

PHYSICS AND COMMON SENSE *

NICHOLAS MAXWELL

I *Physicalism and Common Sense*

THE basic problem to be discussed is this: To what extent, in what sense, may the discoveries of physics legitimately conflict with our ordinary common sense views about the world based on our ordinary experience? In order to discuss this question, I consider a particular extreme view about the nature of the world—a view I call Physicalism—which may seem to be supported by the findings of physics, and which asserts at least that:

- (a) The world is made up entirely of only a few different sorts of things—the fundamental physical entities.
- (b) Precise, exceptionless laws govern the way in which these entities change.
- (c) Human perception is almost entirely deceptive: almost all perceptual qualities, e.g. qualities such as colours, sounds and smells, have no real, no objective existence.

According to physicalism, only those qualities which apply to the fundamental entities, or to aggregates of fundamental entities, such as mass, position, electric charge, etc., really exist.

Many eminent physicists appear to have believed in some form of physicalism. Thus Planck has written that certain '... considerations ... and not any logical argument ... compel us to assume the existence of another world of reality behind the world of the senses; a world which has existence independent of man, and which can only be perceived directly through the medium of the world of the senses, and by means of certain symbols which our senses allow us to apprehend. It is as though we were compelled to contemplate a certain object in which we are interested through spectacles of whose optical properties we were entirely ignorant.'¹ Again, Einstein has written: 'Physics is an attempt conceptually to grasp reality as it is thought independently

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¹ M. Planck, *The Universe in the Light of Modern Physics*, Allen & Unwin, 1931, pp. 8-9

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of its being observed. In this sense one speaks of "physical reality"¹, and: 'The belief in an external world independent of the perceiving subject is the basis of all natural science. Since however, sense perception only gives information of this external world or of "physical reality" indirectly, we can only grasp the latter by speculative means.'²

The findings of physics do not of course oblige us to adopt some version of physicalism. We may argue that scientific investigation involves an extension, elaboration and refinement of common sense, of our ordinary experience, and therefore that scientific discoveries cannot contradict in any fundamental way the tenets of common sense that are based on ordinary experience. According to this second view—which I call the 'common sense' theory—scientific discoveries can only undermine those of our ordinary views about the world that are based on inadequate or distorted observation.

Thus scientists may find some means to extend the range of our experience, to that which is very distant perhaps, or very small, or to that which occurred long ago. As a result of obtaining this new, direct or indirect, observational evidence, the scientist is in a position to correct previous assumptions made about the nature of that part of the universe in question.

Again, it is the physicist's fundamental aim to discover, in so far as this is possible, those very general regularities between phenomena to which there are no exceptions; to discover, in other words, the 'laws of nature'. On the whole physicists have been extraordinarily successful in this search. But from our immediate, uninformed experience it is not at all obvious that the nature of the world is such as to be amenable to this kind of investigation. Thus from ordinary human experience, not altogether unreasonable conclusions may be reached about the nature of things in the world, which may seem to be rendered highly implausible by the subsequent apparent discovery of universal laws of nature—by the discovery that it is possible to formulate laws which (a) are not refuted by experience (perhaps within certain limits) and (b) make accurate predictions possible.

But none of this implies that there is anything inadequate or distorted about our observation of the familiar 'furniture of the earth'. Thus, according to this second view, as long as we are not mad, drugged, blind, deaf or dreaming, our ordinary experience provides us with knowledge about the visual, auditory, tactile, etc., properties of

¹ P. Schilpp (ed.), *Albert Einstein: Philosopher-Scientist*, Tudor, New York, 1957, p. 81

² A. Einstein, *The World as I see It*, Bodley Head, 1935, pp. 156-157

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the things on this earth which no legitimate scientific theory could ever refute. Roses really are red, dogs really do growl, etc.

These two theories, the 'common sense' theory and physicalism, have of course been formulated with no very great precision. Any number of different versions of each theory may be developed. Enough has been said however, I hope, to make quite clear the following crucial point: we have here two very different theories about the nature of the world, for either of which the claim may be made that it is *scientific*, that it is supported by science, and takes into account possible future scientific discoveries.

