VIII.—PHENOMENALISM.

By C. D. Broad.

I propose in the present paper to try and define what is meant by Phenomenalism and to state how it is related to Idealism. I shall consider the main motives and arguments that have led people to be Phenomenalists, and shall try to estimate their value. And in all this I shall have specially in view the general considerations which Mr. Russell puts forward in his recent lectures on our Knowledge of the External World. Mr. Russell's present position is not Phenomenalism, but that is the ideal which he sets before himself. I shall try and show that he is much less phenomenalistic than he thinks himself. I would say at once that much the most important point is the general question of the validity of the arguments for and against Phenomenalism; no one at present claims to have worked out in detail a phenomenalistic philosophy of science, so that even a perfectly valid criticism on some particular point in Mr. Russell's constructive theory would have hardly any bearing on the general validity of his philosophic method.

Before we can understand either what is meant by Phenomenalism or what kind of arguments can be suggested for and against it we must be perfectly clear as to the distinction between sensations, sense-data, and physical objects; for it is largely on the question whether and in what sense it is necessary to assume the existence of separate entities corresponding to each of these terms that Phenomenalism distinguishes itself from other views. We may in fact say at once that Phenomenalism is a philosophical theory which claims to be able in some sense to dispense with at least one of the three, viz., physical objects. This is as far as some phenomenalists, *e.g.*, Mr. Russell, are at present

prepared to go. But others believe that they can also dispense in some way with one of the remaining two. Thus Mach seems to wish to do without sense-data and to keep sensations, whilst the American realists wish to do without sensations and to keep sense-data. It must be understood that at present all that I am saying is very rough and inaccurate; I am overlooking the fact that Mach probably never even recognised the distinction between sensations and sense-data; and again I am leaving it quite vague in what precise sense Russell claims to do without physical objects and James to do without sensations. I believe that any careful thinker must recognise the three distinctions, and, in that sense, anyone who tries to get rid of any of them is merely confused, as Mach almost certainly is. But it is quite compatible with a clear recognition of these distinctions (such as is certainly possessed by Russell and I think by the American realists) to hold that one or more of the distinct terms corresponds, not to a new kind of entity, but to some complex or function of the others.

The best thing to do, therefore, is to consider for ourselves as accurately as possible in a limited space the nature of these distinctions and the motives for them. We can then consider in what sense Russell claims to dispense with physical objects, whether he is justified in holding this to be feasible, and whether any special philosophic advantages come from doing so.

Ordinary common sense unquestionably distinguishes between mental acts and their objects. But it wants to hold that the objects that we perceive with our senses are at any rate parts of physical objects. I use the word "parts" here in two senses. (1) In a geometrical sense. It is admitted that when I look at or feel a penny I only see or feel a part of it at a time. I do not, *e.g.*, see both sides at once, or, as a rule, feel the whole circumference. And of course we admit that other people who say that they perceive the same penny may be directly aware only of different parts from ourselves. But there is no special difficulty about this: if the part that you see and the part that I see fit together to form one closed

surface our united information will just tell us more about the whole physical object than either of us could have known separately. No difficulty arises unless our information is or seems to be inconsistent. (2) There is, however, a different sense in which we can say that we perceive parts of a physical object. When I look at a penny I see an object with a certain colour and shape, when I only feel it I am no longer aware of the colour but I do become aware of coldness and of some other qualities. Common sense admits that I may only be aware of some of the qualities of a physical object at a given moment; that it may have qualities of which I never become aware; and that other people may become aware of qualities of which I cannot become aware. But here again there is no difficulty of principle; my failure to become aware of a certain quality of a physical object does not prove that it is not there, and so is quite compatible with the fact that someone else can become aware of it. Once more his information and mine combined will tell me more about the whole physical object than my own by itself could, unless there be some positive incompatibility between his and mine.

Then again we suppose that the object continues to exist and to have much the same qualities even when we cease to perceive it. Of course the mere fact that we sometimes perceive it and that it then has such and such qualities is no proof that it exists or has these qualities at other times. But the common belief here does not rest on arguments, though that is not the same as to say that no arguments can be produced for and against it. Once we distinguish between objects and our awareness of them and find no difficulty in the view that they are common (in the modified sense mentioned above) to us and to others, we can at least believe that their existence and qualities do not depend on their being perceived by any particular person. This, though it would not prove that they are independent of being perceived by someone, certainly would add to the probability of this. So here again common sense has a perfectly good ground for keeping its belief unless some strong argument be brought against it.

We may say then that physical objects are defined as objects of the same general logical character as those of which we from time to time become directly aware, *i.e.*, they have qualities and parts and they can change and move. But we add to this that they exist and keep their qualities in the main unchanged when they are not objects of any mind. Common sense tends to hold (*a*) that there are such objects, and (*b*) that we quite often perceive their geometrical parts and some of their qualities. The fact that we perceive different parts and qualities at different times, and that we and others perceive different parts and qualities at the same time does not matter so long as our information is compatible; and the fact that we only certainly know that what we perceive exists so long as we perceive it is no proof that what we perceive is not parts of physical objects.

