

# Properties

## 9.1 The one and the many

Certain philosophical questions arise on their own quite naturally. Few persons have to be prompted to ask such questions as “Are there souls?”, “Is there a God?”, “What is the basis of good and evil?”, or “Why do ethical and moral values seem to change from culture to culture and from time to time?” Other philosophical questions are slightly more remote, and occur to some, but not nearly as many, persons. A few of these we have already mentioned, e.g. “Is there an edge to space?” and “Are persons distinct from human bodies?” But some other philosophical questions are so *recherché* as to be distinctly ‘philosopher’s questions’. They are the sorts which occur naturally to very few persons. They are the sorts of questions which one must be induced, under provocation or tutelage, to come to see as posing genuine problems worthy of pursuit and whose answers are both subtle and central. One of these latter problems is the problem of ‘the one and the many’ introduced, virtually at the dawn of the philosophic enterprise, by Plato (427?-347 BC).

Plato asked a deceptively simple question: How is it possible for there to be two or more things of the same sort? How, for example, is it possible for there to be two ‘identical’ clay vases?

At one level, the answer might simply be: there are two identical clay vases because one is a good copy (replica) of the other. Or, we might say: there are two identical clay vases because they were both cast from the same mold. But Plato’s original question was not the kind of question to which these latter would be proper answers. Plato’s question was intended to go much deeper. It is not about any two (or three, or more) examples we might care to single out; his question is one of overarching generality: How is it possible for there to be more than one thing of any kind whatsoever, regardless what

kinds of things (vases, persons, clouds, mountains, etc.) there are? In short, what sort of theory must we propose to explain *multiplicity itself* in the world?

Why is the very occurrence of multiplicity (in Plato's terminology, 'the many') thought to be a problem? Let us see.

Perform the following thought-experiment. Imagine any two things, e.g. two vases or two pens or two apples. Now imagine them *perfectly alike*: they have the same weight, same physical dimensions, same color, same temperature, same texture, same physical constitution, etc. etc. It is not just that they have no perceivable or detectable difference, something that might reveal itself to your eye or to your measuring instruments; you are being asked to imagine that the similarity goes beyond undetectable difference to there being absolutely no difference whatsoever. If you have trouble stretching your imagination in this way in regard to ordinary material objects, imagine some of the more arcane products of science, e.g. microscopic perfect crystals which really do seem to exhibit the perfect sameness just posited, or a DNA molecule which replicates itself with no mutation. The problem can now be put: What accounts for the *difference*, the very fact that there are *two* or more of these things, when *by hypothesis* everything that is true of one – e.g. its being red, or its having a mass of 15.65 g, or its being made up of a number of specific atoms in some determinate spatial configuration – is likewise true of its mate? In short, what accounts for sheer difference, given identity of features?

Modern philosophers use a technical vocabulary to frame these questions and to discuss possible solutions. Things which share all their features in common, e.g. the perfectly similar vases, apples, cloned DNA molecules, which we have just described, are said to be *qualitatively identical*. They are identical, that is, in sharing one another's *properties* in common.

Obviously every one thing is qualitatively identical to itself, in just the same manner as, for example, every woman is as tall as herself. But while every thing is qualitatively identical to itself, only some things are qualitatively identical to other things. The hand calculator sitting on my desk right now is (to the best of my knowledge) not qualitatively identical to any other calculator in existence. The unique damage to one corner of its case, having been caused by its getting caught in the drawer in my desk, accounts for the difference. The fact that no other calculator, however similar otherwise, bears precisely the same sort of physical damage to its own upper-right-hand corner

assures that my calculator is *qualitatively distinct* from every other thing in the world. (Chipped plastic cases are as unique as fingerprints.)

This very calculator, the one with the damage to its corner, which is qualitatively distinct from every other thing in the world, is nevertheless *numerically identical* with the calculator which is positioned on my desk next to the telephone. That is to say, my calculator with the chipped case just *is* the selfsame, or very same, calculator that is positioned next to my telephone. When one speaks of *numerical identity*, one is speaking of a single thing. The single thing being spoken of is *both* the calculator having the damaged case *and* is (at one and the same time) the very thing which is positioned next to the telephone on my desk.

It is obvious, then, that certain *logical* relationships hold between the concepts of *qualitative identity* and *numerical identity*. These relationships may be stated in three axioms (theses or principles):

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1. Each and every thing is qualitatively identical to itself.
  2. Each and every thing is numerically identical to itself.
  3. Whatever are numerically identical are qualitatively identical.<sup>1</sup>

*Figure 9.1*

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It is somewhat barbarous, and indeed even somewhat logically misleading, to talk of two things being numerically identical. The very concept of *numerical identity* implies singularity of reference. To avoid such clumsiness, and indeed literal incoherence, philosophers typically take recourse to using variables, e.g. “*x*” and “*y*”, in talking of qualitative and numerical identity so as not to give the mistaken impression that they are presupposing that they are talking of exactly one or two things. We are already familiar with the use of variables in algebra, where difference in iconography, the visual appearance of symbol, does not invariably mean that the things referred to also are different. Consider, for example, the relatively trivial pair of equations:

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1. This third axiom will be refined in chapter 11.

$$x + y = 14$$

$$x \times y = 49$$

The only values which satisfy both these equations simultaneously (i.e. together) are  $x = 7$  and  $y = 7$ . Although the two *symbols*, “ $x$ ” and “ $y$ ”, certainly differ, that difference does not carry over to a difference in the things referred to. Both symbols, in spite of their difference, refer to one and the same thing, viz. the number seven. When, then, philosophers use variables, e.g. “ $x$ ” and “ $y$ ”, in stating theses about qualitative and numerical identity, their use of different symbols explicitly leaves it as a wholly open question whether one or more things is being referred to. That is, difference of symbols does not suffice to imply difference of referent.

Using variables, the theses, or principles, stated a moment ago can be restated somewhat more perspicuously. We will also introduce a bit more symbolism.

- Numerical identity will be symbolized with the familiar equals-sign, “ $=$ ”.
- Qualitative identity will be symbolized by “ $Q$ ”.
- The relation of *implies* will be symbolized by “ $\rightarrow$ ”.
- The so-called *quantifier*, e.g. “for any  $x$ ”, will be symbolized as the prefix “ $(x)$ ”.

Thus in figure 9.2 (p. 232), we get the symbolic renderings of the principles of figure 9.1 above.

The third of these principles (in figure 9.2) bears the name “The indiscernibility of identicals.”<sup>2</sup> It is one of the few undisputed theses of metaphysics.<sup>3</sup> After all, it says nothing more startling than that each

2. The name was coined by Quine ([162], 139). The term “indiscernible” is principally one of psychology: there it refers to what we cannot *perceive* to be different. But as used here, in these metaphysical principles, the term is intended in a *stronger* sense, viz. it is to be taken to mean “indiscernible *in principle*”, i.e. to mean that there is no difference at all in properties, not just that there are no perceivable differences. “Indiscernible” in metaphysics is thus a synonym for “qualitative identity”.

3. An apparent exception may be found in the writings of Alfred Korzybski (see above footnote 13, p. 166). On the face of it, Korzybski seems to deny the very possibility of numerical identity: “a principle or a premise that

1. Each and every thing is qualitatively identical to itself.  
(For any  $x$ ,  $x$  is qualitatively identical to itself.)  
 $(x)(x \mathcal{Q} x)$
2. Each and every thing is numerically identical to itself.  
(For any  $x$ ,  $x$  is numerically identical to itself.)  
 $(x)(x = x)$
3. Whatever are numerically identical are qualitatively identical.  
(For any  $x$  and for any  $y$ ,  $x$ 's being numerically identical to  $y$  implies that  $x$  is qualitatively identical to  $y$ .)  
 $(x)(y)(x = y \rightarrow x \mathcal{Q} y)$

*Figure 9.2*

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single thing shares with itself whatever properties it happens to have.

Far more controversial and far more problematic, however, is the converse thesis which was originally introduced by Leibniz. This latter principle conveniently bears the converse name, viz., “The identity of indiscernibles”, and it says that if any  $x$  and any  $y$  share *all* their features or properties in common, then there is but one thing, i.e. then  $x$  and  $y$  are not two objects, but are the selfsame object. In symbols, this latter, fourth, principle may be stated this way:

$$(x)(y)(x \mathcal{Q} y \rightarrow x = y)$$

Immediately, this latter principle seems to be in direct conflict with the result of our thought-experiment of a moment ago. We had posed

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‘everything is identical with itself’ is *invariably false to facts*” ([114], 194). But his ensuing explanation suggests that he is not denying the principle of the indiscernibility of identicals, indeed is not even discussing that principle. He is, rather, calling attention – in a somewhat misleading manner – to his theses that all things change over time (194) and that no two persons react to any one thing in precisely the same way (194-5). Neither of these latter two claims, whether true or false, contradicts the principle of the indiscernibility of identicals. (We will devote the whole of chapter 11 to an examination of the problem of change over time.)

ourselves the task of trying to imagine two numerically distinct, qualitatively identical objects: two apples; two vases; even a DNA molecule and its perfect clone. But if this latest principle of the identity of indiscernibles were to be accepted as true, if, that is, indiscernibility (i.e. qualitative identity) were conceded to confer numerical identity, then the results of our thought-experiment ought to have been at least mistaken if not outrightly impossible.

Obviously, this relationship between qualitative identity and numerical identity requires closer examination. Plato certainly believed that qualitative identity was possible without numerical identity, that it is possible, for example, for two or more things to share all their properties in common. But if two things really do share *all* their properties in common, what, then, could possibly account for there being *two* of them? How is it possible for there to be multiplicity without qualitative difference?

Leibniz himself thought that there *could not be* two numerically distinct but qualitatively identical things. But he believed that this impossibility flowed, not from logic, not from metaphysical principles, but from the perfection of God. Leibniz acknowledged that there was no *logical* bar to there being qualitatively identical, but numerically distinct, objects. If such existed, however, there would seem to be a curious redundancy, a gross imperfection, in Nature. And thus Leibniz hypothesized that the reason there are no such actual oddities in Nature is because Nature is the handiwork of God and God is perfect. God, he argued, could have 'no sufficient reason' for introducing a redundancy into the world. If He made two of the same things, then that would be evidence that He had not 'got it right' the first time: an unacceptable imperfection in a Perfect Being ([5], Third paper, §§5, 13, and 19). In short, even though it is logically possible that there could be numerically distinct, but qualitatively identical, things, their existence would be a blot on God's perfection and hence Leibniz steadfastly believed that no such things in fact existed. So sure was he of this latter conclusion that he ridiculed an acquaintance who actually tried, empirically, to find two qualitatively identical fallen leaves in the autumn garden ([5], Fourth paper, §4). Without venturing outdoors, Leibniz was convinced of the folly of the exercise.

Virtually no philosopher since Leibniz has given any credence to Leibniz's 'theological solution' to the puzzle about how qualitative identity does not automatically confer numerical identity. Better theories are needed to explain the real possibility, indeed the actuality, of the numerical difference of qualitatively identical things.