I wish to stress that these are theories about the nature of the world, theories about *things*, and not primarily theories about the nature of science or the theories of physics (although each theory may, incidentally as it were, imply different things about the nature of science). Thus, according to physicalism, the world is made up solely of a few different kinds of fundamental physical entities, nothing really being coloured, etc.; according to the 'common sense' theory, the world is at least made up of all the different kinds of things that we ordinarily experience, many of which really are coloured, etc.

We have here surely an extraordinary state of affairs. Physics appears to be a particularly precise discipline; most physicists at any one time seem to agree as to which theories are acceptable, which unacceptable. Yet we have just seen that wholly divergent views may be held about what physics can tell us about the nature of the world.

The reason for this, briefly, is that precisely what we consider physics can tell us about the nature of the world depends to a considerable extent on the kind of interpretation we think can legitimately be given to the mathematical formalism of a physical theory. And on this point there is no general agreement.

Let us suppose a wholly successful, all-embracing, fundamental physical theory has been found which suits ideally the physicalist's purposes. We may suppose that this 'ideal' theory is such that given any isolated system, and given the so-called 'initial conditions' corresponding to some state of that system, then the theory will in principle enable us to predict all subsequent states of the system. Further we may suppose that the theory at least ostensibly postulates the existence of just a few different kinds of fundamental entities.

The physicalist would interpret such a physical theory in the following manner. Given any isolated system, in order to describe what really exists at any instant we require (a) the fundamental theory, which

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states in general terms what kind of things the fundamental entities are, (b) the initial conditions, which specify the precise values at the moment in question of such variable attributes of the fundamental entities as position, momentum. According to the physicalist, a description of what really exists at a given moment is only *complete* if it enables us to deduce descriptions of subsequent states of the system. By hypothesis, the above 'ideal' theory does provide such a 'complete' description.

The physical theory might however be given a quite different, non-physicalist interpretation. Briefly, it might be argued that the theory would not *really* postulate the existence of fundamental entities. The theory would *really* only describe a *model*, a conceptual tool invented by the physicist solely in order to facilitate the prediction of observations. Thus the fact a successful physical theory apparently postulates and describes fundamental physical entities in no way implies that such entities *really* exist.¹

Defending such different interpretations to one and the same mathematical formalism clearly amounts to defending different theories about the nature of the world. The question arises: Does a successful mathematical formalism, given a physicalist interpretation, constitute a possible theory of physics, as opposed perhaps to a theory of metaphysics?

I accept here without argument Popper's solution to the problem of demarcation between physics and metaphysics: a theory, in order to belong to physics, must at least be experimentally falsifiable.²

From this requirement it follows that the kind of interpretation of the mathematical formalism of a physical theory, demanded by physicalism, which we may call 'tentative realism', is legitimate. In practice of course no isolated system can be observed; but experiments can nonetheless be devised to test deductive consequences of theories intended to apply to isolated systems.

It should be noted that even if one day the kind of ideal fundamental physical theory described above is found, the physicalist will still never know with certainty that entities precisely like those described by the theory do really exist, since it will never be possible to know

¹ Variants of this view have been defended by Berkeley, Mach, Poincaré, Bridgman, Heisenberg, Bohr, and by the logical positivists. For an exposition and criticism of this view, under the heading 'Instrumentalism', see K. Popper, 'Three Views concerning Human Knowledge', in *Conjectures and Refutations*, Routledge and Kegan Paul, London, 1963.

² K. Popper, *The Logic of Scientific Discovery*, Hutchinson, London, 1959

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with certainty that the theory is true. Nonetheless the theory *might* be completely true, and hence entities precisely like those postulated by the theory *might* really exist. The fact that the theory must be open to experimental refutation ensures that it is meaningful to call the theory false, which in turn ensures surely that it must be at least *meaningful* to call the theory *true*.

In giving a tentative realist interpretation to physical theories we are not obliged to assert that entities postulated by *all* acceptable physical theories really exist. Suppose a theory, by postulating certain entities, is able to make accurate predictions within certain conditions or limits, but outside these, goes wildly astray, and is, in other words, refuted. Clearly, in this case, not all of the entities postulated by the theory really exist. Nonetheless the theory might be retained, perhaps because it is the only theory available, or perhaps because of its relative simplicity.