This is the belief that common sense would like to hold. If it could hold it there would be no need to introduce sense-data in any other meaning than as parts of physical objects in the sense already defined. But unfortunately it seems impossible to go on holding it. There seem to be positive incompatibilities between what two people see when they say that they see the same thing, and positive incompatibilities between what I see at various times when I say that I see the same thing and hold that it has not changed. When I look straight down on a penny I see a circular shape, when I look from the side I see an elliptical one. Common sense says that I see the same penny and that it has not changed, but it can no longer hold that the difference is that I perceive different geometrical parts of it. I may see both a complete ellipse and a complete circle, and these will not fit together as parts of one closed figure. If there were only myself to consider I could get over this difficulty. I could say that the movement of my body is causally connected with the shape of the penny, that it really was circular when I stood over it and that it really is elliptical when I stand at the side. But, if we are to accept the testimony of other people, this explanation will not do

Another man whom I judge to see the same penny may stand still while I move. What he sees remains unchanged, what I see changes. Clearly then we cannot both be directly aware of precisely the same object, and also we cannot both be aware of different parts of the same object in any sense in which we have yet used the term "part." What I see and what he sees are both closed curves, they are not just fragments which, when taken together, will make up a closed curve. The conclusion at which we arrive is (*a*) that something changes, (*b*) that this something is that of which I am directly aware, and (*c*) that it is not identical with the penny which I say that I see nor with a part of it in any sense of that word which has yet been used, *i.e.*, it is not a part which fits in geometrically with what I see at other times and what other people see at the same time to give that closed curve which common sense calls *the* shape of *the* penny. Lastly we distinguish changes in the penny from changes in these objects of which I am directly aware. We come to believe that these objects often change when the penny does not; and, although changes in such objects are our sole ground for believing in changes in physical objects, yet we come to believe that the physical penny may alter without there being any change in that particular immediate object which I regard as peculiarly connected with the physical penny. (This would happen, *e.g.*, if the penny shrank, but I approached it in proportion as it did so). These immediate objects by means of which I judge physical objects to exist, and believe myself to learn their qualities, relations, and changes, are called sense-data.

Two questions at once arise: (1) Is there any reason to suppose that sense-data are not themselves physical objects, and, if so, how do they differ from physical objects? (2) If sense-data be physical objects is there any need to assume any other physical objects, and, if they be not physical objects, is it necessary to assume any physical objects at all? There can be no doubt whatever of the existence of such things as sense-data: it is practically a mere matter of definition. In my example

about the penny I am directly aware of an object at each moment as I move about. And it is absolutely certain that these objects have shapes and different shapes. All the objects then that are directly perceived by anyone from anywhere under any conditions most certainly exist and have the qualities that we perceive them to have at least as long as we perceive them. But are all or any of these objects physical objects or parts of them? This is commonly denied. What seems certain is that at any rate they are neither identical with nor geometrical parts of those particular physical objects which common sense says that we come to know through them. When it is pointed out to us that the objects of which we are immediately aware when we say that we see the same penny differ and are not geometrical parts of any one closed figure, we do not regard them as parts of the physical penny, and we seem to have little temptation to assert that they exist unchanged when we cease to perceive them. Yet we do not cease as a rule to believe that something connected with all these objects continues to exist. This something we call *the* penny. Common sense does hold, I believe, that we are sometimes aware of a part of this physical object, viz., when we look straight down on it. But this seems very doubtful. It is doubtful whether we mean more than that the relation between this particular sense-datum and the physical object is that of identity in respect of shape, whilst it differs from identity for all the other visual sense-data.

Now I think it will be admitted that the view to which we have been forced is an odd one and that it needs some justification. We are immediately aware of a number of rather similar sense-data the shapes of which are related in a certain definite way to our various positions. (I use the last phrase without criticism at present, though of course it needs it.) We seem to have very little tendency to believe that these exist unperceived when once we clearly understand that they cannot be geometrical parts of any one object. Yet we do believe that they are all connected with some one thing which can exist

unperceived and probably never is perceived by anyone. We do not believe that these sense-data are geometrical parts of this object, in fact the geometrical qualities of all but one of them are not supposed to be identical with those either of this object as a whole or of any of its parts. Yet, on the ground of the existence of the many sense-data, we believe that the one object exists; and, on the ground of the qualities of the sense-data, we believe that the object has such and such qualities.