The solution to the puzzle about the exact nature of the relationship between qualitative identity and numerical identity turns on the degree of inclusiveness, or the compass, we are to understand when we describe qualitative identity as the sharing of *all* properties in common. What *are* the properties we are here talking about? What are the properties which make up a thing? For example, is my being born several years after Bertrand Russell a *property* of mine? Is it one of Russell's? If the calculator on my desk happens to have been the 234,921st one to roll off the assembly line, is that one of its *properties*? If a distant relative, totally unknown to me, happens to die and leave me a fortune which his lawyer steals without ever having informed me of the inheritance, do I have the *property* of being a legatee, although I am in total ignorance of the situation? Might we want to make a distinction between intrinsic (or real) properties and extrinsic (or accidental) properties? If so, what might such a distinction amount to?

Such examples, and the questions they raise, show that the very notion itself of *having a property* is not pre-analytically precise. We have an unrefined concept which serves admirably for ordinary purposes, but it is not sophisticated enough to guide us through these current perplexities. To advance, we shall have to examine, in considerably more detail, just what the concept of *having a property* amounts to.

## 9.2 Cataloguing properties and relations

So central is the concept of *property* not only to our doing of philosophy, but to our very ability to communicate in language one with another, that it itself has been the object of much research and speculation. Just reflect for a moment on how very much of our ordinary conversation, the news we hear, and the instructions we are given, consists of someone's picking out a subject and then proceeding to specify one or more of its properties: "The toast is burned"; "Sylvia is at the door"; "The Free Trade bill was given third reading in Parliament today"; "You can thin the shellac by adding 50 cm<sup>3</sup> of denatured alcohol"; "DNA is a helical molecule"; etc.

There is no one way, nor probably even just a few, to catalogue properties. One might, for certain purposes, want to classify properties according to whether their presence in physical objects is detectable by direct sensory experience. For example, we might want to contrast

such readily observable properties as size, shape, weight, and color with more remote properties of the sort detectable only with scientific instruments, e.g. electrical resistance, conductivity, inductance, atomic number, and magnetic permeability, to name just a few. Or, again, we might want to classify properties according to whether they are relatively familiar (e.g. toothache, worry, fear) or whether they are comprehensible only in light of a sophisticated theory (e.g. capital, debenture, cash flow, psychosis, superego, male bonding, disfellowship).

For the purposes of doing philosophy, certain ways of cataloguing properties have proved useful for shedding light on some philosophical problems. No one way of cataloguing properties can be regarded as definitive. The following catalogue is devised, then, with an eye on its eventual use in philosophy. It is in no sense the only, or the 'best', way to classify properties. What warrants its introduction here is the use to which it will subsequently be put.

### 9.2.1 Primary versus secondary properties

One of the most fundamental notions many persons operate with is that some properties (features) of things are 'out there', in the world, as they say, while others are 'in us', in our minds, they might put it. For example, some persons are wont to subscribe to the dictum "Beauty is in the eye of the beholder", by which they mean that the 'external' physical world is not literally beautiful or ugly; it is, in the final analysis, merely a display of shapes, noises, and colors, and any beauty or ugliness associated with the scene is literally located within us. Beauty or ugliness – on this account – is our individual (or in some cases, perhaps, our collective) way of *reacting* to certain external stimuli.

Persons who adopt the sort of dichotomy between what is 'out there' (the stimulus) and what it causes in us (the response) are, knowingly or not, operating with a pair of distinctions, if not originally due to, then at least actively promoted by, John Locke. Locke believed that the external physical world, the world, that is, outside our minds, is populated (furnished) with objects having very few properties indeed ([124], book II, chap. VIII, §§7-26). These external objects have but five properties. Locke was, one must recall, operating with seventeenth-century physics which knew nothing of modern atomic physics, electricity, magnetism, chemistry, and biology. These five properties he called "primary properties". They comprised: (1) extension



(i.e. the object's taking up space); (2) figure (roughly, its shape); (3) motion or rest; (4) number; and (5) solidity (or impenetrability).<sup>4</sup> Together these primary properties had the 'power' to cause *in us* not only perceptions ('ideas'<sup>5</sup> he called them) of shape, motion, etc., but as well perceptions of color, sound, warmth or cold, odor, etc. These latter perceptions which did not 'correspond' to the primary properties of material objects were said to be of 'secondary' qualities.

I think it safe to say that most persons, particularly those who are products of Western culture, habitually vacillate between two incompatible theories of perception. If not pressured by odd cases, many of us go about our lives believing that the things we see really do have the properties they appear to have: the wall is yellow; the piano is dark brown; and the apple is red. But if someone reminds us that the yellowness of the wall, the brownness of the piano, and the redness of the apple cannot be seen when the illumination is extinguished, and yet nothing much seems to have happened to the wall, the piano, or the apple themselves, many of us will immediately switch to a Lockean-type theory and will then be inclined to place the color of these objects, not in the things themselves, but in our reaction to them. We may, under these latter circumstances, find ourselves saying: "The yellowness of the wall is my way of reacting to some physical feature of the wall. When the wall is illuminated, it gives off electromagnetic radiation (visible light) which is focused on the retina of my eye, which in turn causes a signal to pass along the optic nerve to my brain. And by some process, not yet understood, it eventuates in my seeing yellow. According to this scientific explanation, then, yellowness is not a property of the wall, but a property of my mind (brain?). What property the wall actually has is the physical 'power' to cause *in me* (and in the rest of us) a certain kind of reaction."

I am sure that this latter sort of response is familiar to nearly every reader. It is virtually an icon of modern science. But it is also, perhaps very much less obviously, more a product of metaphysics. It is, after all, not the sort of theory which is even amenable to laboratory testing. It is, rather, a philosophical edifice mounted upon certain scientific

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4. Sometimes Locke added another to this list: texture. (See, for example, [124], book II, chap. VIII, §§10 and 14.)

5. The word "ideas" in seventeenth- and eighteenth-century philosophy was more multipurpose than it is today. Then it was used to refer not only to beliefs but to perceptions and memories as well.

data in an attempt to explain, to make sense of, that data. It is no product of experience, but clearly goes beyond experience.

At first it may seem that the Lockean theory cannot be of the latter metaphysical sort. It might be supposed, as I think it often mistakenly is, to be a straightforwardly scientific theory whose credentials have been so well established in the psycho-physiologist's laboratory as to be beyond reasonable doubt. But the situation is not at all so simple. Our sensations of secondary properties are supposed, on this theory, to be *caused* by primary ones. But all of the data 'furnished' to our minds, whether of alleged primary or secondary qualities in the things themselves, turn out – on such a theory – to be secondary, caused by, but once-removed from, as it were, the primary properties of things out there in the world external to our minds. We have no direct access, except through the mediation of our senses, to the external world itself. We can no more sense directly in things themselves the power which causes in us perceptions of length or of solidity (supposed primary properties) than we can sense in things the power which causes in us, for example, feelings of warmth, images of color, or episodes of musical tones (supposed secondary properties). But if so, if in principle there is no direct access – save through their effects – of the primary properties of external objects, how can we know that such things really exist and how can we know anything of their 'real' nature? Locke thought that the relationship between, on the one hand, our perceptions of primary properties and, on the other, the primary properties themselves was that of resemblance, while our perceptions of secondary properties bore no resemblances to anything 'in' material objects themselves ([124], book II, chap. VIII, §15). But this belief is at the very least unprovable. There is certainly no conceivable experiment which could ever show that our perceptions of primary properties 'resemble' real properties in material objects and that our perceptions of secondary qualities do not.

Locke's theory soon encountered still worse problems at the hands of Bishop George Berkeley. Locke's theory, which was motivated to accommodate the burgeoning empiricist movement in the new science of the day, ironically was to furnish the groundwork for Berkeley's theory that there was no good evidence of any external, or material, world whatsoever ([27]). It is easy to see how the seed of such a radically opposing theory lay within Locke's theory. There was no convincing way, or suggestion of a mechanism, within Locke's theory to bridge the gulf between the knowledge of the contents of one's own mind and the supposed correspondence of these contents with some-

thing external to one's mind, i.e. a physical, material world independent of mind. Berkeley took the audacious leap of pressing the seventeenth-century version of empiricism to its limits and thus – paradoxically – coming to deny what had up until then seemed to be a bedrock of empiricism. Berkeley insisted that only what is perceived can be regarded as proven to exist. Such a dictum might be thought to be necessary to the pursuit of an objective science. Mere opinion and flights of fancy are to be banished. No more would one invoke such unempirical, untestable existents as Aristotle's 'natural place' or 'unperceivable substance' (more on the latter in chapter 10). For science to be properly grounded, it must be grounded – Berkeley and most of his empirically minded contemporaries similarly believed – in *proofs* stemming from that which was perceivable, demonstrable, and reproducible.

But like so many principles which on first enunciation seem so promising, and indeed even self-evidently true, Berkeley's uncompromising insistence on the centrality of the role of perception in determining what was to be regarded as real and what was to be relegated to the storehouse of mythology soon had some extremely counterintuitive implications. Having adopted Locke's notion that secondary properties have bona fide credentials of reality (no one could possibly doubt that he/she was in pain), Berkeley was driven, ineluctably, to the conclusion that material objects, existing independently of their being observed, not only did not in fact exist, but were a logical impossibility. In pursuing to its inevitable conclusion a particularly hard-nosed (or perhaps less charitably described, ham-fisted) version of empiricism, Berkeley found himself driven away both from Cartesian dualism and from materialism\*, to idealism\* – to the theory that only minds and their contents exist. So startling and unacceptable was such a conclusion, however, that Berkeley 'saved the day' by having God observe everything constantly and by His so doing keep the external world in continuous existence. Needless to say, Berkeley's theological way out of his own dilemma about the existence of the external world (just like Leibniz's earlier theological solution to the dilemma about qualitative identity [see above, p. 233]) would turn out to be one which would be shunned by his successors. Theological solutions to metaphysical puzzles have not been much in vogue for centuries. Indeed, even in those periods in history when they were rather more acceptable, they were always adopted only as a last resort. Metaphysics has always preferred natural explanations to supernatural

ones. And in recent centuries, the tolerance for the latter has declined headlong.

In the two-and-a-half centuries since Berkeley, scores of philosophers have tried to construct philosophical accounts which at once will do justice to empiricism and the important role therein of theorizing combined with deliberative, controlled observation and experimentation, but without at the same time carrying Berkeley's conclusion that the external world is a myth.

Kant's efforts in this regard were both monumental and heroic ([106]). But his particular solution, although eliciting extraordinary numbers of responses and reactions, has not earned a contemporary following. In 1939, the redoubtable G.E. Moore (1873-1958) tried his own hand in a remarkably curious and highly original article, "A Proof of the External World". It is, at the very least, entertaining – and perhaps a bit eye-opening – to sample the method of his argumentation and the style of his unique prose.

... if I can prove that there exist now both a shoe and a sock, I shall have proved that there are now "things outside of us"; ... and similarly I shall have proved it, if I can prove that there exist now two sheets of paper, or two human hands, or two shoes, or two socks, etc. ... Cannot I prove any of these things?

It seems to me that ... I can now give a large number of different proofs, each of which is a perfectly rigorous proof ... I can prove now, for instance, that two human hands exist. How? By holding up my two hands, and saying, as I make a certain gesture with the right hand, "Here is one hand," and adding, as I make a certain gesture with the left, "and here is another." ...