The kind of tentative realist interpretation of physical theories indicated here is often opposed by a view which combines a non-realist interpretation of theories that apply to the so-called micro-level, with a realist interpretation of theories that apply to the macro-level. Such a view is prompted partly by the belief that scientific theories must be observationally verifiable (the kind of belief that is presupposed by Hume's polemic against causation as 'necessary connections' between events), partly by the fact that such a view enables one to sidestep the apparent wave/particle paradoxes of micro-phenomena. Unfortunately there is insufficient space for a discussion of such matters here.¹

The view that physicalism might conceivably be formulatable as a physical theory raises the problem: Why would not such a theory be refuted immediately by our ordinary experiences? Is not the theory that the world is in reality colourless, soundless, odourless, etc., refuted by the fact that we do see colours, hear sounds, smell smells?

I wish to argue that physicalism is only a defensible theory if interpreted in such a way that it does *not* imply that there are no colours, etc., in the world. The problem here is to interpret physicalism in such a way that it does not contradict an acceptable version of the 'common

¹ For a criticism of the principle of complementarity (and thus of phenomenalist interpretation of quantum mechanics) see: M. Bunge, 'Strife about Complementarity', this *Journal* 6, 21; for a suggestion of how apparent wave/particle paradoxes of micro-phenomena may be resolved see A. Landé, 'Why do Quantum Theorists ignore the Quantum Theory?' this *Journal*, 15, 60.

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sense' theory. But before indicating how the 'common sense' theory and physicalism may be reconciled, I wish to discuss two versions of physicalism that reject outright the 'common sense' theory.

The thoroughgoing physicalist clearly requires a theory of perception which explains why our ordinary experience does not refute physicalism. From Popper's demarcation requirement, it follows that if physicalism is to be formulatable as a physical theory, then from the theory, and a description of the constitution of the human brain and sense organs, it must be possible to deduce a theory of perception which:

1. Explains why most of our experience is delusive.
2. Indicates precisely what aspect of our experience is *not* delusive, so that predictions of the physicalist theory may be tested experimentally.

2 *Two Physicalist Theories Rejected*

The two physicalist theories of perception I wish to discuss are (a) dualism, (b) the discriminatory response/brain process theory, defended recently by Professor Smart.¹

For the purposes of this discussion I shall call those qualities which, according to physicalism do really, objectively exist, *physicalist*, and those perceptual qualities which, according to physicalism, do not really, objectively exist, *phenomenal*. This leaves open the possibility that some, but clearly not all, physicalist qualities, such as for example shape, may also be perceptual.

(a) *Dualism*. This doctrine accounts for the alleged deceptiveness of human perception as follows. We know that if I perceive, let us say, a red rose, then a causal sequence of events takes place between the surface of the rose and my brain via my eyes and optic nerve. According to the dualist, it follows from this that my visual sensation of the rose must be an entity caused by, or in some way associated with, some event in my brain, but nonetheless distinct from any event in my brain, and open only to my own inspection. Hence, in perceiving the rose, I really only perceive my visual sensation of the rose. I can therefore have no reason to believe that the perceptual quality, redness, applies to the physical object I have called a rose: redness is a quality that can apply only to visual sensations that occur in the mind. Of course in practice if a physical object causes us to have the visual sensation of redness, then we will tend to call that physical object 'red'; but strictly it must always be *false* to ascribe a perceptual quality to a physical

¹J. J. C. Smart, *Philosophy and Scientific Realism*, Routledge & Kegan Paul, London, 1963, Chaps. 4, 5

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object. In general, physicalist qualities apply only to physical objects, perceptual qualities only to sensations or sense impressions, which exist exclusively in our minds. Dualism thus involves a serious addition to physicalism, since according to dualism the world is made up of the two entirely different sorts of things: (i) fundamental physical entities, (ii) sense impressions, or, more generally, ideas. Ideas exist only in dimensionless 'bubbles', called 'minds', which are associated in some strange way with certain clusters of fundamental physical entities called 'brains'.

