PAPERS READ BEFORE THE SOCIETY, 1900-1901.

I.—THE COMMON-SENSE CONCEPTION OF A MATERIAL THING.

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WE have to enquire what constitutes a material thing, such as a stone, a tree, or a billiard ball, as it is apprehended by the ordinary consciousness. For purposes of exposition it will be convenient to deal first with things in their static aspect, and afterwards to consider them as subject to change. However true it may be that, as a matter of fact, all things are in perpetual flux, it is undeniable that to the ordinary consciousness most things appear to remain precisely in the same condition and position for long periods of time. For instance, I find my writing table this morning to all appearance exactly as I left it last night, and I presume that it has persisted unaltered in the interval. Considered in this static aspect, we may offer the following sketch of the essential constituents of the ordinary conception of a material thing.

To begin with, it is clear that a material thing has duration in time and position in space. Of these two characters spatial position is the more distinctive. For existences which are not material have temporal duration. Next we ask how the space occupied by a material thing is filled. What are its contents? We may give a partial answer to this question by saying the

place occupied by a body is filled by a complex of sensible qualities. But not all sensible qualities have, in the strict sense, a position in space. Sounds and smells are not spatially localised as tangible and visible qualities are. We do, indeed, speak of localising a sound; but what we mean is that we fix the position of its source, determine its place of origin. We do not mean that the sound itself occupies this place. We say that a sound comes from a bell, not that it is in the bell, and we express by this such facts as that the sound is heard when the bell is struck and not otherwise, and that it becomes fainter as we recede from the bell and intenser as we approach it. The position of the bell itself is the position of its visible and tangible qualities. All colour is spread out in space of two dimensions, and every coloured surface has a definite position relatively to other coloured surface. The same is true of tangible qualities, such as roughness and smoothness, hardness and softness, hotness and coldness. But the same place cannot be simultaneously occupied by different colours, and it cannot at the same time be both hot and cold, both hard and soft, both rough and smooth. These are mutually exclusive, because they are specific variations in the same respect of the same generic quality. On the other hand, specific variations of different generic qualities, or of the same in different respects, can occupy the same place. A body may be hot, hard, and smooth in the same place. In particular, visible and tangible qualities are capable of having an identical position in space, and, as a rule, they are actually apprehended as spatially coincident and co-extensive on the bounding surfaces of material things. The exceptions are confined to instances, such as that of the air, in which a thing is tangible but not visible. The inverse exception does not occur; what is visible but intangible is regarded as a phantom, not as a material thing at all. We may then affirm in general that a material thing is a complex of sensible qualities, and that within this complex there is a central core

constituted by visible and tangible qualities which have spatial extension and position, and are spatially coincident and co-extensive. Other sensible qualities are more loosely attached to this central core. They are attached to it in so far as their appearances, disappearances, and variations are connected in definite ways with change in it, and in its spatial relations.

Up to this point we have considered only sensible qualities and their inter-connection, and our results harmonise with Mill's famous definition of a material thing as a group of permanent possibilities of sensation. But our next step brings us into conflict with Mill. Only the bounding surfaces of bodies are visible and tangible. But these bounding surfaces have something between them, and this something, by its nature, is invisible and intangible. We may indeed be said to perceive it by means of sight and touch. But it is not in itself a visual or tactual or any other kind of sense-presentation.

Solidity in the strict sense is rather a permanent impossibility than a permanent possibility of sensation. It is true that it involves possibilities of sensation, but these possibilities *depend* on it; they do not of themselves constitute it. At any rate, this is the unsophisticated view of common sense. I have, let us say, a billiard ball before me. I can see and feel the surface, but not what lies beneath. But this surface is only the outer surface; there are an indefinite number of inner surfaces which it hides from me. I can suppose the billiard ball divided into an indefinite number of concentric layers, and I can suppose these concentric layers to be peeled off successively like the coats of an onion. In the process an indefinite number of visible tangible surfaces would be disclosed. Again, I can suppose the billiard ball to be sliced across in an infinite variety of ways, and each section would disclose two surfaces. Thus the solidity of the billiard ball involves a very complex system of permanent possibilities of sensations. None the less, the solidity itself remains a permanent impossibility