There would clearly be a very great advantage if we could somehow define a physical object in terms of sense-data; if we could regard it as a function or complex of actual sense-data. We can see what conditions it must fulfil. It must be neutral as between various observers; we must be able to talk of its remaining constant while many of the sense-data connected with it change, and *vice versâ*; we must be able to state causal laws in terms of such objects; and there must be a sense in which they persist when I cease to be aware of the sense-data connected with them. If such a function of actual sense-data can be found I think that all that is clear in our belief in persistent physical things would be preserved. The motive to such a construction is perfectly clear, and may be put as follows. The ordinary view about physical objects makes them logically very much the same kind of entities as sense-data. They are extended and have qualities and relations, just as a visible patch of red is extended, may be to the right of another patch, and is red. But we come to the conclusion that, whether sense-data themselves be in any sense physical objects or not, at any rate neither the physical objects in which science and even common sense are most interested nor the geometrical parts of them are ever the immediate objects of anyone's mind. Hence it seems difficult to give any satisfactory reason for believing in the existence of these objects or in ascribing to any particular one such and such qualities. Note carefully that the difficulty is not in the existence of such objects in general; their logical likeness to sense-data

which certainly do exist makes it perfectly easy to conceive of their existence and nature in general. The difficulty is to see how we can satisfactorily pass from the existence, qualities and relations of a certain group of sense-data of which we are aware to assert the existence, qualities, and relations of some determinate physical object of which we never can be directly aware. We all know roughly, of course, how we actually do pass from one to the other. It is described very fully and carefully in such books as Professor Stout's *Manual of Psychology*. But the interesting point for the philosopher, as distinct from the psychologist, is not *how* we come to regard a certain set of sense-data as the appearances of a certain physical object with such and such qualities, granted that there very well may be physical objects and that we certainly do have an innate tendency to believe that all sense-data are somehow connected with some physical object. The interesting point is whether we are *logically justified* in believing in the existence of such and such objects with such and such qualities on the basis of our general belief and the particular facts about certain groups of sense-data. If the phenomenalist can show us (*a*) that the causes which psychologists say produce such conclusions do not also provide good reasons for them, and (*b*) can offer a meaning of physical objects which shall in the main agree with all that is clear in our beliefs about them, and (*c*) show that we are logically justified in the believing in physical objects as defined by him, then he will be fully justified. I certainly do not think that it will be any conclusive objection to the phenomenalist if his definition of physical objects makes them of a different logical type from sense-data, *e.g.*, makes them classes whilst sense-data are particular individuals. Philosophy must certainly respect strong innate beliefs as much as possible, if there be no positive arguments against them; and it may be a part of our innate belief in physical objects that they are particular individuals like sense-data. But we know well enough that

our strongest beliefs are often very vague; *e.g.*, we all believe that in some sense $2+2=4$, but very few people could tell us precisely what they mean by 2 and 4 and +, and when they try to tell us they are almost invariably wrong. If the physical objects that the phenomenalist can offer us fulfil the conditions of being common and persistent and of being connected in an intelligible way with our sense-data and their qualities, so that our belief in such objects can be logically justified, I think we shall have little ground for complaint merely because these objects prove to be of a different logical type from that of which we had rather vaguely supposed them to be.

Let us then consider the following questions: What is the phenomenalist's objection to the ordinary physical theory; is his objection valid; and does his substitute avoid these and other objections? One argument of Mr. Russell's in favour of Phenomenalism appears to me to need considerable refinement before it can possibly be accepted. This is the argument from Ockham's Razor and from the analogy to the Principle of Abstraction in the philosophy of mathematics. Ockham's Razor is the principle that "*entia præter necessitatem non esse multiplicanda*," and Phenomenalism plumes itself on according much better with this principle than the ordinary view. I am not acquainted with the works of Ockham, and therefore I do not know in what sense he used this principle, but I can see that as it stands it is ambiguous, and it is not perfectly clear in which of its possible senses Mr. Russell uses it in favour of Phenomenalism. It might mean either (*a*) entities of a kind which is known to have instances are not to be multiplied, or (*b*) kinds of entities are not to be multiplied. The Principle of Abstraction obeys the second form. Instead of assuming a particular kind of quality common and peculiar to all equally numerous classes and making this the number of the classes, you define the number as a certain logical function of the classes, viz., the class of which they are all members. Now I do not think that it can

be objected to the ordinary view that it multiplies kinds of entities to any serious extent. A physical object, as we have seen, is commonly supposed to be something very like a sense-datum; it is certain that sense-data exist, and the only addition that the common view makes is to hold that whenever a set of sense-data fulfil certain conditions then there will also exist something, not indeed identical with any of these sense-data, but still closely resembling them and only differing in that (*a*) no one is ever directly aware of it, and (*b*) that, whilst it is uncertain but not impossible that sense-data exist unperceived, it is certain that this object, if it exists at all, exists unperceived. The mere fact that a successful Phenomenalism could dispense with an entity so like many entities which certainly do exist seems to me to be no strong argument in its favour. But Mr. Russell's own theory does not succeed even in accomplishing this modest amount of simplification. It assumes more entities than the common view, and those entities seem to be of precisely the same kind as physical objects on the ordinary theory. Let us consider these points.