Such a dualist theory of perception does provide an explanation of how human perception might be deceptive, of how things might not really be as they seem. It is a mistake, however, to suppose that dualism can be derived from the existence of the causal sequence of events involved in any perception. We may stipulate that a necessary condition for perceiving an object is that a certain kind of causal sequence of events should take place between the object and the brain via the eyes and optic nerve. The visual sensation (as opposed to the perception) we may define as the last event in the above sequence, leaving open the question of whether this is a brain process or some peculiarly 'mental' occurrence. From such an explication of 'perception' it follows that far from *only* being able to perceive our own visual sensations, in practice we *never* perceive our visual sensations.

A more serious objection to dualism as a physicalist theory of perception is however that it does not meet the second of the above two requirements for such a theory. According to dualism, we can have no reason to believe that any experience is *non-delusive*, if our experience is interpreted as providing information about the physical world. This is because, according to dualism, we can *only* perceive our own sensations, it being impossible to perceive any physical object.¹ In other words, the assumption that dualism is true implies that there can be no evidence in favour of the theory. (More precisely, dualism implies that no singular existential proposition about the physical world can be verified, and hence that no physicalist theory can be experimentally refutable.)

(b) *The Discriminatory Response/Brain Process* theory of Professor Smart. Briefly, Smart's thesis is that phenomenal qualities must be understood not as intrinsic, unanalysable, objective properties of things,

¹ This, basically, is the point behind Berkeley's polemic against Lockean substance, see 'Three Dialogues' in G. Berkeley, *A New Theory of Vision and other writings*, Everyman, London, 1910.

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but in terms of the discriminatory responses of human beings. Colour, for example, is to be analysed in the following manner. First we explicate the phrase 'discriminate with respect to colour' without introducing colour as an undefined primitive. A person discriminates between objects with respect to colour if the discrimination can be made when the objects are illuminated with daylight but cannot be made when the objects are illuminated with monochromatic light. A normal human percipient with respect to colour is then defined as a person who is able to make all the colour discriminations that anyone else can make. We then define objects of the same colour as objects which a normal human percipient would not be able to discriminate between with respect to colour. Thus Smart declares: 'We might say at a first shot, that 'this is red' means roughly that a normal human percipient would not easily pick this thing out of a heap of geranium petals, though he would easily pick it out of a heap of lettuce leaves.'¹

Smart acknowledges that this account of colour has one slight flaw: we can imagine that colours of all objects undergo a systematic change, so that for example lettuce leaves become red, geranium petals green. According to the above account, this radical change would not be detectable, since human beings would continue to make colour discriminations just as before. In order to meet this difficulty, Smart admits that we must take into account the inner experiences that accompany discriminatory responses. But this does not involve admitting that unanalysable mental or psychic entities exist, since these inner experiences are, according to Smart, nothing more than complicated neurophysiological events.

This last point—which we may call, following Smart, the 'brain process theory of inner experiences'—does not, I think, represent a weak point in Smart's position. The theory is based on the argument that in having an inner experience I am presented with no evidence for the existence of entities over and above brain processes, in the sense required by dualism. Thus, if I experience, for example, the visual sensation of a red patch, then I have undeniable evidence only that something exists which, in some unknown respect, resembles that which exists when I perceive a red patch. Hence all available evidence supports the hypothesis that the 'something' in question is a particular brain process. This does not imply however that 'brain process' and 'inner experience' have the same meaning.

¹J. J. C. Smart, *op. cit.* p. 79

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The brain process theory is often considered as an implausible last step in the physicalist's reductive programme. I shall assume here however, without further discussion, that this theory, if formulated and defended entirely independently of physicalism, is an entirely sensible, unobjectionable view, with considerable ordinary empirical evidence in its favour. I assume that it is in full accordance with our ordinary experience, and by no means implies that men are merely mechanisms, or that life can have no significance or value. In other words, I assume that the brain process theory, formulated independently of physicalism, is in full accordance with the 'common sense' theory. It is, I think, in part just because the brain process theory is thought to presuppose physicalism that it is usually considered to be so implausible.¹

Objections to Smart's physicalism lie elsewhere, in connection with his 'discriminatory response/brain process' analysis of qualities such as colours. (It should be noted that acceptance of a version of the brain process theory does not automatically implicate us in an acceptance of the role which this theory plays in Smart's analysis of colours.) Crudely, the obvious objection to Smart's physicalism is surely this: the theory just does not account for the existence of qualities like *redness*. Whenever we see a red object surely we just are indubitably aware of the existence, somewhere in the world, of a unique, unanalysable quality which we may call 'redness'. Yet according to Smart it is just this kind of quality that does not exist at all, either in things or in our minds.