But did I prove just now that two human hands were then in existence? I do want to insist that I did; that the proof which I gave was a perfectly rigorous one; and that it is perhaps impossible to give a better or more rigorous proof of anything whatever. ([136], 144)

Moore, himself, was under no illusions about the expected reception for his 'proof'. He knew that such a proof would be bound to elicit dissatisfaction, indeed even ridicule, from some other philosophers. Even so, Moore was convinced that he was on the right track. Be that as it may, controversy still continues over the cogency of such an approach. Some philosophers regard Moore's work as a needed breath

of fresh air on a stuffy topic; others think it totally off-base, that it misses entirely the very problem facing Locke, Berkeley, and Kant.

My own opinion as to the place to find a solution leans heavily toward the revising of empiricism which has taken place in more recent decades.

When I went for a walk recently, I passed a parked car sporting a bumper sticker reading: "When all else fails, lower your standards." Although I would normally simply smile at such an unabashedly unreserved slogan and would dismiss it as being too sweeping, I recall it here because it has a particular relevance. It sums up succinctly what was wrong with Locke's and Berkeley's empiricism and points to the way out of their dilemma.

Locke's theory contained implicitly the requirement that the existence of external objects could be known only through sensory experience, or as it is sometimes called, the data of sense. But sensory data are intrinsically 'in the mind'. Berkeley probed this feature of the then-current version of empiricism remorselessly and saw, correctly, that it leads to a skepticism about the external world. The only way he was able to see to escape his conclusion was to posit a God who kept a constant vigil on the world.

Contemporary metaphysics pursues another course. In particular, philosophy of late has dropped the inordinately high, unrealizable requirement that sensory data be required to *prove* that the external, public, objective world is of one kind rather than some other. The demand for *proof* (understood in the sense of "certainty") has given way to the more realizable, tractable, and practicable demand for reasonable, although not necessarily conclusive, evidence for whatever is being hypothesized. The modern view is not that sensory data prove, or ever could prove, the existence of a physical, external world, but that sensory data provide good grounds for regarding the hypothesis of the existence of a physical, external world as a reasonable posit, indeed as the *best* of the (currently) available alternatives. Moreover, there are two powerful incentives for adopting this particular posit. One, it matches the common, ordinary view of the way the world is; and two, it matches the scientific view of the way the world is. But neither of these two benefits can be regarded as establishing the hypothesis as being *demonstrably true*. We cannot, in any absolutely conclusive way, prove that an external world exists. The hypothesis that it does exist is a *metaphysical posit*, probably the most common metaphysical posit of our entire civilization. But for all that, it is a piece of metaphysical theorizing nevertheless and not an incontrover-

tible 'fact'. It is after all possible, with some effort, to deny the existence of an external world; it is possible, for example, to believe that the only things that exist are mental things. To cite a near, but not so extreme, parallel: we have seen Christian Scientists, with perfect consistency both in word and in deed, deny the existence of disease.

### 9.2.2 *Manifest versus dispositional properties*

Consider the contrast between the two properties *is broken* and *is breakable*, or between *is burning* and *is flammable*. The first of each of these pairs, *is broken* and *is burning*, seems readily comprehensible. We recurrently encounter both broken and burning items. Indeed these properties of things can literally be *seen*. Their existence can be ascertained by direct observation. But what about the latter pairs of properties, *breakable* and *flammable*? What sorts of properties are they? We cannot in general tell whether something is breakable simply by looking at it; and only rarely – for some few selected kinds of things – can we tell, without putting a flame to it, whether something is flammable. These latter sorts of properties bear the technical name “dispositions”. In a sense, they are properties in potentiality; they are properties waiting, as it were, to break out into actuality. The flammable thing has the potential to become burned; the breakable thing has the potential to become broken.

The properties of *being broken* and of *being burned* are standardly said to be “manifest” properties. To be sure, this nomenclature is somewhat ill-chosen, since “manifest” often carries the connotation of being apparent or obvious. In the technical sense in which certain properties are spoken of as being “manifest”, there is no suggestion that they are apparent or obvious. For example, the charge on an electron or the peculiar structure of a carbon diamond crystal are anything but ‘obvious’; and yet, in the technical sense being spoken of here, these properties are said to be manifest.<sup>6</sup> For technical purposes, then, a “manifest property” means nothing more, or less, than a nondispositional property of a thing.

On an intuitive, pre-analytic basis, the distinction between manifest and dispositional properties seems both clear and firm enough. But on

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6. A term which is sometimes used in place of “manifest” is “occurrent”, but it too carries its own peculiar problems, and will not be used here.

careful probing, the distinction seems in danger of evaporating. Properties like *being square* seem paradigmatically to be manifest, while *being fragile* or *being flammable* seem paradigmatically to be dispositional. But what about *being red*? Do physical objects, e.g. ripe strawberries, manifest the property of redness, or, as Locke hypothesized, do they merely have the 'power' (i.e. the potential or disposition) to cause in us a sensation of redness under certain circumstances (e.g. the lighting being of a certain wavelength and intensity, our eyes and optic nerves, etc., being in proper working order)? With examples such as the latter, the very distinction, or at least the criterion for applying the distinction, seems in imminent danger of collapse. Karl Popper has even gone so far as to argue that all properties are, in the final analysis, dispositional: "If 'breakable' is dispositional, so is 'broken', considering for example how a doctor decides whether a bone is broken or not. Nor should we call a glass 'broken' if the pieces would fuse the moment they were put together: the criterion of being broken is behaviour *under certain conditions*. Similarly, 'red' is dispositional: a thing is red if it is able to reflect a certain kind of light – if it 'looks red' in certain situations. But even 'looking red' is dispositional. It describes the disposition of a thing to make onlookers agree that it looks red" ([159], 118). Popper's suggestion that even the property of *being broken* is dispositional may need a moment of clarification. How does a doctor tell whether a bone is broken? Presumably by administering some test: asking the patient to describe his/her sensations; manipulating the limb; looking for telltale swelling and hematoma; taking an X-ray; etc. In other words, the property *being broken* has the disposition to produce certain results in certain test situations, including – in the case of the broken glass – the property of *not* fusing back together when reassembled. In Popper's view, then, the distinction between manifest and dispositional properties is nothing absolute, but merely one of degree. (We can anticipate that devising a scheme to measure such a degree of difference will prove extremely difficult.)

There is a temptation to locate dispositional properties in a peculiar niche in the scheme of things. On some accounts, dispositional properties are portrayed as halfway houses along the road between nonexistence and full-blown actuality. Solubility, for example, on this view, would be regarded as a property intermediary between being undissolved and being dissolved. Such a theory is to be avoided, if possible. Normally we think of existence as a strictly all-or-nothing affair. There are no degrees of existence: either something exists, or it does not. There is nothing which half or partially exists. Of course it may

happen that some part of a thing exists while some other part does not. The east wing of an office building may have been demolished and removed, and only the west wing remains. But it would be incorrect to say that the office building now half exists. What makes better sense is to say that half the office building has gone out of existence, while half the office building still exists.

Having eschewed a notion of 'partial existence' elsewhere in metaphysics, we should be extremely reluctant to invoke it in explicating the nature of dispositional properties. But if dispositional properties are not partial-existents, what might they be?

Some metaphysicians regard irreducible potentialities as anathema: they will have no truck with them in their theories. Dispositions, according to these philosophers, are metaphysical misbegottens. Such philosophers adopt what is called a philosophy of *actualism*. The only properties which they will recognize as being "real" are actual, or manifest, properties. But how, then, is one supposed to be able to account for the real difference between, let us say, a clay brick which is not burning and is nonflammable, and a paper book which also may not be burning but which indisputably is flammable? If neither is now (actually) burning, how are we to account for the fact that one is non-flammable and the other flammable? What does the latter distinction amount to if not that one is not actually burning and the other one is? In short, how can dispositional properties be accounted for in terms of actual (or manifest) properties?

Actualists will have to maintain that in the case of the brick and the book, for example, there is some actual property other than its non-burning or burning which each has and which marks the difference. There will have to be, on their theory, some actual property which the brick has which prevents its burning, while there will have to be some (other) actual property which the book has which allows for its burning. In neither case are there any merely 'possible' properties lurking behind the scenes, as it were, waiting to break out into full actuality.<sup>7</sup>

If dispositional properties ("fragile", "semipermeable", "heliotropic", etc.) figure prominently in natural science, they seem to be at least as, if not more, prominent in our explanations of human behavior. Our descriptions of personality seem invariably to be couched almost exclusively in terms of dispositional properties. A given person may be honest, sentimental, loving, caring, punctual, hardworking,

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7. For more on this issue, see Elizabeth Prior's monograph, *Dispositions* ([161]).



fastidious, and slow to anger. All these properties, we note, are to be regarded more as dispositional than manifest. But how are we to account for persons having such properties? There seem to be some prospects for our coming to understand, from a physical point of view, how a person feels a pain. We might even, that is, reach the point in the foreseeable future of physico-psychological research where we will be able to 'pin down' the source and mechanism, as it were, in our physical bodies of our pains. But will we be able, similarly, to account for dispositions such as a person's being honest? There is no reason to think that the task is in principle impossible. But neither should we underestimate its magnitude. To see how formidable is the task of accounting for dispositions in terms of manifest (actual) properties, just ask yourself what manifest property of a person could possibly account for his (having a tendency toward) being stingy or (a likelihood of) being self-deprecating. Physico-psychological theories which would permit the reducing of human dispositions to manifest properties of physiological states are not even in their nascency.

In light of what has just been said, it may appear that the entire theory of dispositional properties is so rudimentary as to be unworthy of notice. But such a conclusion would reflect a misunderstanding of the philosophic enterprise. A philosopher's progress toward a theory is at least a two-step, often an iterated, procedure. When Carnap tried to explicate the curious practice we call "philosophical analysis" (see above, pp. 102-8), he emphasized the importance of the role of elucidating the explicandum, the pre-analytic concept, which is eventually to be replaced by an improved concept, the explicatum.

There is a temptation to think that, since the explicandum cannot be given in exact terms anyway, it does not matter much how we formulate the problem. But this would be quite wrong. On the contrary, since even in the best case we cannot reach full exactness, we must, in order to prevent the discussion of the problem from becoming entirely futile, do all we can to make at least practically clear what is meant as the explicandum. ... It seems to me that, in raising problems of analysis or explication, philosophers very frequently violate this requirement. They ask questions like: 'What is causality?', 'What is life?', 'What is mind?', 'What is justice?', etc. Then they often immediately start to look for an answer without first examining the tacit assumption that the terms of the question are at least practically clear enough to serve as a basis for investigation, for an analysis or explication. Even though the terms in question

are unsystematic, inexact terms, there are means for reaching a relatively good mutual understanding as to their intended meaning. An indication of the meaning with the help of some examples for its intended use and other examples for uses not now intended can help the understanding. ... By explanations of this kind the reader may obtain ... a clearer picture of what is to be included and what is intended to be excluded; thus he may reach an understanding of the meaning intended which is far from perfect theoretically but *may be sufficient for the practical purposes of a discussion* of possible explications. ([45], 4-5; italics added)

What we have here been doing is laying the necessary groundwork for any eventual, viable theory of dispositional properties. We should not be disheartened that we are unable to propose finished theories. Having introduced the distinction between manifest and dispositional properties, and having explored some of the problems (e.g. whether the distinction is absolute or merely one of degree, and whether potentialities are reducible in principle to actual properties), we can content ourselves with intuitive notions of these concepts. We need feel no particular diffidence about our stopping at this point. As I explained earlier, in the case of the concept of *possible world*, not every concept needs to be clarified in order for us to be able to use the concept and indeed to get much mileage out of it. (Two thousand years of mathematics proceeded apace with no viable explication of *number* at all.) For present purposes, the concepts of *manifest* and *dispositional* property have been elucidated sufficiently for us to proceed.