The ordinary view, mainly from considerations of economy, believes that sense-data only exist in connexion with living minds and bodies. It does not assume sensibilia of which no one *is* aware, still less does it assume sensibilia of which no one *can be* aware: such entities as these it calls physical objects and is blamed by Mr. Russell for assuming. But Mr. Russell's own present theory assumes by admission sensibilia of which no one is aware, for there are supposed to be perspectives where there are no minds. If you and I (as we say) are "looking at the same penny," your group of sense-data containing an ellipse of a certain eccentricity constitutes one point in perspective space, and my group of sense-data containing another ellipse of slightly different eccentricity constitutes another point in perspective space. At present Mr. Russell's theory assumes that there are perspectives that come between yours and mine whether there happen to be minds there or not; *i.e.* that there

are groups of sense-data containing ellipses of intermediate eccentricity. But a very important point to notice is that not merely *is* no one at present aware of these sensibilia if there be no one between us now, but that no one ever *can become* aware of them. When (as we put it) anyone moves into one of these intermediate positions his brain and nervous system (once more in a Russellian sense) move into surrounding places in perspective space. So the sense-data of which he becomes aware are not those which were in this perspective, but are the different ones which are determined by this different medium. Mr. Russell may say that their shapes are not affected by this change of medium, but I am sure I cannot see how he knows this. Shapes of sense-data very often are altered by changes of medium. If he makes the ground for his belief the fact that this is the assumption on which physics can be built up and that physics is probably true, I agree that it is a good ground. But it is precisely the same ground on which non-phenomenalists would ultimately justify their belief that the real penny is circular, although no one can perceive the real penny.

I cannot help thinking then that Mr. Russell's present theory is much less near to Phenomenalism than he supposes, and that the difference in simplicity between it and the ordinary theory is not in his favour. Instead of a few imperceptible physical objects whose existence and qualities we must precariously infer from our sense-data, Mr. Russell offers us an immense number of imperceptible sensibilia whose existence and qualities we must equally infer from the sense-data of which we are aware, the latter being always determined to an unknown extent by our brains and nervous systems. I do not see that these sensibilia differ in any important logical respect from the physical objects which the common view is so blamed for introducing. All that one can say is that there are a great many more of them than of physical objects and of sense-data taken together on the ordinary theory.

These considerations do not merely show that Mr. Russell's present theory is not at all in a position to cut the throat of the

common view with either edge of Ockham's Razor. They also show that his present view, whatever its merits in other respects, is in no way supported by a very plausible general argument which he uses in favour of Phenomenalism. The argument is as follows. The laws of physics start from observations on our sense-data and must ultimately be verified by such observations. For a law is only directly verified by its predicting that something will happen under certain circumstances and our finding that it actually does happen under those circumstances. Now the only events and conditions of which we can be quite certain are those which we can directly observe, and these are our sense-data and the changes in them while they remain our sense-data. Laws are hypothetical propositions of the form: If an event of the kind p happens then an event of the kind q will always follow after a certain time t (which may be 0, as in laws of co-existence). Now the only way directly to verify such laws is to find events of the kind p very often followed by events of the kind q, and never to find the former not followed by the latter. Mr. Russell concludes that it must be possible in theory to state all that is verifiable in the laws of physics in terms of our own sense-data, or at most in terms of our own and of those in whose existence we believe on the testimony of others. It will follow that all entities and laws which physics talks about as intermediate between the sense-data with which we start and those which verify the law must be expressible in terms of sense-data. There may be practical difficulties in this, but they must be theoretically soluble.

This argument has always seemed to me a very plausible one. But, whether it be true or false, it provides no motive for believing in Mr. Russell's present theory, for that is as far from expressing all the laws of physics in terms of my own and my friends' sense-data as is the common view. The best we can say for it in this regard is that possibly the best way to meet the moon is sometimes to go round the sun. But it will be well worth while to treat this general argument on its own merits.

In ordinary life we constantly make a distinction, not merely between our states of mind and their objects, but we also sharply distinguish between three kinds of changes. There are (1) the supposed changes in supposed physical objects; (2) changes in the appearances of physical objects while they are under continuous observation, *i.e.*, changes in the sense-data of which we are aware and by means of which we believe ourselves to become aware of physical objects; and (3) those changes, partly bodily and partly mental, which we call adjusting our bodily organs and voluntarily looking for something, *i.e.*, turning the mind now on one object and now on another. If we accept the present argument we must, of course, express (1) somehow in terms of (2) and (3). But can we still distinguish (2) and (3)? Whether sense-data do or do not exist when we cease to be aware of them a law is only directly verified by those sense-data of which we are aware while we are aware of them. So all the sense-data of which the present argument will ultimately let us take account are objects of contemporary sensations. It follows that their temporal relations must be precisely the same as those of our sensations, if we say, what seems reasonable, that we have a different sensation whenever there is any difference in the sense-data before our minds. Hence the causal laws of physics, if they can be stated wholly in terms of sense-data of which we are actually aware, can equally well be stated in terms of our sensations. There will still be a difference between sensations and sense-data, and sense-data will have some qualities which sensations lack, but physics will never mention a sense-datum which is not also the object of a sensation, and so there will be nothing in Phenomenalism with which a reasonable and atheistic Berkeleian need quarrel. I am merely stating this as a fact, not using it as an argument against Phenomenalism; Mr. Russell admits that his ideal is solipsism, and I have now tried to show that, if it can be successfully reached, it will not differ essentially from Berkeleianism.