Unfortunately, in order to give a precise formulation to this apparently simple objection, it seems it is necessary to raise the following somewhat intricate considerations.

Smart does not always make it quite clear which of the two following positions he is defending:

- (i) The physicalist analysis of sentences such as 'This is red' explicates satisfactorily what we ordinarily mean by this sentence.
- (ii) 'This is red', as ordinarily understood, is always *false*; hence all perceptions of colours are delusive, and colours are only phenomenal qualities.

Clearly Smart must be defending one or other of these positions, but not both. It would seem that the following objection to the first position is decisive: an analysis of 'This is red' in terms of discriminatory responses of certain biological mechanisms misses the most important part of what is ordinarily meant by this sentence, namely that

¹ For a defence of these points see N. Maxwell, *Physics and Common Sense, a critique of Physicalism*, M.A. thesis, 1965, Manchester University, pp. 72-126.

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unanalysable part which can only be understood by actually seeing a red object, or, at the very least, by experiencing the visual sensation of redness. To this Smart might reply 'But this experience can in turn be analysed in terms of some brain process, which clearly could be fully described without mentioning any such quality as "redness"'. The answer to this (accepting the brain process theory as formulated here) is that in order fully to understand 'This is red' it is necessary to have the brain process in question occur in one's own brain; it is wholly irrelevant whether or not one is in possession of a description of this brain process. In having this brain process occur in one's own brain for the first time something wholly new is learnt; one discovers what red things are like, just that which the congenitally blind never know.

To this the following qualification must be added. It is just possible, as far as our knowledge goes at present, that the *public* meaning of 'This is red' (i.e. that meaning which is common to all the rather different meanings which people *may* give to 'This is red') can be completely analysed in Smartian terms. This would be the case if, from person to person, the inner experience that accompanied the perception of a red object was different. Suppose the brain process that accompanies my perception of a red object is A, while the brain process that accompanies your perception of a red object is B; suppose further that if B is induced by some means in my brain I experience a visual sensation which I regard as quite different from 'experiencing the visual sensation of redness'. In this case I would say 'What I mean by "This is red" is quite different from what you mean'. Nonetheless a part of what I meant by 'This is red' would be the same as what you meant by this sentence. This 'public' part would be explicated entirely by a Smartian analysis.

However, given these circumstances (which may very well not be the case) the *private* meaning which I give to 'This is red' would still be a perfectly genuine meaning. For another person to understand this private meaning it would be necessary only for that person to have a brain process which I judged to be sufficiently like A in the relevant respect in order to constitute for that person 'experiencing the visual sensation of redness'. Thus arguments such as Wittgenstein's against the possibility of a private language,¹ do not apply here, since a definite procedure exists for determining whether two people have similar inner experiences.

To sum up, we must reject the contention that Smart's analysis of

¹ L. Wittgenstein, *Philosophical Investigations*, Blackwell, Oxford, 1958, §258, etc.

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colours explicates all that we ordinarily mean by such sentences as 'This is red'.

But no doubt Smart does not wish to make the above claim for his analysis of colours. Smart would maintain I think that a sentence such as 'This is red', if given its ordinary meaning, is always false. In other words Smart is defending a physicalist theory of perception, according to which all perceptions of colours (as ordinarily understood) are false, i.e. according to which colours (as ordinarily understood) are phenomenal qualities only.

