

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY



I.—THE EXTERNAL WORLD.¹

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THE philosophical problem of the external world and our knowledge thereof arises primarily from certain facts about the variations in the sensible appearances of what is regarded as a single physical thing. These difficulties may fairly be called the fundamental ones in the subject, because they are independent of all detailed knowledge about the physical and physiological processes which condition sense-perception. There is of course a further crop of difficulties when the assertions of the physicist and the physiologist on this subject come to be considered in detail. But it is hardly profitable to start from this end, since the alleged facts are stated in terms of the common-sense notion of physical objects and established on the common-sense assumption that perception gives us substantially correct information about such objects. Hence, if the solution of the first problem should involve any profound modification of these assumptions, the alleged facts which give rise to the second problem would need to be entirely restated. The two problems are of course very closely connected, and the relation between them may be roughly summed up as follows. When we leave out of account the physical and physiological details of sense-perception a number of alternative solutions of the first set of difficulties are open to us. When we take these details into account some of the solutions which seemed plausible

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become much less so, whilst others, which would have seemed at first sight needlessly complex, even if they had suggested themselves at all, may be found necessary in order to do justice to all the facts.

Now there is one general remark that may be made at the outset. Since the problem arises through the various appearances of what is supposed to be a single physical object the solution must be sought in two directions. On the one hand we must try to clear up the notion of sensible appearance, on the other we must try to clear up the notion of physical objects. There is no incompatibility between the mere facts that something appears to you to be circular and that something appears to me to be elliptical at the same moment. There is again no incompatibility between the mere facts that something appears to me now to be round and that later on something appears to me to be elliptical. The incompatibility is not between these experiences as such, but between them and the supposed facts that the something which appears to you to be circular and the something which appears to me to be elliptical are the same something, and that this is really round. Thus all progress in the solution of the problem must take the form of analysing the obscure notions of sensible appearance and of physical object. Neither of these is clearly conceived by common-sense, but it may fairly be said that we all have a considerably more definite idea of what we mean by a physical object than of what we mean by such statements as that something appears round or elliptical. (i) A physical object is conceived to be something which at least is public; it is neither yours nor mine in the sense in which certain wishes and feelings belong wholly to me and certain others wholly to you. We do of course apply possessive adjectives to certain physical objects; we talk of my umbrella as well as of my toothache. But it is clear that the possessive adjectives are used in different senses; you can never literally make my toothache yours, whilst it is only too fatally easy for you to do so with my umbrella. (ii) A physical object is conceived to be capable of appearing in many different ways at once, and again to be capable of appearing differently at different times, without having changed. This statement is by no means clear or definite. No doubt it would be commonly held that a physical object could not appear differently if it had not changed at least in its relations to something else. Still there is felt to be some important sense in which a physical object can remain unaltered whilst some of its appearances change. Conversely there is felt to be some important sense

in which a physical object can change without appearing different. These two characteristics of publicity, and a certain relative independence of appearances, are necessary but not sufficient to the common-sense notion of a physical object. They both apply to the volitions of God on Berkeley's theory, and to things-in-themselves on Kant's theory. Yet it would commonly be held that, if either of these theories were true, there would be no physical objects. The reason seems to be that, on such theories, the objects, though public and relatively independent of their various appearances, are not sufficiently like what they appear to be. I do not know that common-sense would object to physical objects having many properties which they do not appear to have and which are very different from any that they appear to have. Again, it is prepared to admit that many properties which they appear to have do not belong to them. But it demands a certain minimum of resemblance between the qualities which physical objects have and those which they appear to have. At least something corresponding to apparent shape, size, and position seems to be demanded.

Now of course the first two demands can be fulfilled in a vast variety of ways. Almost every system of philosophy except pure subjective idealism fulfils the first two. The chief difficulty is about the last. There are or seem to be very great difficulties in fulfilling it literally. But in itself the third demand is not precise; it is a matter of more or less in any case; and again the question will arise: What do you mean by saying that such and such a physical object has such and such a property? If you insist on a very literal interpretation of having such and such a quality we must deny that bodies, as conceived by science, are coloured, and that physical objects, as conceived by Mr. Russell in his *Lowell Lectures* or by Leibniz, have shapes and sizes. A class of sensa or a group of confused monads with very similar points of view does not literally have shape, size, or position. Yet it is very easy, as Dr. Moore puts it, to say that in a Pickwickian sense bodies, on the scientific theory, are coloured, and Russell's classes of sensa or Leibniz's colonies of bare monads extended. The question is: How Pickwickian may we become in our interpretations of common statements before we have to reject the notion of physical objects altogether?

As regards the meaning of sensible appearance we have almost an open field, for common-sense and natural science have no clear views on the matter at all. Naturally we find that various possible analyses of sensible appearances will

require different views about the nature of physical objects and some may even require the rejection of physical objects. Conversely certain views of physical objects demand certain types of view about the proper analysis of sensible appearances, e.g., scientific theories about light, heat, sound, etc., have led to the view that sensible appearances are effects of physical objects working first on our bodies and thence on our minds. Now I might sum up the work that really matters which has been done on our subject in the last few years in the following way. It starts, in England at any rate, from Dr. Moore's *Refutation of Idealism*. I do not think, and I do not suppose Dr. Moore thinks, that that article refuted Idealism. But it did point out the scandalously ambiguous way in which the word 'sensation' was used, and led to the distinction being drawn between sensations and *sensa*. Now, starting from that distinction a great deal of very important work has been done on the following lines. A sensation has been supposed to be an act of direct acquaintance with a *sensum*. Since the *sensum* is no longer confused with the sensation, one ground at least for regarding the *sensum* as mental vanishes. It is embarrassing to say that a state of mind is round or hot or red, but we need not hesitate to ascribe these qualities to *sensa*. This leads to a definition of sensible appearance. When we say that the physical object *x* appears to us to be circular we mean on this theory that we are aware of a *sensum* which really is circular, and that this *sensum* is connected in some peculiarly intimate way with the physical object *x*. The essence of this theory of appearance is that whenever I judge that something *appears* to me to have the quality *q* there must be an object with which I am acquainted which *really does have* the quality *q*. This object is the *sensum*. It is, I think, admitted that *sensa* with which I am acquainted may have other qualities beside those which I notice in them; it is even held by many people that arguments like Stumpf's prove that this must in many cases be so. But it is held that, at any rate, they must have all those positive sensible qualities that they seem to me to have. In fact, if the present analysis of seeming to have a quality be accepted as complete, it is tolerably clear that we cannot literally talk of *sensa seeming* to have qualities; they just have them and we notice them.