But the consideration of those changes which ordinary people call the adjustment of the body and the directing of the mind on some object has an important logical bearing on Phenomenalism. Why do we state our physical theories in terms of intermediaries like atoms and microbes, of which we either cannot be or are not generally directly aware, in spite of the fact that the only directly verifiable laws are hypothetical propositions in terms of sense-data of which we are directly aware? There are at least three motives.

(1) We certainly do begin with a belief in physical objects, *i.e.*, objects which in general resemble our sense-data, which may actually be identical with some of them, and whose existence and changes are independent of our observation.

(2) There is a methodological reason. If we stated our laws entirely in terms of sense-data of which we are directly aware, their antecedents will always have to include sense-data connected with what I call my body and its adjustment on the ordinary view. I could not say: If a bar of iron be heated it expands. I could not say: If a certain group of gray visual sense-data is accompanied by a certain group of hot tactual sense-data, then, as the tactual sense-data get hotter, the visual sense-data get larger. For I have to take into account the facts that a heated bar does not in general look longer than a cold one, and again that a bar at which no one is looking may, by its expansion, cause a railway accident. I must add to my law something of the following kind: If I use a micrometer gauge in a certain way I shall be aware of a difference in my visual sense-data. Then I must analyse the micrometer into visual and tactual sense-data, and, since I am not always using micrometers when rods are heated, I must introduce into the antecedent of my law a reference to the muscular and other sensations which are the phenomenal interpretation of the fact that I am using a micrometer in the proper way. It is clear that, whether this be the right method of stating physical laws or not, it would be intolerably complicated in practice. We

therefore analyse the directly verifiable hypothetical into several parts. One part is supposed to go on regardless of people's minds, and, in general, regardless of the adjustment of their bodily organs. This has various effects which happen whether anyone becomes aware of them or not; *e.g.*, the expansion of the physical rails alters the gauge of the line, a physical train comes and runs off, and only at this last stage do people become aware that anything has happened. But it is further supposed that this physical process, combined with certain other physical and physiological conditions which are only occasionally fulfilled, will give rise to the awareness of certain sense-data in human minds. As this is on the whole the least usual and the least important of the immediate consequences of the physical process, we do not want every time we refer to it to introduce the hypothesis that these conditions are fulfilled. There are thus the very strongest practical motives for dividing up the observable process which can only directly serve to verify a phenomenal law into two parts, one of which at least goes on whether we perceive it or not, and another which depends on the presence of variable physiological conditions, and results, if these be present, in human minds becoming aware of certain sense-data from which they can judge that the first process has taken place.

Let us just recapitulate the results that we have at present reached. We have seen (α) that all physical laws do contain a great deal more than we can directly verify. A hypothetical proposition is directly verified by our actually observing in a sufficient number of cases the actual occurrence of the events mentioned in the antecedent accompanied or followed by those mentioned in the consequent. So all that we can directly verify will be hypotheticals about our sense-data, and moreover the antecedents of these will have to contain a reference to the sense-data, muscular sensations, etc., which on the ordinary theory are said to be connected with the adjustment of our bodily organs; for, unless these be present, we shall not

be aware of the other sense-data mentioned in the antecedent of the law, and so the law will not be directly verifiable. (*b*) Natural science and common sense substitute for these very complex and restricted but directly verifiable laws an analysis which makes them depend on the consilience of two sets of more general physical laws which separately are not directly verifiable. One of these sets of laws is about the changes of physical objects other than the human body; *e.g.*, "Iron expands when heated." The other set is about the connexion between changes in physical objects other than the body, changes in the body, and the awareness by the human mind of certain sense-data and of certain changes in sense-data. *E.g.*, a piece of iron when expanding will give rise to changes in the visual sense-data of a person who looks at the end of it through a microscope. We may, I think, fairly conclude that unless we had had a tendency to make this kind of analysis we could never have got far with physics. In the first place our laws would have been too complex and unwieldy to use or remember; in the second place there would have been no motive to look for co-ordinations between separate verified laws, for quite often the only connexion between phenomenal laws which we now believe to be closely connected is the fact that they are all implied by some general physical theory like the electromagnetic theory of light. So if our tendency to make this kind of analysis be a fault it is a *felix culpa*. Still, of course, the fact that a certain kind of analysis is useful and even indispensable in practice does not prove that our belief in its hypothetical laws and entities is justifiable. We must remember that, after all, this method is not strictly analysis; it is not simply the breaking up of a complex into separately verifiable parts. It is the showing that a complex but limited law would hold if two simpler and more general ones held. The complex one can be directly verified, *i.e.*, it only has the amount of uncertainty that all inductive conclusions have, the simpler ones have all this + the fact that,

even if the complex law be absolutely true, the simpler ones which together imply it will only thereby have their probabilities increased. So we come to the third question: Is there any logical ground for our preference for physical over phenomenal laws?