The question arises: Does this theory satisfactorily explain why all perceptions of colours are delusive, why colours are phenomenal qualities only? It is important to realise that Smart's discriminatory response/brain process theory does not in itself explain why certain perceptual qualities are only phenomenal. After all, to any perceptual quality whatsoever there will correspond certain discriminatory responses and brain processes of human beings. Hence merely from the existence of such discriminatory responses and brain processes we cannot deduce that the quality in question is only phenomenal, and does not really, or objectively, exist. Thus the theory is no more than a device whereby the term for a quality which has been shown to be phenomenal can be given a physicalist interpretation.

Why then does Smart maintain that colours as ordinarily understood are phenomenal? Basically Smart distinguishes physicalist from phenomenal qualities as follows: Physicalist qualities are just those which physicists will ascribe to the fundamental physical entities and to all possible assemblies of fundamental entities, once (or if) they formulate a satisfactory, basic, all-embracing physical theory. Phenomenal qualities are then those qualities which we do ordinarily attribute to objects and appear to perceive, but whose existence cannot be predicted from a full knowledge of the properties of the fundamental entities. But the mere fact that a physical theory does not predict the existence of a perceptual quality cannot in itself be a sufficient reason for concluding that that quality does not really exist. In fact perception of a quality not predicted by a physical theory would *refute* that theory unless it could be shown that either (1) our perception of the quality is always delusive, or (2) the theory does not imply that the quality does not exist. Hence nothing that has been mentioned so far supports the hypothesis that all perceptions of colours are delusive.

Smart does provide certain *ad hoc* arguments in support of the hypothesis that qualities such as colours do not really, objectively exist, and

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therefore that our perceptions of colours are always delusive. For example he argues that the view that colours have an objective existence is rendered extremely implausible by the fact that the physical property which corresponds to any colour is usually complex and, from the point of view of physics, wholly arbitrary.¹ Thus, to light of any specific colour, there corresponds infinitely many mixtures of light of different wavelengths and intensities. But these considerations show only that from the point of view of physics, classification in terms of colours seems arbitrary; it does not follow that colours do not really, objectively exist. From the point of view of the person who perceives colours, classification in terms of colours is very far from arbitrary.

It is true that doubt may be raised as to what is to count as a veridical experience of colour, particularly by the findings reported by E. H. Land.² But any such doubt must presuppose in the end that *some* experience of colour is veridical.

3 *An Acceptable Physicalism*

I wish to turn now to an examination of our original problem: How can physicalism be interpreted so as to render it consistent with an acceptable version of the 'common sense' theory?

In essence the solution I offer to this problem is very simple. Both theories provide comprehensive descriptions of the world. These two descriptions are however compatible, since they are not both the same *kind* of description. Thus each description applies to almost all there is, and yet does not tell us all that there is to know about that to which it applies. Our task in what follows will be to:

- (a) Explicate the precise requirements which each description must fulfil.
- (b) Show that an ideal, fundamental physical theory would support physicalism given this interpretation.
- (c) Show that the two kinds of description are compatible.
- (d) Refute such claims as that only physicalism describes the world as it *really, essentially or objectively* is.

(a) In saying what exists at any moment we can only say what that which exists is *like*, in some respect or other. A number of very different *kinds* of resemblances can be found between things. The physicalist and the 'common sense' descriptions classify things in terms of different *kinds* of resemblances between things.

¹ J. J. C. Smart, *op. cit.* pp. 69-72

² *Scientific American*, May 1959, 200 (5), 84-99.

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I suggest that physicalism is to be interpreted as providing the following kind of classification of things:

- (i) That which exists at any instant is classified, in the simplest possible way (i.e. with the smallest possible basic vocabulary), in terms of causal consequences, i.e. is described in such a way that descriptions of what exists subsequently can be deduced. (In the terminology of physics, given an isolated system, that which exists at any instant is described in such a way that descriptions of subsequent states of the system can be deduced.)
- (ii) Things are classified only in terms of those resemblances which any intelligent being, however its sensory equipment may be constructed, can discern, discover, become aware of.

It is assumed that these two requirements are compatible.