Some such theory as this has at least the merit of giving a clear and intelligible meaning to the statement that a physical object appears to have such and such a quality. Until very lately most of us have regarded it as the only

tenable analysis of such statements. The work of Prof. Dawes Hicks and the latest work of Dr. Moore do however suggest that a very different mode of treatment is possible. I shall confine myself to developing some of the consequences of the older view, partly because this will occupy all my available time, and partly because the second has not as yet been very fully developed. It must be understood however that I think that the alternative theory of appearance is logically possible and may prove to be of great importance.

Certain objections which many people apparently feel to the theory just sketched may be removed at once. It is often objected that we are not aware of *sensa* and their properties, as a rule, until we specially look for them. It is a fact that it often needs a good deal of persuasion to induce a man to believe that when he looks at a penny sideways it seems elliptical. It is argued that we have therefore no right to hold that the man is directly acquainted with an object which is in fact elliptical. This is a weak argument. If the theory were that the man first becomes aware of a *sensum*, then judges that it is elliptical, and then infers from this premise and the laws of perspective that he is looking at a round physical object, the argument would of course be fatal to the theory. But this is quite obviously not what happens. The best analogy that we can have to the relation between our sensing of *sensa* and our perception of physical objects is to be found in the case of reading a book in a familiar language. What interests us is the meaning of the printed words, not the peculiarities of the print. We do not explicitly notice the latter unless there is something markedly wrong with it, such as a letter upside down. Nevertheless if there were no print we should cognise no meaning, and if the print were different in certain specific ways we should cognise a different meaning. We can attend to the print itself, if we choose, as we do in proof-reading. In the same way we are not generally interested in *sensa*, as such, but in what we think they tell us about physical objects. We therefore pass automatically from the *sensum* and its properties to judgments about the physical object and its properties. If, however, the *sensum* is queer, as when we see double, we notice its peculiarities as we notice an inverted letter. And again we seem to be able to detect the properties of *sensa* and contrast them with those which we ascribe to the physical object even in normal cases if we specially try to do so.

Having got rid of this preliminary objection, a question at once arises as to the status of *sensa* and their relation to physical objects. Although *sensa* are not sensations and

therefore are not necessarily states of mind, it does not follow that they may not be states of mind. Philosophers like Stout, who have admitted the distinction between sensations and *sensa*, have yet held that *sensa* are states of mind. It is true that they will not be acts like sensation, perception, judgment, etc.¹ But Stout, at any rate, holds that there are states of mind which are not acts. I understand that what he means by a presentation is an entity which is mental but is not an act. An act is apparently a state of mind which is directed on an object; an act may happen to be an object of another act, *e.g.*, of introspection, but it need not be so. A presentation is mental and *may be* an object, but it does not itself *have* an object. Whether presentations *must be* objects I am not quite sure, but I do not think that this is supposed to be necessary. If anything is a presentation, in this sense, bodily feelings, like headache and stomach-ache, are the most plausible candidates. Now I understand Stout's view to be that *sensa* are presentations and that they are of the same general nature as headaches and stomach-aches. Stout does not seem to me to state very clearly why he believes this, but I think it is possible to produce three more or less plausible arguments which have probably influenced him.

(i) If we take publicity as a mark of the physical and privacy as a mark of the mental, *sensa* seem to fall on the mental side. It is at least very doubtful whether two people who say that they are looking at the same physical object are ever aware of precisely similar *sensa*, and still less of the same *sensum* at the same time. This seems to suggest that *sensa* are mental, at any rate in the sense of being mind-dependent. If we look more closely, however, this conclusion does not seem to be necessary. The facts are much better explained by supposing that *sensa* are partly dependent on the positions and internal structure of the percipient's body. Since no two people's bodies can be in precisely the same place at precisely the same time it is not surprising that two men's *sensa* should differ. And since the internal state of two human bodies is never precisely the same it is still less surprising. This explanation not only accounts as well for the facts as the view that *sensa* are mind-dependent; it accounts a good deal better for some of the most striking of the facts.

¹ I understand that Stout no longer holds the views that I here ascribe to him. I have not altered the form of my statement, because the view which I am here discussing is that of his last published book, the third edition of the *Manual of Psychology*. Later developments have as yet only been revealed to a small circle of the elect at Edinburgh.

The orderly variations in the shapes of *sensa* as we move about are explicable if we suppose *sensa* to be partly conditioned by the positions of our bodies. The assumption that they depend on our minds provides no explanation whatever of such facts.

