel because to answer it requires only a small qualification of the argument. The thing to notice is that it is of the *essence* of such a propensity that, in combination with the other categorical factors, it sets up a certain probability of the manifestation being brought about. This must be a logical probability, a probability that, as it were, logically reaches across from the cause to probabilify a certain outcome to a certain degree. If anything, this is a more mysterious connection than a simple necessary connection.

By contrast, what Armstrong wishes to maintain is that the initiating cause, the microstructure and perhaps environmental factors are the only causes operating and that they are purely categorical. It is these factors alone that bring about, or merely probabilify, the manifestation. What then is the disposition, the brittleness? It is the 'categorical base', the microstructure, but it is this property of the object picked out not *via* its intrinsic nature, but rather *via* its causal role in bringing about the manifestation. Picked out in this way, it is that standing condition of the glass which, in conjunction with the initial cause, the striking, *plus*, perhaps, particular relations of the glass to its environment, brings or tends to bring about the shattering.

It is to be noticed that the identification of the standing condition with a certain microstructural property of the glass is a 'contingent identification'. It is not like the *a posteriori* identification of the heat of a substance with the motion of its molecules, an 'identity of property constitution' where, Armstrong agrees with Kripke,[6] the identity is necessary. A good model for the identity of brittleness with a certain microstructure of the brittle thing is the identity of genes with (sections of) DNA molecules. Genes are, by definition, those entities which play the primary causal role in the transmission and reproduction of hereditary characteristics. At least in some possible world whose laws of nature differ from the actual world, something other than DNA might have played the causal role of genes. But in fact sections of DNA play that role. So genes are (are identical with) sections of DNA.

In the same way, other microstructures might have played the brittleness causal role in the glass, at least in a world whose laws of nature differ from the actual world. But it is a contingent truth that in this glass the brittleness causal role is played by this microstructure, i.e. that the brittleness of this glass is (is identical with) this microstructure.

It may now be seen that it is rather easy for this scheme of analysis to answer Place's *argument from ordinary usage* and his *epistemological argument.*

In the first case, Place argues that

> In ordinary usage, to say that an engine's cylinders have a certain cubic capacity [microstructure or equivalent, DMA] is not to say the same thing about it as saying that it has a certain horsepower [disposition or capacity, DMA].
>
> (p. 30)

Of course it is not 'saying the same thing'; but for all Place has shown, what is said refers in both cases to the very same feature of the engine. In one case it specifies the feature in an intrinsic way—cylinders of a certain cubic capacity—in the others it specifies that very feature in a more abstract way, in terms of causal role, in particular in terms of the output those cylinders have when the machine operates.

In the second case, according to Place,

> On the epistemological argument, the way we ascertain the state of the microstructure of a concrete particular is quite different from the way in which we determine the corresponding dispositional state.
>
> (p. 30)

Again, Place's premiss is granted, but I deny that his conclusion follows. He has not ruled out the (epistemic) possibility that here we have two different 'routes of access' to one and the same property. In the first case we gain some access to the intrinsic structure of a property—how constituent molecules are aligned and so on. In the second case we gain access to something which, in Armstrong's view, pertains to the property but is nevertheless extrinsic to the property in its own nature—how things having that property are caused to behave as a result of having that property. We could say that in the second case we get some access to the place of this property in the nomic net of all properties. That place may be said to be a 'property' of the property, but I deny that it is essential to the property.

So much for Place's two arguments. But we must pause to note a very important objection to what has been said so far by Armstrong. It was argued that the brittleness of glass is nothing but a microstructure of the

glass, but where the microstructure is picked out semantically—not by microstructural detail, but rather by the key causal role that the structure plays in the causal sequence: striking causing shattering. But, of course, for many brittle things this sequence may never occur. The microstructure bestows only a potentiality to shatter, and the glass has that potentiality whether struck or unstruck. It is this that prompts Place and others to postulate dispositions, powers, propensities and capacities as extra properties, or extra facets of categorical properties. These ontological extras serve as truthmakers for such counterfactuals as 'if it had been hit then [as it was not], it would have shattered'. Many philosophers have thought that such non-categorical properties are required in order to do ontological justice to the unfulfilled threats and promises of the world.

What Armstrong has to do therefore is to make plausible the idea that categorical properties by themselves will provide adequate truthmakers for the counterfactuals associated with dispositions, capacities and, more generally, with all active and passive powers. What follows is an attempt to meet this challenge.

Consider a brittle glass that is not struck. All the enabling conditions—microstructure, etc. —for shattering are present, except for the initiating cause, the striking. Make the false supposition that the glass is struck. Given that false premiss, given the other enabling conditions, *and given the relevant laws of nature in our world*, then it *follows* that the glass shatters (deterministic laws) or has a certain high probability of shattering (irreducibly probabilistic laws). Putting the matter in the fashionable possible worlds style, in the worlds that most closely resemble our world, except for the fact that, unlike our world, the glass is actually struck, the glass shatters or has a high probability of shattering. (It is not very clear how a mere high probability would be handled in a possible world's semantics.)

So the suggested candidate for the truthmaker for a true attribution of brittleness to an unstruck glass is the glass with a certain microstructure, with (perhaps) certain relations to its environment, *plus the relevant laws of nature*. There is no call for non-categorical properties. Notice that the laws are not causal factors. The causal factors, real and feigned, bring about the manifestation *in accordance with* the relevant laws, and not with the addition of the laws.

LAWS OF NATURE

It is obvious that this treatment of dispositions places great weight on the notion of a law of nature. It is important to realise therefore that there is a

deep crisis in current philosophical thinking about laws, a crisis that must now be explained.

Our concern, I re-emphasise, is not with *law-statements:* 'It is a law that all *Fs* are *Gs*'. It is rather with the truthmakers for true law statements, whatever these truthmakers are. To the extent that analytic philosophers have engaged with this ontological issue they have, by and large, come up with little more than regularities, either uniformities or statistical only, in the behaviour of things. Cause and law are not the same thing, even if intertwined in their nature; but the influence of the regularity theory of causation is evident here.

In earlier work[7] Armstrong brought together a great many criticisms of the regularity analysis of laws, including various sophistications of this analysis that have been attempted. Here four rather central difficulties will be mentioned.

1 *Nomic* versus *accidental uniformities*. There is a well-known difficulty in distinguishing regularities that flow out of laws from mere accidental regularities. A stock, and good, example is the following comparison. That every spherical mass of pure uranium 235 is less than a mile in diameter is certainly a law-like state of affairs, because such a sphere far exceeds the point of critical mass which involves explosion and dispersal. That every spherical mass of pure gold is less than a mile in diameter is a uniformity but, as comparison with the uranium case shows, it is not law-like. So how can a law be a mere uniformity? Armstrong takes this problem to be the *central* difficulty for 'regularity' theories of laws.
2 *Counterfactuals.* A quite closely connected point, and one directly germane to the topic of dispositions, is this. Laws do, but mere regularities do not, 'support counterfactuals'. That all glasses with a certain microstructure shatter when struck, a truth which appears to be law-like, ensures that if such a glass had been struck, although it was not, it would have shattered. It may be that, at a certain time and place, all of those present are wearing a wrist-watch. It is likely, though, that this is a mere uniformity. If so, there will be no particular reason to think that if person *P* had been present, although he was not, he would have been wearing a wrist-watch. What differentiates the uniformity that supports counterfactuals from the uniformity that does not? Why can we extrapolate in one case and not in the other? The restriction to particular times and places that is found in the wristwatch case does not seem, by itself, to provide any explanation for the difference. Recognising the problem for a regularity theory of law, John Mackie[8]

gave an ingenious solution. He said that where we do extrapolate beyond actual to merely possible cases, we are in our imagination making an *inductive* extrapolation from the given cases. Given, say, that in our experience *Fs* are always *Gs*, we extrapolate in just those cases where, if the imagined new instance of *F* were a real one, we would expect it to be a *G* on inductive grounds. The main trouble with this move, as Mackie himself points out, is that, as a defence of the regularity theory, it depends upon the assumption that induction is a rational procedure, *even when combined with a regularity theory of law*. I believe, however, that Hume has given us good reason to think that if all observed *Fs* are Gs, but one is not allowed on this basis to make any assumption of further connection between the properties of *being an F* and *being a G*, then one can have no good reason to believe that unobserved *Fs* are Gs.

3 *Induction*. So we are led to a third great difficulty for a regularity theory of laws of nature: that it makes induction an irrational procedure.

4 *Probabilistic laws*. The final difficulty I will mention for a regularity theory of law is the problem of giving an account of irreducibly probabilistic laws. This is important because it seems quite likely, given our present evidence and perspectives, that the fundamental laws of the world are irreducibly probabilistic. The difficulty is this. Given independence of chances, a particular probabilistic law linking *F* and G (say, bombardment of an atom causing detachment of a particle) does not *mandate* any distribution of instances between *Fs* that are Gs and Fs that are not Gs. It merely makes some distributions indefinitely more improbable than others. Contrariwise, any such distribution of instances is logically compatible with any merely probabilistic law linking Fs with Gs. This strongly suggests that, although the actual distribution is the *manifestation* of the law, it is not identical with the law.

These difficulties in the regularity account of laws persuade Armstrong to move to what seems a much more natural view: that laws are connections of properties, or, alternatively but apparently equivalently, connections between *types* of states of affairs. These connections are not constituted by, but issue in, regularities of various sorts. These properties are universals: the vital importance of this will emerge.

As already indicated, Armstrong holds that all (genuine) properties are instantiated properties, instantiated at some time. The postulated connection of properties, though contingent, is equally to be thought of as categorical. Laws are categorical states of affairs—higher-order states of affairs—linking properties (state of affairs types) directly and issuing

in regularities involving the particulars which have the properties. Indeed, positive instances falling under the law (Fs that are Gs, as opposed to the Fs that are not Gs) instantiate not only the universals F and G, but instantiate also the connection between F and G. On this scheme, furthermore, the law has no existence except as it is thus instantiated in instances. (Which implies that, strictly speaking, there are no laws uninstantiated at any time, although some truthmakers for statements of an 'uninstantiated law' can be provided.[9])

Let us now apply such a scheme to the case where a brittle glass is struck, and as a result shatters. The striking of the as yet unbroken glass may then be thought of as the instantiation of a very complex universal which, because there is a certain forward linking of universals, brings forth the glass in a shattered state.

It will now be indicated, first, how natural this account of laws of nature is; second, how easily it dissolves the four classical difficulties for the regularity theory of law; and, third, how to mollify those many contemporary philosophers who think that the suggested link between properties and the issuing of this link in regularities is utterly mysterious.

The *initial* naturalness and attractiveness of the idea should not be in dispute. Consider Boyle's law: $PV=RT$. (Assume, what is false, that it is a genuine law.) It is surely natural to think of the law as correlating, and asserting a connection between, three properties of a gas sample: its pressure, volume and temperature. It is then natural to say that it is a *consequence* (logical consequence, not effect) of this contingent connection between properties that in any sample of gas the three values for that sample connect according to the law. But the fact that this consequence, this universally quantified proposition, is true is not naturally thought of as the law itself.

We pass on to consider the problems that have been indicated for the regularity view and how this alternative view can solve them.

1 The distinction between a regularity that issues from a law and one that is a mere regularity is immediately perspicuous. There is nothing in the properties involved in being gold that ensures that spheres of gold have a certain limited size. Whereas the properties of uranium 235 are such as to ensure (or render enormously probable) that spheres of this element which have reached critical mass will disintegrate violently. (Notice that since Place does not accept universals, this account of the distinction between the two sorts of regularity is unavailable to him. What account can he give?)

2 From the point of view of the debate about dispositions the problem that counterfactuals poses for the regularity theorist is even more interesting. The point to be noticed here is one that has been made by Michael Tooley. He has emphasised that if the law is, ontologically, a connection of properties, then it constitutes an *atomic* (though, of course, higher-order) fact or state of affairs. This contrasts with the ontology of a law as conceived by a regularity theorist. For the latter it is necessarily a *molecular* state of affairs: this *F* is a *G* and that *F* is a *G*…. and *Fn* is a *G*. The point may be put by saying that for the relation-between-universals view the law does not in any way change if the number of its positive instantiations is increased or decreased. Contrast this with the regularity account. The molecular state of affairs that is the law will expand or contract according as the set of positive instances falling under the law expands or contracts. To apply this point to counterfactuals and dispositions consider the unstruck glass that is nevertheless brittle. 'If it had been struck, it would have shattered.' That is to say, we think that the law would have applied. But what is our justification for extending the law to this new case? For the connection-of-universals view there is no problem: the law is unchanged. But, for the regularity view, the truthmaker has to expand to include the new contemplated case. The question has to arise, then, what the justification is for expanding the law in this way. This is the problem that Mackie, to his great credit, saw and tried to deal with, unsuccessfully it was argued, while assuming the truth of the regularity theory. It must now be noted that because Place is a nominalist, meaning by 'nominalist' a denier of universals, he seems forced to defend a version of the regularity theory. For him the 'universal' F is a class of F-features, features which resemble each other (perhaps even exactly), but which are in no way identical. He must give the same account of the universal *G*. So what is the law, ontologically considered? Feature F_1 is accompanied by, is copresent with, feature G_1, F_2 by G_2, and so on for each F-property. What alternative is there? But now, in the case of the brittle but unstruck glass, say, he contemplates a new, a further, $F(F_0)$. Why should he think that the thing that is supposed to have F_0 as a property will also have G_0 as a property?

3 We may pass on to the question of the rationality of induction. It was asserted that it is not possible for an upholder of a regularity theory of law to hold that induction is a rational procedure. In the case of a relations of universals view, however, the situation changes in a hopeful way. The connection between universals may be thought of as something postulated which, if true, genuinely *explains* observed

regularities and makes predictions about unobserved instances. The explanation explains by unifying the phenomena, that is the regularities, by subsuming them under an atomic connection of properties. Induction thus becomes a species of abduction, an inference to what is hidden that explains what is observed. The rationality of abduction is not explained, of course; but it appears to be a more natural form of non-deductive inference than 'straight run' induction. And an important and promising simplification of scientific principle is involved when 'straight run' inferences are explained abductively. An explanatory advance has been made in the theory of explanation. However, those who, like Place, deny the reality of universals cannot take advantage of this line of thought.

4 We may note finally that, although probabilistic laws are very puzzling affairs on anybody's view, it seems possible that connections of properties should come in various strengths, so that something's being an *F* gives it no more than a certain chance of being a *G*. Deterministic laws, if there are any, may then be identified with a simple limiting case, where the probability of an *F* being a G is strictly 1. What is the situation of one who accepts properties, but takes them to be particulars, with respect to probability laws? Not too bad, perhaps. Laws will still have to be regularities involving classes of resembling features; but what each *F* feature (property) bestows on the object that has *F* could be an objective single-case propensity to acquire a *G* feature. Place is stuck with single-case dispositions in any case. It does not create much extra trouble to make these dispositions probabilistic in some or all cases.

This section on laws of nature may be concluded by trying briefly to show that neither the connections between property-universals, nor the connections between these connections and the regularities of ordinary things which they issue in, are as mysterious as is often alleged by Humean opponents. It is conceded that the connections between properties, though real, are theoretical entities which have to be postulated. But once postulated they explain the corresponding regularities, and their mode of connection with the regularities is actually quite perspicuous. In particular, the mode of connection does not, as is sometimes alleged, involve any mysterious necessary connection between *distinct* existences.

Consider the following case. On the basis of observed regularities, we come to the view that ingestion of a quantity of cyanide causes immediate death to any person who has ingested it. Here we appear to have a causal relation between types of states of affairs, that is, between properties.

One type brings about a further type. The ingestion-of-cyanide state of affairs causes the sudden-death state of affairs. Why should we not take this to be as it seems to be: a causal connection of types, of properties? That is how we think about it outside philosophy.

Contemporary philosophy, of course, hastens to reconstrue this as no more than the truth of a universally quantified proposition: *Each person who ingests cyanide, dies*. Someone who upholds Singularist theories of causation may construe this proposition by allowing that each ingestion of cyanide *causes* that person to die, and, indeed, I think this is the truth. But it is not the whole truth. The statement itself, on the surface, asserts a causal connection of universal properties from which singular causal statements analytically follow. It is proposed here that this surface reflects the depth!

It is easy to see then that if the connection holds at the level of universals, then, automatically, the regularity is entailed. I do not think that the entailment can be captured formally. Rather, it is, to use Carnap's phrase, a fairly obvious 'meaning postulate'. The connection of properties that are universals expresses itself, without exhausting itself, in a corresponding regularity. Just as a state of affairs of *a*'s being *F* entails the existence of *a* and *F*, without being exhausted by the existence of the constituents, so the postulated higher-order connection of universals entails the existence of regularities (which may be statistical only, or conditional upon the absence of extra interfering factors, etc), but is not exhausted by the regularities.

I repeat something already said. The connection of properties which, on this view, constitutes a law has no existence except in those cases where the law is *positively* instantiated. Indeed, it seems right to think of the connections of universals, instantiated in particular instances, as themselves universals. If this is right, the law is complete in each instance, just like any other universal.

NOTES

1 Cf. Wittgenstein, *Tractacus Logico-philosophicus*, London: Routledge and Kegan Paul, 1961 and B.Skyrms 'Tractarian nominalism', *Philosophical Studies*, 40 [Reprinted as an appendix in D.M.Armstrong, *A Combinatorial Theory of Possibility*, Cambridge: Cambridge University Press, 1989].

2 G.Fine, 'The one over many', *The Philosophical Review*, 1980, *LXXXIX:* 197–240.

3 M.Tweedale, 'Aristotle's universals', *Australasian Journal of Philosophy*, 1987, 65:412–426.

4 See D.M.Armstrong, *Universals: An Opinionated Introduction*, Boulder, CO: Westview Press, 1989 Chapters 1 and 6 especially.

5 See C.B.Martin, 'Anti-realism and the world's undoing', *Pacific Philosophical Quarterly*, 1984.
6 S.Kripke 'Naming and necessity' in G.Harman and D.Davidson (eds) *Semantics of Natural Language*, Dordrecht: Reidel, 1972. Reprinted as *Naming and Necessity*, Oxford: Blackwell, 1980.
7 D.M.Armstrong, *What is a Law of Nature?*, Cambridge: Cambridge University Press, 1983.
8 J.L.Mackie, 'Counterfactuals and causal laws' in R.J.Butler (ed.) *Analytical Philosophy*, Oxford: Blackwell, 1962, pp. 66–80.
9 See Armstrong 1983 *op. cit.*, Chapters 7 and 8.

4

A CONCEPTUALIST ONTOLOGY

U.T.Place

THE ONTOLOGICAL IMPORT OF THE PICTURE THEORY OF MEANING

In evaluating the measure of agreement between his own position and Place's, Armstrong states that

> While very sympathetic to Place's version of the picture theory of the meaning of sentences, Armstrong would…add a warning note. It must not be assumed that when monadic and polyadic predicates are applied *and truly applied* to particulars, the situations which made the application true—the truthmaking situations —always correspond to the form of the sentence in a perspicuous manner. (p. 34)

He then proceeds to illustrate this point by means of the examples *Jack is a father,* where he claims that the predicate 'is a father' looks like a property rather than what it actually is—a relation, *the man is healthy, the food is healthy, and the urine is healthy,* which 'are made true by situations of quite different sorts', and the evidence of relativity theory which forces us to conclude that 'simultaneity should be pictured as a three-place rather than a two-place predicate'.

Now, although Armstrong does not attribute this view to him, it is worth emphasising that Place is not committed to the view that there is always, or even typically, a simple and invariant mapping between types of syntactic unit and the types of entity, feature or situation they depict. That this cannot be part of Place's view is evident from the fact that the conceptualism to which he is committed involves denying the existence of abstract objects. According to this view the belief in abstract objects is a result of the practice of nominalising an expression whose natural occurrence within simple sentences is as or within a predicate expression, in order to be able to put the expression into an argument place (usually

the subject argument place). Thus instead of saying *The glass is brittle* we can say *Brittleness is a property of the glass*. This device enables the speaker to focus on the predicate and what it stands for, instead of *using* it, as in the first case, simply to say something *about* something else, in this case the glass. Unfortunately argument places, particularly the subject position, have a double function. One is the function of bringing something into the focus of discussion. The other is the function, which it has in cases like *The glass is brittle* or *The cat is on the mat*, of indicating that what is being mentioned by this part of the sentence is an object (in the sense of a physical substance or concrete spatially extended and bounded particular). Clearly 'brittleness' is not an object in this sense. So we are tempted by the use of the noun form occupying the subject position in the sentence to suppose that what we have here is another kind of object, an abstract object.

A similar argument applies in the case of intentional objects or 'referentially opaque contexts', as Quine calls them. In this case a linguistic expression occupying the direct-object argument place, as in the case of the noun phrase 'an apple' in the sentence *I would like an apple, if there is one*, is used, not to refer to any actual object as the form of the sentence might suggest, but to specify a range of possible objects any one of which would satisfy the speaker's desire. Here again we are tempted by superficial grammar to follow Meinong in postulating an *Außersein* inhabited by these 'inexistent' intentional objects. Needless to say, it is a similar thought process which has led philosophers to propose the ontology of possible worlds in order to accommodate another grammatical device, very germane to the present discussion, the counterfactual conditional.

These, however, are all examples of cases where the 'surface structure' of language tempts us to add entities to our ontology *praeter necessitatem*. I am not at all convinced by Armstrong's contention that we are in a similar danger of adding redundant features—properties and relations—to our ontology on the basis of the surface structure of predicate expressions when playing their normal role as the function around which the sentence revolves. I agree that the surface structure of predicate expressions can sometimes be misleading in that speakers and writers frequently omit one or more argument places in the case of a multi-place (relational) predicate. In the case of a two-place predicate, omitting one of the two argument places has the effect of giving the predicate a monadic surface structure typical of expressions which ascribe properties rather than relations. This is well illustrated by Armstrong's first example *Jack is a father*. Here the surface structure of the sentence makes 'is a father' a monadic predicate, whereas the fact that no one can be a father, unless

there exists at least one other individual to whom that person stands in the relation of father to child shows that being a father is really a relation.

Armstrong's second example seems less suited to the point that he intends. *The man is healthy, The food is healthy* and *The urine is healthy* are examples, not of differences in the surface structure/deep structure relation, but of two different senses of the word 'healthy'. In *The man is healthy* and *The urine is healthy,* 'healthy' means 'free from disease'; whereas in *The food is healthy* it means 'having a disposition to protect the consumer of it from illness'.

The only example that Armstrong gives which supports his claim that 'it is for total science to tell us just what are the true properties and relations of particulars'—is his third example. This is the example of simultaneity, where he claims that physics teaches us that what we might have thought was a straightforward two-term relation between events is in fact a three-term relation involving the point of view of an observer. However, I am not at all sure how apt this example is for his purpose. For it is arguable that the three-term simultaneity of relativity theory is *apparent* simultaneity as viewed from a particular standpoint, not *real* simultaneity which is absolute and two-term. Of course, the point that relativity theory is making is that when events are separated from one another by distances on the astronomical scale, this notion of absolute simultaneity is of no conceivable scientific interest. For our only interest in the simultaneity of events derives from our interest in questions such as

> Are these two observations of one event or of two discrete events?

or

> How are these two events causally related to one another?

Neither of these questions could conceivably arise with respect to two widely separated, but absolutely simultaneous events. For if two events are widely separated in space, the possibility of this being one and the same event hardly arises. But since nothing travels faster than light and light nevertheless takes a finite time to travel from one point in space to another, it follows that if two events are widely separated and simultaneous in the absolute sense, there can be no possible causal influence of the one event on the other.

Nevertheless, despite some deficiencies in the examples he uses to illustrate the point, Armstrong's contention that the 'surface structure' of a sentence does not always correspond in any simple way to the reality which it depicts is clearly correct. But if that is agreed, we are confronted with what is arguably the most fundamental problem in the methodology

of ontology, namely, the problem of how to decide which parts of the structure of a sentence correspond straightforwardly to objects and features of reality and which do not. The only answer I can suggest to that problem is that in deciding such questions we should be guided by three principles:

- the principle of choosing those ontological assumptions which make best sense of the human ability to construct and construe novel sentences in natural language,
- the principle whereby the child will begin by construing and constructing sentences in which there is a one-to-one correspondence between lexical items and some aspect of the extra-linguistic environment, and will only begin to use more devious and sophisticated forms of expression, such as nominalisation or referentially opaque expressions, at a later stage in its linguistic development,
- the principle of ontological parsimony (Ockham's razor).

I am reluctant to add to these Armstrong's principle, as stated above, which would require us to add to or subtract from our ontology in order to accommodate varieties of existent postulated within scientific theory. This reluctance is grounded in the belief that the source of the philosopher's claim to authority in matters of ontology derives from an understanding of the process whereby linguistic utterances acquire the dispositional property of depicting a reality beyond themselves. Since human beings developed their languages in the first place in order to describe their physical and social environment at the scale dictated by the sensitivity of their sense organs, we should not be surprised if scientific investigations of phenomena at scales very different from that of common-sense observation should lead us to postulate existents which do not fit conveniently into the categories of common sense—things like curved space, or light which from one standpoint consists of particles and from another of a series of waves, waves, moreover, which are unlike sound waves or the ripples on water in that there is no medium corresponding to the atmosphere or the surface of water which is being perturbed in this way. But what experience tells us, I suggest, is not that, in order to accommodate such cases, we need to add new categories of existent to our ontology or abandon old ones. It is rather that in these areas we have passed beyond the proper scope of natural language into a domain where only the language of mathematics has literal application. For a conceptualist this conclusion is no embarrassment. It simply emphasises the mind-dependent character and consequent limitations of our conceptual scheme. It confirms the view that it is a mistake to do as Armstrong proposes we should: namely, to project that conceptual scheme onto reality

by postulating universals and laws of nature as something more than convenient ways of classifying particulars and characterising the way particular relations between particular situations resemble one another.

CONCRETE PARTICULARS, FEATURES AND SITUATIONS

It is gratifying to learn that despite differences over the ontological status of universals and laws of nature there is a considerable agreement between us over the basic ontological categories that need to be recognised. Place would perhaps accept Armstrong's claim that situations or, as he prefers to say, 'states of affairs' constitute 'a super-category' in the sense that situations include features and features include concrete particulars. Concrete particulars do not exactly include the features which they 'bear'; nor do features include the situations which are constituted by something's possessing them. Nevertheless Place would prefer to emphasise the interdependence of these three categories. Like Armstrong he rejects 'bare' or propertyless particulars. He also rejects 'bare' features, i.e. properties and relations which are borne by something without thereby existing, coming into existence or ceasing to exist and thus constituting a state of affairs or event. But so does Armstrong.

Where the two views begin to part company is over the issue of 'atomic situations' or 'atomic facts', to use Russell's[1] term. Place accepts that sentences map onto situations and that there are such things as 'atomic sentences' of the 'cat on the mat' variety two or more of which can be linked together by the relations of conjunction, disjunction or implication to form compound sentences which are not themselves susceptible to analysis into a conjunction, disjunction or implication between sentences at a more fundamental level. What he is reluctant to accept is that there is a corresponding distinction to be drawn between 'atomic' and 'compound' situations or facts. This way of talking seems justifiable if you consider a conjunction *The cat is on the mat and eating its dinner*. Here we do seem to have a compound of two distinct situations, the cat on the mat and the cat eating its dinner. But, in the case of a disjunction or implication, it seems very odd to say that the situation whereby it is true is a compound of the two situations mentioned in the compound sentence. Do we really want to say that the situation which makes true the sentence *Either the cat is on the mat in the kitchen or it is on the bed upstairs* is a compound of the situation specified in *The cat is on the mat in the kitchen* and that specified by *The cat is on the bed upstairs!* Surely not. What makes the compound sentence true

is whichever of the two situations specified by the two constituent atomic sentences happens to exist. Here again there is no disagreement between the two views.

Another set of considerations which also incline Place to resist the temptation to talk of discrete atomic situations are those derived from Elizabeth Anscombe's observation[2] where she points out that a past action, where an action is a species of event and, hence, a species of situation, can be characterised by reference to any of its consequences however remote they may be both in time from the agent's actual contribution and in conception from his or her intention in so doing. This is not just a matter of alternative ways of characterising exactly the same situation, an agent's contribution to a particular chain of events. It may well be that what counts as the agent's contribution will change according to the consequence by reference to which the action is described. Take, for example, the case of someone who kills someone else by shooting them. It may happen that the victim is killed outright by the first shot. In this case the agent's contribution ends with the pulling of the trigger. After that events simply take their inevitable course. But suppose that the victim is only wounded by the first shot and the range is short enough for the agent to see what the consequences of the first shot have been. In this case the agent has a choice between

1 attempting to reverse the consequences of his or her initial act by trying to stem the flow of blood from the wound,
2 leaving the victim to die or not as the case may be,
3 finishing the victim off by firing further shots into the body at close range.

Here agency with respect to the eventual death of the victim extends no further than the initial pressing of the trigger, if course 1 is selected. It extends up to the point where the agent no longer has the option of trying to prevent the sequence of events from taking this course, if course 2 is selected. It extends up to the moment when the final shot has been fired, if course 3 is selected, even if it is the case that the victim would have died anyway as a consequence of the first shot.

For these reasons Place would be uncomfortable with the claim 'that the world is a world of situations or states of affairs', if that is taken to imply that there is one uniquely correct way of carving up the world into situations. He is equally resistant to Armstrong's suggestion that, holding as he does that situations are spatially and temporarily located, he is committed to

> recognizing space and time or space-time as entities or an entity additional to his situations.
>
> (pp. 33–4)

Nor can he accept

> Armstrong's suggestion that space-time is itself to be thought of as a huge situation or state of affairs consisting of a conjunction of innumerable simpler situations.
>
> (pp. 34)

So conceived, space, time and space-time are abstract objects whose existence Place denies, regarding them as linguistic fictions generated by the process of nominalising predicates. All that exists on this view are particular spatial relations between and within concrete particulars and particular temporal relations between and within particular situations. 'Space' and 'time' are shorthand for classes of relations, spatial relations, temporal relations and spatio-temporal relations. Spatial relations are relations which hold between concrete particulars. Such particulars occupy particular volumes of space defined by the relation of those volumes to the volumes occupied by other such particulars, at a particular moment or over a particular stretch of time.

Temporal relations, on the other hand, are relations which hold, not between concrete particulars, but between situations. Processes and states of affairs are temporally extended between the instantaneous events constituted by their beginning and their end. But whereas concrete particulars are located and extended both spatially and temporally, situations are not, strictly speaking, located or extended in space, as is shown by the example of the telephone conversation between someone in the United Kingdom and someone in Australia which is not located in either country. Nor can it be intelligibly thought of as extended along the telephone lines or satellite link between the two. What *are* spatially located are the concrete particulars involved, the two speakers and the telephone equipment employed in transmitting the voice sounds they are making from one place to the other. There are, of course, events such as battles which have a spatial location and extension which is not dissimilar from that of a concrete particular such as the town or village from which it derives its name. But even in this case the location and extension of the event is entirely parasitical on the location of the individual participants during their interaction. This is true even where, as in the case of a sporting event, the location is narrowly constrained by the fixture list and the rules of the game.

THE DISPUTE ABOUT UNIVERSALS

Repeatedly in the previous chapter Armstrong accuses Place of holding a nominalist view of universals. It is true that the conceptualist theory of universals entails rejecting the Platonic view that universals are independently existing abstract objects. Conceptualism, however, differs from nominalism in that it does not, as Armstrong claims, deny the existence of universals. On this view to say that a universal or kind of thing exists is to say that there are instances of that kind. If, as in the case of witches, centaurs or dragons, a universal has no instances and never had, we can say that the universal exists, but only in the sense that some human beings have a disposition to assign instances to those categories, but, as it turns out, no instances which genuinely satisfy the criteria for that assignment are to be found. What is denied is that there is any other sense besides these two in which universals can intelligibly be said to exist.

In defending his view that there *is* some further and stronger sense in which universals exist, Armstrong would not want to deny the conceptualist claim that universals which have no instances exist only as constructions of the mind. The universals which for him exist *in re* only do so in those cases where the universal has instances. Despite Armstrong's two-volume exposition of the matter,[3] Place is not persuaded of the need to postulate the existence of a universal as an entity distinct both from its instances and from the human disposition to classify things in that way, but which as the very same individual somehow inhabits all its instances and would not exist if they did not. Here, surely, is a prime candidate for ontological excision in accordance with Ockham's razor.

From the arguments he deploys in defence of his view, it would appear that Armstrong is not claiming the existence of a universal as an entity distinct from its instances in the case of what Aristotle called Second Substances, i.e. kinds of concrete particulars or substances. For him it is only features, i.e. properties and relations, which exist as universals distinct from their instances. What is claimed is that in a case where two objects exactly resemble one another—where, for example, they are both painted exactly the same shade of red—they both partake in one and the same universal which is present in all past and present objects anywhere in the universe which are painted exactly that shade of red. Stated in this way, the doctrine appears somewhat implausible. However, when presented as a conclusion of an argument which has been around since its first recorded formulation by Plato,[4] it is not easily resisted. The argument runs as follows:

1 We recognise things as instances of a kind because they resemble one another.
2 If two things resemble one another they resemble one another in some respect Therefore
3 Different kinds of things resemble one another in different respects But
4 If two things resemble one another in some respect, they share one or more properties in common.
5 If two things share a property in common, that very same property exists in both of them. Therefore
6 Instances of the same kind of thing share a common property or set of properties, such that the very same (universal) property exists in all of them.

This argument can be resisted, I believe, by employing the same strategy as that outlined at the beginning of this section, that is to say, by considering what we mean when we say that a kind of thing exists. If all we mean when we say that the same property exists in all instances of a kind is that all instances of that kind are instances of the kind 'bearers of a certain property', we are saying no more than that possessing that property is our criterion for assigning instances to that kind. To say that a substance possesses a given property is to say that that property-kind has an instance. Consequently to say that all instances of a kind of substance possess a particular property is to say no more than that that property-kind also has instances, and that whatever is an instance of that kind of substance is also an instance of the kind 'bearer of that property'.

THE ROLE OF DISPOSITIONS IN CAUSATION

In criticising Place's contention that a modal or dispositional property, such as brittleness, depends causally on, and is therefore not identical with, an underlying state of the microstructure of the entity possessing that property, Armstrong claims that that commits Place to the view that when

> the glass is suitably struck…this initiating cause…plus the microstructure of the glass, *plus* the brittleness of the glass, *plus* (perhaps) further attendant circumstances…bring about the shattering of the glass.
>
> (p. 38)

This formulation is a serious misrepresentation of Place's view. On that view 'the state of the microstructure' is shorthand for a multiplicity of causal

factors which combine to bring it about that the glass has the particular degree of brittleness that it does have, just as the cubic capacity of the cylinders, the ignition timing, the compression ratio, the length of the stroke, the presence or absence of a supercharger, etc., combine to determine the horsepower produced by an internal combustion engine. The state of the microstructure in this sense is the cause, not of the glass's breaking, but of its brittleness. It is the brittleness, not the state of the microstructure which is a part cause of the glass's eventually shattering as and when it did. Of course we can say that the state of the microstructure *indirectly* determines the glass's shattering by giving it that particular degree of brittleness. But to say that the shattering is caused by the striking *plus* the brittleness *plus* the state of the microstructure is grossly misleading.