### 9.2.3 *Binary properties; comparative and quantitative properties*

It is a poor joke which describes a woman as “half-pregnant”. Being pregnant is one among a class of properties which are strictly binary, i.e. such properties occur in an all-or-nothing manner. Either a woman is, or she is not, pregnant: there is nothing halfway, as it were, between nongravity and pregnancy. Similarly, a given combination of playing cards in a game of gin rummy either has, or does not have, the property of being a meld. Binary properties, we say, “do not come in degrees”.

Many properties do, however. Your car may be heavier than mine: its weight is greater than, or exceeds, the weight of my car. Or, again, my piano may be more out of tune than yours: its dissonance is greater

than, or exceeds, that of your piano. These properties – weight, dissonance, intelligence, hardness, etc. – permit of *ordering*. Such properties, which do come in degrees, are sometimes spoken of as being ‘qualitative’ properties. But since we will use the word “quality” in a specialized sense in a moment (in section 9.2.6), we will not adopt that particular nomenclature, preferring instead to call properties which come in degrees ‘comparative’ properties. Accordingly, pregnancy is a binary property; but length of pregnancy is a comparative property: one woman may be in her fourth month of pregnancy while another is in her third. The former, although being no more pregnant than the latter, will have been pregnant for a greater length of time.

Certain comparative properties themselves feature a further property.<sup>8</sup> Some comparative properties – weight, for example – occur in quantifiable amounts in such a way as to permit us to say that one thing exceeds another in that property by some specifiable factor. Intelligence, for example, although, like weight, a comparative property, lacks this further feature. A person with an intelligence quotient (IQ) of, let us say, 150, is not twice as intelligent as a person with an IQ of 75. The joint intellectual efforts of two persons each with an IQ of 75 will not match that of a person blessed with an IQ of 150. But the combined weight of two persons each with a weight of 75 kg will equal the weight of a person of 150 kg. The property of weight, then, is quantifiable in a way in which intelligence quotient is not. Weight is said to satisfy ‘the law of addition’; intelligence not.<sup>9</sup>

Such obvious differences, and their causes, explanations, and peculiarities, have been the subject of much research in the past one hundred years. One of the most telling differences between the modern period of physics (i.e. since the seventeenth century) and its precursor has been the emphasis on quantitative measurements of the sort we see possible in the example of weight. And one of the most

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8. This claim is no mistake. Properties may themselves have properties. This hierarchical structure of properties has been implicit throughout this entire discussion. The property of pregnancy, for example, is binary, we have already said. Spelled out in greater detail, what we have said is that the property of being pregnant itself has the *property* of being binary. Etc.

9. The classic study of the distinction being alluded to here is Norman Campbell’s *Foundations of Science* ([43]; see esp. chap. 10). More recent ‘classic studies’ include S.S. Stevens’s “On the Theory of Scales of Measurement” ([197]). Brian Ellis’s *Basic Concepts of Measurement* ([66]) includes a good bibliography through 1966.

enduring debates in the philosophy of science has been on the question whether the sorts of measurements which are common within physics, and consequently the sorts of scientific laws it is possible to adumbrate within physics, should be thought to be the goal as well of 'softer' sciences. Is psychology somehow less 'authentic', somehow a 'lesser science', if it fails to state laws holding between quantitative properties? Is a science which is confined to ascertaining orderings – e.g. being able to determine that Person A's rage is greater than Person B's rage, without being able to measure *how much* one person's rage exceeds that of another – any less a *science*? Is the hallmark of a genuine science its ability to produce quantitative laws, i.e. laws stating relationships between quantitative properties, or is that merely a fortuitous feature of a few select sciences, e.g. physics, chemistry, and (perhaps) economics?

It is an innocent-sounding philosopher's distinction at first glance: that between those comparative properties which do not permit further quantification and those which do. And yet, on this seemingly subtle distinction rests one of the longest-lasting and intensely personal debates in the philosophy of modern science. Scientists, particularly those in some of the social sciences, are put on the defensive by their present inability to posit properties having the quantitative features of those of physics. While physicists may invoke mass, energy, heat, etc., all of which are quantifiable, social scientists, it seems, often have to make do with 'softer' properties: intelligence, anger, hostility, covetousness, caring, etc., all of which may be (roughly) ordered, but none of which seems to be nonarbitrarily quantifiable. What is at stake is a very fundamental view, call it metaphysical if you will, of the ultimate nature of physical reality. Certain particularly tough-nosed physicists are likely to conceive of the world as ultimately constituted of things bearing quantitative properties; other researchers believe that no such account – restricted solely to such properties – could ever do justice to the richness and diversity of reality. The debate cuts right to the quick of scientists' view of the world and of the validity of their professional pursuits. For in this arcane distinction lurks a challenge to the very basis of the practice in which scientists daily engage.

#### 9.2.4 *Intensive versus extensive properties; eliminable and ineliminable concepts*

*Properties of properties of properties of ...* – there seems to be no limit to our ingenuity to classify, to subclassify, to subclassify, and so on. And thus it should come as no surprise that the very category of

quantitative property itself should be further subdividable, i.e. that certain quantifiable properties should themselves have properties which other quantifiable properties lack.

One of the most interesting, and at the same time peculiar, set of properties to appear in the philosopher's inventory is that of intensive and extensive properties. Take a thin aluminum rod. It will have various quantitative properties including, for example, the properties of having a mass of 6 kg and having a density of  $2.7 \text{ g/cm}^3$ . Now break the rod into two equal parts. The mass of each part will be (exactly) half the mass of the original unbroken rod; but the density of each half will be (precisely) the same as the density of the original. How very strange: the mass subdivided with the rod; its density did not. Properties which, like mass, diminish upon objects' being broken down into smaller parts are said to be 'extensive'; those which, like density, do not, are said to be 'intensive'. (These two terms, incidentally, have nothing whatsoever to do with the distinction between "extension" and "intension" which is common in modern semantics.)

The metaphysical significance of this latest distinction is an outgrowth of the immediately preceding one. We have just seen how some physicists believe that the ultimately significant properties of the world are quantitative ones. But some physicists will want to go even further, and want to refine this latter thesis. It is not just quantitative properties which are ultimately 'real' but, more particularly, it is extensive quantitative properties which form the foundation upon which we may hope to erect our understanding of the universe.

You can see why one might have this prejudice toward extensive properties, if one, that is, is going to have a prejudice at all toward the primacy of quantitative properties. Taking density as our example, we can see that the concept of *density* is – in an absolutely clear-cut way – totally eliminable, expendable, in any scientific theory. Any theory which invokes the concept of *density* could, just as well, invoke the concept of *mass per unit volume*. But does the expendability of the *concept* of density imply that the *property* density is 'unreal' or, as some writers put it, just a convenient 'mathematical fiction'. Is the *term* "density" just a convenient shorthand for "mass per unit volume", and should we want to argue that there really is no such *property* as density which is referred to by this term?

It is illuminating to look into the history of the evolution of the interplay of these various concepts. In Newton's *Principia* (1687), for example, we find that the order of definitions is precisely the reverse

of today's norms. For Newton, *density* was the primitive concept, and he defined *mass* in terms of density. The opening sentence of the book reads: "The quantity of matter [i.e. mass] is the measure of the same, arising from its density and bulk [i.e. volume] conjointly" ([144], 1). On the modern account, we say that density is equal to mass 'divided by' volume. But given that relationship, it is also certainly true to say of a body – as Newton did – that its mass is equal to its density 'times' its volume. For Newton, density, not mass, was the fundamental, or at least more familiar, concept.<sup>10</sup> It was a well-known fact, for example, that iron floats on mercury, and that gold sinks in mercury. Substances could be arranged in order of ascending density: iron, mercury, gold. This property, determined by what floats on what, and what sinks in what, seemed to be fundamental, intrinsic, and did not depend for its determination on measuring either the mass or the volume of the substances involved. Later, it was recognized that one could assign not just orderings to the densities of substances, but specific numerical values, by using the measure of a substance's mass divided by a measure of its volume. This both introduced a new 'handle' on the concept and allowed persons to measure densities for cases where the float/sink method was inapplicable, e.g. in the case of gold and platinum.

What we find is that one can do physics, both better and more easily, if one takes as one's fundamental concepts *mass* and *volume*, rather than *density* and *volume*. (A parallel account can be constructed for the logic of the concept of *speed*.<sup>11</sup>) Even so, this still leaves open the question whether the *property* of density is 'real' or 'unreal'.

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10. See, also, Cajori's notes to the *Principia* ([144], 638-9).

11. "Speed" is eliminable in favor of "distance covered divided by elapsed time" (e.g. kilometers per hour). But children have the concept of *speed* without having the latter concept of *distance covered per unit of time*. (Remember, too, that mariners use a concept of speed, *knots*, which makes no reference either to distance or to time. It is not "knots/hour", but "knots" *tout court*.) Children have the former naive concept of *speed* insofar as they know such things as that Alice can run faster than Betty (i.e. has greater speed than Betty), and that Betty, in turn, can run faster than Carol. But these same children may be several years away in their intellectual development from having the more sophisticated concept of *distance covered per unit time*. For one thing, the latter concept involves the mathematical operation of division, and that concept – if it comes at all – comes much later in a child's comprehension.

It should be clear that there can be no simple truth or falsity in any forthcoming answer. Someone who argues for the 'unreality' of the property of density (or of speed) is, tacitly, advancing the metaphysical thesis that our decisions about what is real and what is not should be decided by the test of what is taken to be fundamental and ineliminable in physics (and perhaps in other sciences as well). Physics (and science in general) on this account gives us an access to what is ultimately 'real'.

But one is by no means forced to adopt that particular metaphysical thesis. And indeed, it is more than just a little resistible. Certainly one can, with coherence and conviction, argue that the foregoing metaphysical theory is overly parsimonious. One can argue that the fundamental concepts of science probably do match fundamental features of the world without having to subscribe to the stronger thesis that the *only* features there are in the world are those which play important and central roles in science. One can, that is, accept the revelations of science without subscribing to the claim that nothing else is real.

There is a more direct objection as well. It is not at all clear that there is any particular way of recognizing fundamental as opposed to definable properties. That is, there may not be any particular property that properties themselves have which identifies them as being ineliminable or not. I have already argued (in chapter 5) that there well may not be any one way of doing science; indeed I think it overwhelmingly likely that there is not. What may be fundamental, ineliminable, in one scheme of science may be definable and eliminable in another. We have already seen how, in certain reconstructions of Newtonian physics (footnote 8, p. 85), the very concept of mass itself dropped out.

There is an important conclusion to draw from this debate about the reality or unreality of those properties which correspond to eliminable concepts. We are often tempted to regard questions about what is real as if all of them were empirical questions to be settled – if not always in practice, then at least in principle – by scientists pursuing the experimental method. But it should be clear that science is, by itself, impotent to answer even as simple a question as whether *density* (or *speed*) is a 'real' property or merely a 'fiction'. How much more impotent science must be, then, to answer the significantly more difficult question whether there is such a property as *intelligence* (or *evil* or *free will*). The answers to such questions simply cannot be had by scientific means. The answers to such questions reside in proposing, debating, and choosing among alternative metaphysical theories.