There is however a better form of the argument, which seems to me to have been somewhat overlooked by people like myself who take the opposite view to Stout. It does seem to me to be true that in certain cases our past experience and our present expectations actually affect the properties of our *sensa*, and not merely the judgments about physical objects that we base upon them. I will give two examples. (a) When I look at the staircase figure in James's *Psychology* it seems to me that it actually looks different from time to time, and that I can notice it changing with a 'click' from a staircase to an overhanging cornice. And it seems to me to change as I concentrate my thoughts on the idea of a cornice or the idea of a staircase. On the present analysis of appearance it is clear that the actual *sensum* must change, and not merely my judgment about physical objects; on the contrary, it is the change in my thought about physical objects which changes the *sensum*. (b) When I turn my head in a room the visual *sensa* of which I continue to be aware are not affected with sensible movement. If I put my glasses a little out of focus and turn my head the *sensa* do move. Whether they move or not seems to depend on my previous experiences and present expectations. The whole psychology of vision is full of similar cases. Such examples might seem to suggest that *sensa* are, at any rate in part, mind-dependent. I think that this might be met by taking a less simple-minded view of the dependence of *sensa* on the percipient's body. The facts just adduced do suggest that the present *sensum* depends in part not only on the present state of the body but also on past states of it. Or, to put it in a more usual way, we must say that among the bodily conditions of *sensa* are the present traces left by past experiences. These traces, so far as I can see, may be wholly bodily. I therefore regard the first argument as failing to prove that *sensa* are mind-dependent, but as strongly suggesting that they are to a great extent body-dependent.

(ii) The second plausible argument which might be brought to prove that *sensa* are presentations in Stout's sense is the following. If we consider our various sensations we seem able to arrange them in an order, starting with sensations of sight, passing through taste and smell, and ending up with bodily sensations like headache. Now as regards

the top members of the series the distinction between sensation and sensum seems perfectly clear. A sensation of red seems clearly not to mean a state of mind which is red, but a state of mind which has a red object. And it does not seem particularly plausible to regard a red patch as mental, or to hold that when we are aware of a red patch we are really introspecting. If we now pass to the bottom members of the series the opposite seems true. It is by no means obvious that a sensation of headache means a state of mind with a headachy object; it seems on the whole more plausible to say that it is just a headachy state of mind. The distinction between act and object seems to have vanished, and, since there is clearly *something* mental in feeling headache, just as there is in sensing red, it seems plausible to hold that the whole thing is mental. Now this fact about the top and bottom members of the series would not greatly matter, were it not that the two types of sensation seem to melt into each other insensibly towards the middle. It is about equally plausible to speak of a sensation whose object is sweet or to treat the whole thing as an unanalysable feeling with the quality of sweetness. Common language recognises this distinction; it talks equally of a sensation of headache and of a feeling of headache or a headachy feeling; but we only speak of a sensation of red, and never of a feeling of red or a red feeling. We talk of a sensation of smell, Scotsmen generally talk of 'feeling' a smell. Now of course the fact that all these experiences are classed together as sensations and that they melt into each other in the middle of the series encourages people to try to treat them all exactly alike. If you do this you must either hold that it is a mistake to suppose that a sensation of red *can* be analysed into an act of sensing and a red sensum, or you must hold that it is a mistake to suppose that a sensation of headache *cannot* be analysed into an act of sensing and a headachy sensum. Stout takes the former alternative, Laird and Alexander take the latter. If you take the former, sensation and sensum fall together, even in the case of sight; and, since the experience as a whole is certainly mental, you have to say that a sensation of red = a red sensum = a feeling which is red.

Now it is clear that, if you insist on treating all experiences, which are called *sensations*, alike you might equally well argue in the opposite direction, as Laird and Alexander do. You might say: A sensation of red means an act of sensing a red sensum, and similarly a sensation of headache means an act of sensing a headachy sensum. There are two remarks to be made about this. (i) I do not find either Stout's course

or the Laird-Alexander course very plausible, but if I were compelled to take one or the other I should prefer the latter. It seems to me much more certain that in a sensation of red I can distinguish an act of sensing and a red object than that a sensation of headache cannot be analysed into an act of sensing and a headachy sensum. (ii) Even if the Laird-Alexander analysis of bodily feelings could be substantiated I think that Stout would have another fairly plausible argument up his sleeve. It does not follow, as these philosophers seem to suppose, that to prove that a sensation of headache is an act of sensing a headachy sensum is equivalent to proving that a headachy sensum is non-mental. We still have the original question whether *sensa* are mental or not on our hands. And a supporter of Stout's view might quite reasonably argue as follows: 'Even if headachy *sensa* must be distinguished from the act of sensing them it is surely clear that they cannot exist when they are not sensed. An unfelt headache seems an absurdity. If this be true of headachy *sensa* is it not probably true of red and of all other kinds of *sensa*? But, if so, *sensa* are mental, at any rate in the sense that they only exist when someone has a sensation of which they are the object.' I think this would be a plausible argument, but I do not think it is a sound one. (a) As a matter of plain fact I do not find any difficulty at all in conceiving the existence of unsensed red patches, whilst I do find considerable difficulty in conceiving the existence of unfelt headaches. This suggests that there must be some important difference between the two kinds of *sensa*. (b) Moreover I think we can see what the difference is. Our main interest in bodily feelings is that they are pleasant or painful; sensations of sight are as a rule hedonically neutral. Now I am quite prepared to believe that an object has to be cognised in order to be pleasant or painful to us. It might therefore be quite true that an unfelt headache would not be a pain, and, since we are mainly interested in it as a pain, we are liable to think that an unfelt headache would be nothing. This is of course a fallacy, all that we have a right to say is that an unfelt headache would not be painful not that it could not exist.

I think, however, that there is no need to insist on the Laird-Alexander view of bodily feelings in order to deal with the present argument. It seems to me that the simplest and least doubtful way of dealing with the whole matter is the following. The word *sensation*, as commonly used, is defined not by introspection but by causation. We call any state of mind which is the immediate response to a nervous

stimulus a sensation. Now, since sensations are not defined psychologically but causally, it is surely very likely that they may include two different classes of experience, one of which can be analysed into act and object and the other of which cannot. These might be called respectively genuine sensations and bodily feelings. The mere fact that both are *called* sensations is a very poor reason for holding that the same analysis must apply to both of them. It is true that there are marginal cases where it is difficult to say into which class an experience should be put, but this ought not to make us slur over the plain introspective difference between the top and the bottom members of the series. The top members do seem to be acts with *sensa* as objects, and there seems no intrinsic reason for thinking that those *sensa* are either of the nature of feelings or are such that they can only exist when sensed. And no analogies drawn from the bottom members of the series form any logical argument against this view.