of sensation. For no combination of surfaces can constitute solid thickness; the solid thickness is always apprehended as lying between them; they cannot constitute it just because they have no solid thickness themselves, and, if they had, would cease to be mere surfaces. The surface is in space of three dimensions what the line is in space of two dimensions, merely a boundary. The line formed by the meeting of two coloured surfaces is no part of either of them. Similarly the surfaces disclosed by slicing an apple form no part of the solid content of either half of the apple. The next item which seems essential to the ordinary conception of matter is impenetrability—the mutual exclusiveness of solids in space. Each occupies its own place, and no two can simultaneously occupy identically the same place. This characteristic of matter is most important for the conception of mechanical causation.

We have considered the material thing as an impenetrable solid and as a complex of sensible qualities. We have now to add that it is also a complex of powers and susceptibilities, or in Locke's language, of powers *active and passive*. "Fire has a power to melt gold, and gold has a power to be melted. The sun has a power to blanch wax, and wax has a power to be blanched by the sun." A material thing has powers active and passive—powers corresponding to all the changes which it is capable of undergoing or producing. There is here an explicit reference to change and causation which points beyond the static point of view, but does not, I think, actually carry us beyond it. For reference is not to actual change and causation but only to their possibility. Arsenic is poisonous even though it poisons nobody, and tea-cups are fragile even though they remain unbroken. A material thing has a power or susceptibility corresponding to every change which it is capable of undergoing or producing under varying circumstances. It thus possesses an infinite number of powers—active and passive powers—which never have been and never will be actualised. Such attributes attach to the material thing because of their con-

nection with its other characters, its position in space, sensible qualities, solidity, and impenetrability. The changes which the material thing is capable of undergoing are changes of position, of sensible quality, of the spatial relations of its parts at the bounding surfaces, or within the solid content and the like. Changes in other things are referred to it as their source, because they arise in connection with its own changes of position, sensible quality, &c., or with the varying spatial relations of other things relatively to it, or some such conditions. Here the question may be raised whether some of the other attributes of matter which we have enumerated are not in reality mere powers. "Sensible qualities," says Locke, "what are they but the powers of different bodies in relation to our perception?" Now an ordinary educated person who has some acquaintance with popular philosophy or science would perhaps be ready to acquiesce in this view, as far as regards colour, sound, smell, and taste. But he would be inclined to draw the line at touch. As a matter of fact, he would be quite illogical in doing so, for touch sensations are just as much effects produced in us by external things as visual sensations. In any case the whole question is for common sense merely speculative. (In ordinary practical life we attribute to material things the sensible qualities themselves, not the mere power of producing them in something else. The whiteness of the sheet of paper before me actually belongs to the paper: it is spread out over its surface; it is not spread out over the surface of my brain, or my retina, or my soul, or my consciousness. This is the natural view of common sense, and I cannot help adding that common sense seems to me to be in the right. Doubtless there is a problem here, but you cannot solve it by saying that colour is a state of the percipient mind or organism and not of the thing seen. I have already said enough to show that solid occupation of space in three dimensions is not a power of producing sensations in us, and it seems evident that it cannot be reduced

to a mere power of any kind. The case of impenetrability seems more doubtful. For impenetrability might be described as the power of a body to exclude other bodies from the space which it occupies itself. But this power may be regarded rather as a consequence of impenetrability than as identical with it. It involves a reference to possible movement or stress which is not necessary to the conception. No such reference is involved when we say that two different colours cannot simultaneously occupy the same place, and it need not be involved in the statement that two solid bodies cannot occupy the same place.