We are tugged in two different directions. It seems strange to deny that density is a real property, and yet we fully appreciate the arguments and motivations of someone who promotes that thesis. But the ensuing tension we might feel evidences the fact that we standardly operate with a variety of criteria for invoking the very concept of *reality* itself. In the case of intensive properties, those criteria can be made to conflict with one another. And what is ultimately at stake is not a truth about whether intensive properties are ‘real’ or not: there could not possibly *be* an answer to such a question given the tensions inherent in our very concept of what it is to be ‘real’. Rather what is involved in our trying to decide whether intensive properties are real is an effort to try to decide which of our various criteria of reality we want to give primacy to. The answer to this latter question cannot be one of mere random choice. We will choose, both in light of our pre-philosophical intuitions and in light of what future mileage we hope to get out of the revised concept.

### 9.2.5 *Emergent versus nonemergent properties*

Philosophers’ fascination with properties seems endless. In the 1920s, a number of philosophers – including, among others, C. Lloyd Morgan ([138]), J.C. Smuts<sup>12</sup> ([196]), and S. Pepper ([150]) – picking up from some provocative, but undeveloped, notions in Mill’s theory of causation ([135], book III, chap. VI) proposed a theory of emergent properties. The principal figure among this group was C.D. Broad.

... most of the chemical and physical properties of water have no known connexion, either quantitative or qualitative, with those of Oxygen and Hydrogen. Here we have a clear instance of a case where, so far as we can tell, the properties of a whole composed of two constituents could not have been predicted from a knowledge of the properties of these constituents taken separately, or from this combined with a knowledge of the properties of other wholes which contain these constituents.

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12. Jan Christiaan Smuts (1870-1950) had an astounding career. Not only was he a philosopher, albeit a minor one, he was also a player on the world’s political stage. From 1919 to 1924, and from 1939 to 1948, he served as prime minister of South Africa.



... It is clear that in *no* case could the behaviour of a whole composed of certain constituents be predicted *merely* from a knowledge of the properties of these constituents, taken separately, and of their proportions and arrangements in the particular complex under consideration.

... Take any ordinary statement, such as we find in chemistry books; e.g., "Nitrogen and Hydrogen combine when an electric charge is passed through a mixture of the two. The resulting compound contains three atoms of Hydrogen to one of Nitrogen; it is a gas readily soluble in water, and possessed of a pungent characteristic smell." If the mechanistic theory be true ... [a mathematical] archangel could deduce from his knowledge of the microscopic structure of atoms all these facts but the last. He would know exactly what the microscopic structure of ammonia must be; but he would be totally unable to predict that a substance with this structure must smell as ammonia does when it gets into the human nose. The utmost that he could predict on this subject would be that certain changes would take place in the mucous membrane, the olfactory nerves and so on. But he could not possibly know that these changes would be accompanied by the appearance [i.e. occurrence] of a smell in general or of the peculiar smell of ammonia in particular, unless someone told him so or he had smelled it for himself. ([35], 63 and 71)

Broad is actually advancing here two theses, a positive one and a negative. On the positive side, he argues that certain properties of 'wholes' are deducible (he uses the term "predictable" as a synonym) from a knowledge of the properties of their parts. For example, he suggests that a knowledge of the properties of hydrogen and nitrogen would allow us to deduce that atoms of these elements will combine in the ratio of three to one. On the negative side, he argues that this feature just remarked for the combining ratios does not hold universally. He suggests, for example, that the existence of the distinctive smell of ammonia *could not* be deduced from a knowledge of the properties of hydrogen and nitrogen.

There really is a very gripping metaphysical thesis at play here. For Broad is operating with the intuitive notion that somehow certain physical properties of things are 'contained within' the properties of their parts; but that other properties are, in some sense, unexpected or novel. These latter properties are said to be "emergent". In some

metaphorical sense, they seem to be a step above on the ladder of reality.

Is the theory viable? As Broad stated it, the theory contains a striking logical fallacy. Ernest Nagel has adroitly exposed the error ([139], 366-97). Nagel argues that there is no absolute or ahistorical sense of "emergent". Whether a property is emergent or not, i.e. whether the existence of some property may be deduced from some body of knowledge, depends entirely on the information contained in that body of knowledge.<sup>13</sup> But there is nothing, nor could there be, which counts definitively as knowledge of hydrogen and nitrogen. It is up to us to decide just what we choose to include and to exclude in any such body of knowledge. If certain information is included, we will be able to deduce certain facts about ammonia; if not, then not. The only sense in which a property can justifiably be said to be emergent is within a historical setting. At some stage in the development of scientific knowledge no proposition describing the smell of ammonia may be deducible from then-current scientific knowledge; but with the growth of knowledge, we may add to our storehouse of information so that such a proposition does become deducible. Emergence, then, in Nagel's reconstruction, is no metaphysical property at all, merely a historical footnote to the progress of science. What may be emergent today may well be nonemergent tomorrow.

Is Nagel's dismissal of Broad's intuitions too swift, too damning? Might it be that Broad expressed himself carelessly, but was, nonetheless, onto something of fundamental importance? Did he really glimpse an important metaphysical distinction or was he merely the victim of a logical confusion? In short, are there emergent properties?

Let's return for a moment to Broad's example. The motivating intuition in all of this was his tacit belief that there is something *fundamentally different* between ammonia's ability to, for example, dissolve in water and its ability to cause in us a certain kind of reaction. The former seemed somehow 'physical', or at least it was a disposition to

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13. Logicians will know that the principle has been stated casually. A more precise formulation – intended for technically trained readers – is: "(1) Whether a statement containing a given predicate is deducible or not depends on the information logically contained in the premises. (2) A predicate can occur *nonvacuously* in the conclusion of a deductively valid inference which has a self-consistent premise-set only if that predicate occurs explicitly in at least one of the premises."

bring about a physical state, while the latter was somehow ‘more mental’, or at least was a disposition to bring about a mental state. Is this a ‘real distinction’ worthy of preservation, and indeed encapsulation, in the distinction between physical and nonphysical, between nonemergent and emergent? Again, it must be clear that the question is not a scientific one. It concerns not one’s scientific theorizing, or one’s laboratory practice, but a metaphysical view as to what ultimately one is looking at and trying to make sense of.

The situation is this: If you are convinced that there is some important, metaphysical distinction between ‘the physical’ on the one hand and ‘the mental’ on the other, you may well find yourself attracted to the theory of emergence and may try to so restrict the class of physical properties as to allow for the occurrence of emergent properties. The trouble with this procedure, however, is that it skirts the very edge of arbitrariness. It is exceedingly difficult to draw a nonarbitrary dividing line between the physical and the mental. If your metaphysical instincts lie on the other side, you may well want to allow virtually any property to count as ‘physical’, in which case there will not be emergent properties. The point is that the answer to the question “Are there emergent properties?” has no ready answer. It depends on the metaphysical views one has of the world and on one’s abilities to preserve those views in theories which are logically sound.

The metaphysical instincts of the Emergentists of the 1920s seem clear enough. But none of them was ever able to capture those instincts in a theory which satisfies the rigorous strictures of logic. Whether their goal can ever be realized, or indeed is even worth realizing, is a chapter of philosophy not yet written.

### 9.2.6 *Qualities versus relations*

In his novel *The Red and the Black*, Stendhal offers the following description of Julien Sorel:

His cheeks were flushed, his eyes downcast. He was a slim youth of eighteen or nineteen, weak in appearance, with irregular but delicate features and an aquiline nose. His large eyes, which, in moments of calm, suggested a reflective, fiery spirit were animated at this instant with an expression of the most ferocious hatred. Hair of a dark chestnut, growing very low, gave him a narrow brow, and in moments of anger a wicked air. Among the innumerable varieties of the human coun-

tenance, there is perhaps none that is more strikingly characteristic. A slim and shapely figure betokened suppleness rather than strength. In his childhood, his extremely pensive air and marked pallor had given his father the idea that he would not live ... ([28], 28-9).

The only thing remarkable about this passage is its familiar formula: it is one of a piece with countless other descriptive passages all of us have read. In particular, it is far more remarkable for what it does not say, what it chooses to leave out, than what it does say.

There is in principle no end of descriptive detail one can produce. But there are *conventions*. Although it may be true (I do not know whether it is or not) that my son Efrem sits in front of his friend Todd in English class at their school, I would not normally think to include this information if asked to describe Efrem. No more so did Stendhal include in his description of Julien such possible data as that Julien was – at the moment of being described – standing 22 meters from the one oak tree on the property or that Julien was twice as old as the priest’s nephew in Paris. We simply do not usually consider such ‘peculiar’ properties as *sitting in front of*, or *standing 22 meters from*, or *being twice as old as* as being proper, or intrinsic, properties of things. In describing things, we usually omit to mention such properties.

These latter sorts of properties – *sitting in front of*, *standing 22 meters from*, or *being twice as old as* – are *relations*, that is, they are properties which hold between *two* or more things. *Being red* is a property of individual items; *being more intensively red than* is a property which holds between two items. Properties which may be predicated\* (to use the technical term) of single items – e.g. *being red*, *being square*, *having a mass of 6.2 kg*, even *being flammable* – are said to be ‘qualities’ (alternatively, ‘attributes’). (Note, in this technical sense, “quality” does not mean being valuable or of superior manufacture, etc. A ‘quality’ is simply a property which a single thing may bear.) *Being to the left of*, *being heavier than*, *being twice as old as*, etc., are not qualities of things, but relations among things.

One common way philosophers sometimes try to draw the distinction between qualities and relations is to take recourse to some facts about the terms we typically use for these properties. To form a grammatical sentence using the phrase “... is rectangular”, we need to provide the name of but one thing, e.g. “Boston Symphony Hall is rectangular.” To form a grammatical sentence using the phrase “...

is higher than ...”, we need to supply two names, e.g. “Mt Rainier is higher than Mt Hood.” In addition to two-place relations (“... is higher than ...”), there are three-place relations (“... gives ... to ...”), and four-place relations (“... combined with ... tastes a lot like ... combined with ...”). Indeed relations may, and do, obtain between any number of things whatsoever.

According to this latter, linguistic, reconstruction of the distinction between qualities and relations, there is nothing remarkable whatsoever about their difference. Qualities appear as nothing other than one-place relations.<sup>14</sup> They are merely the first in a series of stepwise increase. But if there is nothing remarkable about qualities when viewed from the standpoint of logic or mathematics, do they nonetheless have some special status metaphysically? The four-place relation we just cited as an example, “... when combined with ... tastes a lot like ... combined with ...”, will undoubtedly strike many persons as being somehow bogus. While they may be perfectly prepared to acknowledge the reality of such qualities as *being red* or *having a mass of 6.2 kg*, these persons will regard this latter, four-place, relation as being artificial. Is this mere prejudice, or are there good reasons for regarding relations as ‘artificial’? Two different facts about our metaphysical views may help to explain the naturally felt antipathy some persons have toward relations.