Armstrong then proceeds to suggest that Place is somehow committed to the view that

1 the initiating cause,
2 the microstructure,
3 the brittleness,
4 any required attendant circumstances,

taken all together, *logically necessitate* that

5 the manifestation occurs.

Having erected this straw man, he then objects, quite correctly, that causal relations are contingent rather than logically necessary. Of course; but then what in Place's writings here or elsewhere commits him to the view that causes logically necessitate their effects? Place holds, of course, that there is what Hume called 'a necessary connection' between a cause and its effect. But that necessary connection is construed in terms of the truth of Hume's[5] counterfactual

if the first object had not been, the second had never existed.

In terms of the *logical* distinction between the necessity and contingency of *statements*, statements ascribing this kind of causal necessity to the relation between two *situation tokens* are contingent, a fact of which Hume was well aware.

CONTINGENT IDENTITY

Unlike Armstrong who accepts at least some of Kripke's[6] *a posteriori* and *de re* logical necessities defined in terms of what is true in all possible

worlds, Place's conceptualism and intensionalism lead him to regard necessity, in the sense in which necessity contrasts with contingency, as exclusively *de dicto*, *a priori* and a matter of what can and cannot be denied without self-contradiction, given the semantic conventions of the language. The only kind of necessity that is *de re* is causal necessity which does not contrast with contingency[7] and whose presence or absence is a matter of contingent fact to be decided *a posteriori* by experimental observation.

Identity is a relation between two linguistic expressions whereby they share a common referent. Whether an identity is necessary or contingent is a *de dicto* matter, decided *a priori* by whether the identity statement can or cannot be denied without self-contradiction. By this criterion, token identities are typically contingent, type identities typically necessary.[8] This is not to say that the question of whether or not an identity is contingent or necessary is unaffected by empirical discovery. In science, type identities which are contingent hypotheses when first formulated become necessary truths when the conventional criteria for assigning instances to universals begin to change so as to incorporate the empirically discovered 'real essence of a natural kind' into the meaning of the words and expressions of natural language. Thus, our criteria for assigning an instance to the kind *water* have changed so as to incorporate the empirical discovery that all instances of that liquid turn out to have the chemical composition H_2O. As a result, the statement *Water is* H_2O which was once a contingent hypothesis, becomes a necessary truth. Kripke's[9] well-known 'intuition', the intuition that there is a difference in this respect between these now necessary identity statements and the statement *Pain is C-fibre firing,* is simply a reflection of the fact that the physiological composition of pain has not yet been established by scientific research and that consequently this tentative and almost certainly mistaken hypothesis as to what it might be has, mercifully, not yet become ingrained in the linguistic habits which are the source of our semantic intuitions. It remains a hypothetical contingent identity.

But having endorsed the concept of contingent identity with respect to hypothetical identity statements like *Pain is C-fibre firing,* why should Place be reluctant to extend this principle, as Armstrong wishes to do, to dispositional properties and their microstructural basis? There are, I believe, three reasons for thinking that dispositional properties cannot be identical with their micro-structural basis: (1) differences of category, (2) differences of location, and (3) differences in causal role.

Differences between dispositional properties and their microstructural basis

Differences of category

Two descriptions cannot be descriptions of one and the same thing if there is a difference of category between the kind of thing picked out by one description and that picked out by the other. In the case of the alleged identity between dispositional properties and their basis in the microstructure, both descriptions are descriptions of properties, but they are descriptions of properties of different kinds. Dispositional properties are modal properties, they consist in their possible future and past counterfactual manifestations. The microstructural properties of an entity on the other hand are categorical, which, of course, is why Armstrong who finds modal properties offensive wants to reduce the dispositional to the microstructural. Moreover, as we have seen (above, p. 29) there are reasons to think that these categorical structural properties are really categorical spatial *relations* between the parts of which the microstructure is composed, and not genuine properties at all. It follows that for Place the gulf between these two kinds of property or feature, to be more precise, is unbridgeable. Hence the complementary, but essentially different, roles which ascriptions of the two kinds of feature play in causal explanation.

Place holds, following Ryle,[10] that particular dispositional statements, i.e. statements ascribing dispositional properties to particular individuals over limited stretches of time, are 'lawlike' in the sense that they involve universal quantification over possible situations (events or states of affairs) occurring or existing within that limited stretch of time. In other words what we are saying when we say that the glass is brittle is that *if at any time, so long as it exists and remains brittle,* the glass is suitably struck, it will break. Place also holds, following Goodman,[11] that such dispositional statements are sufficient to 'support' causal counterfactuals without the need to invoke truly universal laws which are not limited to individuals and stretches of time.

By contrast, statements ascribing categorical properties to an entity relate not to what would have happened in the past or would happen in the future, if certain contingencies had arisen or were to arise, but to what is or was actually the case at some moment or over some stretch of time. Categorical statements of this kind have two functions in causal

explanation. First, they serve to describe what actually happened or was the case as opposed to what would have happened or been the case if things had been different from what they actually were. Second, they serve to characterise those actually existing parts and features of the entities involved which when combined with the dispositional properties of those parts and features, bring it about that the entity as a whole has the dispositional properties it does have.

Differences in location

It appears from this that the difference in category between modal and categorical properties boils down to a difference in their relation to time, the difference between what actually happens or is the case at or over time and what might happen or be the case but which may not or did not happen or may not be or was not the case. There is a similar difference in the case of dispositional properties and their microstructural basis in their location or relation to space. Roughly speaking, we can say that the microstructure of an entity is inside the entity, whereas the dispositional property, in so far as it is located anywhere, is outside the entity at its point of interaction with other things. Two descriptions which refer to things which are located at different points or areas of space cannot be descriptions of one and the same thing.

The most striking example of a case where a dispositional property is located outside the entity while its microstructural basis is inside is the case of the magnetic field of an iron bar and its basis in the bar's molecular and atomic structure. But there are exceptions. There are cases, such as the dispositional property of smoothness, where both the putative interaction with other things and the microstructural basis of the disposition are on the surface rather than inside the disposition's owner. There are also cases, such as Molière's[12] *'virtus dormitiva'*, a dispositional property of opium where the manifestation of the disposition (the opium-taker's going to sleep) takes place, in some sense, inside the affected organism, and where the putative interaction consists, at the macrostructural level, in some form of ingestion of the substance by the organism and, at the level of the microstructure, in an interaction between the chemical structure of the opium and the biochemistry of the opium-taker's brain. In this case everything is inside; but the difference in the precision with which location is specified in the case of manifestation, interaction and microstructural basis is hardly consistent with the hypothesis that the dispositional property and its microstructural basis are one and the same thing.

Differences in causal role

Armstrong, of course, is not insensitive to these differences between characterisations of what he regards as the causal/modal and categorical aspects of the same property. What he does not accept is the difference in causal role between a dispositional property and its microstructural basis. As we have seen, the only way he has of interpreting Place's contention that there is a causal relation between the microstructure and the dispositional property is to suppose that what is being claimed is that the microstructure is a causal factor alongside the dispositional property in the causation of the manifestations of the disposition. He cannot accept the notion of the microstructure as cause with respect to the existence of dispositional property as effect. For to concede *that* would be to concede that the microstructure and the dispositional property are two separate things and not one and the same thing under two different descriptions.

It would seem, however, that the case for and against these competing interpretations can only be made out in relation to concrete examples. Place has already adduced the example of the horsepower of an engine and its basis in such features of its microstructure as the cubic capacity of its cylinders. He has used this example to generate the suggestion that the term 'microstructure' is shorthand for a multiplicity of causal factors, of which, in the horsepower case, the cubic capacity of the cylinders is only one, which combine to contribute to the resulting dispositional property of the entity as a whole.

Armstrong, on the other hand, cites Kripke's[13] example of heat and molecular motion and his own example of the gene and its realisation in DNA as cases in which the same thing is characterised in two different ways: necessarily in the case of *Heat=molecular motion*, but as a matter of contingent fact in the case of *Gene=DNA*.[14] Of these, the gene example is relatively easily handled from Place's perspective. For a gene, even when its physico-chemical realisation was unknown, is not and was not a dispositional property. It is the previously unknown basis in the microstructure of an organism on which depend its inherited dispositional properties, such as the propensity to develop hair of a particular colour or the propensity to develop Huntington's chorea in later life. The presence of the gene is and always was the *cause* of such propensities, not the propensity whose existence is thereby explained.

The heat case is more complicated. This is partly because, although being hot or cold is a property rather than a relation, when we use these words, there is always an implicit comparison with something else than

which the object in question is hotter or colder; but it is partly also because the property possessed by an object or body of stuff which has a certain temperature is partly categorical and partly dispositional. The categorical part of the property is a matter of how the object or body of stuff is in itself, independently of the effect that it has or is liable to have on other adjacent things (the dispositional part of the property). It is this categorical property of being intrinsically hot which consists in (is one and the same thing as) having its molecules in a state of relatively rapid Brownian motion. The dispositional part of being of a certain temperature, on the other hand, consists in the object's propensity to impart its heat (molecular motion) to other bodies of *lower* temperature than itself with which it is in direct physical contact and to receive heat (molecular motion) from other bodies of *higher* temperature than itself with which it is in direct physical contact. In this case the molecular motion of the body stands as cause rather than as constituent with respect to this (dispositional) property. The situation is still further complicated by the fact that there is a form of heat, namely, radiant heat which has the dispositional property of imparting heat in the categorical sense to objects at a distance from the radiant energy source without having to impart molecular motion to molecules in the intervening space which may be empty, as in a vacuum. In this case although molecular motion in the heat source is a part cause of its emitting radiant heat, to claim that *this* form of heat *is* molecular motion is quite simply false.

LAWS OF NATURE

We now come to the key issue which divides the two positions, namely, what are the ontological commitments or, to put it another way, what is the truthmaker of a causal counterfactual? Is it, as Place maintains, the existence of a dispositional property as something over and above the state of the microstructure of the entity to which the property belongs on which, on this view, the existence of the property depends? Or is it, as Armstrong maintains, a matter of the existence of two things:

- a purely categorical state of the microstructure of the entity in question, and
- a law of nature considered as a state of the world whose existence makes true the universal law statement from which the counterfactual is deduced?

There is, I suspect, more common ground between these two positions than Armstrong seems willing to concede. The issue has two aspects, a

linguistic aspect and an ontological or existential aspect. I take it that there is little, if any, disagreement over the linguistic aspect of the problem. Whatever view is taken on the issue of causal necessity discussed above, all parties to this debate would accept

- that to *say* that particular situation *A* was a cause of particular situation *B* entails the counterfactual: If *A* had not existed or occurred, *B* would not have existed or occurred and
- that to say that situations of the *A* type are liable, given appropriate attendant conditions, to cause situations of the *B* type, entails the counterfactual: Given the same attendant conditions, if a situation of the *A* type had not or does not exist or occur, a situation of the *B* type would not have existed or occurred in the past and will not exist or occur in the future.

It also appears to be common ground that the truth of the particular counterfactual

> If A had not existed or occurred, B would not have existed or occurred

is true if there is a true universal counterfactual or law statement of the form

> Given that other attendant conditions are favourable, if at any time a situation of the *A* type were to exist or occur, a situation of the *B* type would concurrently exist or thereupon occur

from which it follows.

It would also be agreed, I suspect, that this deduction of the particular counterfactual from the universal counterfactual is of considerable epistemological significance. For since we can never observe a non-occurrent event or non-existent state of affairs, it follows that we can never have empirical evidence of the truth of a particular counterfactual statement. What we can have is empirical evidence which supports the truth of a universal causal counterfactual or law statement. This evidence, however, does not consist as Armstrong, following Hume, appears to think, in nothing more than the observation of either

- the regular occurrence of an event of the *A* type followed by an event of the *B* type, or
- of the coincidence or concurrence of a state of the *A* type with a state of the *B* type.

Regularities of this kind do not provide evidence of the truth of the counterfactual, unless they are accompanied by evidence that if *all other*

attendant conditions are the same as they are on the occasions when a situation of the *A* type is accompanied by a situation of the *B* type, *and* there is no situation of the *A* type, there is no situation of the B type. Place's adherence to this view of the role of observed regularities as evidence for the truth of a causal counterfactual is sufficient refutation of Armstrong's repeated attribution to him of a regularity theory of the truthmaker in causal judgements.

At this point a significant difference between the two positions begins to emerge over the issue of the universal causal conditionals or universal law statements from which the particular causal counterfactual is derived. Place here follows Ryle[15] in holding that particular dispositional property statements, i.e. statements ascribing a dispositional property to a particular individual over a limited stretch of time, are 'lawlike' statements. Such statements have the underlying form of a universal causal conditional:

> Other conditions being favourable, if at any time as long as the disposition persists, a situation of the *A* type (e.g. a suitable striking) were to exist or occur, a situation of the *B* type (a shattering of the glass) would or, in the probabilistic case, would be liable to exist or occur.

Such a particular dispositional statement which is universally quantified only with respect to instances or periods of time within the duration of the disposition is all that is required, as Nelson Goodman[16] points out, in order to 'support' a particular causal counterfactual. Armstrong, by contrast, appears to fall in with the more commonly held view that what is required here is a universal law statement universally quantified without restriction of time over individuals of a particular kind. Place does not deny that some universal law statements quantified over individuals in this way are true, but sees their truth as essentially parasitical on the truth of the particular dispositional statements which are subsumed under them.

This difference in view about what is needed to 'support' particular causal counterfactuals is reflected in different views concerning the nature of the truthmaker whose existence makes the particular causal counterfactual true. According to Place the truthmaker for the particular causal counterfactual is the existence of a particular dispositional state (the peculiar brittleness of this glass). This state, moreover, is a non-categorical modal state whereby the object in question is, as it were, 'pregnant' with a range of possible future outcomes, depending on such combinations of attendant circumstances as may arise in the future or might have arisen in the past. For Armstrong the truthmaker with respect to particular causal counterfactuals is a Law of Nature considered as a

universal unlocated state of affairs in the world. This state of affairs, he claims, is purely categorical. How such a state of affairs can be supposed to act as a truthmaker with respect to a counterfactual remains totally mysterious. He claims, if I have understood him correctly, that such a law of nature is an actually existing universal relation between actually existing universal properties. It nevertheless exists only in so far as those (purely categorical?) relations and properties are instantiated. How something that exists only in so far as actual instances of it exist can act as a truthmaker with respect to what would happen or have happened, if things were to be or had been different from the way they are or were, remains a mystery. For Place such an entity is a metaphysical monstrosity which helps us not at all to understand what it is that makes particular causal counterfactuals true. It no doubt achieves some degree of ontological economy as compared with Place's position in that there are far fewer universal law statements that are true than there are individual dispositional statements. On Armstrong's view, there is only one truthmaker required *per* universal law statement, whereas Place's view requires a separate truthmaker for each individual dispositional statement. But this multiplication of truthmakers, according to Place, is not *praeter necessitatem.*[17]

NOTES

1 B.Russell, 'The Philosophy of logical atomism', *The Monist,* 1918, *xxviii:* 495–527, and 1919, *xxxix:* 32–63, 190–222, 345–380. Reprinted in B. Russell, *Logic and Knowledge, Essays 1901–1950,* R.C.Marshall (ed.), London: Allen and Unwin, 1956.

2 G.E.M.Anscombe, *Intention,* Oxford: Blackwell, 1957, pp. 37–47.

3 D.M.Armstrong, *Universals and Scientific Realism* (two volumes), Cambridge: Cambridge University Press, 1978.

4 *Parmenides* 132–3.

5 D.Hume, *An Enquiry concerning Human Understanding.*

6 S.Kripke, *Naming and Necessity,* Oxford: Blackwell, 1980.

7 Speaking causally, to say that one situation (the effect) is contingent upon another (the cause) is to say that the relation between them *is* causally necessary, not that it isn't. The opposite of causal necessity is not contingency, but causal independence or *non*-contingency. It is notable that in Kripke's formulation which confounds these two radically different forms of necessity the notion of 'contingency' disappears from view.

8 For this point, see the discussion of the example 'his table is an old packing case' on p. 46 of U.T.Place 'Is consciousness a brain process?', *The British Journal of Psychology,* 1956, 47:44–50.

9 *op. cit.*

10 G.Ryle, *The Concept of Mind,* London: Hutchinson, 1949, pp. 123–124.

11 N.Goodman, *Fact, Fiction and Forecast,* Cambridge, MA: Harvard University Press, 1955.

12 *Le Malade Imaginaire.*

13 op. cit.

14 Taken together with Kripke's intuition that *Pain=C-fibre firing* seems contingent and probably false, Armstrong's intuitions with respect to the necessity/contingency of these two type identity statements illustrate both Skinner's contention (B.F.Skinner 'An operant analysis of problem-solving' in B.Kleinmuntz (ed.) *Problem-Solving: Research, Method and Theory.* New York: Wiley, 1966) that intuitive judgments are 'contingency-shaped' (i.e. a matter of habit, in this case linguistic habit, based on long and extensive experience of getting it right and getting it wrong) and Place's (1956 *op. cit.*) contention that 'if we lived in a world in which all tables without exception were packing cases, the concepts of "table" and "packing case" in our language would not have their present logically independent status. In such a world a table would be a species of packing case in much the same way that red is a species of colour.' (Place, 1956, p. 46) Kripke's formula *Heat =molecular motion* is clearly defective in that, as argued below, it does not distinguish between heat as a categorical property of bodies to which it applies and heat as the dispositional property of imparting categorical heat to other bodies to which it does not. Nevertheless, the relationship between the temperature of a body and the rate of Brownian motion in its constituent molecules is sufficiently well-known and has been so for a sufficient length of time to have infected our linguistic intuitions to the point where the statement of equivalence has become analytic and necessary. *Gene=DNA* is still synthetic and contingent, because the co-extension of the two concepts has not been recognised long enough for it to have infected our linguistic intuitions. In the case of *Pain=C-fibre firing t*he process of analyticisation has not even begun.

15 *op. cit.*

16 *op. cit.*

17 What this means is that the law statements of science have the same truthmakers as statements describing dispositional properties to the individual concrete particulars whose behaviour lies within the scope of the law, namely the existence of those properties. Although she speaks of 'capacities' rather than 'dispositions' and reaches her conclusion from a different direction, a similar view is depended by Nancy Cartwright in *Nature's Capacities and their Measurement* (Oxford: Clarendon Press, 1989).

Part II

THE MARTIN-ARMSTRONG-PLACE DEBATE

5

PROPERTIES AND DISPOSITIONS

C.B.Martin

THE QUALITATIVITY AND DISPOSITIONALITY OF PROPERTIES—THE LIMIT VIEW

The three authors agree that properties are needed, though they disagree about their nature. Martin rejects the Linguisticism that renders properties being had by objects as merely a matter of predicates being true or false of the object, if any, to which the subject term refers.

Predicates are linguistic and mind-dependent entities, whereas many properties of objects are not. Linguisticism is silly but it is also endemic and largely unnoticed by many passing ontologists. The suggestion of it needs expunging in the motto 'To be is to be the value of a variable', but appears unmistakably in what can be described as a kind of *Holus Bolus* view[1] that suggests that it is the object *simpliciter holus bolus* that makes each of many statements about it true or false. But when the statements

(A) The passion fruit is round

and

(B) The passion fruit is purple

are true of one and the same object, in each case it is something in particular *and* different *about* the object that makes each statement true. The predicates are built to pick these out.

Furthermore, *different* things (properties) about the *same* object are causally operative in different ways (or inoperative) for different effects. The object is causally operative in some event for particular effects only in virtue of some of its properties *rather* than others. It is not operative *holus bolus* for each and every effect. Therefore, properties are needed for causality. Without properties, objects are empty and predicates blind.[2]

Without a doubt, if one compares two *objects* in terms of their similarities and dissimilarities one needs to do this in some respect or respects thought to be 'in common' between them. This has led to the invocation of the numerically identical universal as the common element. The need for this is removed when one sees that object detection, discrimination and even identification is dependent upon a more basic detection, discrimination and identification of things *about* objects, namely, properties of objects—colours, movements, shapes, loudnesses, tastes, textures, and the temporal pulses and changes and spatial spread of these.

This requires a *mind-shift* from the philosophers' usual emphasis upon exact or inexact similarity between *objects* (that need a *respect* in which similar) to exact or inexact similarity between a specific property or *respect* (of an object) that since already detected or specified needs no *further* respect in which the respects or properties are similar.

An infant or an adult may be selectively attending to a specific property of an object or to exactly similar specific properties of a number of objects without attending to the object or objects themselves. Exercising the natural and basic capacity to detect and come to fix upon some specific property arousing its interest the agent can group exactly similar properties either of different parts of the same object or of different objects. And it can discriminate these properties from dissimilar properties. It can do these things without need of further respects.

The natural direction for detecting or discriminating or recognising or identifying properties is through the perception of what is demarcated *about* an object through, as it were, its 'outline' marked and bounded (allowing for occasional 'overlap') by differences and similarities, exact and less-than-exact from and to what else is within perception *about* the object and its environment. This can be achieved at the most primitive level of detection and also at the higher levels of discriminatory and recognitional and identificatory responses needed for cognitive expertise. One *gradually* comes to acquire cognitive skills reacting to similarities and differences concerning properties, whether one has a many-exactly-similar-tropes view or many-instantiations-of-one-universal view. If there are many exactly similars then it will be natural for one to *group* them.

To (1) note the physical extent and/or duration of some *one* simple property-universal in a particular instantiation or set of many instantiations or to (2) note the physical extent and/or duration of some simple trope or set of exactly similar tropes seems to be a strikingly similar procedure.

At the ontological level, whichever of these notations one uses (and the tropes vs. universals issue may not come to more than that), it is the resemblance or difference between the properties of objects, events or

states of affairs that is basic to the resemblance or difference between objects, events or states of affairs. Two objects are similar to and different from one another in *virtue* of the similarity to and difference from different things *about* (properties *of*) the objects.

This ontological-epistemological model is a corrective to overly object-oriented and false accounts of the perceptual and conceptual development of infants in the womb, and the very young.

Even as adults we can be *as* the infant in total disregard of what *has* the qualities of properties with which we may be totally absorbed. This often is the case with painters, composers and even more pedestrian sensualists.

If one were to reject the ultimacy of objects and replace them with space-time segments or 'worms' or fields, there would still be properties, that is, things *about* or things *had* by these segments or fields that would not *be* those segments or fields themselves or even be *parts* of them. These properties would be more than mere mathematicised measures. Even concerning such elementary particles or fields or space-time representations there is need of more than quantities and numbers. Every quantity or measure is such only in virtue of there being qualities *for* which or of which it is the quantity or measure. The alternative is an unacceptably empty desert of Pythagoreanism unsurprisingly endorsed by Quine in 'Whither physical objects?'.[3]

Place and Armstrong have emphasised *structural* properties in their discussion of dispositional properties. Martin thinks the emphasis is misguided, not only because what is structural is *evidently* intrinsically dispositional *itself*, but, more importantly, because the issue can be more cleanly discussed in terms of non-structural properties.

A great advantage to discussing properties at the non-structural, non-macroscopic, elementary particle or elementary aspects of fields level is that one can avoid reduction vs. non-reduction debates.

Discussion at a structural or macroscopic level is vitiated by debate concerning whether the properties at the higher level, are anything over and above properties at a lower level with the usual gesturing toward all of the many varieties of supervenience that are at best ontologically useless and at worst misleading. Discussion at an elementary particle level (even with epistemic qualms) stops the moves to attempt to account for the properties in terms of still other properties at a *lower* level because (if we were epistemically lucky) there *aren't* any!

Martin devised the following case in the mid 1950s in Adelaide and in the early 1960s in lectures at Harvard and Columbia, and elsewhere since, as a counter-example to verificationism and against many reductive

accounts of causal dispositions. He later applied it against Quine's account in *Word and Object* of a disposition (unmanifested) in terms of an object having a structure similar to that of an object that *manifested* the supposed disposition. It is also a counter-example to Armstrong's view.

The case is one of a cosmic geographical fact concerning the spatio-temporal spread of kinds of elementary particles. It is supposed that there are kinds of elementary particles in some spatio-temporal region of the universe such that they are different from the kinds of elementary particles of our own region and the regions are so vastly distant that the many special dispositions they have for intercourse with one another *never* have their very special manifestations and nothing else in the universe, in the nature of the case, is *like* them that does have the manifestations. Yet they have causal dispositions ready to *go*. The dispositional is as real and irreducible as the categorical.

(Or, as Martin would prefer to say, the dispositional is as real and irreducible as the *qualitative*. Talking of the distinction as being between the dispositional and the categorical can suggest that dispositionality is not really categorical: not really 'there' in the object.)

A very devoted Quinean replied, 'And if pigs had wings they would fly'. When I complained that he didn't know any better than I did that this wasn't a *true* case, he responded, 'And if pigs had wings they would fly'. (I did not have the wit on the occasion to point out the somewhat irrelevant truth that if pigs had wings they *still* wouldn't fly.)

Martin's Limit View of the qualitative and dispositional character of properties is the following three claims:

- To speak of a qualitative property is to take some real property as *only* at its bare potency-free purely qualitative limit, which, of course, it never is.
- To speak of a dispositional property is to take some real property as *only* at its purely dispositional non-qualitative limit which, of course, it never is.
- No real property of an object, event, process or even space-time segment or field can be thought of as existing at *either* limit.

The thought of anything being at either the limit of the purely and only qualitative disposition-free pure act of being (such as the potency-free qualities of the God of Thomas Aquinas) or the limit of the pure state of potency (such as the qualities-for-reduction-to-possible-operations of a thoroughgoing operationalism or qualities as measurement-probabilities 'bundles') is conceptual artifice and unrealisable abstraction suggested, perhaps, by some of the surfaces of grammar.

What is dispositional (concerning some property) may not be exercised in some appropriate manifestation, so that one can say the *manifestation* is not actual or real, but, as Place has remarked, this does not mean that the unmanifested disposition is itself not actual or not real. The *disposition* can come into existence and pass out of existence without the existence of any *manifestation* of the disposition. There can be dispositions for acquiring further dispositions, whether the disposition-acquiring occurs or not.

In what follows, the Limit View will be clarified and strengthened in the light of criticisms of the opposed views of Armstrong and Place.

DISAGREEMENTS WITH ARMSTRONG

Martin and Place agree against Armstrong that properties of the same kind are particulars (tropes) related by exact similarity rather than a numerically identical universal.

Only through the resemblance between numerically different universal-instantiations is it determinable *what* universals are *in* which instantiations. Determining this would be a very fallible procedure, in that for one universal to be present 'in' numerically different instantiations it is not enough that the instantiations be very, very similar, but they must be *exactly* similar.

On Martin's Limit View, it is resemblance between individual tropes that is ontologically basic to resemblance between objects, events or states of affairs. It would seem that Armstrong would have to say something similar, namely, that it is resemblance between individual universal-instantiations that is ontologically basic for if they are less than exactly similar then they are instantiations of different universals.

Dispositionality is as much to do *primarily* with a property as is qualitativity. An object, structure, event, process or state has certain categoricalities and dispositionalities only *through* the categoricalities and dispositionalities of or 'in' the *properties* of the object, structure, event, process or state.

It may appear that all of this simply ignores Armstrong's view of properties as universals such that the *numerically* identical universal-entity is 'fully' found in each of its numerically different instantiations. Yet it is not at all easy to see how a more than verbal difference between Armstrong's view of numerically-identical-universal-existing-only-in-numerically-different-instantiations and the view of exactly-similar-numerically-different-tropes can be made out. If (on Armstrong's view) universals exist *only* through their numerically distinct spatio-temporal

instantiations, having intermittent existence without any shared spatio-temporal continuity and having contingent and altering relations to one *another* as well as to other universal-instantiations, then such instantiation-entities might as well, or even better, count as numerically many but exactly similar tropes rather than as numerically *one* universal-particular existing 'fully' in each of its many intermittently existing instantiations.

If Armstrong finds this unexpected similarity to Martin's view an unpalatable outcome, then he must provide an account of what it *is* about the universals in their various distinct instantiations that will be *that* in virtue of which some strong conditionals and counterfactuals are true.

This is urgent because invoking universals and relations between universals is not sufficient. As Armstrong himself is aware, many relation-instantiations between universal-instantiations are merely accidental though 'regular'.

One of the main sources of David Lewis's courageous and ingenious realism concerning non-'actual' worlds is that it provides a rich enough truth model (ignoring problems this view may have) so that all potencies and possibilities are manifested and realised, not, of course, in any *one* world but in real relations *between* real possible worlds.

Armstrong attempts to serve himself from this largesse of real non-actual worlds in accounting for

> why we are nevertheless entitled to attribute unrealised powers, potentialities and dispositions to objects
>
> (p. 17)

while *disowning* any realism for such worlds. This would be forgiven if Armstrong were not giving an account of something *being* capable of, disposed to or apt for…, such that strong conditionals and counterfactuals are *true* in *virtue* of something *being* so capable, disposed and apt. Thus, an account of something so being must not be in terms of non-being.

This is to provide *no* truthmaker and no truth model for 'what it *is* for the glass to be brittle' or for the relevant counterfactuals to be true. It is a non-account in what Armstrong himself acknowledges to be 'metaphysically misleading terminology'.

Armstrong does not repent of this use of possible worlds but proceeds to develop alternative accounts of truthmakers for dispositional and counterfactual statements.

There is a problem central to Armstrong's different claim that *every* disposition *must* be manifested at some time. It appears that he must embrace *ad hoc* and unwanted necessities.

It is obvious that a particular universal-instantiation that may last a brief time will have many dispositions that are not manifested. For Armstrong, the existence of such an individual *logically necessitates* the existence of other such individuals that cumulatively over the spread of space-time through connection-relation-instantiation manifest each and every disposition of the initial universal-instantiation. This is a grandly cosmic game of ontological 'catch-up' with necessities of outcome built in. It just seems evident that the world doesn't *have* to be that busy.

The alternative to this forced multiplicity of entities is to place the ground for the truth of the strong conditionals and counterfactuals in the *particular* universal-instantiation *itself*. It will be seen that as Armstrong does this he comes closer to the Limit View.

According to Armstrong, when universal-instantiations sustain strong conditionals and counterfactuals they are related in a stronger-than-regularity way as relation-instantiations of natural laws. On Armstrong's terminology, natural laws are not statements but are real instantiations of relations between universal-instantiations.

Armstrong characterises what more there is than regularity in a natural law as a 'connection' and a 'linking' and even a 'forward linking' of universals, that is, universal-instantiations. This 'linking' or 'connecting' of properties is more than their instantiations being regularly correlated, and that extra feature that is not found in mere co-relatedness is 'something in the properties' that 'ensures'. So what is 'in the properties' will explain how

> there is a certain forward linking of universals [that] brings forth the glass in a shattered state.
>
> (p. 44)

This has to sound like something dispositional '*in* the properties'. Armstrong's view then would be hard to distinguish from the Limit View that any real property is neither purely qualitative nor purely dispositional but has the qualitive and the dispositional as its limits.

The tension Armstrong faces is that if he denies that there is really something '*in* the properties' to carry the dispositional weight to make true the counterfactual, then he has to show what it is, as it were, 'outside' the properties that would carry the weight. Surely that could be only external relations—presumably, regularities (no doubt Smart's 'cosmic' ones), and this will be just the regularity view plus gestures, a left-over from Armstrong's Regularity View past. If he claims, as he *has* done, that there really *is* something 'in the properties' in virtue of which they can and would, if and when their instantiations are properly related spatio-temporally, 'bring forth' and 'ensure', then Armstrong should see the

realism he has *himself* embraced of a power, causal disposition, and tendency '*in* the properties'. Having seen that, he can feel free to make full use of the powers and dispositions without need to bite the bullet of denying the existence of never-manifested dispositions. That is, if there really *is* something '*in* the properties' then it is going to be *there* whatever the external relations of those property-instantiations may be, whether the relevant external relations obtain frequently, rarely, once only or *never*.

Epistemically, relevant external relations need to obtain for our *knowledge* of irreducible powers of irreducible properties, but not for their *being* if they truly are 'in' the properties.

Armstrong described abduction as

> an inference to what is hidden that explains what is observed.
>
> (p. 45)

He gestures to what is hidden 'in' the property that 'ensures' and 'forward links', and this is the right direction in which to gesture, but he tells us nothing more about what is 'in' the property. The Limit View provides such an account.

There is yet another aspect of Armstrong's view that seems no more than a Regularist hang-over. He says,

> As already indicated, Armstrong holds that all (genuine) properties are instantiated properties, instantiated at some time. The postulated connection of properties, though contingent, is equally to be thought of as categorical. Laws are categorical states of affairs— higher-order states of affairs—linking properties (states of affairs types) directly and issuing in regularities involving the particulars which have the properties.
>
> (p. 43)

Why should all possible interactions of all kinds of elementary particles have an instance? Of those that don't, some may be underivable from 'laws' limited to only *actual* interactions. Indeed, many real laws are not so limited! Why, then, is there reason to think that the *nature* of their properties is limited to their actual episodic (perhaps through cosmic geographical happen-chance) interconnection-instantiation manifestations? But, even with this implausibility accepted for the sake of the argument, it would not thereby be shown to afford an 'issuing in regularities involving the particulars which have the properties.' This is so because of the *succeeding* argument showing that the contingency of the 'connection of properties' must allow that such 'connection' can *actually* vary.

Working *within* Armstrong's claims of contingency, an argument can be launched against his claims to have provided a special way out of Hume's scepticism concerning induction.

Only the regularity theorist has any argument at *all* for asserting that though the relation between the causal disposition and the qualitative property of things is contingent and so could have been otherwise, they *cannot* actually *be* otherwise in different spatio-temporal regions. This is so because the regularity theorist asserts that *all* there *is* to causal dispositionality is to be expressed in terms of a particular cosmic regularity. Armstrong, Place and Martin all agree that the Regularity Theory is false and that there is *more than* mere regularity, though they disagree about what that is.

There is *no* argument intrinsic to the various theories of Armstrong, Place and Martin that shows that what could have been otherwise cannot actually *be* otherwise in some spatio-temporal region. Perhaps the failure to see this is only an after-effect of a Regularity View past. The invocation of the *necessity* for *actual* regularity made by the introduction of the term 'Law' needs still to be earned. Given

- the logical and numerical distinctiveness of the numerically one universal's numerically *many* instantiations,
- that the universal has existence *only* through its instantiations, and
- that even the co-relation instantiations (that *are* the 'natural law connections and linkings') are contingent,

it is *impossible* for Armstrong, with this ontology, to show a firmer grounding for induction between the *contingently* related universal-instantiations than would obtain between the contingently related exactly similar tropes.

It has been shown that the *abductive* grounding for induction that Armstrong claims for categorical-property-universal-instantiations *collapses*, when it is spelled out, into Martin's Limit View. This point is of sufficient importance to be spelled out in detail.