(3) Let us take the proposition: Typhoid fever is caused by certain microscopic germs in the blood. Now typhoid certainly exists at times when no one is aware of any sense-data of this kind. But the phenomenalist will say: What this law means is that whenever a patient has symptoms of typhoid I could, after making certain volitions and having certain visual and tactual sensations (which process people who believe in matter call looking at the man's blood through a microscope), become aware of certain peculiarly shaped visual sense-data. This hypothetical proposition may be true though I do not actually have these volitions, go through this process, and end by being aware of these visual sense-data.

But the following reply would almost certainly be made. Typhoid in any actual case cannot possibly be caused by anything that is not itself actual, my real typhoid cannot be caused by what you might have done but did not do or by what might have existed if you had done certain things which you never did. You have not told me what caused this case of typhoid; you have only told me that any case of typhoid which is also accompanied by certain volitions, muscular sensations, etc., in the patient's doctor will be followed by the doctor's awareness of certain peculiarly shaped visual sense-data. And I wanted to know the cause of *my* typhoid, not that of the visual sensations of some other patient's doctor. Now the common view gives to every actual case of typhoid an actual cause, viz., germs; and this cause also explains why, under certain circumstances, doctors perceive peculiar visual sense-data, and why they only do so in connexion with typhoid patients. If it be really a part of the law of causation that actual events must have actual causes, and that it is only possible events that can follow

from merely possible causes, and if the law of causation be true, then I think Phenomenalism will be in trouble.

I understand the law of causation to say that every event is connected with some other event by a causal law. And I understand this to mean that, if q be any event, there is some other event p such that whenever p happens q happens within a definite interval. Here, of course, p and q must be abstract enough to be capable of recurring. Now let q be a particular case of typhoid fever, *e.g.*, let it be my typhoid fever. If no one has seen the germs in my blood and no one has examined the insides of the oysters that I ate, then, strictly speaking, there has been no event on a phenomenalist view such that whenever it recurs I shall again have typhoid fever, *i.e.*, my typhoid had no cause. Suppose you go on to say: "But, if you had examined the oysters, you would have had certain sense-data, and these cannot be experienced again without your again having typhoid"; this is not relevant. For the awareness of these sense-data was not itself the cause of the present attack, since it did not precede the attack. And you can hardly say that the hypothetical proposition is the cause of the attack. And, of course, if you say: "It is the fact which *would* have caused you to become aware of these sense-data *if* you acted appropriately which *actually* caused your attack," you have deserted Phenomenalism for the common view.

Is this a valid argument against Phenomenalism? I expect the phenomenalist to say that it takes too conventional a view of causation, and I remember that Mr. Russell has said that the law of causation is probably not true in any sense in which it is useful to science. I therefore want to make quite clear what I suppose myself to have shown. (*a*) If the phenomenalist says that I am not using causation in the scientific sense, but in some mystical or metaphysical one, he is wrong. I have nowhere introduced into my argument the notion of activity, or of the cause compelling the effect to happen. I have taken causal laws in the approved phenomenalist sense as laws of regular connexion. (*b*) I have not even assumed in my actual argument

that the cause must precede the effect in time, because on the phenomenalist view of causation (with which I am largely in sympathy) this does not seem to be necessary. To people who do hold that cause must precede effect I make the present of the following additional argument. On the phenomenalist view, the view that cause must precede effect, germs cannot as a rule be the cause of typhoid, even in those cases where people perform the appropriate acts and become aware of the peculiar visual sense-data. For in ninety-nine cases out of a hundred the doctor only sees the germs *after* the patient has developed typhoid. On the phenomenalist view they must not be assumed to exist before the doctor saw them; hence, if cause must precede effect, they could not have caused the typhoid. (*c*) The best thing for the phenomenalist to do is to admit that some events have no causes. He ought to say: Such an abstract event as typhoid has no cause; though the more concrete event consisting of typhoid, certain volitions, muscular sensations, and tactual and visual sensations, has a cause in my meaning of the word, *i.e.*, it is always accompanied by the awareness of certain peculiar visual sense-data. I may say at once that I sympathise with the general view underlying this argument, though not with this particular application of it. What I mean is this.