It should perhaps be emphasised that the first requirement makes the following presupposition: 'It is at least possible, or conceivable, that from a true description of what exists at one instant, true descriptions of what exists subsequently can be deduced.' (It is precisely this which is presupposed by a tentative realist interpretation of the kind of 'ideal' fundamental physical theory described on p. 297.) Hume of course rejected the above proposition. Hence in accepting the first requirement for a physicalist description (and, incidentally, in accepting a realist interpretation to physical theories), we are committed to denying the validity of Hume's defence of the proposition 'It is not possible, not conceivable, that from a true description of what exists at one instant, true descriptions of what exists subsequently can be deduced'.¹

The ways in which 'common sense' descriptions classify things are less easy to specify precisely. In general, things are classified solely in terms of resemblances easily discernible to human beings, in terms of resemblances associated with the experiences, interests, and purposes of human beings. A 'common sense' description of an object may classify that object in terms of (amongst other things):

- (i) What the object looks like, feels like, etc., to a human being.
- (ii) The object's past (e.g. how the object was made, where it came from).
- (iii) What the object is used for.
- (iv) The object's causal properties.

Often these, and other, kinds of classifications are combined in any one description, although of course one kind may predominate.

¹ For a refutation of Hume on this point see N. Maxwell, *op. cit.* pp. 57-69

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(b) It is clear enough, from our previous discussion, that a certain kind of legitimate fundamental physical theory would, if given a tentative realist interpretation, support physicalism in the above sense. Whether or not contemporary physics supports such a version of physicalism is, as I have already indicated, a controversial issue.

(c) It is further quite clear that it is possible for physicalism and the 'common sense' theory, given the above interpretations, to be compatible. If physicalism satisfies the above two requirements for a physicalist description, then qualities that are, for example, discernible only to beings with sensory equipment similar to those of human beings will fall wholly outside the province of the theory. Physicalism will neither imply that such qualities exist, nor imply that such qualities do not exist. At the most the theory would imply, given a physicalist description of a human being, that that human being will make certain kinds of discriminations in certain situations, and will have certain brain processes. Since physicalism does not imply the non-existence of the quality I discern in seeing a tomato say and call 'redness', it must be compatible with physicalism to say of an object 'This is red' in this sense.

It should be noted that the requirements for the physicalist description do not necessarily imply an altogether sharp distinction between physicalist and non-physicalist qualities. Thus it might be maintained that even such apparently typical non-physicalist qualities as colours are physicalist qualities, since they are (i) not altogether causally inefficacious, (ii) perhaps perceivable by any intelligent being if we permit sufficiently drastic brain surgery.

(d) We turn now to a refutation of the claims that only the physicalist description is *really* true, that only physicalism describes the world as it *really, essentially or objectively* is.

The question 'Is the world *really* as described by the "common sense" theory or as described by physicalism?' only makes sense if the two descriptions are incompatible, if only one can be true. But as we have already indicated, a comparison of the requirements for each description makes it quite clear that it is perfectly possible for both descriptions to be true. Hence the above question makes no more sense than: 'Is this rod *really* one foot or twelve inches long?' Both colours and electrons *really* exist, although they are very different sorts of things.

It may be argued that fundamental particles, and all aggregates of such particles, are *essentially* colourless, *essentially* without perceptual

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properties, precisely the reverse being true of anything to which the 'common sense' description refers. Hence the two kinds of description are incompatible: only one can be true.

But what is meant by the phrase 'the *essential* properties of a thing'? The following two related definitions may be given. The essential properties of an electron, for example, are (a) those which we consider to be the most important, or (b) those which a thing must possess if it is to be called an electron. Clearly in giving the essential properties of the electron, according to the second definition, we are giving no more than an explanation of what we mean by the term 'electron'. There will be a tendency to define 'electron' in terms of the properties which we consider to be the most important. For this reason the two definitions of essential properties will tend to be equivalent.

From this explication of the notion of 'essence', it follows that we may grant that the essential natures of electrons and stones say are different without thereby being committed to maintaining that the two kinds of descriptions are incompatible.

It is true that from a complete physicalist description alone it would be impossible to deduce the *perceptual* qualities of things, but this is due, not to the fact that things do not really possess perceptual qualities, but to the fact that the physicalist description is *incomplete*: it does not tell us all that there is to know about the world. It does not tell us what it is like to be a human being alive and experiencing in the world. In particular, it tells us little about that aspect of objects which we discover in direct perception.