The numerically *one* universal has its *only* existence in a plurality of spatio-temporally distinct and numerically *many* and intermittently existent instantiation-particulars. Since these are *logically distinct* particulars, it should be possible that universal-U-instantiation-X-at T_1P_1 may have different (and exclusive) connection-relation-instantiations than universal-U-instantiation-Y-at T_2P_2.

Therefore, there is no *more* grounding for induction or abduction from universal-instantiations in one space-time segment to universal-instantiations in another space-time segment than there would be from

one trope in one space-time segment to an exactly similar trope in another space-time segment.

The instantiation of a property carries with it as *part* of its very nature a myriad of capacities and dispositions, that is, there must be that in virtue of which an indefinite number of strong dispositional and counterfactual statements are true.

Armstrong claims that natural law must be instantiated and that every true strong dispositional and counterfactual statement concerning some actual universal-instantiation *UI* needs natural-law instantiation and natural-law instantiation consists in some *other* universal-instantiations UI_1, UI_2 UI_3 that are instantiations of that identical universal *U* being related to universal-instantiations that are instantiations of different universals $U_1 I$, $U_2 I$, under the relation-instantiation of 'linkage' or 'connection' coming from what is 'in' the universals as instantiated.

Granting that these various universal-instantiations are numerically and spatio-temporally and logically distinct entities, there is a problem for Armstrong's view. If a universal-instantiation occurs, it cannot occur with less than the full nature of the universal so instantiated. With the above spelling-out of all that would then be required for the existence of a particular universal-instantiation it seems evident that the existence of such an instantiation-entity would logically necessitate an indefinite number of *other* numerically and spatio-temporally and logically distinct instantiation-entities!

The alternative to this is to show either

- that the nature of a property does *not* essentially include, as one would otherwise think it did, innumerable basic capacities and dispositions, or
- that all such capacities and dispositions *must* be manifested or *entail* manifestations somewhere, even, perhaps, only *once*.

That is too much *ad hoc* baggage for Armstrong's universal-instantiation to carry.

DISAGREEMENTS WITH PLACE

The disagreement between Place and Martin centres primarily on Place's view of the dispositional as a distinct and separable property existing, as it were, in its own right.

(It is not relevant to this discussion to elaborate upon the differences between capacity, tendency, propensity and disposition. It is very likely that such differences can be made out in terms of the basic notion of dispositionality plus factors such as having the disposition given

maturation and suitable stimuli to *acquire* or to *lose* further dispositions and/or factors such as degrees of accessibility of triggering manifestation conditions.[4])

Indeed, Place argues that the dispositional property is caused by the categorical (qualitative) property and may exist spatio-temporally distant from it.

As has been shown, Martin is urging that the concepts of disposition and manifestation are more basic than and can include the role played by cause and effect. That makes it hard to see how the purely qualitative property that Place posits plays a causal role *itself*, presumably without any dispositionality for the manifestation of the coming to exist of the (further) disposition. Yet Place must also allow dispositional properties to play a basic role in causality. Is it that they play turn and turn-about causal roles—the purely qualitative causing only dispositional properties and the purely dispositional causing only qualitative properties?

Still, the notion of a distinct, purely dispositional property existing, as it were, on its own is an important and powerful notion, however anti-intuitive it may, at first, appear. Correct or incorrect, the notion has an honourable lineage and should be discussed in terms of some of its past and current forms.

Historically, the supposition of the purely dispositional can arise from operationalism *cum* functionalism that can in turn arise from a verificationism that makes basic an infinitude of possible forms of neural and bodily activity (verification-operations) that need not be actualised.

Weak verificationism claims that no statement of any finite set of verifications/falsifications or confirmings/disconfirmings entails the truth or falsity of what is confirmed/disconfirmed. Strong verificationism claims that some finite set of verifications/confirmings *entails* the truth or falsity of what is confirmed/disconfirmed.

It is ironical that *weak* verificationism is itself verification-transcendent. Any possible finite set of statements about confirming-happenings is consistent with the *falsity* of a statement about the existence of what is being confirmed. Whatever verification is effected, it is transcendently projective beyond any finite amount of verification-exemplifications.

This incompleteness is underscored by the fact that, typically, the performance of a set of one kind of verification *excludes* the possibility of the performance of some other kinds of verification. Recourse to falsification or disconfirmation changes nothing.

Gestures to the 'Ideal Observer' do not help because verification of the ideality of an 'Ideal Observer' must be incomplete as well. So, weak verificationism has the seeds of a verification-transcendent projectivism

within it!

The reductivist ontologies that tend to emanate from weak verificationism, such as operationalism, phenomenalism and behaviourism, inherit the same verification-transcendent projection to the limitless and indefinite in number would-have-been-ifs that take the *weight* over and against any possible finite set of *actual* confirmings in the form of operations or observings or behavings.

The focus on the incompleteness of verification or falsification and the recourse to the rough linguistic gesture toward an indefinite number of dispositionals and counterfactuals is a focus toward the dispositional (*mostly* unmanifested) and away from the qualitative.

Instead of operations or observations one can speak of measurements. Quantum theory has commonly been interpreted as encoding measurement predictions and the irreducible incompleteness of quantum 'states of affairs' understood as irreducible probabilities (less than unity) stated in measurement predictions. This interpretation reads in or *imposes* an essential mind-dependence of quantum events described in the theory. The choice is whether or not to give such a function a physical interpretation as a physical continuant at *all*.

Arthur Fine[5] has shown a fascinating vacillation in Schrödinger's interpretation of measurement predictions, between referring to and not referring to the ?-function as a *real* continuant. Fine describes and quotes from Schrödinger's laconic letter of 13 July 1935 to Einstein:

> Schrödinger then proceeds to set out briefly what he thinks is going on; namely, that the classical physical model has in fact been abandoned but that instead of replacing it with another, one has simply declared all of its determinables to be exactly measurable in principle and 'in addition prescribed with wise, philosophical expressions that these *measurements* are the only real things, which is, of course, metaphysics. Then in fact it does not trouble us at all that our claims about the *model* are monstrous.'
>
> (Fine *op. cit.* p. 76)

In such a mood (very different from the mood in which he attempted interpretations in terms of wavelike models) Schrödinger rejects all attempts to provide a model. Even the model of sparse and intermittent measurement events as the only 'real' posits is described, dismissively, by him as 'epistemological'. This vacillation provides few ontic crumbs for ontologically hungry philosophers whether realist or anti-realist or something in between.

The introduction of the term 'measurement' is somewhat ambiguous. Any measurement procedure will involve certain physical movements. Surely, if exactly *those* physical movements were brought about by something that was not an intelligent agent at all, or the experimenter performed the 'measurement' but no measurement was recorded, perhaps due to a lapse of attention, then, in a sense, no measurement would have been made. Yet the physical outcome of the physical experimental procedure would have occurred, though it remained unknown. The alternative to this interpretation is an interpretation that would read *in* from the very *beginning* a mental dependence through the observer-dependent notion of measurement; so that it should be no surprise that mental dependence would be read *out* in a final account. It would only be clumsy question-begging to use (perhaps without notice) such a mind-dependent interpretation of quantum physics as authority against forms of realism. Looked at quite literally, if *the physical* result of measurement requires the knowing attentiveness of the observer, then it is a mind-over-matter factor that is not even specified in the theory but evoked only in some interpretation of the theory. This may remind us of Einstein's reference to the quantum theorists' 'epistemology-soaked orgy'.

Einstein says in 'Reply to criticisms':[6]

> They (Born, Pauli, Heitler, Bohr and Margenau) are all firmly convinced that the riddle of the double nature of all corpuscles (corpuscular and undulatory character) has in essence found its final solution in the statistical quantum theory. On the strength of the successes of this theory they consider it proved that a theoretically complete description of a system can, in essence, involve only statistical assertions concerning the measurable quantities of this system.[7]

In what follows, let us consider interpretations that take the ?-function as a *state* that grounds or is the truthmaker for the measurement predictions and probability statements concerning measurement outcomes, such that its

> theoretically complete description…involves only statistical assertions.

It can be noted here that such an interpretation of quantum theory ends in (1) representing quantum 'states of affairs' as irreducible probability-less-than-unity-continuant-states, referred to as (2) grounding measurement predictions and is equivalent to (3) characterising those

'states of affairs' only as dispositions or probability-states or probabilifyingnesses or even dispositional or probability facts 'at' a place-time that lacking (4) suitable triggering conditions may not be actually *manifested* in manifestations or actually have outcomes. That is, just as there may be a disposition (for dissolving in H_2O), yet there may not be any manifestations (dissolving in H_2O), so there may be a set of probabilities (for alternative occurrences), yet there may not be any or 'enough' occurrences to match the probability fact or probability state of affairs.

On such an interpretation, the full characterisation of a state of affairs is *just* in terms of *irreducible* probabilities, excluding any further complement that could not itself be expressed in terms of probabilities.

The parallel interpretation in terms of dispositional properties is that of *full* characterisation of a state of affairs *just* in terms of *irreducible* dispositions or 'readiness potentials'.

Speaking of probability facts or even probability bundles or states is merely an alternative way of speaking in terms of pure dispositionalities. This becomes most apparent when it is claimed of their ontological status that they are not reducible to and need not *have,* as any basis, any ration of *actual* relevant occurrences. The opportunity for mathematicisation no doubt affords this metaphysics an added respectability.

The ontology of this is the positing of non-qualitative pure probabilities or probabilifyingnesses or pure dispositions, propensities or 'potentials'. A probablifyingness is more like a propensity than it is like a *specific* manifestation directed disposition. Propensities can admit of degree and so there can be a propensity of a certain degree (probability) for outcome *A* and also a propensity of a certain degree (probability) for outcome *B.*

Characterising states of affairs only in terms of irreducible probabilities, then, is just equivalent to a characterisation only in terms of irreducible propensity properties. *Each* can be satisfied or actualised for a particular state of affairs in the absence of the outcome the probability is *for* or the propensity is *to*.

This kind of interpretation of the ?-function is the nearest parallel to Place's view of the purely dispositional property that may exist at a different place from its (microstructural) qualitative property complement. Place states the need for such a purely dispositional non-qualitative property in a graphic but hardly self-evident way in the following passage.

> Roughly speaking, we can say that the microstructure of an entity is inside the entity, whereas the dispositional property, in so far as it is located anywhere, is outside the entity at its point of interaction

> with other things. Two descriptions which refer to things which are located at different points or areas of space cannot be descriptions of one and the same thing.
>
> (p. 61)

Given the realist view of a disposition as fully actual even without the actuality of its manifestations, a purely dispositional account of properties has at least a degree of plausibility. The plausibility is enhanced (*contra* Armstrong and Place) by the impossibility (as argued by Martin) of characterising any property as purely qualitative, that is, as existing without any implications of dispositionality. Martin has also argued (pp. 73–5) that it is equally impossible to characterise any property as purely dispositional, that is, as existing without any implications of categoricality. Such was the argument strategy for Martin's Limit view, the remaining debate, between other participants, should and will concern the need for and indeed the meaningfulness of the qualitative given the actuality of dispositions on a robustly realist view.

Sydney Shoemaker argues for the claim that in speaking of causal powers of a property, 'we would have said all there is to say about the intrinsic nature of the property':

> Suppose, however, that all of their causal powers and potentialities, all of their dispositions to influence other things or be influenced by other things, were exactly the same. Then, I suggest, they would share all their properties in the narrow sense, all of their 'intrinsic' properties. Likewise, when I say that the loss by my pencil of the property of being fifty miles south of a burning barn, or the property of being such that Gerald Ford is President, is not a real change, the cash value of this is that the acquisition or loss of these so-called properties does not in itself make any difference to the causal powers of a thing. This suggests a view about what the intrinsic properties, properties in the narrow sense, are. According to this view, what constitutes the identity of such a property, what makes it the particular property it is, is its potential for contributing to the causal powers of the things that have it. Each of the potentialities that makes up a property can be specified by saying that in combination with such and such other properties that property gives rise to a certain causal power. Thus, for example, the property of having the shape of an ordinary kitchen knife—for short, the property of being knife-shaped—is partially specified by saying that if anything has this property together with the property of being made of steel, it thereby has the power of being able to cut wood if applied to it with

> suitable pressure. If we could indicate all of the ways in which the having of this property could contribute to the causal powers of things, we would have said all there is to say about the intrinsic nature of this property. Such, at any rate, is my suggestion.[8]

Martin's response to any such account is to state it fairly but baldly and let its absurdity show through.

The image of a property as *only* a capacity for the production of other capacities for the production, etc. is absurd, *even* if one is a realist about the capacities. Whether one takes this argument as just question-begging or as revealing a *reductio ad absurdum*, the opponent cannot plead misrepresentation.

When one tries to state or to think out what justifies or warrants or makes true a counterfactual or causal dispositional statement, it seems quite absurd to attempt to find it in something purely dispositional and non-categorical, and *equally* absurd to find it in something purely qualitative and non-dispositional—what Aquinas called 'pure act'. The purely qualitative is as much a 'logical fiction'[9] as is the purely dispositional. The truth is obvious. In this matter, *nothing* is pure.

The only way to express this Limit View of real properties that does not amount to treating real properties as compounds of purely qualitative and purely dispositional properties is to show how the attempt to abstract these as distinct elements is unrealisable in reality and only approachable as *limits* for different ways of being of the same unitary property such that they may be necessarily or contingently co-variant. This will hold for all real properties all the way down even to the most ultimate properties of elementary particles or fields.

It is useful to replace talk of cause and effect by disposition and manifestation (under triggering and manifestation conditions). Whatever resistance there may be to speaking of causality at the quantum level, it should be obvious that *quanta are not potency-free, in pure act, or at all times manifesting all of which they are capable* under every sort of manifestation-condition. Pure act under any property is better left to the properties of God and, perhaps, the number two.

This ontological fact is *more* evident than is any hypothesised law-like regularity that seems, in fact, *not* to occur at the *quanta* level and, for that matter, at the macroscopic level either.

No doubt, the expression of generalities is helped with enough disjunctive 'cover' expressed in probabilistic terms. But, as Armstrong seems to be feeling (p. 39ff.), it is hard to think of what exists as a purely qualitative state, that can be candidly stated, as that in *virtue* of which

irreducible disjunctivities and probabilities 'obtain'. On the Limit View, the dispositionality of a property could vary, as a sort of disposition-flutter of an otherwise stable state, as an ontic grounding for disjunctivities and probabilities over a period of such fluttering.

The dream of a purely non-dispositional qualitative property is as much a philosophical fantasy as that of the purely non-qualitative dispositional property.

The Limit View has maximum flexibility in expressing both the necessary (if any) and the contingent (if any) relations between qualitativity and the dispositionality of properties.

This is an important and largely unexplored area of ontology. If an ideal physics is expressed in terms only of qualities, then the system of relations of quantities is a natural material for the necessities accruing to the mathematicisation of nature.

This was the place, namely, amongst 'the finer interstices of nature' and 'the insensible corpuscles,' at which Locke suggested that the real necessities between the primary qualities resided, though, he thought, we would be largely ignorant of them. He also thought the molecular theory of heat provided an approximation to such hidden necessities. Necessities will have to be earned but so will contingencies. The Limit View is specially suited for the statement of either or a judicious *mixture.* For anti-modalists it can suit non-modal talk as well.

NOTES

1 See C.B.Martin 'Anti-realism and the world's undoing', *Pacific Philosophical Quarterly,* 1984, 65:18–20.

2 See C.B.Martin 'Substance substantiated', *Australasian Journal of Philosophy,* 1980, 58:9–10.

3 W.v.O.Quine, 'Whither physical objects', *Boston Studies in the Philosophy of Science,* 1976, 39:497–504.

4 See p. 174 below.

5 A.Fine, *The Shaky Game: Einstein, Realism and the Quantum Theory,* Chicago, IL: University of Chicago Press, 1986.

6 P.A.Schilpp (ed.) *Albert Einstein: Philosopher-Scientist,* The Library of Living Philosophers, La Salle, IL, 1949, pp. 665–688.

7 Schilpp, *op. cit.,* p. 666.

8 Sydney Shoemaker, 'Identity, Properties and Causality' in Peter E.French, Theodore E Uekling, Jr., and Howard K.Wettsetin (eds.) *Midwest Studies in Philosophy,* Vol. IV, Minneapolis: University of Minnesota Press, 1979, p. 332. See also Shoemaker, 'Causality and Properties' in Peter van Inwagen (ed.) *Time and Case: Essays Presented to Richard Taylor,* Dordrecht: Reidel, 1980.

9 Hume's phrase for causal power.

6

REPLY TO MARTIN

D.M.Armstrong

AGREEMENTS WITH MARTIN

Martin holds with Place and Armstrong that ontology should recognise objective properties, properties 'in' the object. He offers some incisive arguments. Armstrong would only add, what he thinks Martin would not disagree with, that objective relations are also required. Martin says of the statements

> (A) The passion fruit is round
> (B) The passion fruit is purple

that

> in each case it is something in particular and different about the object that makes each statement true.

Agreed. And equally in the case of the statements

> (C) The passion fruit is on the table
> (D) The passion fruit is pressing on the table

it is something particular and different about the two objects that makes each statement true.

Martin and Armstrong differ about whether 'the same property' is a maximal set of exactly resembling particulars (Martin) or an instantiated universal (Armstrong). But they agree that in a good many contexts the difference does not seem to be very important, and that it might even turn out to be a mere notational difference. Much then turns on whether a certain advantage that Armstrong claims for universals is real. More of this on pp. 98–104.

Armstrong further agrees with Martin that even if we pass over into a four-dimensional account of reality (one that Armstrong is inclined to accept) there will still be need of objective properties over and above mere spatial and temporal parts. Nor could these properties be mere

'mathematicised measures'. There cannot be quantities and numbers in the absence of properties to differentiate one sort of quantity from another.

Martin, Armstrong and Place all hold that the manifestation of a disposition is a causal process. Suppose that a piece of brittle glass is struck sharply. Suppose also that in the short interval before the striking has had its usual effect, the glass is struck by a bolt of lightning. The lightning pre-empts the striking and causes the glass to shatter. But suppose also that the bolt is so powerful that it would have shattered even tough and strong, i.e. unbrittle, glass. It seems that we would not account the shattering a manifestation of the object's brittleness. The original striking and the shattering do not stand in the right relation.

But Martin and Armstrong do not merely agree that causation is involved. They also agree in holding a 'strong', an anti-Humean, anti-regularity, account of causation. (Place holds a 'counterfactual theory' of causal necessity which Martin and Armstrong find obscure.) If token-cause gives rise to token-effect, this striking bringing about this shattering, then, they hold, the causal relation is intrinsic to this sequence. The relation is not in any degree determined by the existence e.g. of similar sorts of sequences elsewhere and elsewhen. To use an old example of Martin's, in a very small world that contained only a flash followed by a bang, it is an objective question, not to be settled in any merely conventional manner, whether the flash did or did not cause the bang.

It is a further question just what positive theory of causation should then be accepted. Martin, it seems, holds a *purely* Singularist theory of causation. Token causes (presumably constituted by the state of affairs of the same or related particulars having certain properties) bring about token effects (the same or related particulars acquiring or remaining with certain properties), and that is all there is to it. Certain singular counterfactuals will be associated with each causal sequence—their exact nature we need not consider at this time—but they are subsequent to the causal relation itself.

Armstrong held the same view himself for a number of years because he was unable to see anything better, but now believes that a more satisfactory theory is available. The fundamental problem for a Singularist theory is that it fails to make any connection between causes and laws. More of this later.

In what follows, Armstrong will first consider the case of the distant and alien fundamental particles which Martin very largely relies on to bring out the force of his position. The next piece of business will be to

say something about Martin's positive proposal. Finally Martin's criticisms of Armstrong's treatment of dispositions will be considered.

But before ending this section, a brief word about a rebuke, in some degree justified, that Martin administers to both Place and Armstrong. In talking about the categorical properties that dispose a thing to act in a certain manner if and when certain initiating causes are present, influenced no doubt by a desire to tie the discussion to paradigm cases such as brittleness, both Place and Armstrong speak of 'structures'. But structures such as bondings, the sort of structures that are relevant to dispositions such as brittleness, are, as Martin says, 'evidently intrinsically dispositional' themselves. Bonding, in particular, is a sort of negative disposition, involving resistance to parting. Armstrong therefore sees the force in Martin's suggestion that it is best to work with such cases as hypothetical non-structural properties of (hypothetical) genuinely elementary particles. At the same time the more homely examples do seem to have value in giving concreteness to the discussion. He would therefore plead for a grain of salt to be applied to talk of categorical structures directly underlying *ordinary* dispositions.

MARTIN'S CASE

To establish his view of dispositions Martin relies rather heavily on a certain case. A very similar case was independently arrived at somewhat later, and brought into the literature, by Michael Tooley[1]. Tooley, however, does not draw quite the same metaphysical conclusions from the case that Martin does.

First to restate Martin's case. Suppose that there are elementary particles in another region of the universe from ours, particles that are quite different in nature from our local particles. These foreign particles interact with each other, but the natures of the interactions are quite different from the local interactions. It may be supposed further that the foreign particles have various dispositions to interact in various ways with our particles. The evidence is that these interactions would be quite idiosyncratic, and so not deducible from the local interactions, or even from the local interactions plus the foreign ones. This supposition, however, cannot be tested directly because local and foreign particles never meet in the whole history of the world.

But now consider these unmanifested dispositions that the foreign particles (and our particles) have. What account can we give of them? Nothing, Martin argues, except that they are irreducibly dispositional. He

draws the conclusion that in the actual world dispositionality is an irreducible 'side' associated with all categorical properties.

The nerve of the argument is of course the truthmaker doctrine. Given a true counterfactual that the foreign and local particles would react in an idiosyncratic but otherwise unknown way, Martin is suggesting that the truthmaker required is irreducible dispositionality 'in' the particles. Equally seized of the truthmaker doctrine, Tooley draws a different moral from the same case. He upholds the objective existence of laws of nature conceived as relations between property-universals. What the particle case then demands, he says, is laws of nature that have no positive instances and are not entailed by laws that do have positive instances. Such laws will have to be relations between universals that are not instantiated. The countenancing of uninstantiated universals gives his position a somewhat Platonic cast. (He calls it 'Factual Platonism'.)

Armstrong is dissatisfied with both these reactions. In favour of going with Martin is that it enables one to remain with Naturalism, defined as the doctrine that all there is, is the world of space and time. This is one of Armstrong's most strongly held views, held all the more strongly because the ground for it is to be found more in the natural sciences rather than philosophy. There seems to be no threat to Naturalism in the idea that some or all spatio-temporal things have an irreducibly dispositional component. Tooley, however, explains the case by bringing in uninstantiated universals, and these are incompatible with Naturalism.

Nevertheless, as already indicated in discussion of Place's view, Armstrong finds irreducible dispositions very mysterious. The dispositional property points to, or is pregnant with, a certain manifestation. Yet in the case considered, at no point in the whole history of the world does this manifestation occur. It is this that prevents one taking the disposition as a relation to its manifestation, unless indeed one is prepared to go along with Reinhardt Grossmann[2] who follows Twardowski in postulating 'abnormal' relations that lack one or more terms. Yet somehow the irreducible disposition involves the manifestation. It would appear that here we have a second, inferior, level of being: merely potential being. With his teacher John Anderson, Armstrong is extremely reluctant to postulate such a second level of being. At the very least it seems well worthwhile to try for a metaphysics where the actual has undisputed rule.

But the Martin-Tooley argument is ingenious and interesting. What should be said about it? Like Martin and Place, Armstrong accepts the need for truthmakers for true attributions of unmanifested dispositions. But he suggests that non-dispositional properties of the disposed thing

plus 'strong' laws of nature linking these non-dispositional properties may be sufficient truthmakers.

In his book *What is a Law of Nature?*,[3] when considering Tooley's views in particular, Armstrong sought to blunt its force in the following way. Begin by considering an irreducibly probabilistic law having the form: 'If *P*, then *Q* or *R* (but not both), with *Q* and *R* equiprobable'. Such a law will, like any law, 'sustain counterfactuals'. Now consider a true counterfactual about an object *a* at time *T*: 'If *a* at *T* had had property *P*, then *Q* or *R* would have resulted'.

Very few, it seems, would be prepared to assert that there is some truth of the matter about the way that the situation would have developed—the *Q*-way or the *R*-way—if *a* had in fact been *P*. The counterfactual holds: just one of *Q* and *R* would have occurred. But there would seem to be no truth of the matter about which alternative would have occurred. Excluded middle fails for this counterfactual.

One may then seek to apply this to the Martin-Tooley case. What we are given is a generalisation, which may be thought to have nomic force, that modes of interaction between different sorts of fundamental particle (say between particle pairs) differ irreducibly among themselves. This then allows us to assert a true conditional that if particles of type *A* and *M* were to meet (by hypothesis they never do) then they would have a unique mode of interaction. But, and of course this is the point of analogy with the case of the irreducibly disjunctive law, the suggestion is that there need not be some determinate mode of interaction that an *A* and an *M* would have exhibited, if they had met after all. If *a* had been *P*, as it was not, the outcome would have been *Q* or *R*. But although this statement is true, there seems to be no truth of the matter as between *Q* and *R*. It is not like 'That was either Fred or Jim'. Similarly, if an *A* and an *M* had met, as they did not, then it is true to say that the outcome of their interaction would have been idiosyncratic. But, the suggestion is, we are not forced to conclude that there is some unknown but perfectly determinate mode of interaction that would have occurred.

Armstrong's suggestion here is considered by Evan Fales in his very interesting book *Causation and Universals*.[4] He locates the indeterminacy in the case of the probabilistic law as due only to its irreducibly probabilistic character, which provides nothing to make one outcome or the other the one that would have occurred. But, he says, no such irreducibly probabilistic law need be involved in the fundamental particles case.

But it seems to Armstrong that Fales misunderstands the role of the disjunctive probabilistic law case in the argument. What it is meant to do is to show that there are cases where a counterfactual can be truly asserted,

but where the consequent of the counterfactual is indeterminate between certain outcomes and it is not plausible to think that there is a truth of the matter that resolves the indeterminacy. (Not plausible, but it seems possible that a metaphysician in love with counterfactual discourse —the very opposite of Aristotle and his sea-battle—could assert that there was an unknowable truth of the matter.) That being so, it is at least *open* to one like Armstrong who wishes to avoid irreducible dispositionality (or uninstantiated universals) to hold that in the Martin-Tooley case, certain counterfactuals would hold, but that their consequents would be, not merely epistemically but also ontically, indeterminate.

But do we not all feel a clear difference between the probabilistic law case and the fundamental particle case? We do, but it seems far from clear how seriously we ought to take this felt difference for the purpose of ontology. Consider the tremendous importance that dispositions have for us in practical life. Again and again we must take account of the potentialities of things in ordinary life. That importance is really quite unchanged given an account of dispositions in terms of strong laws and purely categorical properties. It is, nevertheless, completely *natural* to think of the dispositional properties of things as threats and promises to us who interact with the things. Death lurks within the poison, while inanimate desirable things solicit being used. Such anthropomorphism may even have biological value. What more natural, then, when we turn to the metaphysics of dispositionality, than to project into the disposed things a ghostly image of the manifestation of the disposition, even when it is not manifested?

It may be said that this is a Humean line of thought, and it is true that it is influenced by Hume's psychological explanations of what he took to be our metaphysical superstitions. But what a difference there is in the dialectical context! Armstrong wishes to defend (against Hume among many others) the reality of both 'strong' causes and 'strong' laws. All that he wishes to reject is just one of the notions that Hume and Humeans customarily reject, *viz.*, irreducible dispositions, and he thinks that he has made some case against this notion. It is surely methodologically respectable to point out how easily the false notion of irreducible dispositionality, if it is a false notion, could have arisen in our minds.

Place has said in chapter 2, section 3 of this debate that Martin and Pfeifer have persuaded him that

> intentionality is not, as Brentano thought, the mark of the mental, but rather the mark of the dispositional.
>
> (p. 23)

Armstrong thinks that something very important and interesting has been shown by Martin and Pfeifer in their article, but would put the matter differently. He thinks that what has been shown is that the traditional marks of intentionality are necessary but not sufficient for intentionality, just because even dispositions have the traditional marks. This could degenerate into a quite boring semantic dispute, but perhaps all parties could agree that at least this has been shown: that there is a surprising formal resemblance between dispositions and the way that mental states and processes point to their objects. This resemblance, though, is a two-edged affair. Some may take it as evidence that a 'pointing' character is built deep into the structure of reality. That is the Martin-Place view. Others, Armstrong amongst them, will take it to explain why we project back a pointing character from mentality, where it really exists, to non-mental objects, where it does not.

Moving on, Armstrong has another suggestion, though it is tentative only, for answering Martin. Let it now be granted for the sake of argument that Martin has described a possible case that, if actual, would constitute a strong argument for postulating irreducible dispositionality. But what we know about the world does little to suggest that the case, or anything like it, is actual. If, then, the case is merely possible, why should we suppose that the world's particulars have anything but purely categorical properties linked by strong and positively instantiated laws?

It cannot be denied that extreme cases, even where no more than possible, are often very illuminating in metaphysics. Such cases seem to cast light, for instance, on the view that particulars can be constructed purely out of universals. (Not a topic of direct interest to Martin.) A 'bundle of universals' view has the consequence that distinct particulars differ in at least one (universal) property. It seems to be a strong argument against this account of particulars that apparently possible cases can be constructed in which distinct particulars have all their properties in common. These cases seem to retain their force even where they are merely possible.

But the question whether we should accept irreducible dispositions may be more of an empirical matter than the question whether particulars are reducible to universals. Armstrong maintains, and it seems that Martin may agree, that just what properties we postulate as genuine constituents of objects is a matter to be settled *a posteriori*, in the light of total science. Martin argues for properties with both dispositional and categorical sides or aspects. Might it not be reasonable to postulate such properties if, but only if, there actually were phenomena of the sort that Martin sketches? If the actual facts seem to be explicable through the postulation of categorical and instantiated properties only, together with strong laws

that link these properties, then we may be justified in setting aside the possibility that Martin argues from.

Tim Crane has suggested that taking this line rather undercuts my defence of a purely categorical theory of properties, because that defence (and in particular my reasons for rejecting irreducible dispositionality) has a distinctly *a priori* air. That may be so, but I will have to leave it to the reader to decide how far I am involved in inconsistency in making an *empirical* objection to the Martin-Tooley argument.

MARTIN'S THEORY

Some criticisms of Martin's whole theory, as opposed to animadversions on his fundamental particle case, have already been made. This section will raise further questions.

Suppose that one of Martin's far-distant fundamental particles does after all come within effective range of a local particle and an idiosyncratic result ensues. For Martin this will be brought about by the fact that each particle, besides its categorical nature, has the power to produce just this idiosyncratic result in conjunction with its opposite number particle. It would appear to follow that, if the powers are deterministic, then, given the conjunction of these two particles, the result is necessitated; Given that cause, then that effect must follow 'in every possible world'. If the powers involved are irreducibly probabilistic—if they are mere propensities—then the effect is not necessitated. But, of necessity, there is an objective probability that the effect would have occurred. It appears therefore that Martin is committed in the deterministic case to a necessary connection between cause and effect, and in the non-deterministic case to a logical probability connecting cause and effect.

Armstrong would reject such a view on the ground that there can be no logical links between distinct existences such as cause and effect. This principle he would in turn derive from the idea that necessity, absolute necessity, springs only from identity. But he recognises that this is controversial doctrine, and that here he is opposing Martin's view rather than arguing against him.

The question just taken up is how, on Martin's view, dispositions are related to their manifestations when the latter occur. A further question for Martin is how the two 'sides' of properties—their categorical and their dispositional side—are linked to each other. In particular, is the connection of the sides a contingent or a necessary one? It seems that it could not be contingent. For if it was, then it would be possible to have the categorical 'side' with different powers or even with no powers at all.

And once this is allowed, what is the force of calling the powers a 'side' of just one entity? But if powers spring necessarily from the categorical side then, by transitivity, effects spring necessarily from the categorical nature. And at that point it would be tempting to cut out the middleman (irreducible dispositionality) and simply postulate categorical properties which necessarily produce certain effects. It would be open to such a view to hold that in particular circumstances which never in fact occur (a meeting of distant and local particles) a completely idiosyncratic effect would necessarily flow.

In Armstrong's view this is to load the world with necessities in an unacceptable way. But the issues here are so deep and so difficult to argue about constructively that it may be best at the moment to pass on.

One thing that Martin does not discuss, but it seems would not deny, is an important asymmetry between the categorical and the dispositional 'sides'. *Prima facie*, a world where things have categorical properties without a dispositional side is possible. Martin might claim that such a world would be an inert world, because it would be a world that lacked causality. That is a matter for discussion between Martin and Armstrong. But whatever disadvantages it might have, it does not seem to be an impossible world.

But consider by way of contrast a world of particulars having none but purely dispositional properties. This seems to be an incoherent supposition. Essential to the notion of a disposition is the notion of a manifestation of the disposition. The manifestation must at least be empirically possible. Indeed, in countless number of cases the manifestation actually occurs. Armstrong agrees with Martin that a manifestation may be the acquiring or losing of a disposition. But at least some manifestations must involve the acquiring or losing of categorical properties. For if this were not so, then the manifestation would itself have to be analysed dispositionally, that is the analysis would involve a further possible manifestation. The resulting regress appears to be vicious. The upshot is that dispositions require categorical properties in a way that categoricals do not require dispositions.

This asymmetry could be rather convincingly explained if dispositionality was not another 'side' of a categorical property but was rather a relational property of the categorical property. It would be a property of the following nature: causer in suitable circumstances of a manifestation of a certain sort. The dispute between Martin and Armstrong could then be formulated thus. For Martin this property would be a non-relational property of the categorical property. For Armstrong it would be a relational property (to be distinguished from a relation) of

a rather complex sort involving some of the laws in which the categorical property figures.

Given the Martin view, would the dispositional property attach to the categorical property necessarily or contingently? Either option would seem to be available, although Armstrong thinks that the contingency option would be the most plausible. The dispositional property would still have a special logical link with its manifestation.

Martin holds an anti-Humean theory of causation. It would seem, however, that his emancipation from Regularity theories is not complete. For him, it appears, *laws* are mere regularities. But the world (*pace* such sceptics as van Fraassen) is subject to natural law. We might render this, for the case of causal laws at least, by saying that the same properties of particulars, in the same circumstances, give rise, or have a certain objective probability to give rise to, the same effects.

Martin (and Place), however, take properties, whether categorical or dispositional, to be particulars. As a result, therefore, they cannot understand the word 'same' in the above formula in any strict sense. For them it can only be a matter of resembling properties, in resembling circumstances, giving rise to resembling effects. This great fact about resembling things Martin and Place will, it seems, have to take as a mere brute fact. Peter Forrest has put the point by saying that those who think of properties as particulars must work with a 'like causes like' principle.[5] Causes that are like each other give rise to effects that are like each other. This principle is not unintuitive, but it is not clear that it can be given any further justification. As it stands it is a mere cosmic regularity, or as one may also say, a cosmic coincidence.