First is the strongly held intuition that things can change their relations without losing their identity. A delicate crystal vase, for example, in being moved from a high shelf to a tabletop remains the ‘same vase’: the change in its spatial relations (from having been two meters above the floor to now being only one meter above the floor) has not affected its identity. But let that same vase drop from the shelf to the tabletop so that it shatters, so that it loses its property of wholeness or cohesiveness, then it ceases to be the ‘same thing’. What had been a vase is no longer; the vase has gone out of existence to have been replaced by a collection of glass shards. Or, again, a person may move across town: the change in her spatial relations to other things does not (generally) affect her identity. She is still the same person. But let her lose her memory, or let her undergo a radical change in

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14. Below, unless it is explicitly qualified as “one-place” (or “monadic”), the term “relation” will be used to designate the class of dyadic (two-place), triadic (three-place), etc., relations. We will continue to use the term “quality” for “one-place relation”.

personality, and the resulting individual is not the 'same' person. Such conceptions are very deeply seated in our world-views. In asking about the identity and 'nature' of things, we almost invariably inquire after their qualities. Qualities (or at least some important subset of qualities), not relations, are generally taken to constitute a thing's 'essence'. And thus Stendhal describes Julien as: *being flushed, having downcast eyes, appearing weak, having irregular features, having delicate features, having animated eyes, possessing a fiery spirit, having chestnut hair*, etc. Relations, in contrast, are regarded as extrinsic, as mere accidents or incidentals. "My son's being good-natured is a 'real' property of him; his happening, at the moment, to be standing two feet from my desk is just an accidental feature, it has nothing to do with who or what he *is*", many persons might be inclined to argue.

This first reason why persons might feel uneasy about ceding full reality to relations, refusing to deem them real properties of things, lies pretty close to the surface as it were. But there is a second, much deeper, reason which additionally informs the thinking of some persons and makes them antagonistic toward granting the reality of relations. In ancient philosophy, Aristotle had advanced a logic which treated certain kinds of propositions: singular propositions (e.g. "Alexander the Great was a soldier") whose subjects are individual things (persons, places, times, etc.); and general propositions, whose subjects are classes of things. General propositions are further subdividable into universal propositions (e.g. "All men are mortal") and particular\* (e.g. "Some men are blue-eyed"). But what is common to all these kinds of propositions is that they single out *one* subject (e.g. Alexander the Great; the class of men) and then proceed to predicate of the subject a quality (attribute). Such propositions are standardly known as 'subject/predicate' propositions. But are these the only types of propositions? Does every proposition predicate a quality of a subject?

For over two thousand years, until the early part of the twentieth century, most philosophers believed so. Few, if any, were inclined or bold enough to propose that logic should and needed to be expanded to encompass relational propositions as well. Their resistance came about through the belief that relational propositions could – in principle – be replaced by, or be 'reduced to', subject/predicate propositions. This belief was in turn prompted by the belief that relations themselves, e.g. *being west of* or *being taller than*, were eliminable in favor of qualities. How might this be argued?

There are two different ways one might think it possible to eliminate relations.

Consider what we might take to be a paradigmatic instance of a relational proposition, e.g. the proposition expressed by the sentence “John is west of Toronto.” In modern logic, this proposition would be taken to refer to three ‘things’: the two individual items, John and Toronto, and the relation, *being west of*. But there is a way to parse the English sentence, a way that is commonly taught in high-school grammar classes, a way that reflects its origins in the theory that all sentences are of subject/predicate form. According to that grammatical theory, the subject of the sentence (or proposition) is “John” and the predicate is “is west of Toronto”. On this classical account, there are just two things being referred to in the sentence: the one individual thing, viz. John, and one quality (attribute), viz. the quality of *being west of Toronto*. Such ‘properties’ as *being west of Toronto* are sometimes, understandably, called ‘relational properties’.

Which is it? Is *being west of Toronto* a quality (a relational property) of John, or is *being west of* a relation holding between John and Toronto? Two considerations favor plumping for the latter – the relational – account.

Suppose a person says, “My father and mother are divorced.” How would we construe this if we were to adopt the theory that makes relations simple qualities? What shall the subject of this sentence be taken to be? Shall we construe it this way: “My father is (i.e. has the quality of being) divorced-from-my-mother”; or in this: “My mother is (i.e. has the quality of being) divorced-from-my-father”? Either choice seems wholly arbitrary. It is far less arbitrary to regard both father and mother ‘equally’ as subjects, standing to one another in the relationship of *being divorced from one another*. The point is that if one argues that all relational propositions are ‘convertible into’ subject/predicate propositions, then one can often, if not always, choose the subject only arbitrarily. Is the sentence “John is west of Toronto” any more ‘about’ John than it is ‘about’ Toronto? Is the sentence “Ronald and Nancy are married (to each other)” any more ‘about’ Ronald than it is ‘about’ Nancy?

The second consideration suggesting that we might prefer to construe such sentences as “John is west of Toronto” as relational rather than as being subject/predicate has to do with the peculiarity of the relational-property of *being west of Toronto*. Compare the (single-place) quality *being west of Toronto* with the (two-place) relation of

*being west of*. The quality, but not the relation, in a sense invokes or refers to an individual\*, viz. Toronto. One might, on metaphysical grounds, regard 'qualities' which refer to individuals as being no 'real' qualities at all: one might, that is, want to advance a theory which makes individuals, on the one hand, distinct kinds of entities from qualities, on the other. If so, then the hybrid expression "is west of Toronto", inasmuch as it refers to an individual (the city of Toronto), would be deemed not to refer to any quality at all.

Perhaps, though, there may be another way to eliminate relations, one which would, again, offer qualities in their place, but which would not take recourse to 'hybrid-qualities' (relational properties) such as *being west of Toronto*. Can this be done? This brings us to an examination of a more radical approach some philosophers have taken in their attempts to argue that relations are in principle eliminable in favor of qualities.

Here we might take as our example the relational proposition that object  $O_1$  has twice the mass of object  $O_2$ . How might one argue that such a proposition can be replaced by a proposition containing only one-place predicates, i.e. terms referring to qualities? In this way: remember that every material thing has a mass. When one asserts, then, that object  $O_1$  has twice the mass of object  $O_2$ , one could argue that what was being asserted was true only insofar as  $O_1$  had some particular mass (an attribute) [e.g. 40 g] and  $O_2$  had some particular mass [e.g. 20 g]. The relational claim – that  $O_1$  has twice the mass of  $O_2$  – could be regarded, then, as reducible to *two* nonrelational, subject/predicate claims about the masses of  $O_1$  and of  $O_2$  respectively. Or again, consider the relational proposition that Lincoln was similar to Washington. The natural reaction in someone's being told this might well be to ask, "In what respects were they similar?" And the answer may be, "They were both Presidents", or "They were both excellent public speakers", or "They were both elected to second terms", etc. In these latter cases, attributes – *being President*, *being elected to a second term*, etc. – are predicated of each person individually. The relational proposition "Lincoln was similar to Washington" is replaceable by the two nonrelational propositions "Lincoln was a President" and "Washington was a President." With examples such as these at hand, some philosophers have argued that attributes (qualities) are to be regarded as ineliminable and 'real', while relations are to be regarded as eliminable and 'unreal'.

There are, however, at least two problems with the theory that rela-



tions are in principle eliminable in favor of qualities. First is the difficulty that relational propositions and their supposed nonrelational replacements in general do not *mean* the same thing (or more exactly, they are not logically equivalent). Consider, again, the claim that  $O_1$  has twice the mass of  $O_2$ . Suppose, as above, that this relational claim is true just because  $O_1$  has a mass of 40 g and  $O_2$  a mass of 20 g. The latter conditions will 'make' the relational claim true. But are the latter conditions implied by the former, relational, claim? Clearly not. Someone can assert that  $O_1$  has twice the mass of  $O_2$  without having any idea what the mass is of either object: only that the mass of the former is double that of the latter. The former, relational, proposition can be true without either of the latter, nonrelational, propositions being true. There are, in fact, an infinite number of pairs of nonrelational propositions which could 'make' the relational proposition true.

The second difficulty comes about through the challenge that some relations do not seem, even in principle, to be eliminable in favor of qualities. Consider a possible world consisting of three physical objects,  $A$ ,  $B$ , and  $C$ , spatially arranged so that  $B$  is *between* the objects  $A$  and  $C$ .<sup>15</sup> What *quality* does any of these objects possess which accounts for the truth that  $B$  is between  $A$  and  $C$ ? We might try to say that  $A$  lies to the left of  $B$  and that  $B$  lies to the left of  $C$ . But saying this will not have eliminated relations: it will simply have invoked a different relation, viz. the relation of *lying to the left of*. Or, to take another example, suppose that line  $L_1$  *lies parallel to* line  $L_2$ . What qualities might we imagine each line to possess 'all on its own' which might account for its being parallel to the other? Nothing whatsoever suggests itself as a plausible candidate.

What, finally, are we to make of all this? When all is said and done, are relations 'real' or are they not? There have never been any knock-down arguments on either side: neither party to the dispute has ever

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15. We often, naively, suppose that the relation of *betweenness* is unproblematic. But it is not. If I am right in what I earlier argued (see section 8.6), viz. that visual space need not correlate with tactile space, then there is the possibility that an object which is *seen* to be between another two might not be *felt* to be between those two. Indeed I suspect that the successful use of the concept of *betweenness* usually rests on our presupposing a certain context: we assume that we are talking about spatial distribution; or visual; or tactile; or mass; or temperature; or ... But we need not trouble ourselves here over this complication. For the purposes of the present example, we can simply stipulate that we are talking about three objects in *visual* space.

shown that the other's arguments are self-inconsistent. And, of course, it is in the very nature of the debate that no empirical evidence could possibly settle the question. Nonetheless, the view which would make relations every bit as 'real' as qualities has clearly in the last century almost entirely vanquished the theory that qualities alone are real and that relations are unreal. The change in attitude has come about principally through the remarkable successes and power of modern logic, which has abandoned the straitjacket of subject/predicate sentences for relational ones. Subject/predicate sentences have become in this modern account merely a special case – that of one-place relations – of relational sentences. The ground has shifted, not because the old theory was ever demonstrably shown to be false or mistaken, but because the new theory is so much more congenial and so much more powerful. To the extent that one believes that aesthetic features – such as beauty and elegance – and simplicity are indicative of truth, then, to that extent, one can believe that the modern theory is true. But no one should believe that the truth of the theory which makes relations as 'real' as qualities has been demonstrated. It has not. Its acceptance comes about, necessarily, through softer, metaphysical considerations.

But even with all this said, a problem remains. We have talked uncritically, at some length, in the first instance of qualities as being 'real', and later of relations, as well, as being 'real'. But what, exactly, might this mean? What are philosophers saying when they say that qualities are real and that relations are real?

### 9.3 Realism and its rivals; abstract and concrete entities

The concept of *property* encompasses both the concept of *quality* (or *attribute*) and the concept of *relation*. As understood here, a thing's properties may include its *being red* (a quality), but also its standing in the two-place relation of *being north of* some second thing, as well as its standing in the three-place relation of *being between* two other things, etc.

It is important to emphasize that properties – qualities and relations – are neither physical things themselves, nor *parts* of things. A piece of chalk, white though it is, is not literally whiteness itself. Neither is the chalk's whiteness a *physical part* of the chalk. Physical *parts* of material objects are themselves (smaller) physical parts and may in their turn be physically separated from the larger thing of which they are parts. One might for example remove chips of chalk from a larger

piece of chalk. The chips are (or were) *parts* of the original chunk. But the property of whiteness is no part of that chunk. The whiteness cannot be removed so that we could then say: "Here on the left is the whiteness which used to be in the chalk, and here on the right is what remains of the chalk, that is, the chalk with its whiteness removed." Or, to take a second example, imagine the impossibility of trying to remove the *weight* of the chalk: "Here on the left is the weight of the chalk; and here on the right is what remains of the chalk with just its weight and nothing more taken from it." Relations, too, are not parts of things. John may be taller than Bill; but the relation of *being taller than* is neither part of John nor part of Bill. In short, properties – qualities and relations – are not parts of things. But if properties are not parts, what, then, might they be?