We have so far considered only the general conception of matter. In order to complete our inquiry we must also consider the characters which mark off one material thing from another. What constitutes the unity and distinctness which is implied in the use of the indefinite article when we speak of *a* material thing, or of the plural number when we speak of material *things*, or of the demonstrative pronoun when we speak of *this* or *that* material thing? Within wide limits this unity and distinctness is fluctuating, and varies as our own subjective interest varies. The cloud of dust which meets us on the highway is one thing, and we do not distinguish its portions or particles as separate things. But if a particle gets into our eye, it at once assumes individuality and independence. When we contemplate a tree from a distance, its parts may not assert themselves as separate things; but if we attempt to climb it, the protuberances of its trunk and each branch which offers foot-hold or hand-hold emerge from the whole as distinct portions of matter. In spite of this fluctuation, there are, none the less, relatively fixed and permanent unities corresponding to relatively fixed and permanent interests. We find a unity of this kind wherever a portion of matter is marked by a separate name. Thus chairs, tables, dogs, horses, trees, &c., are portions of matter permanently marked off from their environment, and, so to speak, ticketed as separate articles

by the current use of language. In particular, those portions of matter which are the vehicles of conscious life appear to have a peculiar claim to independent individuality. Such are the living organisms and men and animals, and the material products of their activity as guided by intelligent purpose—horses, ploughs, steam engines, and the like. On the whole, we may affirm that the unity and distinctness of a material thing is bound up with the unity and distinctness of our interest in it, and that it is shifting or permanent according as our interest is shifting or permanent. But this is only one side of the question. In order that we may have an independent interest in a thing, the thing must by its own nature be capable of exciting this independent interest. The conditions necessary and sufficient for this may, of course, vary indefinitely in different cases; but there is at least one condition which, though by no means always sufficient, appears to be nearly always necessary to the unity and distinctness of a thing—I refer to that definite limitation in space which is called shape. What is regarded as a single thing must, as a rule, have bounding surfaces which are sensibly distinguishable from empty space or from the bounding surfaces of other things. Of course, what I here call empty space is really filled with air; but as air is usually invisible, and as its tangible quality usually escapes attention, space which is only filled with air is generally regarded by common sense as if it were empty. Any portion of matter which is wholly or partially separated from other portions by this virtually empty space may be apprehended as a distinct thing. One branch of a tree is separated in this way from other branches, though it is spatially continuous with them in so far as they all spring from the trunk. Thus we may either regard the whole tree as one thing, or we may distinguish each branch as a separate thing. Portions of matter which are continuous with each other in space may be distinguished by difference in the sensible quality of their bounding surfaces. Where both

means of distinction fail, we may introduce them by a mental artifice. In what appears as a uniform sheet of white paper there is nothing to prompt me to single out one portion from another. If I attempt to do so, I shall find myself looking for slight differences in the texture or shading of the different parts, and if I fail I must have recourse to the artifice of mentally introducing differences which are not actually present. For instance, I imagine black lines drawn on the paper; or perhaps I represent a bit of the paper as torn off from the rest. Thus it seems that in all cases, in order to apprehend a portion of matter as a distinct thing, I must either perceive or imagine it as separated from other things by intervening empty space, or at least as discriminated from surrounding matter by difference in the sensible quality of its bounding surfaces.

I have now, I think, given a tolerably complete account of common sense conception of a material thing in its static aspect. Before taking up the question of change, it will be well to say something concerning an attribute of material existence which belongs to it equally whether we regard it as undergoing alteration or persisting unaltered—I refer to its independence of the processes by which it is perceived or ideally represented. This is a point on which Kant lays great stress, and he simply identifies it with the objectivity of matter. But he apparently fails to recognise that the objectivity which belongs to material things and process is only a special case of objectivity in general. Whatever we can in any way perceive or think has a being and nature of its own independently of the processes by which we cognise it. We do not create it, but only become aware of it in the process of cognition. The number two, the fact that $2 + 1 = 3$, the validity of a syllogism in Barbara, the necessity or the arbitrariness of the transitions in Hegel's *Logic*, a symphony of Beethoven, the moral law, all these are possible objects of our cognition, and all these, inasmuch as they are objects,