Consider by way of contrast the situation where resemblance is analysed in terms of identity. Martin and Armstrong agree that a thing causes whatever it causes in virtue of (certain of) its properties. If, in addition, causally efficacious properties can be identical across instantiations, then surely there is no particular surprise in it, the very same property, bringing forth the very same effect in the same circumstances.

Sceptical doubts may also be raised about an 'identicals cause identicals' principle. Why should not the very same cause, even in the very same circumstances, bring forth different effects? It may be said, and said truly, that this is not 'contrary to reason' in the sense that it cannot be ruled out *a priori*. But if we find by experience that the same causes in the same circumstances regularly bring forth the same effects, may we not argue that this regularity is best explained by the hypothesis, a putative atomic fact, that the properties involved are linked, so that

property *F* in circumstances *C* is a bringer forth of *G*? Further experience tests, and may strengthen, the hypothesis.

Martin may suggest, as he hints at the end of his discussion of Place's views, that the ultimate property-connections are necessary, so that the apparent brute regularities in the world are explained by these connections. That would be to argue along somewhat the same lines as Armstrong, although the latter does not think of his atomic facts that connect properties as necessary. But, it is submitted, merely particular properties are not good candidates when it comes to the postulation of hidden necessities connecting them.

MARTIN'S CRITICISM OF ARMSTRONG

Martin appears to have four major criticisms to make of Armstrong's position. These will be considered in order.

Problems about resemblance

Martin says that while he takes resemblance between tropes (properties and relations taken as particulars) as basic, Armstrong must equally take as basic resemblance between individual universal-instantiations. It is true that for the case of exact resemblance Armstrong will say that the very same universal is instantiated by different particulars. But what can he say about less than exact resemblance? For Armstrong that must be a case of the instantiation of two different universals. How are these universals related? Martin suggests that Armstrong must take their resemblance as ontologically basic thus giving a good deal of aid and comfort to Martin's position.

The difficulty is real and very well worth raising. But Armstrong would respond by trying to analyse the inexact resemblance of universals. His thesis, which he does not know how to prove, is that all such cases are cases of partial identity. The notion of partial identity can be approached in the first place through the mereological calculus, the calculus of whole and part. The cup stands to the handle of the cup as whole and part, two houses with a party wall overlap with each other. These relations are mereological (D.C.Williams called them 'partitive' relations). It seems, however, that partial identity is not confined to mereological cases. Certainly, if one recognises properties and relations and further allows that some of these are complex properties and relations, then part/whole and overlap relations will be found, but they will not, in general, be mereological.[6]

For a simple example, consider the properties of being 5 kilograms in mass and being 3 kilograms in mass. If something is 5 kilograms in mass, then it is, among other things, a thing composed of just two things that do not overlap (this is the mereological concept), one of which is just three kilograms in mass, while the other is just two kilograms in mass. It seems correct here to say, if what we are dealing with are universals, that being 3 kilograms in mass is a proper part of the structural universal: being 5 kilograms in mass. It is a case of partial identity, though a non-mereological partial identity.

One of the simplest sorts of complex universal is the conjunctive universal, of which being red and being round and being green and being round may stand as two examples. (It should be noted that for Armstrong, who allows instantiated universals only, the universals exist only if there are things that are both red and round, and equally things that are both green and round.) Although no particular can instantiate both conjunctive universals, still the two universals themselves 'overlap'.

These examples are illustrative only. It would remain to be argued, through a consideration of more difficult cases, that all inexact resemblance of universals is a matter of their partial identity. A particularly tricky question is the resemblances that hold between secondary qualities. Armstrong needs, in order to cover such cases, to postulate physicalistic reductions of these properties.

A parallel theory can be developed for tropes. This will take the form of arguing (controversially again) that the partial resemblance of tropes can be analysed solely in terms of exact resemblance between constituents of the partially resembling tropes.

What is the truthmaker for the counterfactuals?

Martin challenges Armstrong to

> provide an account of what it is about the universals in their various distinct instantiations that will be that in virtue of which some strong conditionals and counterfactuals are true.
>
> (p. 76)

The short answer is: a relation holding between the relevant universals. Spelling out the answer will take longer. Let us begin by considering all the manifestations of a certain disposition. Each of these manifestations will be a token causal sequence. What is more, given a philosophy of instantiated universals, each sequence will (or at least may) involve the same universals organised into the very same structure. The structure [an

F causing a *G*] will be instantiated in each sequence. Let us suppose for simplicity's sake that, given an *F*, a *G* invariably eventuates. (We may include circumstances of operation under the umbrella of *'F'*.) May we not say that there is something about an *F* that makes it produce a *G*? We need not assert that an *F* is such that it cannot but produce a *G* 'in every possible world'; and Armstrong would prefer to avoid such an assertion and so keep laws contingent. But still we can say that an *F*, simply in virtue of being an *F*, will bring forth a *G*. It is this atomic fact or state of affairs, a higher-order, non-supervenient, relation between universals *F* and *G*, that constitutes the truthmaker sought.

Let us consider this characterisation at more leisure. The law—the truthmaker for a true law-statement—is an atomic state of affairs. The atomicity is vital in considering the counterfactuals sustained by the law. Consider the situation of a Regularity theorist with respect to laws and causality and who, unlike Martin and Place, has no irreducible dispositionality in the world. For such a 'Humean' the law (the ontological correlate of the true law-statement, it will be remembered) is a molecular state of affairs. Consider then a counterfactual 'sustained' by a law. The law links properties *F* and *G*. If at time *T*, a had been an *F*, it would have been a *G*. With the law as something atomic and the same in each instantiation, it is indifferent to the number of its instances (except, Armstrong maintains, that it is somewhere and somewhen instantiated). So, given the law, and given (what is in fact false) that *a* is *F*, it can be deduced that *a* is *G*. But with the molecular conception of the law, the hypothetical *a* that is *F* and so should be *G* constitutes, almost literally, an expansion of the law. But then what justification is there for arguing that the new instance will conform to the pattern found in the actual instances?

The question may be raised whether the same sort of difficulty just raised for a pure Regularity view does not constitute an objection to Martin and Place's view. The problem here flows from the fact that their properties and powers are particulars rather than universals. With properties as universals then any link between a universal and a particular power will be an atomic state of affairs. But with properties as particulars, all that will be available is a molecular state of affairs: each member of a class of exactly resembling properties bestows on the thing that has that property a member of a class of exactly resembling powers. Will there not be the same difficulty in extending the result to a supposed further case?

As has been already noted, this difficulty would be eliminated if there is a necessary connection between the possession of a certain property-trope and that property's bestowing a certain power. In that case the counterfactual would be perfectly secure. So much seems to hang on the

question whether Martin and Place are prepared to assert such a connection, and, of course, still more on whether this is defensible doctrine.

This is Armstrong's response to Martin's question about a truthmaker for counterfactuals. But before leaving this sub-section a final question should be considered. It may seem mysterious that an atomic state of affairs in which universals are linked should have the consequence that a regularity obtains everywhere in space and time. How is this magic possible?

The alleged situation is one where certain first-order states of affairs are excluded by a second-order relation's holding between universals. Cutting various corners, Armstrong suggests that for causal laws, at least in the simplest case, an entailment along the following lines obtains:

Cause(F, G)* entails *(x)(Fx→Cause([Fx],[Gx]))*.

This may be read as: *F*-ness causes *G*-ness entails that, for all *F*s, if something is an *F*, this brings it about that the something is a *G*. The entailment does not hold from right to left. On the right-hand side there is a mere bunch of singular causes. The left-hand side is the non-supervenient, higher-order atomic fact that constitutes the best explanation of the regularity recorded on the right-hand side. The square brackets on the right-hand side indicate that what we have here are types of states of affairs. If the letters *F* and *G* are taken to represent types of states of affairs (which constitutes a reasonable way of understanding a universal) then the extra brackets can be absorbed into the predicate letters. The predicate 'cause' is given an asterisk on the left-hand side because it is not strictly the relation of causation. It is, rather, that relation postulated to hold between *F* and G which makes *an F* apt for causing *a G*. One particular complication that the formula does not address is the fact that in causal sequences there is always the logical possibility, and often the empirical possibility, of the cause failing to bring about its effect because of the irruption of an external interfering factor. (Armstrong, at least, is unable to include absences of such factors in the cause because he rejects negative universals.) It may need to be included in the specification of an *F* that it is not to be interfered with. Only so will the right-hand side be a universal quantification. Note also that it is 'the simplest case' in that it is the very same thing—*x*—that features in the two states of affairs on the right-hand side. Actual cases might be more complex.

Armstrong submits that an entailment of the sort indicated is reasonably perspicuous. It may be worth noticing that other higher-order states of affairs exclude certain first-order states of affairs in the same way that

nomic connections exclude the states of affairs that contravene the law. Consider what Russell called 'general facts', facts of totality, the fact, for instance, that a certain huge assemblage of states of affairs is the totality of first-order states of affairs. Given that this assemblage is less than all the possible first-order states of affairs, then this higher-order state of affairs automatically excludes from existence innumerable states of affairs. (Armstrong owes this point to David Lewis.) The situation with nomic connections seems no different.

It is at this point that we can gain release from the profoundly unsatisfactory doctrine that causation is in its essence purely singular. It is a thinkable hypothesis that this is the truth about causation, and that in addition, despite this, causes come in regular patterns. But here is a more attractive hypothesis whose warrant is, nevertheless, purely *a posteriori*.[7] Singular or token causation is on this view nothing but the instantiation of a law where the latter is a relationship between universals. We have seen that if a law is conceived of in this way then the law is completely instantiated in each of its instantiations. This explains why it is correct to think that token causes are entire in themselves, but it allows us to think this without having to accept what seems the inevitable corollary: that causation is essentially purely singular. Armstrong thinks of this identification of singular causes with instantiations of strong laws that are relations between universals as like the empirical-theoretical identification of, say, water with H_2O.

There is a loose end here that Armstrong does not know how to tie up or snip off. What marks off a causal from a non-causal law of nature?

Must every disposition be manifested?

Martin says that Armstrong is committed to the view that every disposition (disposition-type) must be manifested at some time. Martin seeks to make this a reproach to Armstrong. A particular universal-instantiation may last but a brief time, but in that time it will ground many dispositions that are not manifested. All these dispositions will have to be manifested elsewhere. But

> the world doesn't have to be that busy.
>
> (p. 77)

Let us consider these unmanifested dispositions. As Martin is aware, the properties involved will be governed for the most part by functional laws. These are what Martin calls, at the end of his discussion of Place, 'the

system of relations of quantities'. Now if the hypothesis of Physicalism, or even something close to it, is true, then the system of relations of quantities may not be very extensive. If the dream of the unified field equation is ever fulfilled, then the system of physical laws may be summed up in the one equation.

In the case of a nomic relation holding between ranges of quantities, it is not necessary that every value of the antecedent variable be instantiated for satisfactory truthmakers to be provided for dispositions associated with that value. A functional law may be thought of as a higher-order law, or law about laws. The higher-order law connects two or more determinable quantities—mass, length, charge, etc. These quantities will be universals and they will be related by some function that takes the value of the antecedent quantity to some value of the consequent quantity.

Such laws allow for what may be called a counterfactual nomic connection. Suppose that the antecedent quantity never takes a certain value, for instance in the case of mass-quantities a mass greater than the total mass of the universe. Even so, with the functional law as truthmaker, it may be deduced that if that antecedent value had ever been instantiated, then the value of the consequent would have been such and such.

In the sort of case Martin is envisaging, a portion only of the antecedent is 'in position'. (The object is brittle but it is unstruck.) The functional law dictates what the nature of the consequent would have been, if the remainder of the antecedent had been in position. But there will be occasions when the whole of the antecedent is present and some value of the functional law will be instantiated. Which will be sufficient. The point may be summed up by saying that Armstrong requires no more than that each law, including each functional law, be instantiated once. That is not all that busy. If Martin says that is insufficient, then that is merely begging the question against the truthmakers that Armstrong supplies.

The Problem of Induction

The final point to be discussed is Martin's contention that, *contra* Armstrong, the latter's view of laws gives no particular advantage in dealing with the problem of induction. Armstrong's idea (independently proposed at about the same time by John Foster[8]) is to see induction as an abductive inference from regularities in the world to strong laws. (Induction is thus assimilated to abduction.) The particular form of the inference favoured by Armstrong is, of course, a connection between universals which will entail a regularity or lesser probability in the unobserved cases. But, says Martin,

> there is no argument intrinsic to the various theories of Armstrong, Place and Martin that shows that what could have been otherwise cannot actually be otherwise in some spatio-temporal region.
>
> (p. 79)

Like so many other inductive sceptics, Martin sets so high a standard for a solution to the problem of induction that it is not clear that anybody could come up with one. But Armstrong would claim that a universals theory has a significant advantage over those who deny universals. We have already noted the advantage. Universals are identical in their different instances. That is a conceptual point. From a certain sort of situation the same results are observed to flow. That is empirical observation. It is therefore a good abductive inference that what we are dealing with is the very same universal or range of similar universals both for the antecedents and the consequents in the observed sequences. But, if so, do we not have a good, though obviously non-conclusive, inference to an atomic though higher-order state of affairs which links the universals in question? That attempt to justify inductive reasoning is not available to Martin and Place.

NOTES

1 M.Tooley, 'The nature of laws', *Canadian Journal of Philosophy,* 7:669.
2 See his *The Categorical Structure of the World,* Bloomington: Indiana University Press, 1983, Sec. 82.
3 D.M.Armstrong, *What is a Law of Nature?*, Cambridge, Cambridge University Press, 1983, Ch. 8, Sec. 4.
4 E.Fales, *Causation and Universals*, London: Routledge and Kegan Paul, 1990, Ch. 8, Sec. 7.
5 Peter Forrest, 'Just Like Quarks? The Status of Repeatables' in *Ontology, Causality and Mind,* J.Bacon, K.Campbell and Lloyd Reinhardt (eds) Cambridge: Cambridge University Press 1990.
6 Armstrong owes his understanding of this point to David Lewis. See his 'Against structural universals', *Australasian Journal of Philosophy,* 64: 25–46. Unfortunately, however, Lewis also holds that all composition is mereological, and, as a result, he denies the existence of complex ('structural') universals and so is led to be sceptical about whether any universals exist.
7 Armstrong is greatly indebted to Adrian Heathcote for this suggestion. See A.Heathcote and D.M.Armstrong' Causes and Laws '*Noûs*, 1991, 25:63–73.
8 J.Foster, 'Induction, explanation and natural necessity', *Proceedings of the Aristotelian Society,* 1983, 83:87–101.

7

STRUCTURAL PROPERTIES

Categorical, dispositional or both?

U.T.Place

DIFFERENCES WITH MARTIN AND ARMSTRONG OVER LINGUISTICISM

It would seem that the differences between Place's position and Martin's are less substantial than those between Martin's position and Armstrong's or between Place's position and Armstrong's. But there are two issues on which Martin and Armstrong agree and Place's position differs. The first of these is one which, curiously enough, Martin raises at the very beginning of his chapter, the issue of linguisticism.

Martin is not alone in rejecting

> the Linguisticism that renders properties being had by objects as merely a matter of predicates being true or false of the object, if any, to which the subject term refers.
>
> (p. 71)

That should not surprise us when we reflect that all three participants in this debate subscribe

- to realism, understood as the claim that the universe exists independently of our conceptions, beliefs and knowledge about it,
- to the truthmaker principle, understood as the claim that, at least in the case of those propositions which are contingently true a proposition is true, if and only if there exists a situation (event or state of affairs) corresponding to that which the proposition depicts.

Linguisticism, as Martin characterises it, offends against both principles by collapsing reality and the segments of reality depicted by sentences (situations) into the truth of the indicative sentences used to depict them. To this extent there can be no difference between us. Differences only

emerge in relation to the cases that are cited as instances of this peculiarly philosophical disease. The example cited by Martin is the slogan

To be is to be the value of a variable,

introduced semi-seriously by Quine,[1] but taken progressively more seriously by his followers, if not by Quine himself, as an account of what it *is* for something to exist. Another instance of linguisticism is the doctrine that wanting is a propositional attitude, the doctrine that what the wanter wants is that a certain proposition be true. If I want something, say an apple, what I want and what, given the opportunity, I am disposed to bring about is the state of affairs whereby I obtain and, presumably, eat an apple. The fact that that state of affairs, if and when it exists, makes true the proposition expressed by the sentence *I now have and am eating an apple* is a massive irrelevancy as far as the wanter is concerned. What is wanted is the state of affairs, not the truth of the proposition that describes it.[2]

The linguisticism involved in the doctrine that wanting is a propositional attitude is important for our present purposes because it shows that linguisticism consists, not just in equating the existence of a property with the truth of a proposition in which a predicate is ascribed to a subject, but more generally in equating the existence of a situation with the proposition it makes true. It thus draws our attention both to the link between linguisticism and Martin's truthmaker principle and to what Place sees as another piece of linguisticism to which, despite the fact that both adhere to the truthmaker principle, both Martin and Armstrong, along with a majority of contemporary philosophers, subscribe: the doctrine that causal necessity is a species of logical necessity.

That this is an unacceptable case of linguisticism should be apparent when we reflect that logical relations, as the etymology of the word 'logic' implies, are relations between linguistic entities—sentences and propositions—relations whereby the truth of one or more sentences or propositions guarantees or rules out the truth of another. Causal relations, on the other hand, are relations between situations—states of affairs and events. Situations are neither true nor false. They either exist or do not exist. If a situation exists, it makes a proposition asserting its existence true. Such a proposition can stand in logical relations such as necessity and contingency with propositions asserting the existence of other things. But the situations themselves stand to one another only in relations of a spatio-temporal and sometimes causal kind. To suppose that causal relations are a species of logical relation is once again to confound the existence of a situation with the truth of the proposition its existence makes true. It is, perhaps, their commitment to this piece of linguisticism which

explains why, as Armstrong observes (p. 89), 'Martin and Armstrong find obscure' the '"counterfactual theory" of causal necessity' held by Place. For if you think of causal necessity as a species of logical necessity, the need for a separate account of causal necessity will not arise.

Another manifestation of this linguistification of the causal relation is the widespread belief that, despite obvious logical difficulties, causal conditionals, such as the causal counterfactual ('if situation *C* had not existed, situation *E* would not have existed') and the subjunctive conditional ('if at any time a situation of the *C* type were to exist, a situation of the *E* type would *ceteris paribus* probably exist') to which Ryle appeals in his analysis of dispositional statements, can be represented as conditional relations of the form 'If *p* then *q*' between the truth of propositions describing them. It is sometimes suggested that this form of linguisticism is committed only if we represent a sentence such as

> 1 'If someone were to strike the match against the sandpaper, it would ignite.'

as

> 2 'If "Someone strikes the match against the sandpaper" is a true sentence, "The match ignites" is a true sentence.'

and that no such objection can be raised to a form such as

> 3 'If it is true that someone strikes the match against the sandpaper, it is true that the match ignites.'

But on Place's view the only difference between renderings 2 and 3 is that 2 uses *oratio recta* or direct reported speech to quote the conditionally connected sentences; whereas 3 uses *oratio obliqua* or indirect reported speech. The effect of this is that 2 ties the claim to particular ways of formulating the two sentences; whereas 3 applies regardless of which particular sentence forms are used to 'express' the two propositions. The same linguisticism is present in both.

In Place's view, what makes philosophers reluctant to abandon the linguisticism involved in construing 'wanting something' as a prepositional attitude, in treating causal necessity as a species of logical necessity and in treating causal (i.e. subjunctive and counterfactual) conditionals as connecting statements or propositions is that the alternative raises what appear to be insuperable logical difficulties. The alternative is to accept that the objects of desire and the entities connected by the 'if…then …' in a causal conditional are situations which either, as in the case the objects of desire and those conditionally connected in a subjunctive conditional,

do not yet exist and may never do so, or, as in the case of the counterfactual, will never now exist. The problem is that standard quantification theory does not allow quantifications over non-existent objects. Consequently, in order to accommodate the phenomena of dispositions and causation we seem driven into the ultimate absurdity of asserting the existence of non-existent objects, such as the intentional objects in Meinong's *Außersein* and the possible worlds of possible-world semantics.

As he argued in the article which initiated this debate,[3] in Place's view the solution of this problem awaits the development of an intensional quantification theory which will allow us to quantify over the merely possible, as do the quantifiers of ordinary language. But until such a theory is developed, we shall have to make do with ordinary language.

THE ROLE OF STRUCTURE IN THE EXPLANATION OF DISPOSITION

The other issue where Armstrong follows Martin, whereas Place is reluctant to follow suit, is in moving the discussion away from structural properties as the basis for dispositional properties and towards a discussion of the categorical and dispositional properties of elementary particles, particles so small that they have no known microstructure. Place is not impressed by the argument that discussion of the dispositional/ structural property relation

> is vitiated by debate concerning whether properties at a higher level are anything over and above properties at a lower level.
>
> (p. 73)

This seems to him a straightforward matter. Of course, properties at the higher level are something 'over and above properties at a lower level'. Properties at the higher level are properties of the whole. Properties at the lower level are properties of the parts[4] which make up the whole. Since they are properties of different things, there is quite simply no way that we can hope to 'reduce' the properties of the whole to the properties of the parts. To that extent, all the properties of wholes are 'emergent properties' relative to the properties of the parts. But that should not be taken to mean that the properties of the whole cannot, at least in some cases, be predicted from a knowledge of the properties of the parts and the way those parts are put together so as to form the whole. Thanks to science, there are now many cases where just such predictions can be made. Such predictions, however, are only possible on the assumption

that there exists a causal relation whereby the parts, their arrangement and their properties stand as cause to the properties of the whole as effect. But, as Hume has taught us, causal relations hold only between 'distinct existences'. For that reason also, we have to conclude that the properties of the whole are not properties of the parts under some other guise.[5]

Place fully accepts and appreciates Martin's insistence that the issue of the distinction between the categorical (or 'qualitative' as he prefers to call it) and the dispositional needs to be disentangled from that of the relation between the properties of the whole and those of its microstructure; but he rejects the suggestion that considering the case of an elementary particle which has no microstructure allows him to deal with the former issue without being drawn into the latter. This stratagem fails, according to Place, because on what he calls his 'Limit View', every property has a categorical (qualitative) as well as dispositional aspect. Consequently, just as Armstrong's view commits him to finding a categorical property or set of such properties in which every property which appears dispositional actually consists, so Martin's view commits him to finding a qualitative aspect to balance what he takes to be the dispositional aspect of a property such as the brittleness of a pane of glass which others, such as Place, take to be purely dispositional.

Now, as we shall see later, not all the candidates for the role of qualitative aspect with respect to what others would think of as a purely dispositional property are to be found in the microstructure of the property bearer; but what an examination of the relevant examples *does* seem to suggest is that there are no non-dispositional features of the property bearer which are *not* structural properties. There would also seem to be no exceptions to the rule that all dispositional properties are underpinned by structural properties, both dispositional and non-dispositional, which in the case of a particle with no microstructure would have to be properties of the macrostructure.

If this is correct, it would seem that Martin's choice of the case of the microstructureless elementary particle, while allowing him to finesse the issue of the relation between the properties of the whole and those of the parts, deprives him of the possibility of providing any illustrative support for the claims that he makes about the relation between the non-dispositional (qualitative) and dispositional aspects of a property. Moreover, the claim (p. 73) that by choosing this example he has described an entity whose (unspecified) properties are 'non-structural' would appear to be without foundation. For if all properties have a qualitative as well as a dispositional aspect and all qualitative properties/ property-aspects are structural, there can *be* no such thing as property which is not structural.

MARTIN'S DISAGREEMENTS WITH ARMSTRONG

Martin notes that he and Place agree as against Armstrong that properties of the same kind are particular properties ('tropes') which resemble one another in some respect (other than being the properties of the same particular substance). Martin uses the adjective 'exact' to describe the kind of resemblance that must hold between particulars for them to be of the same kind. Place is inclined to wonder whether this is not too much of a concession to Armstrong's view according to which a universal is conceived as a kind of particular such that the very same individual is somehow present in every instance of that universal. As Martin points out, on such a view resemblance has to be exact. Otherwise, it is a different universal that is instantiated in the two cases. On the conceptualist view to which Place and, it would seem, Martin subscribe, there has to be *some respect* in which two things resemble one another for them to be 'of the same kind'. It is true that two things of the same kind cannot be only approximately similar in the respect in which their resemblance makes them instances of that kind. But to express this by saying that they must 'exactly' resemble one another in that respect is wholly pleonastic. 'Exactly' adds nothing to the resemblance that has not already been specified in saying that the two things resemble one another 'in some respect'.

This is Place's only reservation with respect to the contents of this second section of Martin's first chapter in which criticism is directed at Armstrong's theory of universals and laws of nature. There is, however, a comment which he would wish to contribute from his perspective to the discussion of Armstrong's theory of universals.

What puzzles Place about this theory is the apparent contradiction between the claim that universals are something over and above resemblances between their instances and the claim that is also made that such universals exist only in so far as instances of them exist. He thinks that what makes such a view seem plausible is the apparent *implausibility* of the conceptualist alternative. For if, as the conceptualist maintains, kinds/universals are mind-made, wherever the words 'kind' or 'universal' occur, we ought to be able to substitute words like 'concept' or 'intension' without loss or change of meaning. Yet clearly we cannot do this.

The solution to this problem favoured by Place is that terms such as 'kind' and 'universal' look at a classification from the point of view of the object classified. They focus on the features particulars need to have in common to be recognised as members of a class. Terms such as 'concept'

and 'intension', by contrast, focus on the mind's disposition to classify things in a particular way. The consequence of this difference of focus is that we predicate existence of kinds and universals under different circumstances from those under which we predicate existence of concepts and intensions. A concept or intension is said to exist in so far as some being has a disposition to classify things in that way. A kind or universal is said to exist in so far as there exist instances of that kind. Since instances of a kind can pre-exist any disposition on the part of an organism to classify things in that way, this usage forces us to say that kinds/universals existed long before the corresponding concept existed. Hence, the logicist/platonist/realist conclusion that universals exist independently of our conceptual scheme. The conceptualist reply has to be that what criterion of existence we employ is just a matter of which aspect of the classificatory process we want to focus on: the existence of the objects classified or the existence of an ability to classify them in that way.

MARTIN'S DISAGREEMENTS WITH PLACE

It seems to Place that Martin's criticism of his view of the relation between dispositional and categorical properties is based on a misunderstanding. He supposes that whereas on his own view every dispositional property has a categorical or, as he would say, 'qualitative' aspect, for Place there are two distinct properties such that the categorical property stands as *sole cause* to the dispositional property as effect. That this cannot be Place's view follows from the fact that he agrees with Martin in holding that without a dispositional property linking the two interacting objects, there can be no causal relation between them. That this must be so follows from Place's contention[6]

- that causal necessity is a matter of the truth of a causal counterfactual (the Hume-Mackie principle),
- that the truth of a causal counterfactual depends on the truth of a causal law statement governing the relation between states or events of the cause type and states or events of the effect type,
- that dispositional statements (statements ascribing a dispositional property to a particular substance) are causal law statements restricted in their application to the individual concerned and to the period of time over which the disposition persists (the Ryle principle),
- that the truth of such an individual dispositional statement is all that is required in order to 'support' the truth of a causal counterfactual (the Goodman principle), and

- that the possession by the individual of a dispositional property consists in the existence of a state of affairs which cannot be characterised other than by saying that it is the state of affairs whereby the individual dispositional statement is true (an application of the Martin 'truthmaker' principle-p. 15).[7]

It is a consequence of these principles that in order to explain how the structure of a substance contributes to its dispositional properties, in order, as it were, to get a causal relationship going between the structure of the property bearer and its dispositional properties, the structure must have dispositional as well as categorical properties. Armstrong's contention that all properties are ultimately categorical (in the sense of non-dispositional) cannot be right.[8] As Martin puts it,

> The dispositional is as real and irreducible as the categorical.
>
> (p. 74)

On that point Place and Martin are in complete agreement.

WEAK VERIFICATIONISM

Holding, as he does, that all properties have both a categorical and a dispositional aspect, Martin is concerned to deny the existence of 'pure dispositional properties' by which he means the kind of disposition described by Ryle[9] which is simply a matter of what *would* happen if certain contingencies were to be fulfilled. He attributes the belief in such properties (p. 81) to what he calls 'weak verificationism'. Place is not entirely sure how these remarks are intended to apply to his own position. 'Verificationism' in the sense intended here is presumably the doctrine that the meaning of a predicate does not extend beyond the observations which confirm or which, if made, *would* confirm the truth of a statement in which it is predicated of something. 'Strong verificationism' would then be a version of this doctrine in which the meaning of the predicate extends no further than the *actual* observations which have confirmed statements containing it in the past. 'Weak verificationism' would then be the more plausible version of the doctrine, which allows the meaning of the predicate to extend to events and states of affairs which, if observed, *would* verify the statement. Martin appears to believe that adherence to some form of weak verificationism is the only motive one could have for believing in pure dispositional properties which consist in nothing over and above what would or would be liable to happen, if certain conditions were to be fulfilled.

It is true that Place does use, in support of a purely dispositional account of dispositional properties, the argument that the only way to verify a statement asserting the existence of such a property is to carry out an experimental test which permits observation of what *does* happen when the relevant conditions are fulfilled (see above, p. 29). But that does not commit him to the verificationist view that there is nothing over and above the observations which, if they were made, would verify a statement asserting its existence whose existence is asserted by a statement containing a predicate ascribing such a property to an individual. The claim is that the existence of a dispositional property is a matter of what is liable to *happen*, not of what is liable to be observed.

Place accepts the actual here-and-now existence of dispositional properties; but all that exists *now* is a state of the property bearer, a substantive law of its nature, which can be specified *only* by reference to its potential future manifestations. He is persuaded that *that* is all there is to it, not by consideration of what can and cannot be observed at the level of common sense, but by the linguistic fact that is as far as the entailments of dispositional predicates (predicates ascribing dispositional properties to a substance) extend. To say that the glass is brittle is not a mere ungrounded prediction of what is liable to happen in the future. It is to say something about the glass. But what is said about the glass contains no mention of its structure, whether micro or macro. According to Place, all that is *entailed* by such a predicate is the probable existence of manifestations of the disposition whenever the relevant conditions are fulfilled. Of course, the observations which verify the existence of such a disposition are observations either of the occurrence or existence of a manifestation of the disposition on a particular occasion when the relevant conditions *have* been fulfilled, or of the absence of such a manifestation in otherwise similar circumstances when the conditions have *not* been fulfilled. But these observations tell us only what happened on those particular occasions. They are not, and could not conceivably be, observations of what would have happened if they were to be fulfilled at some time in the future or had been fulfilled on some occasion in the past.

THE SHARPNESS EXAMPLE AND MARTIN'S 'LIMIT VIEW'

We have seen that Place agrees with Martin in holding that the dispositional cannot be reduced to what Armstrong calls 'the categorical' and he calls 'the qualitative', meaning by that what does not project, as does the dispositional, beyond the here and now. He also agrees that the categorical/

qualitative cannot be reduced to the dispositional. Both are essential for causation. But Martin's 'Limit View' makes two further claims which Place cannot accept:

1 that every property has two aspects, a categorical/qualitative aspect and a dispositional aspect, that there are no properties that are purely categorical/qualitative or purely dispositional, and
2 that properties vary along a dimension which extends in one direction towards the extreme and uninstantiated limit of pure categoricality/ qualitativity and in the other towards the extreme and uninstantiated limit of pure dispositionality.

With regard to 1, Place accepts that there are *some* cases where a property has two aspects, a dispositional aspect and a structural aspect which is at least partly categorical in the sense of having no dispositional import. A case in point is the example of the sharpness of a knife which we encountered in a discussion in note form (note 5, p. 123 above) of Armstrong's suggestion that the properties of the whole might be said to 'supervene' on the properties of the parts.[10] It was argued in this connection that this suggestion needs to be evaluated in the light of a paradigm case of supervenience, that in which the goodness of knife or needle is said to 'supervene' on its sharpness. It now appears that the sharpness of a knife or needle provides, at first sight at least, an excellent illustration of Martin's contention that properties have both a categorical and a dispositional or modal aspect. Here, on the face of it, we have a property with two aspects: a categorical/qualitative/structural aspect— the fineness of the edge or point—and a dispositional/modal aspect—the object's propensity to cut or pierce. Moreover, the categorical/qualitative/ structural aspect of sharpness, unlike that of most other dispositional properties, is a feature of the *macrostructure* rather than the microstructure of the object. It may, therefore, give us a handle on how an elementary particle, such as the quark, which has no known microstructure can nevertheless have a dispositional property, its 'charm', without which we would have no evidence of its existence.[11]

On closer inspection, however, this example appears less apt for Martin's purpose. A serious discrepancy between the example and the requirements of Martin's 'Limit View' comes to light when we observe that to say of an edge or point that it is fine and to say of it that it is apt for the purpose of cutting or piercing is not to say the same thing. For, although the fineness of an edge or point is a necessary condition for a thing's being apt to cut or pierce other things, in order to have that

dispositional property, the object must also be harder and more rigid than the object to be cut or pierced. This shows us three things:

1 that the concept of 'sharpness' is an amalgam of two distinct concepts,

- the structural concept 'having a hard, rigid and fine edge or point', and
- the purely dispositional concept 'being apt to cut or pierce',

2 that the relation between the features of an object which are subsumed under these two concepts is a causal relation which, if Hume is right, entails that they are 'distinct existences' and not, as Martin claims, aspects of one and the same thing, and

3 that the structural property, having a hard, rigid and fine edge or point, on which the existence of the dispositional property, apt for cutting and piercing, depends is itself a combination of three distinct properties only one of which, the fineness of the edge or point, is categorical/ qualitative; the hardness and rigidity are both dispositional.

It is Place's contention that there is an intimate and universally applicable connection between the fact that the macro/microstructure of an object stands as cause to its dispositional properties as effect and the fact that the relevant structure consists of two parts or aspects, one categorical (in the sense of having no projection beyond the here and now) and one dispositional. For, contrary to Martin's allegation (above, p. 81), Place not only

> allow[s] dispositional properties to play a basic role in causality,

he insists that the existence of a causal relation, any causal relation, depends on the coincidence of two causal factors, one categorical/ structural, the other dispositional/modal. As argued in an earlier chapter (above p. 27), the categorical/structural element here is a matter of the spatial *relations*, either of contact or, in the case of relations such as gravitation and magnetic attraction, proximity between two substances, the causal agent and the causal patient, rather than anything properly describable as a 'categorical' or, for that matter, a 'qualitative' property. But such proximity or contact is not by itself sufficient for a causal relation to exist. To bring the causal relation to life, as it were, there must be a dispositional property governing the interaction between the two substances which provides what Hume[12] has called the 'cement' binding the cause and the effect together.