The one feature of properties which is universally acknowledged is that properties are *general*. Although only one thing in the world may happen to exhibit, for example, some specific shade of blue, there is nothing in principle preventing any number of other things from also exhibiting that specific shade of blue. And similarly for any other property: zero, or one, or two ... or countless numbers of things may be square; zero, or one, or two ... or countless numbers of pairs may stand in the relation of *being friendly with*; etc. This distinction between, on the one hand, particulars\* – individual things, such as persons, places, times, or material objects – and, on the other, their qualities and relations is acknowledged to be perhaps *the most fundamental* distinction in our conceptual scheme.

But what account are we to give of the relationship between particulars and their properties? Plato struggled mightily with this problem throughout his lifelong philosophical writings. Every theory he advanced he was soon to realize was beset with difficulties. And his own experience was to presage virtually every successor's. The problem has turned out to be the most enduring of all philosophical puzzles. Today, more than two thousand years later, no theory has won anything like universal acceptance; indeed there is probably nothing that can even be called the 'received' account.

These are the data Plato believed had to be accounted for in a theory of properties: (1) two or more existing things can share the same property; (2) properties (e.g. the property of being square) are not *parts* of things; and (3) properties can exist without anything instancing that property (e.g. squareness would exist even if nothing in the world happened to be square). The last of these three claims is the most problematic and is the one most often challenged. Whether or

not one subscribes to this last claim will determine whether one opts, like Plato, for a so-called Realist theory of properties or for a non-Realist theory.

Why might one think that each property exists even if nothing happens to bear that property? Why, for example, might one believe that squareness exists in a world where nothing whatsoever is square?

Consider the sentence: "Everything is such that it is not square" (or more idiomatically, "Nothing is square"). Although this sentence happens to express a false proposition, we can perfectly well conceive that what is being claimed *could have been true*. It is not necessary that the universe contain square things; it just happens to be a contingent truth that it does. Suppose, for the sake of argument, that there never were any square things in the universe at any time, past, present, or future. The proposition under examination – that everything is such that it is not square – would then be true.<sup>16</sup> But how could it be true? For on the face of it, it would seem to be referring to two quite different concepts, that of *every (existing) thing* and that of the property *squareness*. The concept of *squareness* must refer to *something or other*. But, by hypothesis, it cannot be referring to the property of any actually existing thing. Therefore, in some sense, squareness would have to 'exist' even if nothing whatsoever at any place or any time in the universe happened to be square.

Although the foregoing argument is not Plato's, but a more modern version of the reasoning leading to his conclusions, Plato argued that the properties of things must exist 'independently' of those things. But what might this mean? If the properties of things exist independently of those things, what are we to make of the nature of this 'existence'?

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16. Having never experienced anything which was square, perhaps persons may never come to formulate and entertain either the proposition that things might be square or the proposition that nothing is square. But what propositions persons formulate and subsequently come either to believe or to disbelieve is irrelevant to whether those propositions are true or false. There are innumerable propositions which we never formulate, still less do we have opinions about their truth or falsity. And there probably are countless numbers of propositions which we are incapable of considering, if for no other reason than that their constituent concepts lie outside the conceptual capacities of human beings (see pp. 84-5 above). The point is that a proposition such as that nothing is square does not depend on human beings' beliefs; even more strongly, it does not depend even on there being human beings or any conscious creatures.

Physical objects – things which are actually square, blue, etc. – exist in both space and time. If their properties are hypothesized to exist, but neither as parts of objects nor as physical objects themselves, then – it would seem reasonable to maintain – they must exist *outside of* space and time.

On purely combinatorial grounds, there are four possibilities: (1) something exists both in space and in time; (2) something exists in time, but not in space; (3) something exists in space, but not in time; and (4) something exists neither in space nor in time. Physical objects, including human beings, exist in space and time. They are said to be ‘spatiotemporal’ objects or existents. Are there any ‘things’ in any of the other three categories? Does anything exist *outside of* space and/or of time?

I am not quite sure, but perhaps some religions have posited a god who exists in time, but not in space. But I must confess ignorance on this score. In any event, some philosophers have argued that minds satisfy this second category, i.e. they have advanced the theory that minds exist only in time but not in space. G.E. Moore counterargued, however, that from the difficulty of attributing some particular length, width, and depth to minds, it does not follow that minds are not in space:<sup>17</sup> “... our acts of consciousness ... occur *in the same places* in which our bodies are. ... When ... I travelled up to Waterloo by train, I believe that my mind and my acts of consciousness travelled with me. When the train and my body were at Putney, I was thinking and seeing at Putney. When the train and my body reached Clapham Junction, I was thinking and seeing at Clapham Junction. ... My acts of consciousness take place in my body; and yours take place in yours: and our minds (generally, at least) go with us, wherever our bodies go” ([137], 19-20).

Is there anything which might plausibly be regarded as falling into the third category, i.e. of things in space but not in time? Offhand, I cannot think of a single example where a philosopher has proposed such a thing. I know of no alleged examples of things which are supposedly spatial but are not temporal. Of course one can neglect to mention a spatial object’s temporal extent. One could talk about the geographical features of Paris without ever mentioning at what time they happened to exist. But failing to mention their time of existence

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17. Moore seems to be echoing here a similar argument in Locke. See [124], book II, chap. XXIII, §§18-20.

does not make them nontemporal objects. The Champs Elysées has temporal existence even if one happens to neglect it in describing that boulevard.

The fourth category, that of objects which are neither spatial nor temporal, is the focus of the most intense controversy in this scheme. For it is here that followers of Plato, “Realists” as they have come to be known, will assign properties. Objects which are neither spatial nor temporal, which lie ‘outside’ of both space and time, are known as ‘abstract objects’. Objects which lie within space and time, e.g. this page you are reading, your body, the planet Earth, the Sun, or the Milky Way, are known as ‘concrete’ objects. Concrete objects have spatiotemporal positions.<sup>18</sup>

There is a certain irony in the name “Realism”. Philosophers who argue for Realism, i.e. the theory that properties ‘really’ exist outside of space and time, seem to be bucking ordinary notions of what is ‘real’. In the ordinary way of invoking the concept of reality, one would be inclined to identify reality with spatiotemporal existents, i.e. with concrete objects. But by a curious twist of history, the name “Realism” has been attached to the theory that abstract objects are ‘real’. (Sometimes vocabulary, other than that adopted here, is used to label abstract objects. Sometimes in place of “abstract”, the term “subsistent” is used. And some philosophers prefer to use the verbs “subsist” or “have being” in place of “exist” in the case of abstract

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18. Sometimes we tend to view ‘the entire universe’ as the *class* of all the things it contains; othertimes as a kind of super-object, a gigantic *scattered object* of the sort we discussed earlier on p. 195. But can this latter mega-object, the entire universe, itself have a place? a time? If we try to persist with the relational theories of space and of time advanced in the preceding chapter, and if we were to try to say *where* or *when* the entire universe exists, wouldn’t we be illicitly supposing that there was something *else* – outside of the universe – which stood in some spatial or temporal relation to it? I think we need not be too troubled over this difficulty. Once again we can use the techniques of section 8.8. Just as we can say where the Mississippi River is located in space by specifying where its spatial parts are (it is at Memphis, Vicksburg, Natchez, Baton Rouge, New Orleans, etc.), we can say where the entire universe is: it is simply where any of its spatial parts are. Similarly, it exists in time whenever any of its temporal parts exist. Thus the entire universe can be regarded as a spatiotemporal object and there is no need to posit anything in space and time outside of the universe.

entities in order to contrast their ‘manner of existence’ from that of objects which are in space and time.)

Having posited that properties are outside of space and time, i.e. are abstract entities, a Realist is posed a formidable problem. Plato quickly realized this. At various times, he proposed a variety of alternative explanations. At one point he thought that these abstract entities (squareness, justice, etc.) – “forms” he called them (their more modern name is “universals”\*) – were perfect particulars of which the concrete existents, the spatiotemporal objects, were somehow imperfect ‘copies’. But he recognized that no such account could be made to work. If blueness itself were a particular, the sort of thing which might be copied, then it itself would have to have the property of blueness, and one would merely have deferred the problem, not have solved it; one would in fact thus have an infinite regress.

If particulars are not copies of universals, perhaps they ‘participate’ or somehow ‘share in’ the universal. But this notion is mere metaphor. We understand how two children might share a toy: by both handling it at the same time or by taking turns. Or, again, persons might participate in a stock offering or own a share in a company: they have a legal right to certain assets or profits. But there is only so much of the company to go around. Sharing cannot go on indefinitely; eventually the asset runs out, or at the very least, each ‘sharer’ gets a steadily diminished portion. But universals do not ‘run out’: any number of things can be blue without in the slightest detracting from the blueness of other things.

All attempts to explicate the relation obtaining between universals and particulars (i.e. their instances) in terms of other, more familiar relations have proved equally insupportable. We can give a name to the relation obtaining between a particular and its properties, i.e. we will say that the particular ‘instances’ or ‘exemplifies’ certain universals, but we seem unable to explicate the relationship any further. It seems, so far at least, after two thousand years of philosophers’ trying, to have eluded explication. It seems, so far, to be wholly *sui generis*\*.

Some persons find the theory of universals exceedingly attractive. They take delight in positing another ‘world’, a world of abstract objects outside of space and time. To have found the need for such a posit appears to persons of this temperament to be one of the great triumphs of metaphysics. But, equally, there are persons of the contrary temperament who regard the positing of a world of abstract entities as the greatest blot possible in metaphysics and try, with enormous effort, to construct theories which have no need to posit such strange

entities. These latter, anti-Realist, theorists typically take one of three approaches. They will try to construct either a Conceptualist theory, a Nominalist theory, or a theory positing the existence of what have come to be called 'tropes'.

Conceptualists attempt to argue that there are no abstract entities, that certain items in our minds – our *conceptions*<sup>19</sup> of squareness, extension, etc. – are all we need posit in order to explain such facts as that two or more objects may share the same property. But making the analysis depend on the existence of conscious creatures has one immediate consequence which is wholly unacceptable to most contemporary philosophers: it makes it impossible for things to bear properties in worlds in which there are no minds. Few philosophers are disposed to make the existence of the world depend on the existence of *us*. The favored modern belief strongly seems to be that a world could exist devoid of consciousness. There may be conscious creatures in this world, but there did not *have to be*. It would still have been a world, even if we had never existed.

The preferred anti-Realist approaches today are through Nominalism and through the Theory of tropes.

Nominalists argue that the only things that exist, that are 'real', are individuals. There are no entities existing (subsisting) independently of individuals, i.e. nothing exists outside of space and time. Squareness, for example, might be explicated by invoking either the class of square things or – in some accounts – the complex individual (or scattered object<sup>20</sup>) which just is all the square things in the universe.