(iii) The third argument for regarding *sensa* as mental is their resemblance to images, which are supposed to be indubitably mental. The analogy may be admitted, though there is some intrinsic difference which it is hard to describe. But it seems to me very doubtful whether images are mental in any important sense. It is quite true that most if not all images depend in part on our past experiences and that many depend in part on our volitions. Both these facts, however, seem compatible with the view that images depend on our bodies, and do not necessitate the view that they depend on our minds. Involuntary images may depend on processes that go on inside our bodies without our volition. Voluntary images no doubt depend on our minds in the sense that they would not exist there and then if we did not will that they should; but the same may be said of a chemical reaction in a test-tube:—it would not happen if we had not deliberately put the reagent there and held the tube over a flame. No one considers that this renders the chemical reaction in any important sense mental. In the same way it seems to me likely that when we voluntarily call up an image we simply voluntarily throw some part of our body into a certain state, and this bodily change is a necessary condition of the existence of the image.

I conclude that the arguments to prove that *sensa* are mental, in the sense of being presentations, or in the sense of only existing when the mind is aware of them, are inconclusive though plausible. It does seem necessary to hold that they are in some sense partially conditioned by the

percipient's body, including in this the traces left by past experiences, but it does not seem necessary to bring in the percipient's mind.

We can now pass to the question of how *sensa* are related to physical objects. This is a long and difficult story and it will be better to treat it in the following way. Let us at once raise the question: On the present analysis of what is meant by sensible appearance what right have we to believe in physical objects, and what can we know about them? We must remember at the outset that the irreducible minimum that an entity must fulfil to count as a physical object is that it shall be common to a number of observers, that it shall be capable of presenting different appearances without necessarily undergoing any change of quality, and that it shall not be too unlike its appearances in quality. As we move about and continue, as we put it, to look at the same thing, we are aware of a series of *sensa* very similar to each other in shape, size, colour, etc. There are slight variations which can be noticed if we inspect carefully enough, and these variations are as a rule reversed if we retrace our steps. We need some explanation of this combination of a predominant agreement with slight and regular variations. The most plausible explanation is that the series depends in some way on two sets of conditions. One of these is relatively permanent, and accounts for the predominant agreement; the other is variable and accounts for the minor variations. If we feel an object, such as a penny, and meanwhile look at it from various points of view, the series of predominantly similar but slightly variable visual *sensa* is accompanied by an invariable tactual *sensum*. The shape of the tactual *sensum* is very much but not exactly like those of most of the visual *sensa*. It is exactly like that of the visual *sensa* which are sensed from a certain series of positions. As regards other qualities there is complete difference. The visual *sensa* have colour and no temperature or hardness; the tactual *sensum* has hardness and coldness but no colour. These facts again fit in well with the notion of two sets of conditions, one permanent the other variable. We have to explain the predominant agreement as to shape between sight and touch combined with the minor differences. It seems reasonable to assume a common set of conditions for sight *sensa* and touch *sensa*, combined with a different set in the two cases. Lastly when we compare notes with other people who, as we say, are looking at the same object, we find that they too are aware of a series of *sensa* predominantly similar to, but slightly different from, ours. It is therefore reasonable to suppose that there is a

set of conditions common to their *sensa* and ours which accounts for the predominant agreement of the two. In addition there are variable conditions, one set of which has specially to do with me and another specially to do with the other man. These account for the minor differences. It seems to me therefore that we have good ground for supposing that there are physical objects, in the sense of conditions which are common to us and to others and are relatively permanent, and that these, in combination with other conditions which are variable as between different people at the same time and the same person at different times, in some way condition our *sensa*.

These common and relatively permanent conditions might, however, be so utterly different from our *sensa* in their properties that it would be unreasonable to call them physical objects. The question therefore arises: Can we determine anything further about their qualities either with certainty or with high probability? I do not think that we can determine anything further with complete certainty, but I do think that we can determine something further with very great probability. It is perfectly true that a set of conditions, and especially a set which is only one factor in a complete condition, must not be assumed to resemble in qualities that of which it is a partial condition. But, on the other hand, it is equally unreasonable to suppose that the two *cannot* resemble each other. It is therefore perfectly legitimate to postulate hypothetically any amount of resemblance that we like. If now we find that by postulating certain qualities in the common conditions we can account for the most striking facts among our *sensa*, and that without making this assumption we cannot do so, the hypothesis in question may eventually reach a very high degree of probability. A group of visual *sensa* which we ascribe to a single physical object are related projectively to each other and to the tactual *sensum* which we ascribe to the same object. If we regard their permanent conditions as having something analogous to the shape of *sensa* we can explain the shapes of the various *sensa* as various projections of the shape of their common permanent condition. If we refuse to attribute anything corresponding to shape to the permanent condition we cannot explain the relations between the shapes of the various *sensa* of the group. This does not of course absolutely prove that physical objects have shape, but it does suggest that it is a very plausible hypothesis. It is a permissible one, since there is no reason why the common conditions of our *sensa* should not have shape; and it is a reasonable one since with

it we can and without it we cannot account for the shapes of our *sensa*. This appears to me to be the sense in which it is reasonable to ascribe primary qualities to physical objects.