MICROREDUCTIVE EXPLANATIONS OF DISPOSITIONAL PROPERTIES

This causal analysis of the relation between the structure of the property bearer and the dispositional property it bears puts us in a position to address the issue which Martin has sought to avoid by his choice of the example of the microstructureless elementary particle, the problem of the relation between the properties of the whole and the properties of and arrangement of the parts of which the whole consists (its microstructure). In analysing this relation, a useful starting point is Aristotle's distinction between the *form* (μορφη) and *matter* (υλη) of a *substance* (ολσια). In the light of this distinction we can say that the microstructure of a substance is a complex composed of

1 the purely categorical existence of the parts of which the substance is composed (Aristotle's υλη),
2 the purely categorical existence of the spatial relationships between the parts (the purely categorical aspect of Aristotle's μορφη), and
3 the modal existence[13] of the dispositional properties of the parts of the substance whose interactions with one another, when juxtaposed in the way they are, maintain the integrity of the whole, and give it the dispositional properties which govern its interactions with other things which come into contact with it or penetrate it from without (the functional/dispositional aspect of Aristotle's μορφη).

As an illustration of this complexity we can cite Moliere's[14] familiar example of the hypnotic properties or *'virtus dormitiva'* of opium. Thus the property whereby opium puts an organism which consumes a sufficient quantity of it to sleep depends on

1 the chemical composition of opium,
2 the biochemistry and physiology of the brain, and
3 the way the two interact when they come into contact.

A striking feature of this example is that none of the three factors which give opium its dormitive power is purely categorical/qualitative. Like the dormitive power itself, the way opium interacts with the living brain is a pure dispositional property, a matter, not of what is, but of what would happen if.... Both the chemical composition of opium and the biochemistry and physiology of the brain have categorical/structural components; but neither are purely categorical/structural. Both are partly a matter of the purely categorical existence of certain molecules standing in certain spatial relationships to one another and partly a matter of the

dispositional properties both of the individual molecules and of the substructures of which they form part. Notice also that it is not just the microstructure of opium which gives it its dormitive power. The microstructure of the brain is equally important.

For, although language forces us to ascribe it to one substance or the other, the dispositional property can be seen as a property of the interaction between the two substances, a matter of what tends to happen when they interact. Thus the property of opium whereby taking it puts organisms to sleep is the same property as the property of organisms whereby they are put to sleep by taking opium. It is the property which, in Hume's phrase, 'cements' their interaction together. Viewed in this way, dispositional properties are properties neither of the causal agent nor of the causal patient, but of the causal interaction between the two.

The problem with this way of formulating the matter is that such interactions are not situations that currently exist. They are possible situations which may or may not arise in the future and which, on the other side of the interaction, may involve indefinitely many possible 'partners', to use Martin's term,[15] some of whom may already exist, while others do not yet do so. In order to participate in a causal interaction, if and when it occurs, the partner must not only exist, it must also possess the dispositional property which is the counterpart of that borne by the substance to which the dispositional property is ascribed in the first place. But so long as the disposition remains unmanifested, all that need exist for the dispositional statement to be true is the property and its bearer.

DEGREES OF PURE CATEGORICALITY/ DISPOSITIONALITY—THE EXAMPLE OF COLOUR

Another feature of Martin's Limit View which is supported by some examples, but not by all, is a variation between properties in the extent to which the categorical/qualitative or dispositional aspect is more prominent. This variation can be seen in the different varieties of the property of being coloured. On a physical realist theory of colour such as that to which all three participants in this debate would subscribe, the colour of an object is primarily a matter of the wavelength of light it is categorically emitting, transmitting or reflecting. However, there is a difference in this respect between the colour of a reflective surface or a transparent medium and that of a light source. The former is dispositional in that the colour of such objects is manifested only when light is reflected from the surface or transmitted by the medium. The colour of a light source is more

categorical, since it consists in the wave frequency pattern of light radiation *currently* being emitted by the source. But even here there is an element of dispositionality. For the relation between a light source and the radiation it emits is a causal relation; and, as all the participants in this debate would presumably concede, the difference between a causal relation and mere spatio-temporal conjunction is, at least in part, a matter of what would or would not happen, if things were different from the way they are. Moreover, no sensible account can be given of why we classify light, whether emitted, transmitted or reflected, in the way we do without some reference to its disposition to differentially affect light sensitive surfaces such as retinas and photographic plates.

However, there is no reason to think that this complex interweaving of pure categorical and dispositional elements in different proportions is typical of properties in general. It would appear to have much more to do with the complexity of the causal relations involved in visual perception and the physics of light than with any simple gradation along a dimension with pure categoricality/qualitativity at one end and pure dispositionality at the other, as postulated on Martin's Limit View. Moreover, the very fact that analysis of that complexity is possible presupposes that a clear differentiation between the categorical/ qualitative and the dispositional at the conceptual level is not only possible, but is readily achieved. This in turn suggests that, corresponding to the clear concepts of a pure categorical and a pure dispositional property, there are actual instances of such things.

PURE DISPOSITIONAL PROPERTIES: NOT ENOUGH CATEGORICALITY TO GO ROUND

From Place's perspective there is an argument which leads to the conclusion that, whatever may be true of pure categorical/qualitative properties, pure dispositional properties must exist. For if he is right in thinking

- that the relation between a dispositional property and the structural properties, whether macro or micro, which underpin it is a causal relation, and
- that, consequently, these structural properties must include a dispositional as well as a purely categorical element,

the structural properties cannot constitute either the categorical essence of the disposition as required by Armstrong or its categorical/qualitative

aspect as required by Martin. If the relation is a causal one, it must, according to Hume's principle, be a relation between 'distinct existences'. It cannot be a relationship like that between a character in a drama and the actor who plays the part, as proposed by Armstrong, or between the two sides of the same coin, as proposed by Martin. Moreover, if the structural properties are as much dispositional as they are purely categorical, it might be argued that *they* constitute two aspects of a single property; but that would leave the dispositional property they underpin without a pure categorical partner. If the fineness of an edge or point is to be the categorical/qualitative aspect of its hardness and rigidity, it cannot also function as the categorical/qualitative aspect of its aptness to cut or pierce. If the arrangement of atoms in a molecule of opium is to constitute the categorical/qualitative aspect of the binding and repelling properties of those atoms, it cannot also constitute the categorical/ qualitative aspect of the opium's propensity to put those who take it to sleep. It seems that there is just not enough categoricality/qualitativity around to supply every dispositional property with its own categorical/ qualitative partner, its categorical basis as required by Armstrong's theory, its categorical/ qualitative aspect as required by Martin's. But a dispositional property which has no categorical/qualitative partner is a pure dispositional property, something whose existence both theories deny.

Such dispositional properties are 'pure' in the sense that they do not *consist* in anything over and above a projection or orientation (there's no avoiding metaphors here) of the property bearer towards what would happen, if in the future certain conditions were to be fulfilled. They are not pure in the sense of H.H.Price's supposition[16] that there are dispositional properties which have *no* 'categorical basis' whatsoever. All such properties, according to Place, have a basis in the structure, either macro or micro, of the property bearer. It is just that, on this view, the dispositional property and its structural basis are two distinct and causally related things, not one and the same thing.

While the numerical imbalance between categorical and dispositional properties in favour of the latter suggests that some, if not all, dispositional properties are pure in the relevant sense, it turns out that there is no comparable evidence for the existence of the pure categorical properties, which Armstrong's theory demands and which, while rejected by Martin, would be predicted by his theory were he to concede the existence of pure dispositional properties. All the likely candidates are what Locke, following Galileo, calls 'primary qualities', things such as shape, size, internal structure, motion and stasis, all of which are a matter of the volume of space occupied by a substance at a moment or over a period of time,

and which consist in part of dispositional elements, such as the propensity to repel intrusion into the substance or the propensity to prevent its collapse. Moreover, as we have seen (p. 27), the purely categorical aspect of these properties appears to reduce to a spatial arrangement, either, as in the sharpness case, to the shape of the property bearer or to the spatial position of and the spatial relations between the parts of which its microstructure is composed, rather than to anything that would qualify as a specifically categorical/qualitative *property*.

THE PLACE PERSPECTIVE ON THE ONTOLOGY OF CAUSATION

As has been repeatedly emphasised in the course of this chapter, what leads Place to agree with Martin that

> The dispositional is as real and irreducible as the categorical.
>
> (p. 74)

is that the theory of causation to which he subscribes requires both pure categoricality, in the form of spatial contact or proximity between the causal agent and the causal patient, and dispositionality, governing the interaction between the two, as a *sine qua non* for the occurrence or persistence of the effect. This account of the mechanics of causation is laid out in the paper which initiated the present debate.[17] But that analysis is conducted entirely in terms of causal *language*, not in terms of the underlying causal *reality;* whereas it is the underlying reality that is the issue of this debate. It is, therefore, incumbent on Place to make clear the ontological implications of construing the linguistic epistemology of the causal relation in this way. Given the principle which all three parties to the debate accept, Martin's 'truthmaker' principle, the ontological commitments of Place's position are clear. At the linguistic level Place is claiming

- that to say that one event or state of affairs *A* stands as cause with respect to another ('distinct') event or state of affairs *B*, is to say that if *A* had not occurred or existed, *ceteris paribus*, *B* would not have occurred or existed; and
- that the truth of that causal counterfactual is a deduction from an individual dispositional statement of the form: If at any time, so long as the disposition persists, an event or state of affairs of the *A* type were to occur or exist within the life history of the individual in question, an event or state of affairs of the *B* type would or would probably exist or occur which, *ceteris paribus*, it would not otherwise have done.

On the truthmaker principle, the deduction of a causal counterfactual from an individual dispositional statement means that the same truthmaker, the state of affairs whose existence makes the dispositional statement true, will account for the truth of both statements. But, because the application of the causal law/dispositional statement is restricted to that portion of the life history of the individual over which the disposition obtains, there has to be a separate truthmaker for the causal law statement in the case of each individual who possesses the disposition in question and, where the disposition is present only intermittently, in the case of each period over which it applies. In this respect, Place's view contrasts with that of Armstrong who postulates a single Law of Nature whose existence makes true a universal law statement covering all instances where the same disposition or disposition type forms part of the life history of the individual.

It thus appears that, on this view, the possession by a particular substance of a dispositional property is the truthmaker of an individual dispositional/causal law statement which supports any causal counterfactual statement involving a manifestation of that disposition by the substance in question, and that there is no other way whereby a causal counterfactual statement *can* be supported.

The evidence (above, pp. 116–17) that dispositional properties belong to the interaction between substances rather than to the substances to which they happen to be assigned by language is a remarkable vindication of the notion that dispositions constitute the 'cement' which binds cause to effect. However, it must be admitted that the kind of causal interaction envisaged both by the description given of the phenomenon and by the examples cited is not the kind of causal relation envisaged by Place when he argues, against Martin's dual aspect theory, that the structure of a substance stands as cause to its dispositional properties as effect. For this is not an interaction between two distinct and separate substances, as when one billiard ball strikes another and propels it forward. It is an interaction within a single substance between its structure and its dispositional properties.

The notion that there can be and are causal relations between different features of the same substance is undoubtedly problematic in that it appears to conflict with Hume's principle whereby the causal relation holds between 'distinct existences.' This is not a great problem in that the majority of cases in which the structure which stands as cause to a dispositional property of the whole as effect[18] is the microstructure of the property bearer. For, in this case, the causes of the possession of a dispositional property by the whole are properties, not of the whole, but of its parts, their arrangement and *their* dispositional properties.

A more difficult case is that of the sharpness of a knife or needle discussed above. Here the properties of hardness, rigidity and fineness of edge or point which, according to Place, stand as cause to the propensity to cut or pierce as effect are all properties of the same substance. It is arguable, moreover, that the effect, the propensity to cut or pierce, is simply a special case of the propensity to resist penetration or bending by other things in which hardness and rigidity consist. The only consideration which supports the view that these dispositional properties constitute 'distinct existences' in the sense of Hume's principle is the fact that it is only when combined with the categorical property, fineness of edge or point, that hardness and rigidity generate the propensity to cut or pierce. But perhaps that is enough. That, certainly, has to be Place's view.

Conventional wisdom which in this case has its source in Hume's discussion of the matter holds that two situations *A* and *B* are 'distinct existences' if under *some* description it is not self-contradictory to suppose that situation *A* exists or occurs and situation *B* does not.[19] The qualification 'under some description' is required in order to rule out cases where, for example, *A* is described as the cause of *B* in which case the description makes the denial that *B* existed or occurred self-contradictory. In the present case, the supposition that a point or edge is fine, hard and rigid, but is not apt to pierce or cut, might seem self-contradictory. Consequently, the case for regarding the structural properties as existences distinct from the disposition to cut or pierce which they engender has to rest on the fact that there are three different properties at work here such that it is not only conceivable, but a matter of experimental demonstration, that in the absence of any one of them, the dispositional property either ceases to exist or fails to materialise.

NOTES

1 W.v.O.Quine 'On what there is', *Review of Metaphysics*, 1948. Reprinted in *From a Logical Point of View*, Cambridge, MA: Harvard University Press, 1953, Chapter I.

2 There is an interesting difference in this connection between Place and Martin concerning the nature of propositions and propositional attitudes. According to Place (U.T.Place, 'On the social relativity of truth and the analytic/ synthetic distinction' *Human Studies*, 1991, 14:265–285),

> there is nothing to a proposition or thought over and above the actual and possible sentences which are or could be used to say the same thing in different ways on different occasions. (Place, 1991, *op. cit.*, p. 273)
>
> It is an implication of this view that animals and human infants who lack the ability to construct sentences formulate no propositions and can only be said to have a propositional attitude, such as knowing, remembering or believing that so

and so is the case, by invoking the fiction that a being that cannot construct sentences can do so. Martin by contrast (C.B.Martin 'Proto-language' *Australasian Journal of Philosophy*, 1987, 65:277–289) argues that the representations which control the behaviour of pre-linguistic organisms have a structure which is sufficiently similar to that of the sentences of human natural language for terms such as 'proposition' and 'propositional attitude' to have a literal non-fictitious application to the mental life of such creatures. However, this difference between Place and Martin does not affect the agreement between them over the issue of linguisticism, since on both views propositions are construed as *representations* of reality. They form part of the reality represented only by *qua* features of the linguistic or, in Martin's case, language-like mental representations constructed by living organisms.

3 U.T.Place, 'Causal laws, dispositional properties and causal explanation' *Synthesis Philosophica*, 1987, 3:149–160.

4 Parts here in the sense of discrete functional components rather than arbitrary slices or portions. Place is indebted to David Sanford for drawing his attention to this important distinction.

5 Armstrong (personal communication) comments:

The properties of the whole might still *supervene* the parts, their properties and relations to each other.

Place replies:

This is an interesting suggestion. However, consideration of the example of the good picture, given by Hare (*Language of Morals*, Oxford: Clarendon Press, 1952, pp. 80–81) when he introduced the term 'supervenience', suggests that it is not the kind of relation which applies in this case. In Hare's example the goodness of the picture 'supervenes' on some unspecified aspect of its visual appearance. In this case, both the goodness and the unspecified aspect of the visual appearance of the picture are properties of the picture. Neither is a property of the picture's microstructure. Moreover, although we say, in such a case, that it is its visual appearance which makes it a good picture, this is not a causal relation. This can be demonstrated by considering a comparable example to that given by Hare in which the subvenient property *is* specified: the case where the goodness of a knife supervenes on its sharpness. It should be clear that the goodness of the knife and its sharpness are not distinct causally related existences in the way that the horsepower of an engine and the cubic capacity of its cylinders are distinct causally related existences. To say that the knife is sharp is part of what it *means* to say that it is a good knife. To say that its cylinders have a certain cubic capacity is *not* part of what it means to say that an engine has a certain horsepower. An engine with cylinders of a different cubic capacity or with no cylinders at all could have the same horsepower. No knife that was not sharp could be a good knife.

6 Place, 1987, *op. cit.*

7 If this conception of dispositional properties appears excessively paradoxical, as it apparently does to Armstrong (personal communication), it may help to say that, on Place's view, dispositional properties stand to dispositional statements (construed, following Ryle, as laws governing the behaviour of the property bearer in its interactions with other things) in the same relationship that Armstrong's strong universal Laws of Nature stand to the laws formulated by scientists.

8 Armstrong (p. 90) admits that 'structures such as bondings, the sort of structures that are relevant to dispositions such as brittleness, are, as Martin says, "evidently intrinsically dispositional" themselves.' This leads him to 'plead for a grain of salt to be applied to talk of categorical structures directly underlying *ordinary* dispositions'. Presumably the pure categoricality in which, he thinks, dispositionality really consists emerges only at the level of what he calls elsewhere (p. 94) 'total science'.

9 G.Ryle, *The Concept of Mind,* London: Hutchinson, 1949.

10 Place is indebted to a discussion on the topic of supervenience with his colleague in the Leeds University Philosophy Department, Dr Harry Lewis, for this example.

11 Unfortunately, although the properties of an object which give it the ability to pierce or cut are properties of the *macrostructure* rather than the microstructure, one of them, the dispositional property of hardness, requires and receives an explanation of its existence in terms of the *microstructure* of its owner. This suggests that even if a macrostructural explanation were available for the dispositional property of a fundamental particle which *has* no microstructure, that macrostructural explanation would have to include another dispositional property for which, in the absence of a microstructure, no explanation could be given. We would simply have to accept that elementary particles have dispositional properties which constitute an inexplicable brute fact about the way the universe is constituted.

12 D.Hume *An Abstract of a Treatise of Human Nature,* J.M.Keynes and P. Sraffa (eds) Cambridge: Cambridge University Press, 1938. Hume, however, takes the 'cement of the universe' to include the essentially psychological principles of Resemblance and Contiguity, as well as that of Causation. The restriction of this powerful metaphor to Causation alone is due to John Mackie (J.L.Mackie *The Cement of the Universe,* Oxford: Clarendon Press, 1974).

13 Strictly speaking, as Martin points out, sentences which assert the existence (possession by a substance) of a dispositional property are no less categorical than those which assert the existence of a categorical/qualitative property, such as the possession by a substance of a certain shape. What is asserted by such sentences is the (categorical) existence of a state of affairs which *makes true* a modal sentence describing what would happen if certain conditions were to be fulfilled. To speak of this as 'modal existence' is to collapse three things into one: (1) the (categorical) existence of a dispositional property, (2) the truth of a categorical sentence asserting the existence of that state of affairs, and (3) the truth of a modal sentence which characterises that state of affairs, but does *not* assert its existence.

14 *Le Malade Imaginaire.*

15 I take it that Martin is making the same point when he speaks (see p. 133 below) of 'reciprocal disposition partners for mutual manifestation'. However, it appears from personal discussion with him that the 'partners' he has in mind are the properties rather than, as assumed here, the property bearers. This discussion also led to new light being thrown on the distinction deployed in this passage between the causal agent and causal patient. Since in every causal interaction both parties are changed as a consequence, the distinction between the causal agent and the causal patient is a matter of which of the two is changed most (the patient) and which comes off relatively unscathed (the agent). In a case where the changes are more or less equal, as when a cube of salt is dissolved in a bowl of water (Martin's example), it is a matter of which effect, the disappearance of the cube or the water's becoming salty, is of interest to the speaker.

16 H.H.Price, *Thinking and Experience,* London: Hutchinson, 1953, p. 322, cited by D.M.Armstrong in *A Materialist Theory of Mind,* London: Routledge & Kegan Paul, 1968, p. 86.

17 Place, 1987, *op. cit*.

18 As evidence that dispositional properties whose source lies in the microstructure of the property bearer are a very substantial majority of all cases, one may cite the fact that all the dispositional properties mentioned by Geach *(Mental Acts,* London: Routledge & Kegan Paul, 1957, Chapter 5), the brittleness of glass, the flexibility of rubber, the magnetic properties of an iron bar, the dormitive power of opium, are of this type, the fact that all the behavioural and developmental dispositions of living organisms are, and the fact that much of the prestige of the empirical sciences depends

on their track record in laying bare the microstructural basis of dispositional properties which would otherwise have remained totally mysterious.

19 Place is indebted to David Sanford (personal communication) for pointing out that in an earlier version of this sentence he had inadvertently committed himself to a view which he had conspicuously rejected more than forty years earlier (in Place, 'Is consciousness a brain process?', *British Journal of Psychology*, 47, 1956), namely the view that two logically distinct descriptions cannot refer to one and the same thing.

8

REPLIES TO ARMSTRONG AND PLACE

C.B.Martin

REPLY TO ARMSTRONG

Connection of universals or types

Armstrong's numerically *one* universal has its *only* existence in a plurality of spatio-temporally distinct and intermittently existent and logically distinct instantiation-particulars. Unlike Platonism, Armstrong's universal or type is *nothing* except this scatter of logically distinct, non-identical instantiations that, in ways Martin cannot fathom, contain or have 'in' them and 'fully' in *each* the numerically ONE universal or type.

The notion of 'linking' or 'connection' must be Armstrong's essential causal primitive. Armstrong has only this for making the distinction between accidental and non-accidental (causal) co-occurrences between universal instantiations.

Armstrong attempts to make clear the relationship between what is connective with what and how, in the following passages.

First, Armstrong claims the advantages of connection between 'universals or types' rather than logically distinct particulars (such as tropes).

> It is easy to see then that if the connection holds at the level of universals, then, automatically, the regularity is entailed. I do not think that the entailment can be captured formally. Rather, it is, to use Carnap's phrase, a fairly obvious 'meaning postulate'. The connection of properties that are universals expresses itself, without exhausting itself, in a corresponding regularity. Just as a state of affairs of *a*'s being *F* entails the existence of *a* and *F*, without being exhausted by the existence of the constituents, so the postulated higher -order connection of universals entails the existence of

> regularities (which may be statistical only, or conditional upon the absence of extra interfering factors, etc.), but is not exhausted by the regularities.
>
> (p. 47)

> It is conceded that the connections between properties, though real, are theoretical entities which have to be postulated. But once postulated they explain the corresponding regularities, and their mode of connection with the regularities is actually quite perspicuous. In particular, the mode of connection does not, as is sometimes alleged, involve any mysterious necessary connection between *distinct* existences.
>
> (p. 46)

But, also, Armstrong must express his view of connection as that between *universal-instantiations* because, on his account, universals exist *only* in these logically distinct and spatio-temporally separate instantiation-*particulars*, that is, *distinct* existences.

Connection and Connectability

Armstrong has two sets of terms:

1 'forward linking' (p. 44) and 'ensures…would have' (p. 42) and 'apt for causing' (p. 101) and
2 'Connection' or 'connecting', 'linkage' or 'linking', which he claims to be between 'universals or types'

which are used to

1 sustain counterfactuals concerning those numerous universal instantiations that are *not* positive instances of the connection-universal, as in the case of solubility of salt *not* placed in water, and
2 in contrast with universal-instantiations between which instantiations there is a connection-universal-instantiation, namely, salt dissolving in water.

What are needed *within* the universal-instantiations that are *not* 'positive instances' of the relevant connection-universals (because they are *not* connecting) are, on Armstrong's own terms (p. 101), '*forward* linking' and 'apt for causing' and 'ensures…would have' that are not cases of actual connection, but of *connectability*, that is, primitive dispositionality. Perhaps it is some sense of this that leads Armstrong, in a typical moment of admirable candour to admit,

> There is a loose end here that Armstrong does not know how to tie up or snip off. What marks off a causal from a non-causal law of nature?
>
> (p. 102)

Armstrong has said earlier (p. 47) that a law 'is complete in each instance.' That may be, but then it does not *follow* that there are not *different* laws instantiated in different parts of the actual world. Regularity cannot be *entailed* from a law that 'is complete in each instance', as he earlier claimed, because instances are 'distinct individuals' and logical relations, according to Armstrong cannot exist between 'distinct individuals' (see pp. 135–6 below).

The tension and ambiguity in Armstrong's account of 'connection' can now be schematised.

Two cases

Consideration of two cases reveals the ambiguity in Armstrong's use of the term 'connection' as between certain universals or types and as between *some* but not all instantiations of those universals. The resolution of this ambiguity forces him into accepting dispositionality as an unreduced primitive:

Case I

a' There are *F* and *G* universals.

b' There is a further and 'second-order' universal, namely the Connection between *F* and *G*. Call this *CFG*.

(The universals *F* and G and *CFG* exist, on Armstrong's account, only in and through their spatio-temporal instantiations. These instantiations are a scatter of logically and spatio-temporally separate individuals.)

c' There are a specific, individual *F* and *G universals-instantiations* at T_1, P_1. Call these FG-IN'.

d' There is *further* specific, individual Connection of *F* and *G (CFG)*-universal-instantiation at *TP*. Call this *C FG-IN'*.

Case II

a" There are *F* and *G* universal-instantiations *(FG-IN")* at *different* times and places from one another, that is, (*F* at T_1P_2 and *G* at T_2P_1)

b" There is *no* Connection-universal instantiation *(CFG-IN")* between the instantiations of *F* at $T1P_2$ and *G* at T_2P_1

Where, because of spatio-temporal distance or some other fact, there are universal-instantiations, *FG-IN", without* their Connection-universal instantiations, *CFG-IN",* it would seem that the purported Connection-universal between *F* and G universals must hold as a *Connectability-disposition universal.* Call this C^DFG.

C^DFG is instantiated in Case I. Call this $C^DFG\text{-}IN'$.
C^DFGIN' also has a *manifestation* in Case I. Call this $C^{DM}FG\text{-}IN'$.
C^DFG is also instantiated in Case II. Call this $C^DFG\text{-}IN"$.
However, $C^DFG\text{-}IN"$ does *not* have a manifestation $C^{DM}FG\text{-}IN"$ in Case II.

I cannot see an alternative for Armstrong. When the details of his model are made fully explicit, he must have dispositionality-universals as *unreduced primitives,* or his concept of a connection-universal counts for nothing in the matter of accounting for dispositionality and tying what he himself admits are the 'loose ends' (p. 102) left in his theory for the all-important task of distinguishing between causal and non-causal laws.

First-order and higher-order universals and Regularity Theory

That it is the numerically *identical* universals that are instantiated, counts for little in all of this, for they must be co-related *through* their instantiations *either* accidentally (even exceptionlessly so) or non-accidentally.

The Regularity Theory can be expressed *equally* well in terms of universal-instantiations as it can be in terms of tropes. *Furthermore,* a Regularity Theory can be expressed in terms of higher-order relations (universal-instantiations) for regularities between first-order universal instantiations. This would be very like, as Armstrong himself suggests, Russell's 'general facts'. It would be a case of *co-occurrences* of universal-instantiations. It is not clear that Armstrong is doing more than just *that.* If there are any good arguments against the Regularity Theory they apply equally to this *form* of it. There is nothing *here* to distinguish accidental from non-accidental laws of nature, even though there is recourse to higher-order universals and constancies in their contingent relations to the first-order universal.

Higher-order-connection of universals as *itself a* universal and non-connecting universal-instantiations

Armstrong says:

> The connection of properties which, on this view, constitutes a law has no existence except in those cases where the law is *positively* instantiated. Indeed, it seems right to think of the connections of universals, instantiated in particular instances, as themselves universals. If this is right, the law is complete in each instance, just like any other universal.
>
> (p. 47)

So, then, *what* of the cases (Armstrong's non-positive instances of the law) of the universals being instantiated but not of the law (that is not the connection-universal between them) being instantiated? This would be, typically, where the universal instantiations are not sufficiently spatially or temporally contiguous. Surely, *here* is the case for something to be in the non-connected property or universal-instantiations. Martin suggests that dispositionality would do nicely here.

Higher-order functional laws and the infinity of uninstantiated values and Armstrong's answer to the 'busy world' objection

Martin has objected to Armstrong's claim that laws, like all other universals, have their existence *only* in their instantiations because laws and the counterfactuals they sustain typically range over a gradient of an infinity of quantities and values that are *not* instantiated. To insist on such infinite instantiations would involve an *ad hoc* and ludicrously busy cosmic ontic catch-up.

Armstrong suggests a functional higher-order law as the solution.

> In the case of a nomic relation holding between ranges of quantities, it is not necessary that every value of the antecedent variable be instantiated for satisfactory truthmakers to be provided for dispositions associated with that value. A functional law may be thought of as a higher-order law, or law about laws. The higher-order law connects two or more determinable quantities—mass, length, charge, etc. These quantities will be universals and they will be related by some function that takes the value of the antecedent quantity to some value of the consequent quantity.

> Such laws allow for what may be called a counterfactual nomic connection. Suppose that the antecedent quantity never takes a certain value, for instance in the case of mass-quantities a mass greater than the total mass of the universe. Even so, with the functional law as truthmaker, it may be deduced that if that antecedent value had ever been instantiated, then the value of the consequent would have been such and such.
>
> (p. 103)

How, then, is the functional law instantiated *for* those uninstantiated (non-existent) values? *How* is there *anything* instantiated even at higher-order level such that it is the truthmaker for counterfactuals? There is still a truthmaker gap that needs to be filled because the functional higher-order law is 'gappy' in its uninstantiated functions.

Again, this should be the place to make use of something (in the *cases* in which dispositions are not manifested, salt not in water but soluble in the water) that is 'in the properties' (p. 44) that 'ensures (or renders enormously probable)' *(ibid.)* or 'a certain forward linking of universals' (p. 44), all of which descriptions, used by Armstrong, more happily fit Martin's Limit View than anything provided by Armstrong himself

Higher-order-relation-universal-instantiations and mixed worlds

Armstrong's introduction of a higher-order-relation-universal-instantiation between the relevant universals-instantiations is a move that may accomplish less than he realises.

The higher-order relation is a unique relation or a set of *differing* relations between the instantiations of the relevant universals. Armstrong points out the parallel with Russell's 'general facts'. The general fact or the higher-order relation or higher-order relations between the relevant distinct instantiation particulars may be one of uniformity or regularity or that of *different* or alternative or disjunctive relations—namely, a case of a 'mixed world'. In this case, though the instantiations that are disjuncts of the higher-order-relation-disjunction would occur in different spatio-temporal regions, those regions need not themselves be specified in the higher-order relation disjunction, so the disjunction itself can be general and not space-time specific.

Allowing such a mixed world would respect the logical distinctness of the universal *instantiations* over which the higher-order-relations-instantiations range. *Disallowing* such a mixed world is *ad hoc* and would

affront the logical distinctness Armstrong allows the instantiation-particulars. Humean scepticism, if a problem for anyone, is equally so for Armstrong.

Specifying a higher-order relation-between-universals that is *itself* a universal, does *nothing* more than, through *its* relation-instantiations, instantiate the general fact of the regularity of the co-occurrences of, or perhaps the *variety* of co-occurrences of, relevant universal-instantiations-particulars, presumably unknown, through 'all' space-time. It takes not one step toward 'linkage' or 'linkability' and has *nothing* to say concerning Armstrong's outstanding problem of distinguishing 'a causal from a non-causal law of nature' (p. 102).

The Limit View further explained and a glimpse into a deep issue

The Limit View needs to be stated again. Martin has said,

- To speak of a qualitative property is to take some real property as *at* the limit of *only* its bare potency-free pure act of being, which, of course, it never is;
- To speak of a dispositional property is to take some real property as at the limit of *only* its capacities and dispositions which, of course, it never is.

> No real property of an object, event, process or even space-time segment or field can be thought of as existing at *either* limit. The thought of anything being at either the limit of the purely and only qualitative disposition-free pure act of being (such as the potency-free qualities of the God of Thomas Aquinas) or the limit of the pure state of potency (such as the qualities-for-reduction-to-possible-operations of a thoroughgoing operationalism or qualities as measurement-probability 'bundles') is conceptual artifice and unrealisable abstraction suggested, perhaps, by some of the surfaces of grammar.
>
> (p. 74)

Armstrong's suggestion that '…Martin would not deny…Prima facie, a world where things have categorical properties without a dispositional side is possible' (p. 96) is *false*. When he goes on to say 'Martin might claim that such a world would be an inert world, because it would be a world that lacked causality' *(ibid.)*, he is correct in thinking that Martin would claim that an *inert* world was possible but that a world or entity or

property with no dispositionality was *not* possible. To say that a thing or property was *intrinsically* incapable of affecting or being affected by anything else isn't just a case of inertness and it amounts to no-thing.

The Limit View should *not* suggest that there are 'degrees' of dispositionality or qualitativity of some real property.

It isn't that an intrinsic property or quality is purely qualitative but dispositionality is 'supervenient' on it. Properties are indissolubly qualitative-cum-dispositional or dispositional-cum-qualitative. The dispositional is as basic and irreducible as is the qualitative and there is no direction for one's being basic in a property and the other 'supervenient'. To separate one from the other as the really basic property is philosophical artifice and error.

It is useful to replace talk of cause and effect by talk of reciprocal disposition partners for mutual manifestations. Whatever resistance there may be to speaking of causality at the quantum level, it should be obvious that *quanta are not potency-free, in pure act, or at all times manifesting all of which they are capable* under every sort of manifestation-condition. Pure act is better left to the properties of God and, perhaps, the number two.

A purely non-dispositional qualitative property is as much a philosophical fantasy as that of the purely non-qualitative dispositional property.

Armstrong asks of the qualitative and dispositional sides of any property (on the Limit View)

> is the connection of the sides a contingent or a necessary one? It seems that it could not be contingent. For if it was, then it would be possible to have the categorical 'side' with different powers or even with no powers at all. And once this is allowed, what is the force of calling the powers a 'side' of just one entity?
>
> (p. 95)

Martin disagrees with Armstrong's acceptance of Hume's stricture

> there can be no logical links between distinct existences such as cause and effect
>
> (p. 95)

and his claim that

> This principle would in turn derive from the idea that necessity, absolute necessity, springs only from identity.
>
> (p. 95)

One needs to have a close look at a range of examples. In doing this, Martin will attempt to replace Humeanism and further clarify the relationships of the dispositional to the qualitative.

The dispositionality and qualitativity of any intrinsic property is similar to the way shape and size are of *extension.* In each case, one cannot exist without the other, though one can *vary* without the other. *Contra* Hume and Armstrong, they are distinct but not separable.

Contra Armstrong's Humeanism, there are even cases of distinctness that lack separability that also *must* co-vary, e.g. the old example of equiangular and equilateral.

On the Limit View one must logically exclude separability and affirm the necessity of co-existence of dispositionality and qualitativity for any property, but then one is free to decide on any given case whether their co-*variance* is necessary or contingent.

An example of necessary causal relations ('linkings') between distinct properties is *how* a square peg does not fit into a round hole the *way* a round peg does.

A seeming example of contingent causal relations ('linkings') between distinct properties is between the freezing of water and the expansion of water.

Examples of contingent causal relations may, following Locke's suggestion, be only 'seeming' examples. When we get to what is most basically constitutive of macroscopic entities and where the work gets done (on the principle that where the parts go, the wholes are sure to follow), amongst the 'finer interstices' and the 'insensible corpuscles', the appearance of contingency may disappear. It is there that the measures of quantities are fitted to the mathematicisations of nature with its accruing necessities.