possess a being and nature of their own, whether anyone is actually thinking of them or not. But their independent being and nature differs profoundly from that of material things, because it does not consist in independent persistence and change in time and space. $2 + 1$ was equal to 3 *before* anyone began to count, and this planet existed *before* the appearance of life on it. But the word "before" has a different meaning in the two cases. When I say that this planet existed before the appearance of life on it, I mean that it has had an actual history lasting through successive moments of time from some determinate date up to the moment at which I am now speaking, and that in each of these successive moments it has had a definite position in space. When I say that $2 + 1$ was equal to 3 before anyone began to count, I do not mean that this fact endured through successive moments in time, and had in each moment a definite position in space before it was discovered; I only mean that it has a being independent of its discovery, not affected by such occurrences as man beginning or ceasing to count. To put the case in another way; when I leave my house I regard the house as still existing, though I no longer perceive or think of it: I regard it as continuing to exist in time just as I myself and my conscious experience continue to exist in time, and just as the flow of my conscious existence is divisible into successive moments of duration, so I regard the continued existence of the house as divisible into successive moments, so that each moment of its history synchronises with a moment in my history. It is true that the flow of my conscious life has, strictly speaking, no position in space such as the house possesses. But my body has always a determinate position in space, and my body is continually presented to sight and touch. I regard other things which I neither perceive or think of as maintaining or changing their position in space just as my body, which is continuously presented, maintains or changes its position in space. I

emphasise this point because it seems to have an important bearing on Kantian criticism. Kant would investigate the conditions of the possibility of experience. He assumes that there can be no experience without an object, and this assumption is no doubt entirely justified. He also teaches that an object is such only so far as it has a being and nature independent of the actual occurrence of the subjective process by which it is cognised. So far we can follow him. But he also makes another tacit assumption which I cannot admit as legitimate. He seems to take it for granted that the independence necessary to constitute any object whatever, must be of the same kind as that which is characteristic of material things and processes—independent persistence and change through successive moments of time. This assumption he in no way attempts to justify, and it seems quite untenable. It is abstractly conceivable that an experience might exist, concerned exclusively, let us say, with sounds. The sounds might be compared as regards their pitch, intensity, and timbre, and arranged in series according to their resemblances or differences; their musical combination might be apprehended and enjoyed; all this, and the like of this, might take place, without ever a thought of the sounds as enduring, changing, and succeeding each other, apart from their actual presence to consciousness. When we speak of the possibility of experience, we ought to explain very carefully what kind of experience we mean.

We have next to deal with change in material things. In the first place it is necessary to distinguish between change in the thing itself and change in its appearance to the percipient. To the thing itself we ascribe those changes and those only which form part of its independent existence,—of the existence which belongs to it whether or not it is actually perceived or thought of. But there are innumerable variations in the appearance of material objects which are not regarded as changes in the object itself; and all these variations have the

common characteristic of being recognisably due to the varying conditions of the process of perception. If I close my eyes, the things around me disappear from sight. But I do not for that reason regard either the things or their visible qualities as having ceased to exist, or as having undergone any kind of alteration. Again, as I shift the position of my eyes, head, and body, the things around present constantly varying visible appearances corresponding to the constantly varying size, shape, and position of the images which they produce on my retina. But just so far as they arise in connection with movements of my eyes, head, and body, these variations are not regarded as changes in the material objects themselves. The things themselves are unaltered; it is only the point of view of the percipient which changes. When similar variations appear to take place independently of our own active movement or changing position they are regarded as changes in the things seen; the things are apprehended as varying in their position in space or in their shape and size. So when we look at a thing through yellow glasses we do not suppose that the thing itself becomes yellow. But if the same alteration in our experience took place without the use of the yellow glasses, or some equivalent condition, we should say that the thing itself had changed its colour. The same holds good for touch and the other senses as well as for sight. We do not regard things as having lost their odour because we have a cold in the head. If I move my finger tip along the edge of the table, I do not regard the variations in my tactual experience as changes in the tangible quality of the table. The succession is in me, not in it. If, on the contrary, similar variations occur while my finger is unmoved, I am aware of the table itself as moving or otherwise undergoing alteration. It is to be noted that only variations due to *free* movement are thus regarded as attaching not to the thing but to its appearance. Movement against resistance always involves alteration in the position or shape of the thing which resists. The reason is

plain: what lies within the sphere of our own initiative is the power to move or to attempt to move in a certain direction. It does not depend on us what kind or degree of resistance we shall encounter, whence or where we shall meet it, or whether we shall meet it at all. Hence the yielding of a resistant surface to our efforts when we push, pull, or compress it, is regarded as a change in the material object itself, not merely its appearance to us.