What about secondary qualities, such as colour and temperature? We know that Locke, Descartes, and the scientists, hold that we have no right to ascribe them to physical objects, whilst Berkeley and many other philosophers have held that primaries and secondaries must stand or fall together. What is the truth of the matter? The first thing is to try to state the scientific doctrine in a clear and intelligible form. Unquestionably colours and temperatures belong to *our sensa* just as much as shapes and sizes. The assertion of the *physical* reality of primaries and the denial of the *physical* reality of secondaries comes to this. Shapes and sizes belong to physical objects in the same literal way in which they belong to *sensa*, and from the shapes and sizes of our *sensa* we can infer with reasonable probability the shapes and sizes of physical objects. Colours, temperatures, etc., belong literally to *sensa*; they only belong to physical objects in a derivative and Pickwickian sense. There must be something in physical objects that conditions the colours, temperatures, etc., of our *sensa*, but we have no reason to believe that it is colour or temperature. We have seen that there is reasonably good ground for the positive part of this doctrine; is there equally good ground for the negative part? I think that the negative part expresses an important fact but needs to be stated in a much more guarded way. (i) It seems to me certain that if physical objects literally possess shapes and sizes they must possess some other qualities related to shape and size in the same sort of way in which colour and temperature are related to the shapes and sizes of *sensa*. *I.e.*, shape and size imply something that can be spread out and cover an area or fill a volume. (ii) There is no obvious reason why these other qualities, which *must* be present, should not be colours and temperatures. On the other hand of course they *need* not be so; so long as they can cover areas and fill volumes they may be qualities that never belong to *sensa*. (iii) Whilst we found that it did help us to explain the various shapes of our *sensa* if we supposed that their common conditions have shape, it does not apparently help us at all to explain the colours and temperatures of *sensa* if we assume that their common conditions have colour and temperature. This does not prove that they do not have colour and temperature, it only shows that it is not a verifiable hypothesis and that we cannot assert it with any strong probability.

The view that I have just been stating I will call the *Critical Scientific View*. It is simply an attempt to state clearly, in terms of the particular analysis of sensible appearance which we are at present assuming, the view about the external world which is apparently held by scientists. I think it is a self-consistent theory, when stated in these terms, but I certainly do not think that it is an ultimately satisfactory one. It forces on us at once the question which I have used it to lead up to: What is the status of *sensa* in nature and how are they related to physical objects? The theory regards physical objects as conditions of our *sensa*. That physical object which is our body, in conjunction with other physical objects, in some way conditions the *sensa* of which we become aware; and these *sensa* in turn give us highly probable knowledge about the shapes, sizes and motions of physical objects, but no certain knowledge about their other properties. Now what exactly is meant by this phrase 'conditions' which I have so far purposely accepted without cavil? In the first place, what is it that processes in physical objects and in our own bodies condition? Do they produce the *sensa*? Or do they cause us to become aware of *sensa* that already exist? Or do they both produce the *sensa* and make us aware of them? These questions the *Critical Scientific View* leaves quite vague. Let us call these three alternatives respectively the *Creative Theory*, the *Selective Theory*, and the *Mixed Theory*.

The chief merit of the *Creative Theory* is that it reduces the number of *sensa*. We find it difficult to believe that all the *sensa* that anybody with any sort of body could sense from any place are actual existents which would have to be mentioned in any complete inventory of the universe. This may of course be the merest prejudice. If we take the *Creative Theory* to assert that *sensa* are produced by the interaction of living bodies with other physical objects, and that they last only so long as these processes go on, we avoid this embarrassment. And if in addition we suppose, as the *Mixed Theory* does, that the same processes cause the mind attached to the living body to sense the *sensa* thus produced, we reduce *sensa* to quite manageable numbers. We must remember however both that our objection to the existence of enormous numbers of *sensa* may be only an æsthetic prejudice, and that some form of the *Selective Theory* may be able to reduce the number to manageable limits, or in some other way to obviate this objection. The great objection to the *Creative Theory* as commonly held is that it assumes something like creation out of nothing as a result of physical

processes. We are liable to slur this over when we talk of our body in conjunction with foreign bodies *causing* *sensa*. By using the familiar word 'cause' we think we are dealing with the familiar case of a change in one existing substance being regularly followed by a change in the same or another existing substance. But this is not so. A physical process on this theory produces a *sensum* out of nothing, and a *sensum*—for however short a time it may last—is not a change in another substance but is of the nature of a substance itself. We have, so far as I know, no experience of this sort of causation and we ought to be very cautious in asserting it.

We may therefore turn to the Selective Theory. On this view the various physical and physiological processes that condition sensation do not *produce* *sensa*. The *sensa* in some way already exist. What these processes do is to determine which out of the whole set of existing *sensa* we shall become aware of. The pressing difficulty of the Selective Theory is to give a satisfactory account of the relation between the world of *sensa*, out of which certain physical and physiological processes present a selection to our minds, and the world of physical objects. What we should like to do would be to say that *sensa* are in some way parts of physical objects. Now the term 'part' is highly ambiguous, and again the notion of physical object is by no means definite. There is therefore a very wide range of meanings which we can give to the statement that *x* is a part of *y*, and again there is a very wide range of meanings that we can give to the statement that *y* is a physical object. Our best hope then is that we may find a meaning of 'part' and a meaning of 'physical object' in which it will be true to say that *sensa* are parts of certain entities and in which it will not be too wildly Pickwickian to call those entities physical objects. When I look at a penny from the side I am aware of a brown elliptical patch. Inside this there is a figure of Britannia. The figure of Britannia is a part of the brown elliptical patch in the most obvious and literal sense of part. Now a penny is commonly supposed to be an object which is round and brown in the same literal sense in which the *sensum* is elliptical and brown. It seems quite certain that the elliptical *sensum* is not a part of this supposed round object in the literal sense in which the figure of Britannia is a part of the elliptical *sensum*. If therefore there is a physical penny, and the various *sensa* are parts of it, it seems certain either that the *sensa* are not parts of the penny in the literal sense in which Britannia is part of the *sensum*, or that the penny is not