Let there be a warning, 'This way lies Pythagoreanism.' We should see physics as a *partial consideration qua* the measures of quantities and not as the *expungement* of the qualities *for* and *of* which the quantities have a measure (see pp. 72–3)

Richard Feynman[1] says,

> if we look at a glass of wine closely enough we see the entire universe. There are the things of physics: the twisting liquid which evaporates depending on the wind and weather, the reflections in the glass, and our imagination adds the atoms. The glass is a distillation of the earth's rocks, and in its composition we see the secrets of the universe's age, and the evolution of stars…There are the ferments, the enzymes, the substrates, and the products. There

> in wine is found the great generalization: all life is fermentation…How vivid is the claret, pressing its existence into the consciousness that watches it! If our small minds, for some convenience, divide this glass of wine, this universe, into parts—physics, biology, geology, astronomy, psychology, and so on—remember that nature does not know it! So let us put it all back together, not forgetting ultimately what it is for. Let it give us one more final pleasure: drink it and forget it all!

The partial consideration of the qualities *qua* only their measures, works well enough until perhaps the end of the road of the *reductio ad absurdum* of Pythagoreanism. Then the task will be to state the indispensable qualities for which we considered only their measures. We must 'put it all back together' and that will take *more*, much more, as Feynman himself sometimes realised, than to 'drink it and forget it all!'.

We have been led by Quine and by others before and after him to think that, as it were, necessity and contingency are one, that is, there is no distinction in reality between them.

Martin is reminded of the comic strip in which one character says to the other, 'Marriage is where two people become one.' In the next panel the second character is clearly considering the statement. In the final panel the second character asks, 'Which one?'

It seemed that Quine's answer was 'All is contingent.' But, then, when Quine in 'Whither Physical Objects?' took the step for which Martin had waited since 1959 for him to take, namely, from the need of the existence of numbers (the measure for quantities) for physics, and an invocation of the Principle of the Identity of Empirically Isomorphic Theories (a very fancy term for the verificationism Quine never rejected) the step could be taken to Pythagoreanism—all is number, that is, numbers and their relations—the mathematicisation of space and time. After *that*, the Quinean answer to the question 'Which one?' might better be 'All is *necessary*.'

Armstrong says, concerning the debate on whether or not there are necessities in nature as Martin envisages,

> In Armstrong's view this is to load the world with necessities in an unacceptable way. But the issues here are so deep and so difficult to argue about constructively that it may be best at the moment to pass on.
>
> (p. 96)

Martin has tried to say a bit more about this difficult area and is also ready 'to pass on'.

The theory of reciprocal disposition partners for mutual manifestation—a replacement for causality

Armstrong says, 'Martin, it seems, holds a purely Singularist theory of causation' (p. 89) and then goes on to state the differences between Martin and himself using the old Humean notions of cause and effect as distinct and separable events. Martin's view is, indeed, Singularist, but he wishes to *replace* cause and effect by the more basic notions of disposition and manifestation, or, more explicitly, by the notion of reciprocal disposition partners for mutual manifestation. Armstrong fails to see the implications of such a radical view.

The typical (when considered *carefully*) cause-effect situation is that of two playing cards *each* propping up the *other*. What is cause and what is effect in the dissolving of salt in water? Thinking of cause and effect as distinct and separate events raises old conundrums. If the cause is *prior* to and not contemporaneous with the effect then it is 'too early' because there would be a temporal gap in which the cause was not 'brought up' to the effect. If the cause is at any stage *contemporaneous* with the effect then it is hard to see them as separate, distinct existences as Hume and Armstrong wish and also the cause is 'too late' because at that stage the effect is already happening.

It is important to see that the notion of manifestation of a disposition is not the notion of anything purely qualitative or disposition-free.

The state of dissolving or being in solution, though a manifestation of the reciprocal disposition partners of solubility and solvent, is not *itself* disposition-free. Apart from the fact that to be in solution involves the dispositionality for recoverability of what is in solution, it is also the case that the properties involved in something dissolving or being in *solution* are not in pure act but redolent in unmanifested dispositionalities *themselves*.

Causality and the Non-Existent Conditions

The notion of reciprocal disposition partners for mutual manifestation can explain, as Armstrong cannot, the nature of the causal relevance of absent or non-existent factors without undue reification of the non-existent.

The production, prevention or the *continuance* and *sustaining* of various properties of an entity (or spatio-temporal segment of a field), some of which may even be essential for its existence, can be seen as *mutual* manifestations. They are mutual manifestations of the properties, *qua* certain dispositions, *with* the reciprocal dispositions of its partners. It is a

model of reciprocal mutual dependence. If the reciprocal dispositional partners are not present then mutual manifestations involving the *continuance* of the properties and the entities for which they may be essential are not present either.

The Non-Interacting Elementary Particles Case again

Martin presented a case (p. 74) of kinds of elementary particles in some spatio-temporal region *different* from kinds of elementary particles in some other vastly distant spatio-temporal region such that they *never* interact, nor is there *anything* in the universe *like* them that *has* interacted. Nevertheless, they are *disposed* to interact in some entirely idiosyncratic way despite the fact that, in the nature of the case, there *never* is any manifestation-instantiation of such unique and totally idiosyncratic dispositions.

This case was put forward as an intuitive counter-example to Armstrong's claim that every disposition *must* have manifestations somewhere, somewhen. This was needed by his account in order to avoid a Platonic view of universals.

This non-interacting elementary particles case (as well as another argument Martin presented on pages 9–10 of 'Anti-realism and the world's undoing'[2]) should serve as a counter-example to the view that causal dispositions are to be explained in terms of qualitative states in virtue of which counterfactual or probability statements are true. This is so, because, in the nature of the case, counterfactuals or probabilities would be left hanging with *no* relevant actual *frequencies*.

To put it another way, given that the dispositionality involved is a contingent matter, *what* would it be *about* the pure qualitativity of the proper ties of the elementary particles that would make *true* their dispositionality for mutual manifestations of one sort rather than their dispositionality for mutual manifestations of some other sort when there are no relevant manifestations either way? Wouldn't it have to be a case of '*anything goes*'? And this would simply be equivalent to rejection of the case with a shrug.

Armstrong has suggested as a way of dealing with this case that it should be considered a parallel to an irreducibly probabilistic case in which there are *repeated* cases of something *Q* and sometimes *R* with identical circumstances and boundary conditions with no hidden variable by which to explain one occurring *rather* than the other. The disposition and its associated counterfactual disjunctive (that is '…would have been

Q or *R*') obtain, and there would be 'no fact of the matter' as to *which* would have been.

> Begin by considering an irreducibly probabilistic law having the form: 'If *P,* then *Q* or *R* (but not both), with *Q* and *R* equiprobable'. Such a law will, like any law, sustain counterfactuals. Now consider a true counterfactual about an object *a* at time *T:* 'If a at *T* had had property *P,* then *Q* or *R* would have resulted'.
>
> > Very few, it seems, would be prepared to assert that there is some truth of the matter about the way that the situation would have developed—the *Q*-way or the *R*-way—if *a* had in fact been P. The counterfactual holds: just one of *Q* and *R* would have occurred. But there would seem to be no truth of the matter about which alternative would have occurred. Excluded middle fails.
>
> (p. 92)

Armstrong goes on to attempt to make a parallel with the non-interacting elementary particles case.

> What we are given is a generalisation, which may be thought to have nomic force, that modes of interaction between different sorts of fundamental particles (say between particle pairs) differ irreducibly among themselves. This then allows us to assert a true conditional that if particles of type *A* and *M* were to meet (by hypothesis they never do) then they would have a unique mode of interaction. But, and of course this is the point of analogy with the case of the irreducibly disjunctive law, the suggestion is that there need not be some determinate mode of interaction that an *A* and an *M* would have exhibited, if they had met after all. If *a* had been *P,* as it was not, the outcome would have been *Q* or *R*. But although this statement is true, there seems to be no truth of the matter as between *Q* and *R*. It is not like 'That was either Fred or Jim'. Similarly, if an *A* and an *M* had met, as they did not, then it is true to say that the outcome of their interaction would have been idiosyncratic. But, the suggestion is, we are not forced to conclude that there is some unknown but perfectly determinate mode of interaction that would have occurred.
>
> (p. 92)

There is no parallel between the two cases. Armstrong needs the repeated occurrences of *Q* and of *R* as *instantiations* of the disjunctive law *Q* or *R*. In the particles case there are no repeated occurrences as instantiations of *any* law *whatsoever.* Armstrong has no right to say anything more about counterfactuals concerning these particles than *'Anything goes!'*, that is, *nothing*.

The best image of cause and effect is that of John Locke's,[3] namely, the turning of a key in a lock. Also the best image of a disposition is that of a lock with its 'fit' *ready* to be turned by what may never exist, or of a key with its 'fit' there *ready* to turn what may never exist. The 'finer interstices' at the particle level are like locks with *or* without keys and keys with *or* without locks.

Probabilifying and disposition flutters

The irreducible disjunctivity in Armstrong's account of irreducible probability rests in the probabilifying 'linking' or 'connecting' primitives between universals. This disjunctive linking does no work for the production of the *particular* disjunct that actually results.

It is like a *nomination* procedure for a disjunction of candidates, but doesn't *decide* between them. It doesn't produce or elect one disjunct or candidate. If it *did* so elect it would decide *for* one *rather* than another, and be determinate *between* them. If there is not such a selection or production of one disjunct rather than another between the candidates, there is not an election or a production of a disjunct at all and the *explanation* of the success of a candidate or production of a disjunct would be incomplete and not take us to the result. Perhaps a randomising element is introduced, or just 'magic', namely 'just happened'. The links in Armstrong's linkage wouldn't take us to the *result* but only to the pre-result determination of disjunctivities. My account of 'disposition flutter' takes us to the result. The disposition flutter is an ontologically primitive oscillator built in to the basic and irreducible properties of the elementary particle itself and not a matter of hidden conditions outside the particle *itself* and its properties. Each flutter (oscillation) of the dispositions intrinsic to the properties of the particle, however unpredictable, is an irreducible ontic ground for the manifestation of a determinate result.

The disposition flutter is *intrinsic* to *irreducible* properties of an *elementary* particle. So we don't have to look to hidden factors *extrinsic* to the basic properties of the particle *itself*, just as the rate of 'decay' of a particle has sometimes been represented as intrinsic to the nature of the particle and not to be explained by extrinsic and hidden causes or variables.

If the disposition flutter is *intrinsic*, it is like other irreducible intrinsic factors for elementary and basic particles or aspects of spatio-temporal segments (if one exchanges particle theory for field theory), namely, *their* presence and nature is not to be explained in terms of *anything* else or, what perhaps amounts to just the same, 'explained' only in terms of *everything* else.

Martin's account is realist throughout with maximum determinacy.

REPLY TO PLACE

Place's conceptualism

Place first stated his conceptualism without ambiguity in a straightforward and traditional form.

> Universals, on this view, are generated by [minds] which abstract them from resemblances between particulars. They exist only in so far as they are used by minds to sort instances into classes.
>
> (p. 26)

Armstrong (pp. 36–7) chided Place for this mind-dependent account of kinds/universals. Martin's anti-conceptualism is on the record in 'Anti-realism and the world's undoing'.[4] Commenting on Armstrong's theory of universals in the course of his reply to Martin, Place poses a problem for this conceptualism and presents his solution in the following passage:

> …if, as the conceptualist maintains, kinds/universals are mind-made, wherever the words 'kind' or 'universal' occur, we ought to be able to substitute words like 'concept' or 'intension' without loss or change of meaning. Yet clearly we cannot do this…. Since instances of a kind can preexist any disposition on the part of an organism to classify things that way, this usage forces us to say that kinds/universals existed long before the corresponding concept existed. Hence, the logicist/platonist/realist conclusion that universals exist independently of our conceptual scheme. The conceptualist reply has to be that it is just a matter of which aspect of the classificatory process we want to focus on: the existence of the objects classified or the existence of an ability to classify them that way.
>
> (pp. 110–11)

Martin is unsure about what is and what is not conceptualist in what Place says here. It may be taken in at least two ways.

1 In *classifying* things into kinds/universals there are two aspects to consider:

- things being classified and
- classifiers able to do the classifying,

2 For things to be of various kinds/universals they are such only in virtue of two aspects:

- features equipping them as being *classifiable* in those ways *via*
- the classificatory *abilities* of classifiers, past, present and future.

Interpretation 1 is neutral to almost any account of kinds/universals. Certainly, Martin and Armstrong have no objection to it. If Place does not mean interpretation 2, then it is unclear how his conceptualism is to be understood. For the sake of the argument and progress in developing a positive theory, Martin will assume that Place asserts 2 and will provide a realist alternative in some detail. It may well be that when all of this is done, Place and Martin will not be in any substantive disagreement on the issue of conceptualism.

Interpretation 2 still has a conceptualist bite to it and would be rejected by Martin and Armstrong. It seems obviously false and Place has given no argument in its favour.

There are manifold properties with similarities and differences in nature that exist in nature without need of the classificatory attention, past, present or future, of any mind. There also exist in nature innumerable intertwining interrelations *between* these properties that *are* the kinds/universals offered for, but (perhaps *contra* Place) in *no* way needing, our selective, classificatory attention. Indeed, they are there, in all their variety, to reify or nullify our classifications, but do not *depend* upon us at all, *including* our classificatory abilities. When we adopt a mode of classification, its reification or nullification depends entirely upon whether or not the properties *have* in the range of their similarities and differences the interrelatednesses we posit in our classification. Nature has sharp edges and we must remember that square pegs don't fit into round holes in the *way* round pegs do, on any geometry. Nature is generous in the provision of the range of interrelatedness of similarities and differences between properties that are ready to reify the classifications we may select, but it is not profligate. It does not oblige us with unicorns. Metaphysical curiosity leads us to try to discover the limits of what nature can offer and what nature *constrains*. The discipline of science leads us to try to discover, amongst what nature offers, what it is that is most basic to its workings. The vicissitudes of survival, ease of movement in the world and a desire

to live well with nature and our fellow creatures lead us to try to discover, amongst what nature offers, what classificatory modes will best serve to satisfy those needs and desires. How many of even the 'successful' classifications are reified or nullified by nature is another matter. There is not a logical connection. Falsity of one's beliefs and nullification of one's classifications may have survival value and make for comfort, as may be the case with what some would claim to be the deep and all-pervasive distortions of the 'manifest image' (*versus* the 'scientific image').

The general problem of mind-dependence has not been broached and a mind-independent reality has only been assumed and not argued in what has just been said. Martin has provided supportive argument elsewhere.[5]

There is a further argument strategy that can also be followed. First, determine the kinds of clear cases of various forms of mind-dependence and mind-relatedness. Second, note the clear cases that do *not* fit these kinds of mind-dependence. Third, demand a proof that *nevertheless* there is mind-dependence in those cases. Martin knows of no such proof.

This is not only a matter of general background for the present discussion but is of direct relevance to what may be Place's conceptualism because there is a *sub-class* of the mind-dependent and the mind-related that requires of a kind/universal (*as* a member of that sub-class) that it be known (and *classified*) as such and *others* that require only that we be *able* to recognise it as such. We can see *how* there are clear cases of these kinds of classification dependence. Equally, we seem to see how there are clear cases of kinds/universals that are *not* classification dependent or even capacity-for-classification dependent. Place would have to provide a proof that *nevertheless* there is classification-dependence in those cases as well. Martin knows of no such proof.

The following categories may help in thinking about the matter.

1 Mental things, states, events, etc., e.g. people, lawyers, apes, pains, beliefs, perceptions, holding an opinion, having a theory.
2 Mind-involved things, states, events, etc. that are *essentially,* under any description, related to the mental, e.g. governments, bank balances, wars, comas.
3 *Mind-related* things, states, events, etc. that are *not* essentially related to minds (i.e. could exist, under some *other* description, and *not* be related to any mind), e.g. scenery, shell-money, clues, costly, interesting, perceived, ignored, forgotten, cherished, classified. Undiscovered scenery explicitly involves a lack of mental involvement or classification, but implicitly connects something with our *capacity* for such involvement and classification.

4 Classification-dependent things, states, events, etc. that are a sub-class of some, but not all, of the members of the previous three categories, that *require* for their being of the kind/universal they are that they be *known* to be and *classified* as being of that kind/universal.

Of these, in 1, lawyers, holding an opinion, and having a theory, but not people, apes, pains, beliefs and perceptions, are classification-dependent; in 2, governments, bank balances and wars are classification-dependent and comas are not; in 3, scenery, shell-money, clues, costly, interesting, cherished, classified are all classification-dependent but perceived, forgotten and ignored are not. It is controversial whether or not flavours, odours, sounds, textures (to the touch) and colours are mind-involved. To add rocks, amoebae and rain to any of the above would be unnatural and would call for rigorous argument for their inclusion. Place has not given such argument. Dictionaries are conceiver-dependent entities. So are flags and bank accounts. But rocks and H_2O are not. Views are explicitly conceiver-dependent and landscapes are implicitly conceiver-dependent but mountains and lakes are not.

We could put this by pointing out that in conceptualising something as a dictionary, flag or bank account or view or landscape we conceptualise these as such kinds of things *qua* being related to conceptualisers in typifying and essential ways. In conceptualising something as rock or H_2O or mountains and lakes one does *not* conceptualise these things *as* such kinds of things *qua* being related to conceptualisers in typifying and essential ways, but, rather, they are conceptualised *qua* having no *need* of any relation whatsoever to conceptualisers. Similarly, talking about a time or place *qua* being without talkers is talking about it *qua* having no *need* of any relation whatsoever to talkers, including me.

For those who wish to insist on the necessary interdependence of *everything*, mind-dependence is trivialised into amounting to no more than turnip-dependence. It helps to remember *again* that some cosmologists believe that during the earliest moments after the Big Bang (or, as a parallel, the latest moments before the Last Whimper) the *kinds* of things that existed for that very brief interval were (or will be) *very* different from the kinds of things that existed afterward *and* we may not technically or intellectually ever be able to conceive *what* those kinds of things were (or will be)! Like petulant children, we may find the suggestion of such insuperable limitations insufferable but to try to *disallow* such cases would be the verificationist stampings of very little feet.

The innumerable interrelatings between the various property instances of things, events and states have ready-made mind-independent and

classification-independent reifications for *alternative* modes of classifying things. The manifold of colours (leaving aside the secondary quality question) has *within* it interrelatings ready-made for countless modes of classifying the colours, whether or not any such classifying activities ever exist. Any particular kind/universal consists of similar interrelatingness instances between similar property instances.

This account of Martin's of the objectivity of kinds/universals differs from the Conceptualism of Place and the Numerically-*One*-Identical-Universal-*all*-in-*Each*-of-its-Numerically-Separate-and-Distinct-Instances View of Armstrong.

The romantic anti-realist notes that there can be alternative ways of classifying nature and *falsely* concludes to the non-determinacy and classification-dependence of the world. A completely realist way of representing the manifold variety of nature is available.

Such factors as the (observable) *stability* and, in some cases, reproductivity of some varieties rather than others of interrelated properties in nature make some modes of classification of things more 'natural' than others. Correlative with this would be factors important for the evolution of the complex structures of the classifying organisms themselves. Some interrelatings of properties rather than others provide greater ease of recognition, and even interest, providing figure-ground perceptions that, in turn, provide conditions for the movement, sustenance and survival of the organism.

The organism must be selective. It would not survive if it tried to accommodate in its classifications the endless variety of interrelatednesses in nature. From which it does not follow that the *unselected* interrelatednesses are not just as *real* as the selected ones. Nor does it follow that there are not sharp *limits* to the scope of interrelatednesses. As noted, square pegs do not fit—*cannot* fit—into round holes the *way* round pegs do.

The human organism has perhaps the best classificatory mechanism that nature can provide for discovering what is indeed *basic* in nature that explains and *constitutes* its endless variety including even those aspects not suited to the perceptual classificatory capacities of the human organism. This it does by explaining the more complex in terms of the simpler, explaining complex things with their complex properties and complex interrelations as various wholes in terms of having a composition-constitution of simpler parts with simpler properties and their simpler but incredibly multitudinous relations, that are *enough* to constitute the various complex properties and rougher macroscopic orders of things.

It must be evident even to the ontologically timid that where the simpler parts and properties and relations and connectednesses go so must go the complex wholes and complex properties and complex relations and connectednesses of which the simpler elements form their constitution.

It is best to avoid the weasel word 'supervenience' and get straight to the ontology of whole and parts.

It is truistic that the whole counts for more than the summation of individual parts taken in their separateness. As constituents of the whole, they *aren't* individually separate. It isn't as if the brick of the buildings foundation has the weight of *only* the bricks immediately above it, or presses with *only* its *own* weight upon the earth below it.

The interrelatednesses of parts as *reciprocal partners* bring into *mutual manifestation* a congerie of dispositions of those parts that could not be manifested if they existed separately *and without* such interrelatednesses. For example a particular part coming to be at the apex or corner or fulcrum in its interrelatings with other parts is an obvious case.

The whole will indeed be the parts *in* their interrelatednesses and degrees of stability thereof. This compositional view of the nature of things will explain why a swarm of spatially separated, fast-moving bees is perceived at a distance as a solid quiescent entity, and how a red-hot poker (or *even* a cold one) is *much* like that, and it will explain how glass is a liquid and mercury a solid, and whales are mammals. That is, it will open our eyes to interrelatingnesses to which we had been blind.

The interrelatingnesses that we had seen and by which we made our classifications may in many cases *still* be as real as ever. *They* show the *differences* between the swarm of bees and the red-hot poker, between glass and even cold molasses, between mercury and wood, and whales and cows. Even after learning at great expense the deeper and non-apparent interrelatingnesses, we *still* can choose to classify by the interrelatingnesses that are least arcane and most apparent outside the academy and learned societies. *They,* in turn can have *their* base and *constitution* in a congerie of interrelatingnesses at a sub-atomic depth. That is, they don't just *free-float, pace* some philosophers of biology and some sociologists. This view need not end in legislative scientism.

A well-read fisherman friend in the Wirral, Cheshire engaged me in the following conversation.

> 'Whales are fish.'
> 'But, …'
> 'They look like fish and swim like fish, they feed like fish, smell like fish and taste like fish. That's it.'

> ‘But, …’
> ‘I know about all of *that*. Warm-blooded and suckle their young, have a brain with four optic lobes and more. I read about that on some long winter nights. I’m helping out a fellow at the University in Bangor with some observations of their movements. I’m in the water with them and for my purposes thinking of them as fish, without *denying* anything about them that is known, fits best.’

To use Locke’s most useful terminology, which interrelatingnesses are taken as ‘leading and characteristical’ and which *other* interrelatingnesses are merely ‘annexed’ or ignored often differs, and may not be firmly determined amongst various thinker-speakers despite constant attempts from the academies to act as language-police and speakers for others’ thoughts.

Nature cares little which of all its interrelatings we take, perhaps for ease of detection, as ‘leading and characteristical’. However, the various degrees *and* levels of *stability* of interrelatings are very *much* its business.

NOTES

1 In Volume 1 of R.P.Feynman, R.B.Leighton, and M.L.Sands (eds), *The Feynman Lectures on Physics*, Reading, MA: Addison-Wesley, 1963–1965, pp. 3–10).
2 C.B.Martin, ‘Anti-realism and the world’s undoing’, *Pacific Philosophical Quarterly*, 1984, 65:3–20.
3 In the *Essay concerning Human Understanding*, 4th edition, IV–III–25.
4 Martin *op. cit.*, pp. 16–17, including footnote 2.
5 Martin, 1984, *op. cit.*.

9

SECOND REPLY TO MARTIN

D.M.Armstrong

Connection of universals or types

Martin begins (p. 126) by suggesting that the 'linking' or 'connection' of universals must be Armstrong's 'essential causal primitive'. This is not quite right. It is Armstrong's essential *nomic* primitive, whether all fundamental laws of nature are *causal* is a point about which he remains uncertain.

Martin goes on to say (p. 126) that Armstrong must take this connection as holding between *'universal-instantiations'* because for him universals exist only in instantiations. This is not quite how Armstrong would wish to express the matter. Suppose that wholly distinct particulars *a* and *b* both instantiate property-universal *F* and, because there is a deterministic law linking *F* with the wholly distinct property-universal *G*, the two particulars also instantiate *G*. What we have at the level of first-order states of affairs are four logically independent states of affairs: *a's being F; a's being G, b's being F, b's being G.* (It is probably best not to say that the states of affairs are wholly distinct, because they do have common elements. But they are logically independent.) For Armstrong there is no distinction between the instantiation of a universal and a state of affairs. What of the law then? It, too, is a state of affairs, but a state of affairs of higher order. It connects a *being F* type of state of affairs with a *being G* type of state of affairs according to a certain pattern. The pattern in our very simple example is that the thing that is an *F* is determined by that fact to be a *G*. States of affairs of higher order do have consequences for the lower levels. Logical independence fails at this point. But the failure seems to be the reverse of mysterious, at any rate provided that the notion of determining is accepted, a notion that Martin accepts. One first-order state of affairs can determine a further state of affairs, Why should not a

type of state of affairs determine a type of state of affairs? 'Types' here are universals.

It is an important part of Martin's critique of Armstrong's position (p. 128) that causal relations *could* be different in different spatio-temporal regions of our world. He points out that Armstrong seems to allow that possibility. Armstrong needs to make his position a bit clearer on this matter.

For some years Armstrong rather uneasily held the view that causation is essentially singular. He still thinks that such a position cannot be disproved *a priori*. If causation is essentially singular then the very same properties of the cause operating in the same sort of context could produce different sorts of effect in different instances. But we have a good deal of evidence, which scientific progress continually adds to, that the same cause brings forth the same effect. Following a suggestion by Adrian Heathcote, we can say that the empirical evidence is strong enough to make plausible the thesis that any instance of singular causation *is* (is identical with) the instantiation of a law.[1] Armstrong tends to think of the identity as a necessary one: a Kripkean necessity supported *a posteriori*, but the key point is the identity claim. If, further, laws are taken to be relations of types of states of affair, with the types universals, then it appears that 'mixed worlds', worlds where in different regions different effects flow from the same cause, are ruled out.

One might contemplate disjunctive laws, laws where *F*s gave rise to *G*s or Hs, with the 'or' exclusive. But one would expect probabilities to be attached to the two possible outcomes, with all spatio-temporal regions exhibiting more or less the same statistical distribution. Alternatively, one might try to give spatio-temporal position nomic force, so that the one property type gave rise to different effects in different regions. Laws would then not be simply connections of universals because a particular, a spatio-temporal position, would play an essential role in the law. But although such a position is thinkable, it is far from clear that it represents a genuine possibility. And even if it is a genuine possibility, it seems that we have inductive evidence that laws are position-independent.

Connection, connectability and Martin's two cases

Martin goes on to argue (p. 128ff.) that Armstrong needs connectability as well as connection, and so requires primitive dispositionality. If Armstrong has understood the argument, Martin considers an *FG* law and asks about the relation between the instance of *F* to be found in one instantiation of the law and an instance of *G* to be found in another

instantiation of the law. There, he alleges, there is connectability between these instantiations though no instantiation of any actual connection. It is possible that Armstrong is in a degree to blame here because he often speaks of a law as a relation of universals. But take this description of a law as shorthand for a connection of a *being F* type of state of affairs with a *being G* type of state of affairs according to a certain pattern. Furthermore, spell this pattern out as a matter of a thing instantiating universal *F* bringing it about that *that same thing* instantiates universal *G*. Then, Armstrong submits, there is not even connectability between *a's being* F and *b's being G*.

Higher order universals and Regularity Theory

Passing on to Martin's point (p. 131) that the Regularity Theory can be expressed equally in terms of universal-instantiations as well as tropes, Armstrong is in complete agreement. Indeed, he has in the past made the very same point. Universals are necessary, but not sufficient, for Armstrong's theory of laws. Furthermore, if Russell is right in thinking that universal quantifications require 'general facts' to make them true (Armstrong thinks that he is right), then a Regularity Theory will require general facts. Martin is also completely right to say that nothing in the notion of general facts will distinguish genuine laws of nature from *mere* regularities. In particular, general facts do not involve 'relations of universals' in Armstrong's sense. We have got to go beyond general facts, which do not involve a direct connection of types of states of affairs, to get a satisfactory theory of laws.

Higher-order functional laws and the infinity of uninstantiated values

It seems to Armstrong that it may well be the case for all actual laws of nature that they one and all have (positive) instantiations. The sort of cases sketched by Martin and Tooley appear to be no more than possible, at best. If so, then Martin's powers and Tooley's uninstantiated laws may be no more than possibilities for the world. The strongest case for the actual existence of such possibilities may be furnished by 'missing values' of functional laws. Martin asks (p. 131) what it is, on Armstrong's view, to have the functional law instantiated for uninstantiated values? Armstrong replies that this way of posing of the question is tendentious. Suppose that there are determinable universals and that functional laws link such universals, or, more accurately, types of states of affairs involving such

universals, Then, on Armstrong's view, there are no uninstantiated values or, strictly, any uninstantiated laws. There is a true counterfactual that if a certain value were instantiated, then it would be governed by a certain formula. But the only truthmaker for this truth, he holds, is the original 'strong' linking of determinable universals. Martin may think that such a truthmaker is insufficient. It is certainly somewhat 'thinner' than the very robust truthmaker that Martin supplies. But Armstrong's contention is that, though thin, it will do the job. Martin seems inclined to beg the question against Armstrong.

Higher-order-relation-universal-instantiations and mixed worlds

Martin (p. 131) then returns to the 'mixed world' where the laws governing a particular universal differ for different regions of space-time. To allow this, he argues (p. 131), would respect the logical distinctness of the different instantiations of the law. But, Armstrong would retort, higher-order states of affairs *always* have entailments concerning lower-order states of affairs, so that the regimenting of first-order states by laws (e.g. the forbidding of *F*s that are not *G*s) is not *ad hoc*. (Armstrong owes this insight to David Lewis who pointed out to him that if 'general facts' — facts, states of affairs, of totality—are admitted, then they regiment the world by forbidding certain additional states of affairs. At that point Armstrong saw that this held—unparadoxically—for *all* higher-order states of affairs.)

Martin's further explanation of the Limit View

Armstrong had suggested that a world with categorical properties alone was a possible world, and suggested further that Martin 'would not deny' this. He now learns (p. 132) that the second suggestion is wrong. But, Armstrong says, a world with categorical properties alone *appears* to be a possibility, though he concedes that not everything that seems a possibility really is a possibility.

The theory of reciprocal disposition partners for mutual manifestation

But in any case Armstrong welcomes the further development of Martin's theory that Martin has now given (p. 135). He sees that, from Martin's point of view, it might be good to replace talk of cause and effect by

'reciprocal disposition partners for mutual manifestations'. That fits in nicely with Newton's Third Law. But what does he do about something—an electron, perhaps—continuing to exist? With Russell, Armstrong is inclined to see this as a case of causality. A continuing thing is a certain sort of causal line. One might speak of immanent causality here. But reciprocity is lacking.

Causality and non-existent conditions

Martin admits (p. 136) that his own view of causation, even when reciprocal disposition partners for mutual manifestation is taken to be the deep structure of causality, is singularist. In that case, Armstrong holds, Martin will be unable to solve the problem of induction, because *laws* become mere regularities. By contrast, Armstrong claims that his laws, both higher-order and *atomic*, enable the inference from observed regularities to suggested laws to cosmic regularities to be exhibited as rational.[2]

The non-interacting elementary particles case again

Martin returns near the end of his response to Armstrong (p. 137) to the Martin-Tooley case, Armstrong points out that Martin seems wrong to say that 'In the particles case there are *no* repeated occurrences as instantiations of *any* law *whatsoever*.' If that is how the case is to be understood, then it is fair to say that for Armstrong nothing follows. But surely if the case is to have force, it must be the case that the other types of interaction occur and in each case involve an idiosyncratic law peculiar to that case. It was this supposed fact that Armstrong was relying on as truthmaker for his counterfactual with indeterminate consequent.

Probabilifying, disposition flutters and conclusion

Finally, Armstrong takes note of Martin's interesting suggestion of 'disposition flutters' (p. 139) associated with irreducibly probabilistic dispositions. Armstrong, it seems, could accept it provided what fluttered was a categorical property or set of such.

Summing up, Armstrong would make no pretence to have refuted Martin's theory. But he thinks that Martin has not refuted his. Both theories are in rather good shape, as metaphysical theories go! Or so he is so immodest as to think. As he sees it, both have advantages and both have

disadvantages. Choosing between them depends upon the way one weighs those advantages and disadvantages.

But Armstrong would recommend that a Martin-type position be developed using universals rather than equivalence-classes of exactly resembling tropes. Each universal would have associated with it its own idiosyncratic set of powers, locks and keys to other universals when particulars interact. These idiosyncratic sets of powers would function as the laws of nature that involve the universal in question. Unmanifested powers would still be on the same ontological level as manifested ones, which is the great strength of the Martin scheme. And, at the same time, a promising attack could be made on the problem of induction. But even then, Martin would have his powers that point beyond themselves. And that would still stick in Armstrong's gullet.

NOTES

1 A.Heathcote and D.M.Armstrong, 'Causes and laws', *Nous*, 1991, 25:63–73.

2 See J.Foster, 'Induction, explanation and natural necessity', *Proceedings of the Aristotelian Society*, 1983, 83:87–101 and Armstrong, *What is a Law of Nature?*, Ch. 4, Sec. 5 and Ch. 6, Sec. 7. For an interesting and promising var*iant* see Fales, *Causation and Universals*, London: Routledge, 1990 Ch. 4.

10

CONCEPTUALISM AND THE ONTOLOGICAL INDEPENDENCE OF CAUSE AND EFFECT

U.T.Place

PLACE'S HUMEANISM AND MARTIN'S FAILURE TO ADDRESS IT

In his reply to Place (p. 140ff.), Martin fails to address Place's submission (p. 118) that his (Martin's) Limit View of the relation between categorical/ -qualitative and dispositional properties fails to allow for the causal relation which, on Place's view, holds between the dispositional properties of the whole and the properties of its structure, both categorical/ qualitative and dispositional. There would seem to be two reasons for this omission. In the first place, by taking as his example the case of an elementary particle which has no parts, no microstructure, which can account for its dispositional property (the 'charm' of the quark), Martin aims to finesse the issue which is central to the debate between Place and Armstrong, the 'reduction vs. non-reduction debates' (p. 74). Second, the fact that Place agrees with him in holding that

> dispositional properties…play a basic role in causality,
>
> (p. 81)

and hence, given his view of causality, that there is both a purely categorical and a dispositional aspect to every causal relation, conceals the difference between the two views over the relation between dispositional properties and their categorical/structural basis.

The difference between Martin and Place emerges very clearly from the former's reply to Armstrong (p. 133) where he (Martin) chides Armstrong for subscribing to the Humean doctrine that

> there can be no logical links between distinct existences such as cause and effect.
>
> (p. 95)

But, as Place makes clear in his previous reply to Martin, that Humean doctrine is a crucial premiss in his argument for the ontological independence of dispositional properties from their microstructural basis. In Place's words

> as Hume has taught us, causal relations hold only between 'distinct existences'. For that reason…we have to conclude that the properties of the whole are not properties of the parts under some other guise.
>
> (p. 109)

The Humean view in the form in which Place subscribes to it takes the following propositions as axiomatic:

A1 Logical properties and relations such as necessity/contingency apply only to or between propositions.