All causal laws must deal with more or less abstract events, or they would be undiscoverable, and, if *per impossibile* discoverable, would be useless. And there is no general principle to tell us how abstractly to take our events. Now it does not seem to me to be *a priori* certain or indeed very probable that if q be any event of any arbitrary degree of abstractness there must be some other event p such that whenever p happens q always happens within a definite interval. It does therefore seem to me quite likely that some events have no causes in the sense of cause which I agree with the phenomenalists in using. But, although I believe that this is so in general, I certainly do not believe, as I should have to do if I were a phenomenalist, that no event which does not include those muscular and other

sensations which I attribute to my bodily organs and the adjustments of them which I have to make to observe what the common view calls the cause has any cause at all. The fact is that the phenomenalist theory cannot distinguish between those cases where I cannot or do not trouble to observe the cause, and cases where there is no cause to find; and it cannot take as events in its causal laws anything less abstract than those which include all the sensations and volitions which the common theory connects merely with the act of deciding to look for a cause and adjusting the body or using an instrument with that end in view. Many people would regard this as a conclusive argument against phenomenalism. I do not go so far. But I think we are entitled to say that we have shown two things: (*a*) that phenomenalists have never grasped how much alteration their theory demands in our most ordinary beliefs about a great many other things beside physical objects, and (*b*) that it is most unlikely that we should have discovered and verified many of the common laws of physics (even when stated in purely phenomenal terms) or had any motive to look for them, unless we had habitually analysed phenomenal and directly verifiable laws into the consilience of more general physical laws partly about our own bodies and partly about other bodies.

Let us consider the last point more in detail. I imagine it will be admitted to be a fact, but what is its *logical* bearing on the validity of Phenomenalism? The phenomenalist will doubtless say: The mere fact that a certain hypothetical analysis in terms of not directly verifiable laws was necessary for you to discover and verify certain phenomenal regularities and to co-ordinate them with each other is only of psychological interest. It is of no logical importance; it no more adds to the probability of your unverifiable laws and entities than the fact that cycloids are most easily treated by regarding them as produced by circles rolling on straight lines adds to the probability that all cycloidal bodies in nature are actually produced in this way. This is a plausible contention, let us test it.

The first point to notice is that, when we say that a certain law would not have been discovered unless people had believed a certain physical theory, the connexion between the law and the theory is different according as we do or do not think it important to state the law in purely phenomenal terms. When I say: "It is a law of light that there is always a small bright spot in the middle of the shadow cast by a small circular object like a threepenny piece, and this fact would never have been noticed if it had not been a deduction from the wave theory of light," I simply mean that, although there would doubtless have been many instances of the operation of this law in nature, none of them would have been noticed if people had not been moved to look for them by their desire to test the wave theory by its consequences. But the phenomenalist must mean something very different. The unnoticed cases are not instances of a phenomenal law at all: the phenomenal law must include among its antecedents all those muscular, visual, and tactual sensations which the ordinary view connects with the adjustment of the body to look for the effect. So the phenomenalist must say that the fact that the man sees that this result follows from the wave theory and that he desires to test the theory is the condition, not merely of his verifying the law, but also of there being any instances of its operation in nature at all. This difference, however, is not, I think, of direct logical importance.

But the following considerations are of considerable logical importance. The reason why phenomenal laws are supposed to be superior to physical laws is that the former can be directly verified; *i.e.*, if a phenomenal law be of the form "If p happens q always follows," we can actually observe p and then observe q. If we can do this often enough the phenomenal law is rendered highly probable by induction by simple enumeration. The probability of the corresponding physical law is necessarily smaller on the same evidence; for it is equal to the probability of the phenomenal law on the evidence,

multiplied by that of the physical law on the assumption that the phenomenal law is true; and the latter is, of course, a proper fraction. But we must notice that the only connexion between a great many phenomenal laws is the fact that they are all implied by a certain set of physical laws. For example, many of the particular phenomenal laws about light, each of which is rendered highly probable by the repeated observation of favourable instances, have no logical connexion with each other except that they are all implied by the wave theory of light, which is a physical theory and not directly verifiable. Now consider some rather recondite deduction from the wave theory, *e.g.*, the example of the bright spot in the middle of the circular shadow. We can state a corresponding phenomenal law, and of course this law, being phenomenal, is in theory capable of direct verification by induction by simple enumeration. But we must notice (*a*) that we generally do not trouble to verify such laws by trying the experiment a great number of times; that (*b*) the concatenation of circumstances needed to give an instance of the antecedent of the phenomenal law is so complicated that, from the nature of the case, we cannot experience many actual instances of the working of the law, even if it be true; and (*c*) that it has no direct logical connexion with the other laws about light which we can render highly probable by repeated direct verification.