round and brown in the literal sense in which the sensum is brown and elliptical. Most probably we shall need to modify both the meaning of 'part' and the conception of the penny. Now I think it is best to modify as little as possible to start with, and only take 'parts' and 'pennies' in more and more Pickwickian senses as we are forced to do so by further reflexion on the facts. I shall therefore begin by working out in my own way a suggestion which is put forward rather incidentally in Alexander's *Gifford Lectures*. This suggestion entails the minimum of modification, and although I do not think it can be made to cover all the facts, I do think that it contains an important truth. In one sense of part a section of a solid by a plane may be called a part of it. In this sense a certain pillar contains an infinite number of parts of various shapes, all the shapes being conic sections of some kind and of various degrees of eccentricity. Now, taking the most common-sense view possible of a penny, it is not a momentary object; it persists through time. The penny is really to be identified not with a round brown thing at any one moment but with the history of a round brown thing through a long stretch of time. We cannot neglect the time dimension of the penny. Suppose now for the sake of simplicity that the penny keeps in the same place for ten minutes. This part of its history will be represented by a circular four-dimensional cylinder. Any section of this normally to the time-axis will consist of a set of contemporary event-particles arranged in a circle. But suppose we take a section of it which is not normal to the time-axis. This will consist of a set of non-contemporary event-particles; the more inclined to the time-axis the section is the greater will be the time-lapse between the earliest and the latest event-particles in it. If pennies do persist through time there must be non-simultaneous sections of their history and these sections will be parts of their history in the same general sense in which a section of a momentary pillar is a part of the momentary pillar. Let us call such sections *Historical Sections*, and let us call sections consisting entirely of simultaneous event-particles *Momentary Sections*. Now our notion of shape is defined in terms of Momentary Sections; we have not as a rule considered the case of historical sections. We cannot therefore say off-hand what an historical section of an object, all of whose momentary sections are circular, would look like if we could see it. It is obvious however that a momentary section is a limit of a series of historical sections as the time-lapse between the earliest and latest event-particle in the section becomes smaller and smaller.

It is therefore not unreasonable to suppose that, if we could see an historical section at all, it would look something like a momentary section, and that it would look more and more like a momentary section the smaller was the time-lapse between its earliest and latest event-particle. It seems then not unreasonable to suppose that if we could see an historical section of such an object it would look elliptical, and that the ellipse would be more and more eccentric the more historical the section was. On the other hand we might fairly suppose that the ellipse would be in some way queer, that it would not look exactly like a momentary section of an elliptical object. So much we may fairly say, considering the whole matter from the point of view of the object. Let us now consider the matter from the point of view of visual sensa. We see things by light that travels from them to us, and light travels with a very great but finite velocity. If I look at a penny from the side and take a perfectly common-sense view of what a penny is, it is certain that the light that reaches me from the nearest point must have started later than that which reaches me from the furthest point and gets to my eye at the same time. It is clear then that the light that reaches my eye at a given moment from the boundary of the penny belongs to event-particles of different dates. If we suppose that what I am immediately aware of by sight at any moment is those event-particles from which the light that reaches me at that moment started, it is certain that I shall be aware of an historical section of the penny and not of a momentary section. The section will of course be very nearly momentary, because of the great velocity of light and the small size of the penny. We have argued that, whilst we cannot say off-hand what such a section would look like, it is not unreasonable to suppose that it would look like an ellipse with something queer about it. Now the sensum of which I become aware when I look at a penny from the side is an ellipse with something queer about it. I could make an elliptical ring of the same shape as the sensum; but it would only look like the sensum in shape if I held it normally to my line of sight. If I laid it down flat like the penny it would not present the appearance that the penny does. Conversely the elliptical sensum is lying down flat and not standing up normally to my line of sight. No ellipse whose parts are contemporary could agree with the sensum both in shape and in situation relative to me. It therefore seems extremely plausible to hold that our visual sensa are in general historical sections of physical objects and that these sections are cut for us by the situation of our bodies with

respect to the object that we are looking at and by the finite velocity of light. Such a theory has manifestly great advantages. The various *sensa* always exist and are parts of the physical object in a perfectly intelligible sense. On the other hand they only exist in the way in which the various possible sections of a block of stone exist in it and we do not feel any embarrassment in supposing this kind of existence for *sensa*.

Doubtless some features that are stressed by this theory are necessary to explain the facts about the physical world and our *sensa*. At least it is evident that we must allow for the fact that physical objects are extended in time as well as in space. But it is quite certain that the theory takes far too simple-minded a view of physical objects. It takes for granted that all the *sensa* which we get in connexion with a penny are in one place, which is the place of the physical penny. And it hardly recognises the difficulties involved in saying that the penny is round. Presumably the latter statement must mean that all momentary sections of the history of the penny are round in the sense in which a *sensum* is round. The evidence for this must be that the penny looks round if you look straight down on it and that it always feels round. Now the roundness of the tactual *sensa* needs some explanation on the section theory. Presumably what is meant is that if we run our fingers round the edge there are no sharper and blunter features in our *sensa* as there would be in the case of an acute ellipse. Now when we run our fingers round a circular plane we are feeling a set of event-particles which lie on a helix in space time. If we proceed with an absolutely uniform velocity this helix will be everywhere alike, but the slightest variation in our velocity will involve a variation in the pitch of the helix. If *temporal* differences be interpreted as variations from uniform *spatial* curvature in the case of sight, it is curious that this does not happen in the case of touch. I do not think that it does happen. When I move my finger with a non-uniform velocity round the edge of a penny it does not cease to feel uniformly round. Of course we are here dealing with velocities of utterly different orders of magnitude, *viz.*, that of light and that of my finger, and we are dealing with two senses of very different acuteness. We shall have to suppose that extremely minute time-differences are registered by sight as quite marked variations of spatial curvature, whilst quite marked differences in the velocity of the finger are not registered by touch as variations in spatial curvature. All this shows that the theory thrown out by Alexander and

further elaborated here by me needs a good deal of further complication even as regards shape. It is still more clear that the theory is unduly simple-minded when we begin to consider the places of *sensa* as well as their shapes.