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19. *Conceptions* are not to be confused with *concepts*. What *sorts* of things *concepts* are is a question which has prompted a great diversity of replies. Above (p. 97) I gave only a minimal characterization of *concept*, one which was (deliberately) silent on the question concerning what sorts of things concepts are. But *conceptions* allow for a slightly fuller characterization. Whatever final account we might want to give of *concepts* and *conceptions* – their ontological status and their relations one to another – we can say at the outset (pre-analytically) that *conceptions* are *in the mind*. For there to be a *conception* of, let us say, blueness, there must be a mind (or consciousness) which 'has' or 'entertains' that conception. Conceptions are 'mental entities'; concepts may, or may not, be in the mind. (Many, perhaps most, current accounts lean toward treating *concepts* as non-mental entities.)

20. See p. 195 and footnote 18, p. 265 above. We will return, again, to this notion of a 'complex individual' in chapter 11, p. 334.



Three problems beset Nominalism. If properties are to be explicated in terms of classes of similar individuals, then it would seem that Nominalism has dispensed with one sort of abstract entity, viz. universals, only to persist with another, viz. classes. For, in most standard accounts, classes are themselves abstract entities. But even allowing for classes, another problem arises. If redness, for example, is to be explicated by invoking the class of all red things, then the members of this class are members in virtue of their *being similar to another* (in respect of their color). But then the relation of *similarity* (or *resemblance*) would seem to be an irreducible property, i.e. one not capable of being explicated solely in terms of some class of things. And finally there is the aforementioned problem of unsatisfied (or unactualized) properties. According to Nominalism, if there were, for example, no actual squares, then squareness would be identified with the null (i.e. empty) class. But similarly, if there were no actual circles, then circularity, too, would be identified with the null class. Thus, in a world where there were neither squares nor circles, both squareness and circularity would be identified with the same, viz. the empty, class. Nominalists believe that none of these objections is fatal and that each can be met in a well-crafted theory. But, in the meantime, another anti-Realist theory has been attracting attention.

I began this section by saying that the properties of material things are not *parts* of things, in the sense that they are not themselves material things. But if properties are not *parts*, then – according to this third anti-Realist theory – they are very much more like parts than they have earlier been regarded. Donald Williams, who is generally credited for resurrecting this theory in the 1960s (elements of the theory were current in the 1920s and 1930s), argued that the properties of specific individuals, e.g. the redness and sphericity of some particular lollipop (not redness and sphericity ‘in general’), are – if not exactly parts, then at least – ‘components’ ([214]). (Williams sometimes called these components “subtle”, “thin”, “diffuse”, or “fine” parts. See, for example, [214], 76.) In any event, he labeled individual properties further, dropping explicit reference to their being either ‘parts’ or ‘components’, by introducing the technical term “tropes”.<sup>21</sup>

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21. Williams appropriated the word, but not the meaning, from George Santayana ([184]). His justification for assigning a new meaning was somewhat imperious: “I shall divert the word, which is almost useless in either his [Santayana’s] or its dictionary sense” ([214], 78). Williams also used the expres-

I propose now that entities like our fine parts [i.e. tropes] ... are the primary constituents of this or any possible world ... They not only are actual but are the only actualities, in just this sense, that whereas entities of all other categories are literally composed of them, they are not in general composed of any other sort of entity. (78)

That things consist of tropes does not imply either that they were made by putting tropes together or that they can be dismantled by taking tropes apart. (98)

There are, then, in this scheme no universals of the sort posited by Realists, i.e. there is no universal redness instanced in this lollipop and in that lollipop. There is rather the particular redness of this lollipop and the particular redness of that lollipop. But certain problems are seemingly solved only to leave others unsolved, and perhaps even in a worse state.

Once again relations seem to pose a formidable challenge. There is a powerful attraction in the theory of tropes when the examples (Williams's own) are of such qualities as redness, sphericity, and aridity. But the theory seems less attractive when one turns to relations, such properties as ...-is-to-the-left-of-... and ...-is-between-...-and-.... The particular redness of a specific lollipop can plausibly be argued to be coextensive\* with the lollipop itself, i.e. it can plausibly be argued that redness of a particular lollipop is – like the lollipop itself – an individual (more exactly, a trope) having spatiotemporal properties. But what about that lollipop's being on the table? Is *being on* a trope which is a 'component' (a 'thin part' in Williams's terminology) of the pair of objects, the lollipop and the table? Neither Williams originally (1966) nor Keith Campbell, who promoted the theory in the 1970s ([41]), addressed how, exactly, relations were supposed to be accommodated within the theory of tropes. It is only more recently that Campbell

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sion "abstract particulars" as a synonym for "tropes" adding, however, that this "good old phraseology has a paradoxical ring" (78). Since Williams used "abstract" in a way quite different from that adopted in this book, I will scrupulously avoid adopting the expression "abstract particular".

"Theory of tropes" should not be abbreviated as "tropism". "Tropism" is a term too well entrenched in biology, where it has a distinct technical use, to be profitably co-opted for use in philosophy.

has tried to adapt the theory to this vexing problem (see e.g. [42]). His current approach recapitulates some of the techniques we have explored earlier (in section 9.2.6) by which philosophers have tried to eliminate relations in favor of (monadic) qualities.

There is another problem as well: Plato's problem of the One and the Many. In a theory of tropes, how is it possible for two or more concrete particulars to 'share the same property in common', e.g. for two or more individuals (my apple, your tomato, and her scarf) all to be red? At the first level of analysis the answer is clear: each of them has as a component, i.e. has as a trope, its own individual redness. But what makes each of these tropes the 'same' trope? Plato's original problem – asked of physical things themselves – returns with an even greater sting as a problem about tropes. What makes two tropes similar? The trouble now is, however, that we cannot say that they, the particular tropes, share some trope in common. We have just seen that Williams has insisted that tropes “are not in general composed of any other sort of entity”. In a way, the very problem that the positing of tropes was supposed to forestall has itself reappeared to infect that theory itself. One proposal which has been made is that the similarity of two (or more) tropes, e.g. the similarity of this red trope to that one, is an 'irreducible brute fact'. But such an explanation – to philosophers who have not themselves adopted the theory – seems more of a resolute avoidance of the difficulty than a satisfactory solution. Like the Nominalists with their earlier theory, those philosophers who lately posit tropes as a way to avoid Realism believe that the problems within their theory are not insuperable.

Although I generally prefer negative theories – those which posit as few unempirical concepts\*<sup>22</sup> as possible – my own leanings in this particular case are toward Realism.<sup>23</sup> My attraction to the theory is

22. For definition of “unempirical concept” in Glossary, see under “empirical”.

23. I was surprised to find in Steven Goldman's combined review of my book *The Concept of Physical Law* ([201]) and of David Armstrong's *What Is a Law of Nature?* ([13]) that he has characterized me as being a Nominalist: “Swartz [sic] argues a nominalist position in which particular events, in virtue of being all there is to reality, are both logically and ontologically prior to universals” ([79], 97). Goldman has obviously read something into my book that is not there at all. Nowhere in that book do I even raise the matter of Realism versus Nominalism. And while I certainly did argue that par-

bolstered by one further consideration: I can see no way to account for the existence of certain items, e.g. pieces of music, plays, and novels, other than by conceiving of them as abstract entities. Here I am considerably influenced by the arguments of C.E.M. Joad (1891-1953). Joad argued ([105], 267-70) that the play *Hamlet*, for example, could not reasonably be identified with any particular in the world: neither with an idea in Shakespeare's mind,<sup>24</sup> nor with any manuscript he wrote, nor with any printed edition of the text, nor with any particular production, nor with any audio or video recording of any particular production. For *Hamlet* could exist even if any one or several of these were not to exist. While Joad, himself, rightly expressed some diffidence about his own arguments, I think that they add considerable impetus to a theory which would posit abstract entities.

Although I am a Realist, I am a reluctant Realist. For, to be frank, there is something exceedingly peculiar about positing entities which exist (subsist) outside of space and time. I, personally, would prefer a theory which could dispense with such mysterious entities. But I find the problems inherent in the various anti-Realist theories even more

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ticular events are logically prior to physical laws, I never argued, nor do I believe, that physical events are logically prior to universals. If anything, I believe precisely the opposite. I suspect that Goldman's mistaken characterization of my position arises out of my having staked out a position contrary to Armstrong's. Armstrong believes that there are ontically necessary relations obtaining between universals; I do not believe that there are. But this does not mean that I deny that there are universals. I deny only that there exist ontically necessary relationships between them. I regard myself as much a Realist about universals as Armstrong. While both of us are Realists, he is a Necessitarian and I am a Regularist.

24. The expression "idea in someone's mind" is ambiguous. Sometimes when we use this expression, we refer to some particular idea on some particular occasion, in effect, to some *act* of thought which is (at least) some temporal particular. Othertimes in using this expression we refer to an idea which other persons may share. If so, then we are talking of a universal. Note that if we mean by "an idea in Shakespeare's mind" some particular act of thought, then insofar as Shakespeare is now dead, that act is now as nonexistent as any of his pains or his visual sensations of the English countryside. If, however, by "idea in his mind" we mean something which could be shared by other persons, which could exist as well in other persons' minds, then we are talking of a universal, and that would not be to deny Joad's argument, but to concur with it.

troubling. Realism is simply the better, in my estimation, of the available theories. But, like many other Realists, I do not much care for Realism. Recently one of my colleagues professed his repudiation of Realism by saying that he found the positing of abstract entities “unintelligible”. I share his displeasure. But I find myself unable to adopt his own anti-Realist position because I cannot in turn believe that the anti-Realist theories provide any better answer or that they can be developed without themselves having to posit at least some abstract entities.

The debate between the Realists and the anti-Realists, we may be sure, will continue for some time. And we may equally be sure that passions will flare.

Some years ago I was present at a conference where Bas van Fraassen spoke about the problems in positing, or abstaining from positing, abstract entities – in particular, sets – in mathematics. He began his talk (which he subsequently published) with the following two paragraphs:

Once upon a time there were two possible worlds, Oz<sup>25</sup> and Id. These worlds were very much alike and, indeed, very much like our world. Specifically, their inhabitants developed exactly the mathematics and mathematical logic we have today. The main differences were two: (a) in Oz, sets really existed, and in Id no abstract entities existed, but (b) in Id, mathematicians and philosophers were almost universally Platonist, while in Oz they refused, almost to a man, to believe that there existed any abstract entities.

They all lived happily ever after. ([207], 39)

In his final paragraph, he added:

I am not arguing that there are no sets. First, it is philosophically as uninteresting whether there are sets as whether there are unicorns. As a philosopher I am only interested in whether our world is intelligible if we assume that there are no sets, and whether it remains equally intelligible if we do not. Personally, I delight in the postulation of occult entities to explain everyday phenomena, I just don't delight in taking it seriously. As a phi-

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25. Doubtless further homage to L. Frank Baum. See p. 207 above.

osopher, however, I look forward to the day when we shall be able to say, “Yes, Virginia, there is a null set,” and go on to explain, as the *New York Sun* did of Santa Claus, that of course there isn’t one, but still there really is, living in the hearts and minds of men – exactly what a conceptualist by temperament would hope. ([207], 50)

Some of van Fraassen’s listeners were amused by his fable. But at least one, Reinhardt Grossmann, a dear teacher of mine from graduate school, was not. Indeed, Grossmann was outraged. Several times he was heard to protest, “How can he believe it makes no difference? There is all the difference between abstract entities really existing and their not.”

As I said, the debate continues.

It is now time to apply the concepts explored in these last two sections to the problem introduced at the outset of this chapter, viz. whether qualitative identity – the sharing of all properties in common – confers numerical identity.