A word may here be added on Kant's treatment of this question. He also distinguishes between change in a material thing and change in its appearance to us. But he seems to me to draw the line between the two very incorrectly. He says that change in the thing itself is apprehended as such, because it is regarded as following on some other change according to a fixed rule, whereas mere variation in its subjective appearance is not so determined. But this seems quite untenable. The changes in appearance are just as much subject to rule as the changes in the thing itself. Take his own example. I survey a house, and in doing so my eyes travel from the top to the bottom, and again from the bottom to the top. The corresponding sequence of varying visual presentations is not regarded as change in the house. The roof is not transformed into the door. The change merely consists in looking at the door after looking at the roof. So far well and good. But can it be truly said that the sequence of visual presentations has no fixed order? On the contrary, it has just as much a fixed order as in the case which Kant contrasts with it, that of a ship being carried down-stream by the current. In both cases the order is conditional. Given the starting point and direction of my ocular movements, the order of my visual impressions is predetermined according to a rule. Given that the ship is merely moved by the current, there is like fixity of order. But as my ocular movement may vary, so the ship may steam or sail against the current. The difference lies in the nature of the condition in the two cases. In the case of the house the

conditions belong to the perceptive process, in the case of the ship they do not.

In what follows we shall consider change in the thing itself as distinguished from change in its mode of appearance. We have three questions to consider. (1) What is the nexus between a thing and its changes which enables us to say that it is a change in this thing rather than in that? (2) At what point does change become transformation so that in undergoing the change the thing loses its identity? (3) When a thing changes, what is it that really undergoes the change? As for the first question, it is evident that all cognition of change involves the presentation or representation of a relatively new content of experience. When we ascribe the change to a material thing, we mean that the new content is a new state of that thing which previously existed in a different state. Now the question is this. In what relation must the new content be thought of as standing to the thing, in order to be recognised as a state of that thing displacing a previous state? We answer:—(a) The new content must be a specific determination of some general property or attribute of the thing, and before its emergence the thing must have possessed some other specific determination of the same general property or attribute. Every change in the thing is a change in some respect, a change in position, or in shape, or in size, or in colour, or in texture, or in temperature, or in solid content, or in powers active or passive, or the like. Each successive state is a specification of some more general character, and for that very reason they are incapable of belonging to the thing simultaneously. They are mutually exclusive alternatives which can only qualify the thing successively if at all. (b) These mutually exclusive alternatives must displace each other continuously in time. The commencement of the one must either coincide with the cessation of the other, or if there is an interval of time between them, this interval must be filled up by continuous transitions

from one alternative to another. Let us take as an example the movement of a billiard ball. To the ball belongs the attribute of having position in space, and at any instant this position must be completely determined. Further, it cannot occupy two positions at the same time, though it does so at different times. In order to occupy different places at different times, the varying positions must succeed each other continuously so that in passing from one it *ipso facto* enters another. (c) Finally we have to add that each successive determination must bear to the total complex of attributes constituting the thing, a relation analogous to that of the precedent state which it displaces. When the billiard ball moves, its new place, like its old place, is the place of its visible-tangible qualities, and of its solid content, and determines in like manner its other sensible qualities and its powers active and passive. Similarly when a leaf turns yellow, the relation of its colour and shape is maintained as it was when the leaf was green. Of course, what thus persists is only the general form of combination characteristic of a material thing. This general form receives various specific determinations as the general attributes vary either separately or together.

Our next question concerns the limits within which a thing is regarded as maintaining its individual identity in spite of the changes which it undergoes. The answer is that so long as the general conditions we have laid down are observed, there is no fixed limit except one, and even this is not absolutely fixed. A thing ceases to be regarded as the same when it suffers disruption,—when it is broken up into parts separate in space, so that each is thenceforth capable of having its independent history. When this happens, the thing no longer exists but only its fragments. Apart from this restriction, a material thing may always be regarded as maintaining its identity through change. I say that there is always a possibility of so regarding it. Whether in any given case a change is or is not treated as involving loss of identity