We do not only find that the shapes of *sensa* connected with a given physical object are different from the shape that we ascribe to the object. We also find that *sensa* are liable to turn up in places which are remote from the place where the object is commonly said to be. This is always liable to happen if we look at anything through a non-homogeneous medium, or if a mirror be introduced, or even if we squint. Very often the visual *sensa* are doubled and the two are seen in markedly different places. Now any satisfactory theory will have to take account of these partly abnormal *sensa* and explain how they are related to physical objects. Let us consider the case of mirror-images. These are seen as far behind the mirror as the *sensa* seen by direct vision are in front of it. Nothing similar can be felt in the places where mirror-images are seen, and they are apparently quite independent of any physical object that may exist there. It is thus practically impossible to combine the view that all visual appearances are historical sections of the objects of which they are said to be appearances with any simple-minded view of physical objects and their places. Mirror-images are not sections of the object of which they are images, for they are in the wrong place. They are not sections of objects on their own side of the mirror, for they seem to be absolutely independent of anything that may exist there. The embarrassment that we feel about such *sensa* is that they belong to certain physical objects from one point of view and not from another. They are like a certain group of *sensa* in a different place and they vary with these, but they are spatially discontinuous with them. We have two different criteria for assigning a given appearance to a given physical object. One is certain relations of resemblance and concomitant variation between this *sensum* and a certain group of other *sensa*. The other criterion is the compresence of this *sensum* with a group of others which are all in the same place. Generally these two criteria point in the same direction, but in the case of mirror-images they point in different directions and we feel puzzled.

It is pretty evident that the whole notion of 'place,' which has previously been taken for granted, needs to be carefully considered, and the subject of 'date' will also have to be overhauled. This is unfortunately a horribly difficult subject, as anyone who reads the chapters on Spatial Perception in a

good psychology book will see. It has, I think, been very much neglected by realistic writers. Prof. Whitehead has the great merit of seeing its importance, but I find his actual statements on the subject extremely difficult to understand. It is probably necessary to begin by distinguishing between various senses of being in a place. No doubt our *criterion* for saying that such and such a physical object is in such and such a physical place is that certain sensa are in such and such a sensible place. It does not follow from this that what we mean by physical place is the same as what we mean by sensible place, or that what we mean by saying that a physical object is in a certain physical place is the same as what we mean by saying that a sensum is in a certain sensible place. I cannot profess to have any satisfactory theory on the subject, and must content myself with throwing out a few disjointed remarks. Let us begin with visual sensa.

It seems to me that when I open my eyes here and now I see various coloured patches at various distances and in various directions. It appears to me to be as clear that I see this characteristic of distance as that I see the colour or the shape. I am quite prepared to believe that unless I had had experiences of movement and touch in the past my visual sensa would not now be at various distances and in various sensible places. This does not prove that there is no such thing as visual position and distance here and now, but simply that the particular visual positions and distances of particular present sensa are not wholly determined by the present physical stimulus to my optic nerve. Now let us consider tactual sensa. To get a certain tactual sensation I have to move about in various ways and thus experience a series of muscular sensations. If visual distance and direction were not a primitive factor in my experience I do not think that these muscular sensations would ever have been interpreted in terms of distance and direction. As it is, it seems to me that sight supplies the *general framework* of the notion of distance and position, whilst muscular sensations fill in most of the *quantitative detail*. Now when I am aware of a visual sensum there is a certain position of my head in which I see the sensum most clearly. If I now 'follow my nose,' as we say, I experience a series of very similar visual sensa all the time, and eventually as a rule become aware of a tactual sensum of correlated shape. The place of the physical object is essentially defined by the place where this tactual sensum is, just as the shape of the physical object is essentially identified with the shape of this tactual sensum.

Now, as a rule, when other people are aware of a visual sensum substantially similar to mine and when they turn their heads so as to get maximum clearness of vision and follow their noses, their course intersects mine and we come in contact with each other and with the tactual sensum together. Thus the place of the physical object becomes the common intersection of your course and my course when we follow our noses and both try to get the tactual experience with the minimum of muscular movement. Now take the case of the mirror. Suppose you see an object by direct vision and I see its mirror-image. If we both follow our noses we do not come in contact with each other and with a correlated tactual sensum at the same time. I get no correlated tactual sensum at all, I just walk into the mirror. Your course may intersect mine, but you get your tactual sensation long before it does so. To sum up, I think that it is only in the case of visual sensa that distance and direction are actual sensible qualities like shape and colour; tactual sensa as such do not have sensible distance. Their places are the interactions of those lines of motion that have to be traversed before the tactual experience is obtained. Owing to correlations between these series of kinæsthetic sensations and changes in visual size and distance, the former are interpreted as distances. This is quite compatible with the fact that visual distance, as an actual sensible quality, does not become developed in any detail apart from experiences of movement. Sight makes us acquainted with the attribute of distance in a very vague and undifferentiated form, touch not at all. On the other hand the detailed differentiations of distance into definite distances and of direction into definite directions is causally dependent to a great extent on experiences of touch and movement. Now it seems theoretically possible to take two different lines, starting from these facts. (i) You may distinguish visual space, tactual space, and other sensible spaces from physical Space. This seems to me to be the line that Mr. Russell takes. (ii) On the other hand you may hold that there is just one space, *viz.*, physical Space, which we learn about gradually by the intimate connexion of sight and touch. And you may hold that, although there is only one space and one sense of place, yet different sorts of objects may be in a place in different ways. A sensum and a physical object may both be in physical space but the meaning of saying that a sensum is in a certain place may be different from the meaning of saying that a physical object is in a certain place. This seems to me to be the line that Whitehead takes, if you