A2 Propositions are linguistic entities, sets of actual and possible semantically equivalent sentence utterances.[1]

A3 A causal relation is a relation between two actual and particular situations.

A4 Situations[2] are of two kinds:
- *states of affairs* whereby a feature (a property of or relation between some other thing or things) persists unchanged over a period of time,
- *events* whereby a feature changes at or over time.

A5 Causal necessity is a matter of the truth of Hume's counterfactual if the first object [the cause] had not been, the second [the effect] had never existed. (D.Hume, *Enquiries Concerning Human Understanding*, Section VII, Part II, para. 60)

From these axioms the following corollaries may be deduced:

C1 There are no logical necessities 'in nature', no '*de re* necessities' as proposed by Kripke.[3]

C2 Causal necessity is not a species of logical necessity.

C3 Statements asserting a causally necessary relation between particular situations are invariably contingent, unless the way used to describe them makes the denial of the statement self-contradictory.

C4 The situations between which a causal relation holds are distinct existences in the sense that they consist either in simultaneous or consecutive changes in or in the simultaneous persistence of different features (relations or properties) of the same or different substances.[4]

It will be conceded, Place thinks, that these corollaries follow from the axioms. As to the truth of the axioms, he can offer no proof, such as demanded by Martin in his discussion of Place's conceptualism (p. 140). What philosopher could? Nevertheless, he sees no argument in Martin's critique of Armstrong's Humeanism (pp. 133–5) which casts doubt upon *this* version of Hume's position.

PLACE'S REACTION TO THE MARTIN-ARMSTRONG DEBATE

When combined with his endorsement of conceptualism (of which more anon), this statement of Place's Humeanism should make it abundantly clear why he sees no point in the debate between Martin and Armstrong over the relation between laws and universals, where both laws and universals are construed as entities existing independently of human conception. It is not just that Place's conceptualism denies the existence of conceiver-independent universals and causal laws, his version of the counterfactual theory of causal necessitation, as set out in the paper which precipitated the present debate,[5] undercuts what he takes to be the underlying motivation for believing in the existence of such entities.

If it is granted

1 that causal necessity consists in the truth of Hume's counterfactual;[6]
2 that this counterfactual is always a contingent proposition; and
3 that every contingent proposition depends for its truth on the occurrence of some event or the existence of some state of affairs whose occurrence or existence makes it true, if it is true;

we are then faced with the problem of finding a truthmaker for the causal counterfactual. This cannot simply be the occurrence or existence of the cause event or state of affairs in juxtaposition to the effect event or state of affairs. For that is precisely to leave out the 'necessary connection'[7] between the two which the counterfactual supplies. Few, however, would want to dispute the claim that, epistemically speaking, the truth of the counterfactual has to be deduced from some kind of causal law statement of the form:

> If at any time an event or state of affairs of the cause type were to occur or exist, other things being equal, an event or state of affairs of the effect type either *would* occur or exist (if the law is deterministic) or *would be likely to* occur or exist (if the law is probabilistic).

It is, therefore, very tempting to suppose that the state of affairs which makes the counterfactual true is the same state of affairs that makes true the causal law statement from which it is epistemically deduced. Indeed, it is difficult to see what alternative truthmaker could be proposed for the counterfactual other than the manifest absurdity of the 'counterfactual state of affairs' which Armstrong and Place agreed to reject at the very outset of this debate (pp. 15 and 20).

At this point, most philosophers in the analytic tradition are driven by their obsession with quantification theory to assume that the causal law statement that is needed in order to 'support' a causal counterfactual has to be universally quantified over *individuals* as well as over *occasions*. Once this move is made, the temptation to postulate something like Russell's 'general facts' (p. 149 [Armstrong], p. 129 [Martin]) or Armstrong's conceiver-independent 'laws of nature' (p. 42) in order to provide a truthmaker for such universally quantified causal law statements becomes well nigh irresistible.

This, however, is a 'gradient of descent' which we don't need to follow. As Nelson Goodman has pointed out,[8] in order to support a counterfactual, the causal law statement does not have to be universally quantified over individuals. A dispositional statement which is restricted to the behaviour of a particular individual over a limited period of time will do just as well, provided, of course, that the period of time over which the disposition obtains encompasses the occasion referred to in the counterfactual. Such individual dispositional statements are universally quantified. If they were not, the counterfactual would not be deducible from them. But they are universally quantified *only* with respect to occasions within the period over which the disposition obtains. In all other respects they are entirely particular. They are laws, not of nature in general, but of the often temporary nature of one particular individual.

The implication of this discovery of Goodman's for our present purpose is that all we need in order to provide a truthmaker for a causal counterfactual is the existence in the case of the entities involved in the causal interaction of a reciprocal[9] dispositional property which has the event or state of affairs envisaged in the causal counterfactual among its possible manifestations. Needless to say it is precisely the existence of particular dispositional properties, construed as states whereby their owners are 'pregnant' with a range of possible ways of behaving any one of which, if it occurred or existed, would constitute a manifestation of the property in question, whose assertion by Place (p. 26) and denial by Armstrong (p. 38) was the starting point for the present debate.

On this view of Place's, all that we need to postulate as existing in the universe of space-time are concrete particulars or 'substances', as they are called in the terminology of medieval Aristotelianism, their particular properties and the particular categorical spatio-temporal relations obtaining between them. There is no need to postulate any conceiver-independent universals, any general facts, any laws of nature considered as conceiver-independent states of affairs. On such a scheme, causal laws universally quantified over individuals are held to exist independently of human conception *only* in the sense that there exist, independently of conception, particular dispositional properties of particular individuals which satisfy the conditions required for a particular dispositional property to constitute an instance of whatever *conceiver-dependent* universal law is in question. Such a view is in no way embarrassed, as both Armstrong and Martin's positions must surely be, by the evidence which Nancy Cartwright[10] has adduced in support of her contention that the laws of physics, as currently construed and written down in textbooks, are at best rough approximations to the truth whose generality, even in those domains where they can be shown to apply, is indeterminate and likely to remain so.

MARTIN'S CRITIQUE OF PLACE'S CONCEPTUALISM

Having examined the implications of Place's conceptualism for the debate between Martin and Armstrong over the issue of conceiver-independent universals and laws of nature, we can now turn to the issue of Place's conceptualism, considered as the thesis that universals are conceiver-dependent, which Martin discusses in his 'Reply to Place' (pp. 140–6).

In an earlier chapter (p. 56), Place complained that, in criticising his (Place's) account of universals, Armstrong confounds conceptualism with nominalism. Place now finds himself confronted by Martin's criticism of the same theory which confounds conceptualism with anti-realism. That there *are* forms of conceptualism which imply anti-realism is not disputed. Kant, for example, held such a view. What *is* disputed is the claim that a conceptualist is necessarily committed to anti-realism and that what Place thinks of as the Aristotelian form of the doctrine is so committed.

On Place's understanding of the matter (see p. 26, and pp. 34–5 for a disagreement between Place and Armstrong on whether Aristotle was in fact a conceptualist), an anti-realist is someone who believes that the existence of both kinds/universals *and* their instances is in Martin's words

'classification dependent'. Place's Aristotelian conceptualism, by contrast, holds that it is only the kinds/universals which are 'classification dependent'. The particulars which, when appropriately classified, acquire the status of instances of those universals exist, in most cases, wholly independently of whether or how they are subsequently classified by human beings or other living organisms.

Martin contrasts (p. 143) universals such as 'lawyers, holding an opinion, and having a theory', 'governments, bank balances and wars', 'scenery, shell money, clues, costly, interesting, cherished, classified', 'dictionaries', 'flags and bank accounts', 'views' and 'landscapes' whose existence is 'classification dependent' with universals such as 'people, apes, pains, beliefs and perceptions', 'comas', 'perceived, forgotten and ignored', 'rocks and H_2O', 'mountains and lakes' whose existence is not so dependent. Here[2] Martin is contrasting universals whose *instances* depend for their existence on human conception (the classification-dependent universals) with those whose instances exist regardless of how they are classified by humans or other living organisms.

Now if you accept, as even Armstrong does, that to say that a universal exists is to say that it has instances, there is a perfectly good sense in which we can say that universals the existence of whose instances is independent of human classification and only such universals exist independently of how they are classified. But that is not the sense of 'exist' which the Aristotelian conceptualist is using when he claims that in all cases the existence of the universals *as distinct from* that of their instances is 'classification dependent'. Since we have reason to think that the universal 'quark' has had instances ever since the Big Bang, in *that* sense the universal has existed since that initial moment of time. However, since the concept was only introduced some thirty years ago,[11] in the conceptualist's sense the universal has only existed for that minuscule instant of cosmic time.

As already remarked, Martin's insistence that Place must provide a proof that conceptualism in his sense is true, goes way beyond anything any philosopher has ever achieved. The most one can hope for in philosophy is to demonstrate the incoherence of the obvious alternatives. Even then, such a demonstration is seldom, if ever, an end of the matter. The case for the kind of conceptualism advocated by Place is the conviction that there is no coherent halfway house, such as that envisaged by Armstrong, between, on the one hand, the Platonic view which holds that universals exist independently of their instances in a full-blooded sense of which it makes sense to ask and answer the question 'where are they?'

and the conceptualist view which hold that all that exists are the particulars, the classificatory behaviour of living organisms whereby the particulars become instances of the kinds identified by the particular classification in use, and the resemblances between the particulars which make such classifications possible.

The challenge to this kind of conceptualism, of course, is to explain how someone who advocates this view can be so confident that the particulars really do exist independently of conception, when the very question as to their existence cannot be posed until the particular has been subsumed as an instance under some universal. To provide that reassurance and avert the slide into anti-realism we need to insist, as Martin does, that the ability to classify in a way that reflects the real order of the natural world is essential to the survival of all complex free-moving living organisms. As Martin puts it—

> The human organism [and not just the human organism—UTP] has perhaps the best classificatory mechanism that nature can provide for discovering what is…basic in nature that explains and constitutes its endless variety.
>
> (p. 144)

That reality in all its particularity should be able to impose its recurrent patterns on the conceptual scheme that controls the behaviour of a free-moving living organism is understandable when we consider the value of such a mechanism for ensuring the survival into reproductive maturity of a number of individuals sufficient to ensure the continuance of the species.

But it is not just considerations of biological plausibility that assure us that Locke was mistaken in supposing that

> the having of general ideas is that which puts a perfect distinction between man and brutes, and is an excellency which the faculties of brutes do by no means attain to
>
> (J.Locke, *Essay Concerning Human Understanding*, Book II, Chapter Xl, Para. 10).

Recent studies of the properties of Parallel Distributed Processors (PDPs)[12] and other more realistic neural network models of brain functioning[13] are beginning to throw a flood of light on the actual mechanisms whereby the brain learns to abstract universals from sensory encounters with the particulars which thereby become their instances. When combined with the evidence from experimental studies of discrimination learning in animals[14] this evidence is beginning to suggest that the ability of a network, whether artificial or natural to

follow 'the natural lines of fracture' in its stimulus environment depends on whether the learning is 'unsupervised' or 'supervised'.[15] In unsupervised learning the network learns to classify inputs (stimuli) on the basis of nothing more than the classical principles of association by contiguity and similarity. No feedback is provided as to the quality of the output, when it is right and when it is wrong. It is characteristic of such unsupervised learning that the system generalises on the basis of what may well turn out to be superficial resemblances between such stimulus events.

In supervised learning by contrast the system is told when it is right and when it is wrong and, in some cases, by how much it is wrong. Given *this* information the system can learn to group things together into the much more disjunctive categories which correspond to likenesses and differences between the actual objects and events which underlie the superficial resemblances between stimuli.

In an artificial network this supervision is supplied by a human trainer or, more usually, by a computer programmed to provide it. In a living organism it is provided by what the organism discovers are the immediate practical consequences of doing one thing rather than another. It follows that those differences and connections between things which the organism incorporates into its conceptual scheme, though real enough, will tend to be those which it finds practically useful to combine and separate, rather than those yielded by a mature human science.

The operation of this principle is beautifully illustrated by Martin's story of the fisherman from the Wirral who persists in classifying whales as fish,[16] despite a full knowledge of the scientific evidence against that classification. What this story also shows us, I believe, is that what justifies scientific realism, the belief that the theoretical entities of science really exist, is not the mythical baptism of natural kinds postulated by Kripke,[17] but the systematic submission of scientific concepts to the kind of supervised learning situation which is provided by the methods of systematic observation and experiment, a form of rigorous testing which under normal circumstances is received only by those concepts which are of immediate practical relevance to the needs and interests of the classifying organism.

NOTES

1 In the passage in his 'On the social relativity of truth and the analytic-synthetic distinction', *Human Studies*, 1991, 14:265–285, pp. 272–274, in which he develops

this account of propositions, Place uses the term 'intensional set' to describe a type of collectivity, of which he takes propositions and Fregean thoughts to be instances, which includes possible as well as actual members. From his intensionalist perspective it is unfortunate that terms such as 'class' and 'set' have been appropriated by and defined in terms of an extensional logic which can only accommodate the possible but not actual by 'quantifying over' possible worlds.

2 Following J.Barwise and J.Perry, *Situations and Attitudes*, Cambridge, MA: MIT Press, 1983.

3 S.Kripke, *Naming and Necessity*, Oxford: Blackwell, 1980.

4 Armstrong (personal communication) wonders whether, in view of the logical connection between the two, this view can handle the causal relation between a dispositional property and its manifestations. Place replies that the 'logical connection' here is between a disposition and its *possible* manifestations, not its *actual* manifestations which may or may not occur, if the disposition exists. This shows that the disposition and its actual manifestations are 'distinct existences' linked by a contingent causal counterfactual whereby the manifestation would not have existed or occurred as and when it did, had not the disposition of which it is a manifestation already existed.

5 U.T.Place, 'Causal laws, dispositional properties and causal explanation', *Synthesis Philosophica*, 1987, 3:149–160.

6 Armstrong (personal communication) asks why dispositions are also needed. Place replies that we are talking about statements here, not their truthmakers. A dispositional statement is needed to 'support' (i.e. provide a premiss for the deduction of) a causal counterfactual.

7 Armstrong (personal communication) objects that, according to 4 above, the causal connection is supposed to be contingent. Place replies that the contingency applies to causal statements, not to the relation between situations whose existence a causal statement asserts. The term 'necessary connection' here is a quotation from Hume. It is his term for the invisible glue that cements two otherwise distinct and separate existences together. As Hume was well aware, 'necessary' in this sense has nothing to do with 'necessary' in the sense in which it contrasts with 'contingent'. As Hume would put it, the latter is a relation between 'ideas,' while the former is a relation between 'matters of fact.'

8 N.Goodman, *Fact, Fiction and Forecast*, Second Edition, Indianapolis: Bobbs-Merrill, 1965, p. 39. For a discussion of this point see Place, 1987, *op. cit.*, p. 152.

9 As Martin's concept of 'reciprocal disposition partners' implies, at the point of manifestation, but not before, all dispositional properties are 'reciprocal' in the sense that they apply to a causal interaction between two substances. As has been argued (p. 117), it is only our language that compels us to assign them to one party or the other. For a discussion of this point, see U.T.Place, 'Skinner re-skinned' in S. and C.Modgil (eds), *B.F.Skinner, Consensus and Controversy*, Lewes: Falmer Press, 1987, Part XI, Skinner and the 'Virtus dormitiva' argument, pp. 239–248. The reference is to p. 242.

10 N.Cartwright, *How the Laws of Physics Lie*, Oxford: Oxford University Press, 1983.

11 In 1964 to be precise.

12 See D.E.Rumelhart, J.L.McClelland and the PDP Group, *Parallel Distributed Processing*, Vols 1 and 2, Cambridge, MA: MIT Press, 1986.

13 E.g. G.M.Edelman, *Neural Darwinism*, New York: Basic Books, 1987.

14 See particularly K.S.Lashley (1938), 'The mechanism of vision, XV, Preliminary studies of the rat's capacity for detail vision'. *Journal of General Psychology*, 18:123–193; R.J.Herrnstein, D.H.Loveland and C.Cable (1976), 'Natural concepts in pigeons', *Journal of Experimental Psychology: Animal Behaviour Processes*, 2:285–302; and J.M.Pearce (1988) 'Stimulus generalization and the acquisition of categories by pigeons', in L.Weiskrantz (ed.) *Thought without Language*, Oxford: Clarendon Press, pp. 132–155.

15 For the use of this distinction in the connectionist literature see P.Quinlan, *Connectionism and Psychology,* Chicago: Chicago University Press, 1991, p. 53.
16 Coincidentally Place (1991, *op. cit.*) has used the traditional classification of whales as fish as an example of the mutability of conceptual schemes.
17 Kripke, *op. cit.*.

11

FINAL REPLIES TO PLACE AND ARMSTRONG

C.B.Martin

Both Armstrong and Place seem to Martin to say things that imply what is false.

- They each frequently state their account of dispositionality in terms of manifestation. Armstrong in terms of 'connection' and Place in terms of being '*between* interactions'. Martin will argue that this leaves a gap at the crucial (and most commonly occurring) unmanifesting disposition occasion.
- They each say things that suggest that this gap is filled by a counter-to-the-facts-fact-of-the-matter that, at the beginning of the Debate they each agreed was false. Armstrong does this by a counterfactual supported by a general fact concerning 'connections' of universals, Place does it by his explaining dispositionality in terms of 'possible future and past counterfactual manifestations'.

The ways in which their accounts differ require Martin to treat them separately. In any critique that Martin offers he will try to provide an alternative view.

FINAL REPLY TO PLACE

I

Throughout the text Place characterises the dispositional property as 'outside the entity at its point of interaction' (above, p. 61) and as really a 'property of the interaction between the two substances' (above, p. 117) and ambiguously, when providing a truthmaker for a causal counterfactual, 'in the causal interaction of a reciprocal dispositional property' (above, p. 156).

These words 'interaction' and 'points of interaction' suggest a conflation of disposition with manifestation—being explosive with exploding, being soluble with dissolving—that cannot be intended. Yet it is oddly parallel to Armstrong's explaining dispositions in terms of 'connection' or 'connecting' (p. 44ff.).

The reference to the disposition being 'outside the entity' and 'between the two substances' with the airy 'in so far as it is located anywhere' would be more comfortable with what have come to be called 'Rylean dispositions' that are of an object or person but not located as any physical state of the entity would be and are, indeed, non-localised counter-to-the-facts-facts about the entity. It would be a vulgar misunderstanding to ascribe a more specific location to such facts.

Place makes a distinction between modal and categorical (qualitative) properties that deepens the difficulties.

> Dispositional properties are modal properties, they consist in their possible future and past counterfactual manifestations. The microstructural properties of an entity on the other hand are categorical which, of course, is why Armstrong who finds modal properties offensive wants to reduce the dispositional to the microstructural.
>
> …the difference in category between modal and categorical properties boils down to a difference in their relation to time, the difference between what actually happens or is the case at or over time and what might happen or be the case but which may not or did not happen or may not be or was not the case. (p. 60)

It is difficult to see how Place would describe a manifestation as 'what actually happens' when the disposition *A* to bring about disposition *B* has its manifestation *actually* happening. What would be actual, for Place, in the actualisation of the manifestation of acquiring a particular dispositionality?

This limitation of the *actuality* of a disposition to its manifestation is further reinforced in Place's later explanation of the disposition of the whole entity's being caused by the dispositionality of the parts (the microstructure) which he characterises as the 'dispositional properties of the parts of the substance whose *interactions* with one another, when juxtaposed in the way they are, maintain the integrity of the whole.' (p. 116, Martin's *italicization*)

Place has said that 'dispositional properties are in reality properties neither of the causal agent nor of the causal patient, but of the causal

interaction between the two' (p. 117).

1 The locutions 'patient' and 'agent' have been familiar for centuries, as the locutions 'operative' or 'standing condition' have been familiar for generations. They misleadingly characterise the causal 'patient' or the 'standing' condition as passive and somehow lacking full ontological engagement in the situation.
2 Place's introduction of 'causal interaction' between the dispositions to causally bring about the manifestation is to do causal work twice over. If one has dispositionality *already*, then it is a short step to Martin's *replacement* of cause and effect by mutual manifestation of reciprocal disposition partners.
3 Place's location of dispositionality at the point of causal interaction leaves no account of the existence of dispositions in the case of the *non*-existence of 'causal interactions' or, in Martin's terms, 'manifestations'.

II

Place's account of unmanifested dispositions is given in the following passage:

> Place accepts the actual here and now existence of dispositional properties; but all that exists *now* is a state of the property-bearer …which can be specified *only* by reference to its potentic future manifestations. He is persuaded that *that* is all there is to it… by the linguistic fact that is as far as the entailment of dispositional predicates (predicates ascribing dispositional properties to a substance) extend. According to Place, all that is *entailed* by such a predicate is the probable existence of manifestations of the disposition whenever the relevant conditions are fulfilled. Of course, the observations which verify the existence of such a disposition are observations either of the occurrence or existence of a manifestation of the disposition…But these observations tell us only what happended on those particular occasions. They are not, and could not conceivably be, observations of what would have happened if they had been fulfilled on some occasion in the past.
>
> (p. 113)

What Place offers here amounts only to a Rylean counter-to-the-facts-fact, or bare truth, despite disclaimers. Facts about the 'probable existence of manifestations' or 'possible future and past counterfactual

manifestations' as 'all that is *entailed* by such a [dispositional] predicate' just as the Rylean counter-to-the-facts-fact that came to be termed disapprovingly, 'Rylean dispositions'. Calling the abstract (largely counterfactual) facts of the matter, of the sort cited in the above quotes from Place and repeated by him elsewhere, a *property* is ontologically misleading.

Martin is not satisfied with this as an account of what Martin takes to be something that is fully real and *actual* (unlike some of the manifestations), namely, the disposition *itself*. Dispositions are actual continuants that predate, outlast and may exist entirely without the existence of their manifestations.

Amongst the actual dispositions, many have non-actual manifestations (remember that the disposition of fragility is actual even though the manifestation of breaking is *not* actual) there would be dispositions (actual) for the *manifestation* of the acquiring or the bringing about of further different *dispositions* (which, as for any other manifestation, may be non-actual).

III

Place gives an emergentist account of the relationship of parts to the whole.

> There is quite simply no way that we hope to 'reduce' the properties of the whole to the properties of the parts.
>
> (p. 108)

> An emergent property is simply a property of a whole which a mere collection of parts does not possess. An engine, for example, has a horsepower. A collection of parts which when assembled correctly to form an engine does not.
>
> (p. 31, note 3)

This account is in terms of a very limited description of the role of the parts that constitute the whole. The descriptions 'a mere collection of parts' and 'a collection of parts which when assembled correctly form an engine' leaves out the interconnectivities and dispositionalities of the parts with and for one another and with and for external objects and situations.

But under that limited description the parts would not be describable as being causes at *all*, let alone as being causes affecting the wholes of which they are the parts. So when Place comes to describe how he thinks the parts affect the whole they would have to cease to be described as 'a mere collection' and instead be described as he does elsewhere in terms of

dispositional properties of the parts of the substance whose interactions with one another, when juxtaposed in the way they are, maintain the integrity of the whole.

(p. 116)

This is needed

> in order to explain how the structure [parts] of a substance [whole] contributes to its dispositional properties, in order…to get a causal relationship going between the structure of the property bearer and its dispositional properties.
>
> (p. 112)

To give the parts a less impoverished description allowing for all of their interrelations and interconnections and dispositions with one another and all external input as well, is only to give them their due as interactive parts. When this is done, the plausibility of Place's claim for the distinctness and separateness of the parts from the whole is lost.

IV

John Searle has very clearly expressed a position that is similar to Place's.

> There is nothing mysterious about such bottom-up causation; it is quite common in the physical world…. The solidity of the piston is causally supervenient on its molecular structure, but this does not make solidity epiphenomenal; and similarly, the causal supervenience of my present back pain on micro events in my brain does not make the pain epiphenomenal.
> My conclusion is that once you recognize the existence of bottom-up, micro-macro forms of causation, the notion of supervenience no longer does any work in philosophy, the formal features of the relation are already present in the causal sufficiency of the micro-macro forms of causation.[1]

Place says the same concerning the question of wholes having emergent properties over all of the parts in all of their connections and dispositions.

> This seems to him a straightforward matter. Of course, properties at the higher level are something 'over and above properties at a lower level'. Properties at the higher level are properties of the whole. Properties at the lower level are properties of the parts which make up the whole. Since they are properties of different things, there is quite simply no way that we can hope to 'reduce' the properties of

> the whole to the properties of the parts. To that extent, all the properties of wholes are 'emergent properties' relative to the preexisting properties of the parts. But that should not be taken to mean that the properties of the whole cannot, at least in some cases, be predicted from a knowledge of the properties of the parts and the way those parts are put together so as to form the whole. Thanks to science, there are now many cases where just such predictions can be made. Such predictions however, depend on a theoretical explanation of a causal relation in which the parts, their arrangement and their properties stand as cause to the properties of the whole as effect. But, as Hume has taught us, causal relations hold only between 'distinct existences'. For that reason also, we have to conclude that the properties of the whole are not properties of the parts under some other guise.
>
> (p. 108)

The question to be asked is a simple one. How do things that are identical with parts of a whole thing, have effects upon the whole that includes *themselves*?

That is what is 'mysterious about such bottom-up causation' and what is *not* 'a straightforward matter'. There seems to be a mystical invocation of levels of being.

V

The alternative is to see that the complex properties and dispositions and relations of the whole are composed of the simpler properties and dispositions and relations of the parts. It is easy to see how the bounds of an observable whole are constituted of a degree of stability of a density of particle populations.

The fluidity of two different kinds of fluid is the same (though the parts and their dispositions are different) so long as amongst their differences there are similarities in their dispositions and interrelatings. The molecules of the fluids are different in that they are disposed to behave very differently in different temperatures and are composed of different elements, but they are also similar in their dispositions for bouncing smoothly over one another, and *that* about the parts *entirely* constitutes and so does not cause the fluidity of the wholes.

It is evident that this story in terms of molecule parts needs to go on ultimately to the elementary particle or field-segments. The compositional model, as it should, has a place for things we do not know. Most

importantly we do not know the nature of the elementary (without simpler parts) particles.

With such an ontologically candid compositional model, there seems no need to employ that weasel word 'supervenience' or to speak of 'emergence' due to causes between parts and whole as different levels of being.

The dispositionality of the molecule parts (microstructure) for bouncing smoothly over one another does not (*pace* Place and Searle) *cause* the fluidity of the *whole* because it constitutes the fluidity of the whole, and is just what the whole *being* fluid in this case consists in. It is even relatively visualisable *how* that is, much as Locke made the molecular theory of heat visualisable.

VI

In preparing the case of the spatio-temporally isolated non-interactive elementary particles against Armstrong, Martin argued that elementary particles, *whatever* they are, have properties that are not purely qualitative because they, like anything else, are capable of more than and something different from what at a given moment they actually manifest.

Place replied that the allowance of any talk of elementary particles by Martin and Armstrong should be embarrassed

> by the evidence which Nancy Cartwright[2] has adduced in support of her contention that the laws of physics, as currently construed, are at best rough approximations to the truth whose generality, even in those domains where they can be shown to apply, is indeterminate and likely to remain so.
>
> (p. 157)

It is difficult to see how the very general way of talking about the properties of elementary particles or aspects of fields that Martin introduced is affected by Cartwright's or Van Fraassen's doubts about our present or even future capacity to develop a complete and true physics. Martin's claim was that *whatever* (known or unknown) properties the ultimate constituents of nature are they are no more *purely* qualitative and in 'pure act' than any more macroscopic or structural properties. The properties of even supposedly elementary particles must be capable (at any time or space-time segment) of more than they manifest. This is sometimes expressed (not happily in Martin's view) as possible world lines.

It seems quite self-evident to Martin that any account of properties and dispositions whose concepts excluded application to the domain of elementary particles is grossly deficient. Perhaps it is useful to see (*without* any scientific theory of their nature) why it is rationally inescapable to believe in their existence.

Complex states of affairs, entities and qualities and dispositions and events and relations are all made up, composed of and consist in their simpler constituents. That much should be clear.

VII

The reasonable belief in the existence of what were called 'insensible corpuscles' in the seventeenth century and unobservable 'atoms' before that, does not depend upon a well-worked-out or even badly worked-out scientific theory of their nature.

1 The first stage is to grasp the notion of composition in which a whole of a particular kind is composed of and completely constituted by and is no more than parts of different kinds *in* various relations. The individual parts of a chair are not a chair, the individual parts of curry are not curry and the individual parts of a tree are not trees.
2 The second stage is to grasp that things get larger by addition of parts and get smaller by loss of parts.
3 The third stage, with this knowledge, is to note that a tree gets larger and a ring, worn for a long time, gets smaller indiscernibly. That is, no matter how closely one observes the tree or the ring one cannot observe an increase by addition of parts or a decrease by loss of parts.

Spurning an explanation in terms of expansion as with a balloon, the thought of increase in size by the addition of unobservable parts of different kinds in various relations so as to constitute the tree is an understandable thought and a reasonable belief.

All of this is accomplished with no theory of the nature of these unobservable parts of things. That much, and it is a great deal, is not threatened by the doubts raised by Cartwright, or even by van Fraassen, about how much we can know about what Locke called 'the finer interstices of nature'.

The bearing of developments in theoretical physics upon our views of things taken at the level of 'ordinary' observation of and language about the macroscopic world, is made graphic, for example, by the discordances between the 'scientific image' and the 'manifest image' (in the phrases of Wilfred Sellars) of colour.

Martin's first encounter with that kind of discordance occurred when, at the age of nine he attended a public lecture by a physicist. He said that the objects we see, such as a table, were composed of parts called 'particles' that were far too small for us to see or feel. These particles had far more space between them than the space they occupied. He went on, to Martin's further astonishment, to say that these part-particles were of *many* kinds making up the objects and these particles were *moving*, constantly, at very great speeds. Martin thought the physicist mad and, on the instant, resolved never to attend a university where such nonsense occurred.

Then the physicist said that it was as if we couldn't get close enough to be almost within the swarm of particles with eyes very different and sharper, rather as when, being at a great distance from a swarm of bees, the swarm can appear as a solid object until one gets very close. Persuaded by this clumsy analogy, the excitement of the thought set Martin on the instant, to resolve to attend university where such matters were discussed.

Martin had, as others in the audience had as well, a view of the solidity of things as some kind of *plenum*. That was why what the physicist said was so shocking at first. Martin gave up this view of solidity *qua plenum* from that moment.

When Martin was a graduate student at Cambridge, the dispute between Eddington and Stebbing about the solidity of a table was discussed. Eddington claimed that theoretical physics refuted our ordinary view of the solidity of a table. Stebbing disagreed, arguing that our ordinary view was inviolate because 'If I drop a piece of paper on the table, it doesn't pass through it.' Martin thought that Stebbing had missed the whole point. The point was that the ordinary implications that people make of 'solidity' as implying a *plenum* turned out to be *false*. True enough, there are other ordinary implications of 'solidity' such as that paper won't just pass through the 'solid' desk that remain true. Martin would claim that, often enough, the false implications and the true implications are wrapped together in how we think of the solidity of things. That explains the shock (as Stebbing can't explain) of the younger Martin and others in the audience by what the physicist said.

Faced with some of the more mind-boggling theories of modern physics, one's most basic concepts are up for at least enough bending and twisting to allow intelligent considerations of what is being proposed.

It should be emphasised that even in terms of the most anti-intuitive amongst seriously considered hypotheses of physics there is something like a relative retention of edges or boundednesses. That is, there would be relative degrees of density of populations of particles (or aspects

of fields) and relative degrees of stability of that density of such populations (or field-aspects). This provides an analogue at the level of elementary particles (or field-aspects) for the edges and continuance of macroscopic things and therefore a further reinforcement of a realist compositional model for the relationship of the macroscopic and the sub-microscopic.

None of this should suggest that the philosopher should react with dumb faith to the latest and changing revelations from theoretical physics or by an arrogant disbelief or a 'That's what they say *now*' cynicism. It should incline philosophers to a greater alertness to alternative ways the world may be.

Ontology is the setting out of an even more abstract model of how the world is than that of theoretical physics, with *place-holders* for scientific results and some *excluders* for tempting confusions. Ontology and theoretical science can help one another along with, we hope, minimal harm.

VIII

Three further brief points need to be made.

(1) Armstrong suggested as only a logically possible case, that there should be an entity that had only categorical (qualitative) properties. Martin objected that an inert object may (doubtfully) be possible but *not* one that is lacking all dispositional properties. Martin claimed it would be to posit an impossible entity that could not affect or be affected by anything actual or conceivable. Place thinks that many properties, even at the observable level, are as a matter of fact purely qualitative and non-dispositional.

> All the likely candidates [for the status of unambiguously categorical properties] are properties such as shape, size, internal structure, motion and stasis all of which are a matter of the volume of space occupied by a substance at a moment or over a period of time.
>
> (p. 119)

Any cabinet maker is fully aware *contra* Place of how disposition-laden shape and size are and most of us learn how simply by change of relative position differences are made in what is *apt* to happen. The shape of the key is disposition-laden, as is the shape of the lock, for alternative mutual manifestations according to varying relative positions, etc. of key and lock.

(2) Place's Humeanism as spelled out on pages 153–5 rests on two questionable assumptions.

A1 Logical properties and relations such as necessity/contingency apply only to or between propositions.
A2 Propositions are linguistic entities, sets of actual and possible semantically equivalent sentence utterances.

Whether or not Place has avoided treating propositions as abstract entities (as I am sure his Humean heart would wish) is not clear. Martin will assume that Place *has* avoided this.

Martin's objection to A2 is that it appears to make the necessary truths of mathematics, etc. depend upon the *contingent* existence of languages, symbolic notations, language users and utterances.

A1 with A2 is supposed to generate C1

> C1 There are no logical necessities 'in nature', no '*de re* necessities' as proposed by Kripke.
>
> (p. 154)

Martin will not add to the arguments on pages 133–5 in reaction to Armstrong's Humeanism (later qualified) except to say that they apply against A1 and C1.

(3) In returning to the topic of universals and conceptualism, Place attempts to stake out the territory.

> The case for the kind of conceptualism advocated by Place is the conviction that there is no coherent halfway house, such as that envisaged by Armstrong, between, on the one hand, the Platonic view which holds that universals exist independently of their instances in a full-blooded sense of which it makes sense to ask and answer the question 'where are they?' and the conceptualist view which hold that all that exists are the particulars and the classificatory behaviour of living organisms whereby the particulars become instances of the kinds identified by the particular classification in use.
>
> (pp. 158–9)

Martin gave an account of just such a 'coherent halfway house' on pages 000–000, and has also given with a different emphasis and context an account of this 'halfway house' between Armstrong's universal and Place's conceptualism in other work.[3]

FINAL REPLY TO ARMSTRONG

I

Some terminological clarification of the use of the term 'disposition' should be helpful.