depends upon subjective interest. So long and as far as the unity and continuity of our interest in the thing is unbroken it remains for us the same thing. "Imperial Cæsar, dead and turned to clay, may stop a hole to keep the wind away." The lump of clay is identified with the body of Imperial Cæsar, simply because the poet is interested in the continuity of the transition by which the one became the other. Change the point of view and the identification will not be made. You say that Cæsar is no more, and that what is left is only a clod of earth. The embryologist, interested in continuity of development, may regard the egg as a stage in the continuous existence of the chicken. But for most people the egg is one thing, and the chicken another. The chicken hops about and feeds on corn, and the egg does nothing of the kind. Both are edible, but they are eaten in very different ways and have very different tastes. The knife which had its blade and handle several times replaced remained the same knife from the point of view of its possessor. It had a continuous history, and throughout its history the personal interest taken in it by its possessor was uninterrupted. Hence it is for him one thing throughout its changes. On the other hand, the outsider who is without this personal interest will be likely to say that there have been several different knives, not one and the same knife.

Even the disruption of a thing into separate fragments does not unconditionally involve loss of individual identity. It only does so in so far as the fragments are regarded as having thenceforth an independent history with discontinuity of interest. But this is not so at the moment of the disruption. When a valuable china tea-cup falls and is broken into shivers, we naturally, for the moment, regard the collection of fragments as being the piece of china itself, as being the same thing in fragments. In the future we adopt the same attitude whenever our minds revert to the occurrence. Similarly, if we regard the fragments as capable of being put together again, we continue to think of them as preserving their individual

identity with the unbroken cup. On the other hand, if we think of them as thrown on the dust-heap, so that each for the future is to have its own history independent of the rest, then from this point of view the cup is no more, and only fragments of pottery remain.

In more primitive stages of human development, solution of spatial continuity is less capable of interrupting continuity of interest and consequent identification. Primitive culture, as represented in savage races, regards the severed fragment of a thing as still capable of sympathetic communion with the whole from which it has been detached. On this view it is possible to make a man ill or cause his death by operating on the cuttings of his hair or the parings of his nails. Hence there is a very important difference between the primitive view of individual identity and our own—a difference which has an important bearing on the development of the concept of a thing.

The third question we raised was: When a material thing changes, what is it that really undergoes the change? The nature of the problem requires some explanation. It arises out of Kant's statement that only the unchanging changes. Kant said that successive states do not change, but only succeed each other. Each, in any moment, is just what it is, and nothing else. Hence the true subject of change must be the thing so far as it remains unchanged. Now, I cannot see that this statement is in reality any less nonsensical than it appears to be at the first blush. So far as the thing is unaltered, it is unaltered, and no more can be said. On the other hand, the successive states do change. This is obviously true if we consider any finite period in time, however small; for during this period, the state includes changes. If, on the contrary, we consider the state as it is in a bare instant of time without duration, it is true that there is no change, but it is equally true that in that instant there is not, in any proper sense, a *state* of the thing. There is only a boundary between the

immediately preceding and immediately succeeding state. There is only the transition from the one to another. Just as the surface is only the meeting of two solids, so the instant of time is only the meeting of preceding and succeeding portions of duration. Like the surface, it is a boundary possessing a positive character, but still it is only a boundary. This is true, whether we apply it to the case of a state which is changing or to one which remains unchanged. Of course all change implies some qualitative continuity. It implies a generic content which receives varying specific determinations. But the change is not constituted by the generic content, nor yet by its specific determinations. The change is constituted by the continuous transition of one specific determination into another; the coincident emergence of the one and cessation of the other.

It will, however, be urged that we have not touched the essential point of Kant's criticism. We can only cognise change in a thing if we are able to recognise the thing as the same in spite of its differences in successive moments of time, and we attribute change to this something which is recognisably the same throughout its varying states. This seems beyond dispute. But we have still to enquire what we mean by the sameness of the thing. Do we mean material or individual identity? Do we mean merely likeness of quality, or do we mean that continuous connection of successive phases which makes possible unity and continuity of interest? Clearly it is the latter kind of identity we have in mind. In our conception of a thing we include all its actual changes past and future, and all the possible changes which it would undergo under varying conditions.

We comprehend all these changes in our thoughts of the thing so far as they do not interrupt the continuity of our interest in it. We mean to include them even if we do not know what they are. It is to the thing conceived in this manner that change is ascribed as a predicate.