substitute space-time for space in my statements, as you undoubtedly ought to do. Russell's view seems to me to be a subtle form of the selective theory. A physical object just is all the *sensa* that anybody with any sort of body could apprehend from any position. Its appearance to a given person at a given moment is a certain member of this group of *sensa*. On the other hand a sensible space is a different selection of *sensa*, one from each of many groups that constitute physical objects. Each of the *sensa* is apparently held to be a particular substance which lasts for a short time. I find this theory extraordinarily difficult to grasp. It has only been worked out for the exceptionally favourable case of the visual appearances of objects seen by direct vision through a homogeneous medium. I do not understand how the effects of variations in the medium are to be stated on the theory, or how tactual *sensa* are to be worked in. Again the notion of *sensa* as substances each apparently springing out of nothing, lasting for a short time, and then ceasing to exist raises all sorts of difficulties. The theory seems to me to underrate the enormous importance of touch and movement in our notion of physical objects and their places. Lastly, I do not think that the term 'sensible spaces' is a happy one. If we are going to talk of visual and tactual spaces we ought presumably to talk also of visual and tactual bodies. We do not do this because the notion of body essentially means something neutral as between the various senses. In the same way it seems to me that there are no visual and tactual spaces; there just is physical space about which we learn through a combination of both these senses with sensations of movement.

Whitehead's theory might be called a subtle form of the Creative Theory. He does not use the word *sensum*, but talks of sense objects. Now an object for Whitehead is an universal, and a sense object is the lowest species of universal, *e.g.*, a particular shade of colour. The substantial side of the external world for Whitehead is space-time. What we call a *sensum* is a bit of space-time in which some sense-quality inheres. Now I said that the usual form of the Creative Theory suffers from the fact that it regards *sensa* as particulars that are in some sense created out of nothing by physical processes. Russell's theory, though predominantly of the Selective type, suffers from the same sort of defect. Whitehead's theory avoids this. To say that such and such a *sensum* begins to exist means for him simply that such and such a bit of space-time has such and such a sensible quality. Leaving out the time factor for simplicity, we can put it in

the form that such and such a volume of space acquires such and such a sensible quality, *e.g.*, a particular shade of redness, and afterwards perhaps loses it. The causation that he requires is not therefore the creation of a substance out of nothing but the familiar case of causing an already existing substance to acquire a fresh quality or to lose a former quality. Recognising only one sense of space and time he has to recognise different senses in which a quality inheres in a bit of space-time. When we say that the mirror-image is in a certain place behind the mirror we do not mean the same as when we say that a certain brick is also in this place. I understand his view to be that to say that a certain *sensum* is in a certain place is to assert a relation between this place, the sensible quality, the place where the observer is, and the places where certain other things such as mirrors and sources of light are. It is thus at least a four-term relation. It is of course very easy to think that a polyadic relation is only dyadic, especially when some of the terms, such as one's own position and the medium, are relatively constant and are taken for granted. If we were confined to quite normal visual *sensa* seen by direct vision through homogeneous media we might never find out this mistake, but we are forced to recognise the real complexity of the situation when we deal with unusual cases like mirror-images. When we say that a physical object is in a certain place I understand his view to be that we are asserting a two-term relation between a universal which is not a sensible quality and the place. Now very similar sensible qualities are in very much the same places with respect to many observers and many media. Such *sensa* are the normal visual appearances of some physical object, and the place where this object is is the place where these sensible qualities are. At any rate there is a rough approximation between the two, though when we take time as well as space into account there may be a considerable gap, as in the case of seeing a distant star. I suppose we should have to admit that on such a theory one and the same sensible quality might be in several different places at once with respect to the same observer and the same source. This, be it noted, is not the same as saying that the same *sensum* is in two places at once. I have taken a *sensum* all along to be a particular, *e.g.*, an elliptical brown patch. What can be in several places at once is simply that definite shade of brownness. Each bit of space in which it inheres becomes thereby a different brown *sensum*. This possibility seems to me to involve no difficulty, when thus explained, and to have some positive merits. It appears to fit very well the case

where I see a lot of mirror-images of the same object in different mirrors. Lastly we must note that Whitehead distinguishes between scientific objects, like atoms and electrons, and perceptual objects, like chairs and tables. In all cases, as I understand him, an object is an universal, and the substance that it inheres in is some bit of space-time. Scientific objects are, however, in all parts of space-time, whilst perceptual objects are in certain definite parts of it. But scientific objects are more especially present in certain places and times than anywhere else, and these special places and times are defined by the places and times in which certain perceptual objects inhere. What he is thinking of when he says that an electron is a quality that inheres throughout space-time is simply that it makes a difference everywhere and always. What he means when he says that it is more specially in one bit of space-time than anywhere else is that this influence reaches a maximum within a certain bit of S-T, and this contains some perceptual object such as a chair or a table.

I think that some such theory as Whitehead's forms a very promising basis for further advance. It will need a much more thorough discussion of the meanings of place, date, and inherence. And it will be necessary to modify our notions of causation very considerably. The concept of things and of causation are closely bound up with each other, as the example about the electron shows. The common view is that it is in one place but influences what happens in all others, whilst Whitehead's view is that it is everywhere where it would commonly be said to exert influence. The lines of advance that these recent speculations suggest is (i) to be much more ready to recognise multiple relations than we have formerly been. Many apparently insoluble contradictions vanish when you admit that a relation that has usually been thought to be dyadic is really polyadic. (ii) To clear up the notions of place and date, and not confine ourselves to shape and sensible quality in our discussion, as we have been too liable to do. And (iii) to recognise the intimate linkage between thing and cause. The boundaries of things have mainly been fixed for us by touch in the past, at a time when the transmissive side of nature was little recognised. We have tried to keep this sense of the limits of physical objects and to eke it out by the notion of transmission of effects through a medium. The question is whether this whole way of regarding things ought not now to be modified.