Picking one term to do all of the work that Martin's use of the term 'disposition' is supposed to do is asking a lot of any single word. Some explanation may help to show that the choice of words has not been thoughtless.

The difference between capacities and dispositions disappears once one asks, 'Under what conditions (reciprocal disposition partners) would the capacity be *exercised*?'

Capacities are capacities for (dispositions for) what are their exercises or fulfillments (manifestations) under certain conditions (reciprocal disposition partners).

The differences in circumstance of usage between 'capacity', 'tendency' and 'proclivity' is in what is considered to be the degree of availability or proximity of (spatial or temporal) reciprocal disposition partners or perhaps the degree to which there is the *start* of a process toward a result that would need the *loss* of reciprocal disposition partners or the *introduction* of a reciprocal prohibitive disposition partner to stop or interfere with the culmination of the mutual manifestation.

'Capacity' can also be used as the most non-specific indicator of a disposition's reciprocal disposition partners for mutual manifestation.

Martin will continue to use the terms 'disposition' and 'manifestation' as the basic causal terms.

Expressing the qualitativity and dispositionality of any real property merely as 'a way of thinking of, mode of predication concerning, way of regarding, looking at, etc.' suggests that it is merely in the eye or voice of the beholder. If the users of such deontologising expressions wish to claim such anthropomorphism then the users should make *that* ontology fully explicit. If the users do not wish to endorse this anthropomorphism then they should join in the task of saying clearly *what* in the world the expressions indicate.

II

There is an untypical mutual failure of communication in Martin's Two Case argument (above, pp. 128–9) and in Armstrong's reply to it (p. 149) because of serious and unnoted disparities in notation:

Case I

Martin's Two Cases notation was supposed to concern *two* individuals a and b. In *Case I* **a**'s being F and b's being G and the instantiation of the *Connection* F and G property-universals *consist* in the **a**'s being F (e.g. salt) and the **b**'s being G (e.g. water) such that with further proper circumstances (e.g. salt immersed in the water) there is a connection instantiated between **a**'s being F and **b**'s being G resulting in the salt dissolving in the water.

The notation used by Martin in *Case I* does not exclude attributing an unmanifesting disposition to **a** (as in *Case II*). *Case I* can be expressed more explicitly as that of some soluble salt (F**a**) disposed to dissolve in water and some solvent water (G**b**) disposed to dissolve salt such that these reciprocal disposition partners (F**a**) and (G**b**) come into the right relation of the salt's being immersed in the water such that they manifest their mutual manifestation of becoming a saline solution.

On Armstrong's account the parallel to *Case I* is an *instance* of the connection of states of affairs types and with the addition of the General Fact of exceptionlessness is an instance of a Law of Nature.

Armstrong's description of the connection between property-universals F and G concerns just *one* individual **a,** with **a**'s being F (e.g. salt) and **a**'s being affected in a certain way G (e.g. dissolving on immersion in water).

On this notation of Armstrong's it is not even possible to attribute an unmanifesting disposition to **a**.

Case II

Case II on Martin's account is of soluble salt (F**a**) and solvent water (G**b**) *not* in the right relation for dissolving, that is, the salt is not immersed in the water. This is the natural place for counterfactuals to be used to indicate (however clumsily) the dispositionalities. It is no ontological disadvantage for the disposition to be unmanifested.

Martin suggested that Armstrong needs something parallel to Martin's *Case II Connectability,* as well as *Case I* Connection, of universals or states of affairs types.

It is still unclear that Armstrong's invocation of laws of nature in terms of the connection of universals or states of affairs types, however it applies to the salt's dissolving in water, is able to carry over with full ontological weight as truthmaker for the *solubility* of the unimmersed and non-dissolving salt. Whatever truthmakers Armstrong has available they seem to be for the wrong situation, namely, the connecting, manifesting occasion *only*.

III

Dispositions have duration and they can change. A piece of glass can be fragile for an hour and cease to be fragile for an hour. This change of disposition can be arranged by means of a change in temperature. A disposition and a change of disposition need not manifest itself. The glass need not actually break during the hour that it is fragile.

Dispositions are actual though their manifestations may not be. It is a common but elementary confusion to think of unmanifesting dispositions as unactualised possibilia; though that may characterise unmanifested manifestations. Armstrong appears to be guilty of this confusion in his reference to 'potential being' (p. 91). Unless this confusion is removed, a realism for dispositions cannot be properly stated. The removal of this confusion should be one of the results of this debate.

Someone says, 'I shall make the glass cease to be fragile, but whenever anything happens to it that would make it break if it were fragile, I shall, *make* it fragile again. So it will break whenever anything happens that breaks fragile glass—because it will *become* fragile on those occasions. At all other times I shall make it cease to be fragile.' If the individual is taken seriously, then in creating the piece of glass and attaching the label reading 'Fragile, handle with care', the word 'fragile' may be crossed out but the phrase 'handle with care' retained.

Indeed, it happens that just as a stone is thrown at the glass, at the moment of impact the molten glass immediately cools and solidifies and the stone breaks the glass. If this is not impossible then how is dispositionality accounted for by any conditional account?

In attempting to make explicit the exclusion of relevantly counter-vailing conditions (after employing the 'Look—nothing up my sleeve' *ceteris paribus* gestures) the conditional would have to contain the explicit dispositional terminology for which it was supposed to be the account.

The detailed working out of this simple argument has been done elsewhere.[4]

The force of the argument seems to apply even to Armstrong's circumspect use of a conditional in his explanation of a Law of Nature.

Concerning Armstrong's conditional representation of causal laws (p. 101)

Cause (F, G) entails(x) (Fx ? Cause([Fx],[Gx]))*

Armstrong remarks that the predicate *'Cause*'* is

> not strictly the relation of causation. It is, rather, that relation postulated to hold between *F* and *G* which makes *an F* apt for

causing *a G*.

(p. 101)

Martin will not press the matter, but this *sounds* for all the world to be invoking a primitive dispositionality.

Armstrong himself, however, suggests a central problem for this conditional account.

> One particular complication that the formula does not address is the fact that in causal sequences there is always the logical possibility, and often the empirical possibility, of the cause failing to bring about its effect because of the irruption of an external interfering factor. (Armstrong, at least, is unable to include absences of such factors in the cause because he rejects negative universals.) It needs to be included in the specification of an F that it is not to be interfered with.
>
> (p. 101.)

The phrase 'apt to cause' and the specification 'not to be interfered with', seems to give us a reading that underlies the suggestion of primitive dispositionality. Even if we substitute 'would cause' for 'apt to cause' it would read 'would cause if nothing were to causally interfere' and still suggest a realism for dispositionality.

If, consistent with his theory, Armstrong shows us how to read the 'apt' or 'would' in a non-realist and non-primitive way, then the conditional would need an interpretation such that it could be understood how things are disposed in the way they are *between* manifestations. The problem is acute for Armstrong, because it is not, as Armstrong allows (p. 97) 'contrary to reason' that all of the causes and dispositionalities should differ though otherwise properties and circumstances remain the same. Because of this, dispositions between the manifestations can change and be lost without detectability. Armstrong's suggestion of making the Laws of Nature disjunctive to cover such possibilities given that there is no limit to the number of disjuncts is enough for Hume to raise his 'problem' of induction for Armstrong as much as for Martin.

IV

Statements ascribing causal dispositions or powers are *somehow* linked to (strict or strong) conditional statements. Attempts have been made to provide reductive analyses of powers in terms of such stronger-than-material-conditionals, that is, to claim that the ascription to an object of a

power or disposition is logically equivalent to one or more suitably glossed and qualified conditional statements about events involving the object.

The argument of this section will be first to show, by means of two imagined cases, that the claimed equivalence does not hold if the conditional statement is formulated in a certain way.

Let it be claimed that

> (A) The wire is live

and

> (B) If the wire is touched by a conductor then electrical current flows from the wire to the conductor

are so related that necessarily (A) is true if and only if (B) is true.

Consider now the following case. The wire referred to in (A) is connected to a machine, an *electro-fink*, which can provide itself with reliable information as to exactly when a wire connected to it is touched by a conductor. When such contact occurs the electro-fink reacts (instantaneously, we are supposing) by making the wire live for the duration of the contact. In the absence of contact the wire is dead. For example, at t1 the wire is untouched by any conductor, at t2 a conductor touches it, at t3 it is untouched again. The wire is dead at t1, live at t2, and dead again at t3. In sum, the electro-fink ensures that the wire is live when and only when a conductor touches it.

First, consider a time when the wire is untouched by a conductor, for example t1. *Ex hypothesi* the wire is not live at t1. But the conditional (B) is true of the wire at t1. Put another way, it is true of this wire that if it is touched by a conductor at t1, then electrical current flows from the wire to the conductor at t1, although since in fact the wire is not touched by a conductor at t1, it is not live at t1, thanks to the work of the electro-fink. Consequently *the conditional is not logically sufficient for the power ascription of which it is meant to be the analysans.* (This point is brought out even more forcefully by considering the case where the wire is never touched and consequently is always dead. Yet the conditional in its counterfactual is true: if the wire *were* touched, it *would* give off electricity!)

Second, consider a transition from a time when the wire is dead to a time when the wire is live (say, from t1 to t2). In the (unanalysed) language of causal powers we can express the fact of this transition by saying that the wire acquires the power, or that it *becomes live*. The spirit of the conditional analysis would seem to require that our idea of an object's acquiring, or losing, a power be explicated as a conditionally

structured predicate coming to apply, or ceasing to apply, to an object. This move, which works in general, breaks down in the present case: although the wire becomes live at t2, there is no conditionally structured predicate of the relevant sort which applies to it at t2, but which did not apply to it at t1. That in the transition from t1 to t2 the wire has undergone a change seems sayable, although the conditional analysis makes this unsayable.

We turn a switch on our electro-fink so as to make it operate on a reverse cycle, as it were. So the wire is dead when and only when a conductor touches it. At all other times it is live. At a time t4 when the wire is untouched, the wire is live *ex hypothesi*, but the conditional is false of the wire at t4. It is not the case that if the wire is touched by a conductor at t4, then electrical current flows from the wire to the conductor, although since the wire is in fact not touched at t4, it is live at t4, thanks to the work of the electro-fink. Hence *the conditional is not logically necessary for the power ascription of which it is meant to be the analysans*. (The permanently untouched wire is always live, yet the conditional is false of it!) Again, the machine operating in its reverse cycle makes it unsayable on the conditional analysis that in the transition from a time when it is untouched to a time when it is touched, the wire undergoes a change, *viz.*, the change from being live to being dead.

V

Before discussing Armstrong's introduction of higher-order universals for the 'being all' or 'none' needed for general facts or states of affairs, Martin wishes to underscore his most elementary and basic objection to Armstrong's account of universals.

It is a 'theological' objection. In theology, the Trinity, Three in One, is allowed to be a mystery, impenetrable to the finite mind. Armstrong's view of a universal as existing only in its instantiations takes a kind of 'theological' twist. A specific universal exists as numerically identical and 'fully' in 'each' of the non-identical spatially and temporally distinct instantiations.

A particular instantiation *A* has spatial and temporal limits or bounds beyond which *it* as a spatio-temporal continuant ceases to exist. Another instantiation *B* that is not continuous with *A* is treated as numerically distinct by Armstrong. Yet the numerically identical universal is nothing more than and *consists* in these numerically distinct and non-identical instantiations.

For all the world this appears to be a 'divided object' or 'scattered object' view of universals. One can be led by conventionalised artifice to treat *any* grouping of entities *as* a unit. To speak of a 'divided object' in this sense can even involve treating as a unit some entity with other entities, actual *or* possible, that are or *would* be spatio-temporally distant and distinct from one another. This may be done to assist some modal talk of what non-actual entities would or would not be suitable parts (or instantiations) of the unit divided object (universal). This can be done with all the tea in China and all the tea in Hoboken forming the divided or scattered object such that this unit object exists *fully* in each and would have existed fully in all the tea in China even if the tea in Hoboken had not existed but only suppositionally included as a 'would be' member of the unit. The divided or scattered object has nothing to do with what is designated by a 'mass term'. 'Tea' may be thought of as a mass term in which a heap of tea is *tea*, but the cubes in China and cubes in Hoboken in a *heap* of cubes need not itself be a cube.

Led by theoretical requirements, there can be benefits even for making what-there-is-and-what-there-isn't a unit as I have suggested is done with terms such as 'the world', 'the cosmos' or 'the universe' in some of their uses. But in *all* of these cases of divided or scattered objects there could be alterations from more tea or cube or world to *less* (or vice versa) in actuality. That, I think, is not allowed for Armstrong's universal.

It is by no means clear that talk about a numerically identical object being fully in each of its locations at different places and times is an adequate parallel to Armstrong's numerically identical universal being fully in each of its different instantiations.

The object is complex and *must* be to be an object. It is *not* exhaustively and so not *fully* constituted of its *atness* at each of its different spatial and temporal locations. It must have more properties than its location properties.

In contrast, the universal at its most basic level is simple and not complex. It *is* exhaustively and so *fully* constituted of each of its instantiations—and *that* is the mystery Martin wanted to have unfolded!

Armstrong has invoked higher-order general facts or states of affairs types to buttress his account of laws of nature. Martin's aim is to make do with things, properties and relations that make up and are the constituents of situations or states of affairs all of which would be first-order.

To add to these first-order entities a group of entities that are non-spatio-temporal, higher-order totality types or general state of affairs is to be led by grammatical features of *reportage* of the world to an abstract penumbral 'allness'. But this needs to be *shown*.

If one considers the terms 'the world' or 'the universe' or 'the how-and-what-there-is' past, present and future, as having first-order but non-specific reference (that is, it does not cite specific entities and then make a higher-order claim for their allness), *then* for any set of entities of a particular kind, their 'allness' *within* that first-order how-and-what-there-is can itself be thought of as having a first-order division into entities of various sorts and absences of various sorts.

The term 'how-and-what-there-is' is a general but first-order term like 'dogs', though admitting of rather more non-specificity and, witness countless ontological battles, rather more variance in what is included and what is excluded.

Russell saw how hard it is to separate the totality fact from the negative fact. Martin suggests that first-order what-there-is itself has first-order divisions into kinds of being and non-being. There is no need of a totality fact or a negative fact on top of that.

VI

David Lewis challenges the width of Martin's and Armstrong's use of truthmakers in his critical notice of Armstrong's *A Combinatorial Theory of Possibility*.[5]

> I borrow a slogan from John Bigelow: 'Truth is supervenient on being' (*The Reality of Numbers,* Oxford University Press, 1988, pp. 132–133 and 158–159)… For myself, I remain uncommitted about universals, I would prefer a more neutral formulation: truth is supervenient on what things there are and which perfectly natural properties and relations they instantiate….
>
> But the way Martin explained the bad smell, namely as the stink of truths without truth-makers, cast suspicion not only on the ratty counterfactuals, but also on innocent negative existentials and predications. By all means find something wrong with phenomenalistic counterfactuals. But if my denial that there are arctic penguins is likewise true without benefit of any truthmaker, true just because there aren't any arctic penguins to make it false then is it really a companion in guilt?
>
> (Lewis, *op. cit.*, pp. 218–219)

Lewis provides his own account of negative existential truths.

> It seems, offhand, that they are true not because things of some kind *do* exist, but rather because counterexamples *don't* exist.

> They are true for lack of false-makers. Why defy this first impression?
>
> (Don't say: 'Aha! It's a lack that makes it true!' The noun is a happenstance of idiom, and to say that a negative existential is true for lack of false-makers is the same as to say that it's true because there aren't any false-makers. The demand for truthmakers might lead one into ontological seriousness about lacks, but not vice-versa.)
>
> (Lewis, *op. cit.*, p. 216)

Lewis says of 'absences' or 'lacks' that 'The noun is a happenstance of idiom…' (op. *cit., p.* 216). This is, as Lewis realises, similar to Quine's *façon de parler* move against 'sakes'. I think that the deontologising is mistaken in each case.

'For the sake of…' or 'for…'s sake' suggest that the 'sake' is the supposed benefit of something *through* support for or initiation of some state or condition by some action or inaction. That is roughly what 'sakes' *are*. It is enough for us to know roughly what in the world to look for and expect of something's being for the sake of something or someone, though what it most ultimately comes down to in terms of theoretical physics is incompletable. And attempting such completeness is unnecessary for the level of description by which we quite competently make our statements about the observable world. The same incompleteness also, quite harmlessly holds for asides about the weather, and for being in harm's way and for trees and for alarm clocks and for being a civil insurrection as well as being for the sake of something. Martin wishes to argue that the deontologising of absences and voids is no more convincing than is that for 'the sake' idioms.

To turn the issue on its head, the argument should not be determined by a literal reading of the 'happenstance of idiom' that Lewis *himself* has chosen, namely, the employment of the term 'things' in the slogan 'How things are'. Alternatives such as 'How the world is' and 'How it is, (at some specific place and time)' or 'How it is (wherever or whenever)', don't make any exclusive use of 'things'.

A hole is a graphic case of an absence. 'Look for the hole' is precisely looking for a particular kind of absence.

In the late 1950s Don Gunner read a conference paper on 'Holes'. In it he employed a criterion of manipulatability for any physical thing, a criterion used much later by Ian Hacking in giving elementary particles their credentials for real entityhood. Gunner argued that holes failed to satisfy the necessary criterion. Martin took this to be difficult to apply to larger heavenly bodies and to smack of verificationism.

At best, it is a criterion of thinghood and therefore irrelevant to the disagreement between Lewis and Martin. Martin does not claim that an absence of something or a hole are things. He argues that they are states of the world or universe and therefore, though not things or natural properties or relations of things, they can serve as truthmakers for negative existentials or falsemakers for positive existentials.

In 1970 David and Stephanie Lewis published a paper[6] that was a remarkably subtle and delightful exploration of how holes and absences couldn't be *anything* like things. This still leaves it open to consider whether or not absences are unthing-like states of the world or not.

Lewis appears to allow (as Martin would as well) falsemakers as well as truthmakers. So what is his account of the *falsity* of 'There are arctic penguins'? Presumably, the non-existence of arctic penguins is no more a falsemaker for 'There are arctic penguins' than it is a truthmaker for 'There are no arctic penguins'. So 'There are arctic penguins' is false just because there aren't any *things* that are truthmakers. This is simply parallel to Lewis's account of the truth of 'There are no arctic penguins' in terms of there not being any *things* that are falsemakers. Lewis says that it is wrong to think that a lack or absence of arctic penguins or any state of the world makes 'There are no arctic penguins' true, and claims that this can be shown by pointing out that

> to say that a negative existential is true for lack of false-makers is the same as to say that it's true because there aren't any false-makers.

But, 'There aren't any falsemakers for "There are not arctic penguins"' is a negative existential claiming the non-existence of arctic penguins, something Martin claims is a state, not of course of *things*, but of a *spatio-temporal region of the world.*

This statement about there not being any falsemakers for 'There are no arctic penguins', needs a state of the world at the end of it (as truthmaker) for it to be true just as much or as little as 'There are no arctic penguins' does and so can't be used to explain or show how the latter needs no truthmaking state of the world for it to be true.

The moves are on the blackboard. The claim that truthmakers or falsemakers have to be things and natural properties of things and not absences thereof, sets the terms on one side of the dispute but argument remains to be given on each side.

That a thing or property *A* exists at $T_1 P_1$ and then that the thing or property *B* comes into existence at $T_1 P_1$ is not sufficient in itself to make it true that *A* no longer exists at $T_2 P_2$. *B*'s existence at $T_2 P_2$ would be sufficient for the truth of *A*'s non-existence only if B's existence *excluded*

A's existence at the same place and time. In general, the attempt to account for the absences of things in terms of the presences of other things is hard to accomplish not only with *vacua* or voids, but is contentious even in more ordinary cases as well.

Lewis has said

> 'how things are' must not be taken to cover just any old condition that things satisfy, on pain of trivialization.
>
> *(op. cit.,* p. 218)

and then limits the bearing of 'how things are' (such that they can make a statement true) to

> truth is supervenient on what things there are and which perfectly natural properties and relations they instantiate.
>
> (Lewis, *op. cit.,* p. 218)

Martin would suggest that the terms 'how things are' or 'how the world is' or 'the universe' (unless limited to specific times and places) are space-time *general* terms though still at first-order level. They are the most general and non-specific terms that we have, and that may explain why one may forget momentarily their great usefulness and their perfectly genuine credentials for providing general referring terms that aren't 'thing' terms or 'natural properties' terms. They refer to the space-time general referent. The presences and absences of things and their natural properties and relations are how that referent is. If the referent is a *specific* space-time region then the presences and absences of things, etc. are also how *it* is.

Lewis, in saying '…truths are about things, they don't float in a void,' (*op. cit.,* p. 218) seems to conflate absence and void. But absences are everywhere and voids are not. Absences only exclude what they are absences of from their spatio-temporal region, whereas voids exclude everything.

A void is not a *thing*, but it may be *how* a *space-time region* is. 'Void' is not a nonsense term. I think that if Lewis were travelling toward a void or a void were travelling toward him, he would be in fear of his very life, and *not* because of things *around* the void, but of the *inside* of the void itself. Martin's account in terms of the absences of reciprocal disposition partners for the mutual manifestation of the continuance in existence of Lewis, can explain that. The notion of reciprocal partners for mutual manifestation helps us not to reify the void.

The real entity, e.g. Lewis himself, has dispositions that are reciprocal with their myriad reciprocal disposition partners for the mutual

manifestations of his continuing physical (what other?) existence.

The distinction between not having or *lacking* a reciprocal disposition for his continuing physical existence and *having* an active prohibitive disposition partner *against* his continuing existence also helps against the reification of voids. A void, or even just an absence, cannot, unlike an actual entity or property, be an active prohibitive or generative or supportive disposition partner.

The distinction between not having a reciprocal disposition partner for some manifestation and having a prohibitive disposition partner *against* some manifestation is an instance of the distinction between causally relevant and causally operative. Absences and voids are causally relevant but not causally operative.

Whether it is a true negative existential sentence (or believing) or a false positive existential sentence (or believing) Martin would claim that the world is at the other end of each and not just idly so. Existential sentences or believings whether positive or negative do not have just further sentences or believings at the other end because, typically, that isn't what they are (rightly or wrongly). There have to be very *different* (first-order) states of the world, that is, differences in how the world is, for the difference between the existence of arctic penguins and the non-existence (absence) of arctic penguins.

There are many states of the world that can constitute there being cows and more still for there *not* being cows. Martin tried and failed to work out (at first-order level) the not being or absence of entities as their *logical* exclusion by other actual entities.

Actual entities (first-order) aren't enough to be logical excluders of other entities. Fields and rivers don't logically exclude other fields and rivers even from the same place and time. Indeed, it has been argued (Michael Shorter and others) that even one human body does not logically exclude another human body from the same place and time. George Molnar once suggested in conversation that deafness seemed to be a negative state, but that no positive state was a *logical* excluder for hearing. Though determinates under the same determinable logically exclude one another in some clear cases, they are no help in the frequent cases in which there are no determinates whatsoever under a particular determinable as there are no determinate odours in an odourless room.

Lewis wishes to keep his eye upon the doughnut and not upon the hole, but absences *are* perceived. We look very carefully to make sure there are not any stains on a shirt. We are not looking for pure nothingness, we are looking for the absence of stains.

The blind feel for *the absence* of solid impediment to their progress. The sensation of their hand or limb passing through the space that is empty of such impediment is the desired perception of absence or emptiness in a perfectly straightforward way. It is the achievement of absence of something by the removal of some unwanted thing that may give very positive relief. The absence of someone can be agonising. Non-being is not in the usual case meant to be pure nothing. It is the absence or non-existence of some entity or entities that is quite compatible with presence or existence of other entities at the same place and time. Non-being is not a form of being any more than being is a form of non-being. Yet, the fittings, the warp and woof of the presence and absence of something are essential and complementary for one another. The concept of an edge is the concept of the limit of where something is and where something isn't. Presences and absences are correlative and both are involved in destroying, removing and being at a distance from things.

This discussion has been for a good cause. Penumbral higher-order levels of being make easy blackboard exercises but they don't fit well for an empiricist conscience. Keeping to first-order being is hard work but it can be done. First-order absences can be earned by making general facts or general states of affairs types unnecessary.

VII

Armstrong has provided a counter-example to Martin's notion of causality as mutual manifestation of reciprocal disposition partners. Armstrong's case of the previous state of a thing causing its own successive state without having any reciprocal disposition partners, is a case of an entity that exists in and for itself absolutely independent of everything else (including electromagnetic and gravity fields of force, etc.). Even so, it is not a case of a total lack of reciprocal disposition partners. A previous state X of a thing A at T has *innumerable* reciprocal disposition partners in *other* states of A at T^1 for the continuance of state X of A at T. Armstrong would need an[1] object with only a single irreducible state[2]—perhaps God.

This case, along with Armstrong's case of a purely qualitative, non-dispositional entity are each cases of entities that are outside the world of causality altogether. At least, Martin's case of non-interacting (because of their spatio-temporal distance) elementary particles does not suffer this conceptually embarrassing deficiency.

VIII

It may still look as if Armstrong's complex and subtle account of laws of nature might help, because, though the connection of states-of-affairs-types is contingent, Armstrong makes it *general* by introducing higher-order general states of affairs or general facts to guarantee the exceptionlessness of the primitive connection between states of affairs types that is central to his notion of a law of nature. Armstrong says of this connection,

> It is a nomic primitive. Whether all fundamental laws are causal is a point about which he remains uncertain.
>
> (p. 147)

This makes it *equally* uncertain whether Armstrong's account in terms of nomic connection is even relevant to causal dispositionality at *all*.

Furthermore, Armstrong has allowed that the laws could be disjunctive. He has not shown that they could not have a *massive* number of disjuncts. That possibility is enough to feed the Humean sceptic about induction with whom Armstrong tries to embarrass Martin. Martin only wishes to claim that he is in no weaker position against the Humean than is Armstrong.

Martin does not take fright easily in this matter. It has been a principle of his philosophical life that every serious ontic commitment carries with it the possibility of epistemic embarrassment.

IX

Armstrong charges that the directedness Martin finds in everything, mental or non-mental, is *just* an anthropomorphisation. This is not justified.

Prepositional attitude states, such as beliefs and desires, have to have a 'what about' (content) that is intrinsic. They have to be about some things and not others. In a parallel way that Armstrong would, it seems, not deny (e.g. his own references to 'forward looking', etc.) dispositions have to have a 'what for'. They have to be 'readinesses' for some (and not others) mutual-manifestations-with-certain (and not others) reciprocal-disposition-partners.

This directedness and selectiveness even to what is absent or non-existent (as with a substance that is soluble in a solvent that does not exist in nature and only shortage of funds blocks its manufacture) is intrinsic to the dispositionality of the properties of all entities, non-mental as well as mental, sub-microscopic as well as macroscopic. This 'what for' of

dispositionality has a parallel directed selectivity to the 'what *about*' of the semantic.

It should help to see that even in the simplest form of directedness, through the dispositionality of the simplest *non*-mental property of the simplest non-psychological entity, the directedness can be internalist and narrow. Projectability to any-of-a-kind-that-may-come-along is satisfied *within* the entity itself by its dispositional states and obviously does not require that the dispositional states *themselves* have anything X-like as their 'typical cause'. (Indeed, nothing X-like may even exist.) This directedness is intrinsic to non-mental as well as mental dispositions and clearly it is narrow, that is, it goes from inside to outside. It would be outlandish to go against nature *itself* and to deprive the directedness of mental dispositions of such a *natural* narrow (inside to outside) function.

There is a sense in which the dispositionality, even of any property of a quark, is for more than *could* ever be manifested because on any occasion some forms of manifestation-conditions or reciprocal disposition partners are lacking and may even *exclude* one another. The totality of this infinity of *alternative* manifestations is unachievable, and this is a necessary fact of nature—the *actual* dispositionality is infinite in its directedness and the manifestations *for* which it is disposed, if actualised at all, are only partial and finite.

It is *natural* that so little can carry so much. *As* a manifestation *of* a particular disposition base, its nature is determined by what it is *from*, namely *that* disposition base with infinite richness of readinesses, not just for future manifestations, but, more importantly, at the *time* of its manifestation, it is disposed for an infinity of *alternative* manifestations under *alternative* conditions within the scope of the limits set by what it is *not* disposed for and what it is disposed to *prohibit* amongst its actual and non-actual reciprocal disposition partners. Every disposition is, in *this* way, a holistic web. Amongst the non-actual reciprocal disposition partners for which it would have readiness would be ones following very different causal 'laws' or natures from those in our world.

Martin believes, but cannot begin to demonstrate here, that this model is rich enough to explain modalities and (*contra* Saul Kripke's[7] doubts) rule-following for mathematics.

An approximation is needed to externalist or 'broad' content and is to be found in the directedness of a dispositional state *S* (non-mental or mental) toward an *individual X* rather than to just *anything X*-like because *X* is the *only* thing of its kind in the vicinity that can serve as a reciprocal disposition partner for the manifestation of *S*.[8]

Systemic use is found (non-metaphorically) in non-mental, vegetative systems such as the Nucleus Tractus Solitarius and the Hypothalamus. These employ integrative, adjustive, spatially projective, anticipatory, negative and positive feedback and feedforward reactivenesses to (*use* of) input that are far nearer to those of the human cortex than perhaps any machine or AI device so far envisaged.

If this directedness and selectiveness and systemic use is found at even the vegetative, non-mental level of organisation, one must not ask for it all over *again* at the mental level as if it were *unique* to the mental.

We should, then, have a clearer vision of what more is required for directedness and selectiveness and systemic use to be *mental* and for the systemic use of input to be voluntary.

Philosophers must become aware of the recent development of sophisticated dispositional mechanisms that are basic to *both* mental and *non*-mental systems, in order to assess how much is in common.

It will be essential to recognise the significance of new work being done in terms of positive feedback and feedforward. The treatment of these as merely uncontrolled explosions and the reliance upon only negative feedback as the primary mechanism for biological function has become outmoded.

The notion of negative feedback was developed into the concept of homeostasis by Walter Cannon.[9] The standard example is that of a thermostat switching heat off when the temperature rises and switching it on when the temperature drops. It is a conservative device adjustive to a set point or what Bernard called 'the fixity of the milieu' and Cannon called 'preserving homeostasis' in order to 'maintain steady states in the body'.[10]

Homeostatic negative feedback has been found inadequate to explain the capacities for plasticity and adaptivity found in physiology at both the level of complex systems *and* at the cellular level.

Positive feedback is an amplificatory and augmenting mechanism for strengthening of signals. It is not limited to 'uncontrolled explosions' and may even occur in 'slow excitatory synaptic responses'.[11] R.C.Jackson provides an explicit rejection of the exclusivity of negative feedback and emphasises the equal importance of positive feedback.[12] N.G.Publicover, E.M.Hammond and K.M.Sanders suggest a 'positive feedback and amplification mechanism in these (interstitial) cells' and describe this as a mechanism for active propagation of inhibitory signals which represents a novel concept in cell-to-cell communication with smooth muscles.[13]

Feedforward in contrast to feedback does not depend upon continuous monitoring of output by a control signal. In this way it can apply anticipatory signals. N.R.St.C.Sinclair and J.R.G.Challis argue that 'while

both feedback and feedforward mechanisms may contribute to tentativeness and fervor, feedforward mechanisms are of more interest since they have not been investigated in any detail and because they account for characteristics of biological systems which cannot be easily reconciled by feedback'.[14] Such feedforward capacities are termed 'anticipatory'.

Possessing these and other projective and integrative capacities, biological vegetative dispositional systems such as the Nucleus Tractus Solitarius are non-conscious and non-voluntary, yet approximate to and often exceed in complexity the typical AI machine in the sophistication of its function. These 'vegetative' systems, as well as the typical AI machine, lack two capacities essential to conscious and voluntary function that are often ignored.

- *Cue-manifestation vs typifying-manifestation.* A neurological system can manifest an assessment or cueing of its own degree (or lack of degree) of readiness or capacity for some task. It can do this without trial or preparation for or continuance of the performance of that task. This is what William James and Ludwig Wittgenstein called the 'Aha!' or 'Got it!' or 'Can go on' that tell so much, though fallibly. An athlete is cued in without trial by 'muscle-tone' to a set of physical capacities for very complex tasks and a theoretical thinker is cued in without trial by sensing what can or cannot be done in some abstract task. Such cue-manifestations of and to some complex capacity or disposition-base are in contrast to typifying-manifestations that would be the performance of the task the capacity or disposition-base is *for* (e.g. running the race or giving the mathematical proof).

  The cue-manifestation allows a system to assess its capacity for a task without having to complete it or perhaps even begin it. Only a bore attempts full performance. It is an essential and *constant* economy for self-assessing, higher cognitive functioning systems.

  When the central importance of this basic and widespread function is appreciated, it will be intriguing to see how neurophysiologists and neuropsychologists plot its physical realisation.

  Internal and external signals. A neurological system can have a capacity to generate signals (internal signals) for levels of processing that are qualitatively similar to signals (external signals) generated at the sensory receptors by the immediate physical environment.

  Complex interrelated structural dispositional neural states for constant and normal reactive, directive, contrastive, anticipatory uses of such internal signals in dream, imagery and hallucination form

> the crucial function for mental activity *independent* of the stimulus of the immediate physical environment. This is a function suited to *quickly* formed adaptivities to and creative reactive use of inputs or internal signals. The *qualitative* similarity between internal and external signals encourages such adaptivities to internal signals that would be parallel to the quickly formed adaptivities and creative reactive uses of novel external signals from the physical environment. This centres attention upon the qualities of the signals. Fortunately, not all cells are alike and the multitudes of their intrinsic differences are just beginning to be discovered. Pure functionalism and its behaviouristic cousins are left behind because they leave no room for irreducible qualitative differences even on the assumption that there are no non-physical qualia.

This discussion fits Martin's argument against *purely* dispositional (that might stand for 'functional') properties (having no implications for qualitative properties) and against *purely* qualitative (that might stand for intrinsic qualities) properties (having no implications for dispositionalities) and for his argument for the Limit View of properties as qualitative-cum-dispositional.

Neurophysiologists and neuropsychologists are breaking through quasi-behaviourist barriers leaving many philosophers and psychologists behind. Making use of Positron Emission Tomography and Nuclear Magnetic Resonance Imaging and Magnetoencephalography they are making strides in detecting to increasing degrees of fineness, temporally and spatially, the episodes of thought and feeling of our inner life in our uses of dreaming and waking imagery and sensory and visceral experience.

Martin's account of dispositionality is supposed to be seminal for a gradualist and naturalistic depiction of the evolving of the mental from the non-mental.

The story has just begun and must be continued in another place.

NOTES

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7 S.Kripke, *Wittgenstein on Rules and Private Language*, Cambridge, MA: Harvard University Press, 1982, pp. 22–37.
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12 R.C.Jackson, 'The kinetic properties of switch antimetabolites', *Journal of the National Cancer Institute*, April 7, 1993, p. 539.
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