Yet, in spite of this, we do regard such laws as but little less probable than those which we can and do repeatedly verify. The only logical justification for this is the following. The set ϕ of phenomenal laws which I can make highly probable by direct verification are all implied by the set ψ of hypothetical physical laws. The phenomenal law l which I do not or cannot render at all highly probable by the number of direct verifications is also implied by the set ψ. Let us call h the evidence for the set of phenomenal laws ϕ; h will be of the form "I have experienced n_1 favourable instances and no unfavourable instance of the law ϕ_1, I have experienced n_2 favourable instances and no

unfavourable instances of the law ϕ_2, . . . and so on for all the laws in the set." Then, if we write p/q for the probability of any proposition p on any piece of evidence q we shall have the following results:—

$$l \equiv l\psi \text{ or } l\psi', \text{ where } \psi' \text{ is the contradictory of } \psi.$$

$$\therefore\ l/h = \psi/h \,.\, l/\psi h + \psi'/h \,.\, l/\psi' h \text{ (by a well-known law of probability).}$$

$$= \psi/h + \psi'/h \,.\, l/\psi' h. \quad \text{(For, since } \psi \text{ implies } l,\ l/\psi h = 1.)$$

$$= \psi/h + (1 - \psi/h) \,.\, l/\psi' h. \quad \text{(Since } \psi/h + \psi'/h = 1.)$$

$$= \psi/h\,(1 - l/\psi' h) + l/\psi' h.$$

Let us consider the formula that we have reached. The last factor is the probability of the law l on the assumption that the physical laws are false and that we still have the evidence for the phenomenal laws. This probability will be exceedingly small; for the whole point about the law l is that, apart from the physical theory, we had no reason to expect it, but that on the contrary it is something of a paradox. Hence this factor will add very little to the total probability. Similarly it follows that the factor $1 - l/\psi' h$ is very nearly equal to 1. Hence we see that the probability of the law l on the evidence h is very nearly the same as the probability of the physical theory on the same evidence. It follows that if I confine my attention to l and ϕ to the exclusion of ψ I have neither direct nor indirect evidence for thinking such laws as l highly probable, though I actually do so. There are in fact a great many purely phenomenal laws in which we firmly believe which we can have no logical ground for thinking appreciably more probable than the set of physical laws ψ. We can put the whole matter in a slightly different way. Such phenomenal laws as l will have very little probability unless the set of physical laws ψ has great probability, but the mere fact that ψ implies the highly probable set of phenomenal laws ϕ will not suffice to make ψ

highly probable unless ψ itself has considerable intrinsic probability.

I conclude then that if we confine ourselves to a belief in phenomenal laws, and deny a high intrinsic probability to certain physical laws, we shall have no right to believe many phenomenal laws nearly as strongly as all physicists, including those who are phenomenalists, do believe them. Once more I cannot call this a conclusive argument against Phenomenalism: possibly we do believe the recondite results of well established physical theories even when expressed in phenomenal terms much more strongly than we ought to do. But I do think that we have again shown that most phenomenalists are far from clear as to the implications of their views.

On the other hand, I do not think that anything that we have said is necessarily incompatible with such a form of phenomenalism as Mr. Russell seems to want. Consider for a moment what is involved in a physical theory. There are hypothetical laws and hypothetical entities which obey these laws. Now the most noteworthy fact in the history of physical science is the persistence of general form of the hypothetical laws and the constant changes in the suppositions as to the nature of the hypothetical entities. And really this is exactly what we ought to expect. The hypothetical laws are the only part of the physical theory which continually have their probability increased by the fact that they imply phenomenal laws which are constantly verified. But if you say anything more about the private nature of the hypothetical entities over and above the fact that they are the sort of entities that obey these laws your statements are in no way rendered more probable by the success of the physical theory, however great that may be. Your beliefs about the private natures of the entities in fact can only be based on analogies with certain sense-data; and it is natural that one analogy should strike one generation of physicists and another analogy should strike another generation. These analogies have

undoubtedly been helpful in practice, but we ought to recognise at once that all statements based on them are in an entirely different and much inferior logical position to the hypothetical laws. Hence there would be a very great logical advantage if it were possible to define certain logical functions of our sense-data as the entities to which the laws of physics apply. The nature of the functions must, of course, be such that when you say that they obey the laws of physics you *ipso facto* imply all the well verified laws concerning the sense-data of which they are functions. We must be careful, however, not to confuse ourselves as to what is possible in this direction; Mr. Russell sometimes seems to me to speak as if he hoped to define functions which both obeyed the present recognised laws of physics and involved no statements about sense-data other than those which a solipsist could verify directly. These two objects, if he really has them, do not seem to me to be compatible. The present laws of physics do involve statements about sense-data which for any one person are only possible and not actually experienced. This does not seem to be undesirable, since it is the condition of all prediction by physical laws; a physical law which was a mere translation of the experiences that a man can remember would be of very little use. The most that we can ask is (*a*) that the hypothetical physical laws shall not imply anything contrary to what the solitary physicist can directly verify; (*b*) that, as a whole, they should be rendered highly probable by what he can verify; and (*c*) that the minimum possible shall be asserted as to the private nature of the hypothetical entities.