Misunderstanding of this point may to some extent be responsible for the view, defended for example by R. Harré,¹ that stones and electrons belong to different ontological classes, that both stones and electrons exist, but in different senses of 'exist'. Certainly the 'essential' properties of stones and electrons are very different. Further, the epistemological status of these properties is in each case very different. Propositions that attribute perceptual properties to stones may be verified in a straightforward way by observation: propositions which attribute physicalist properties to fundamental physical entities are never verified; at most they survive all attempts to refute them. None of this implies however that stones and electrons exist in different senses of 'exist'. Once we have made quite clear what sort of thing a stone or an electron is, then it can only be either true or false that stones exist, either true or false that electrons exist.

¹ R. Harré, *Theories and Things*, Sheed and Ward, London, 1961, p. 85

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Again, it may be argued that the physicalist kind of description is truer than other kinds because it is more objective. Thus Smart argues '... our ordinary manner of talking about the world is suffused with concepts which relate the things in the world to our human concerns and interests, and which depend, in often unnoticed ways, on our human physiology and our particular station in space-time. . . . If the anthropocentricity inherent in these concepts is not brought out into the open we can have a misleading picture of the world. We think, for example, of objective colour *qualia* or of an objective *now*, much as the Hebrews looked up at the dome of the sky and thought that this was a solid half-spherical shell, or firmament, and did not realise that the apparently solid object was an illusion of their own perspective.'¹

We may agree with Smart that 'Our ordinary manner of talking about the world is suffused with concepts which relate the things in the world to our human concerns and interests, and which depend . . . on our human physiology'. As much is clear from the conditions for the 'common sense' description. Whether or not it follows that such a 'manner of talking about the world' is subjective cannot be decided until the distinction between subjectivity and objectivity has been defined (see below). But whatever our decision on this point, from the fact that the 'common sense' description is 'suffused with concepts which relate the things in the world to our human concerns and interests, and which depend . . . on our human physiology', it does *not* follow that such a description is in any way false, or that the corresponding qualities do not exist. Descriptions such as 'That is—a car, a Picasso, green, a waste-paper-basket, etc.', relate the things described to human concerns and interests, and can only fully be understood and verified by human beings, but are not, on that account, false. The fact that you must possess a human physiology in order to perceive the greenness of things does not imply that grass is not really green.

We may grant that if typically 'common sense' descriptions are employed as if they meet both requirements for the physicalist description, then all such descriptions will be false. If colours, for example, are thought of as physicalist qualities, then it would be false to attribute colours to things. But we are not obliged to give such an interpretation to the concept of colour. We are not obliged to interpret the word 'red' so that 'This is red' is bound to be false.

Finally, a few words about the distinction between objectivity and subjectivity. I wish to suggest that the traditional manner in which

¹J. J. C. Smart, *op. cit.* p. 149

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this distinction is drawn makes an implicit appeal to Cartesian dualism, and must be rejected if we reject Cartesian dualism. It might be stated thus: a quality is objective if it exists independently of the observer, subjective if its existence depends on the existence of the observer. This has a clear enough meaning if we accept a dualist theory of perception: physicalist qualities are objective, while phenomenal qualities, qualities associated with the experiences, concerns or emotions of human beings, are subjective. But if we reject dualism, the above distinction becomes wholly unclear.

I suggest that by objective we mean *inter-personal*, and by subjective we mean *personal*, that which is not inter-personal. Thus colours, relative to a group of non-colour-blind people, are objective, but relative to all human beings, or, even more generally, relative to all rational beings, are subjective. It should be noted that in calling a quality either objective or subjective we are making an implicit appeal to a group of people. It should also be noted that in calling a *quality* subjective we do not imply that the quality does not really exist (or does not exist 'independently of the observer'), and in calling a *description* subjective we do not imply that the description is not really true. We imply only that not all members of the group of people in question can perceive the quality, fully understand the description.

Given this definition of objectivity, we may grant the physicalist that his is the only description that is objective relative to all rational beings.

University of Manchester