VI.—CRITICAL NOTICES.

Our Knowledge of the External World. By BERTRAND RUSSELL. Open Court Co. Pp. ix, 245.

THIS book—Mr. Russell's Lowell Lectures—though intentionally somewhat popular in tone, contains some most important and interesting contributions to philosophy. Its scope is very accurately conveyed by its complete title; Mr. Russell deals with our knowledge of the external world 'as a field for scientific method in philosophy'.

The first chapter deals with Current Tendencies; it says something about Pragmatism, Absolute Idealism, and Bergson; and it tries to delimit the sphere of philosophy. If philosophy is to be a genuine separate science it must contain propositions about matters not dealt with in other sciences, and these propositions must be proved or rendered probable by the methods common to all science and to the sound reasonings of daily life. The difference between philosophy and the natural sciences (*e.g.* physics) is not that it deals with a more elevated subject matter, nor that it uses some superior method of argument, but that it consists of propositions about much more abstract entities. Again, like all genuine science (including ethics itself), philosophy must become what it has hardly ever yet been—'ethically neutral'. When philosophy is defined in this way three important results follow: (1) It can never conflict with any discovery of natural science or with any judgment of value; for propositions about entirely distinct subject matters cannot conflict; (2) We see that a number of problems which have been supposed to be pre-eminently philosophical belong to the natural sciences, and, if answerable at all, must be answered by empirical investigation. Examples of such problems are the immortality of the soul and the existence of God; and (3) the essence of philosophy is seen to consist in logic, defined in a certain sense which Mr. Russell elaborates in his second chapter.

In this chapter Mr. Russell gives a very useful account of the main results of the logical studies of Frege, Peano, Dr. Whitehead, and himself, with acknowledgments of further developments and modifications made by Mr. Wittgenstein and not yet revealed to the profane vulgar. He reiterates his belief that the logical basis

of most absolute idealism is the erroneous view that all propositions ascribe qualities to subjects. Moreover he insists on the importance of asymmetrical relations and of polyadic relations; by means of the latter, as we know, he considers that the problem of erroneous judgment can be solved. For any extended knowledge we need to know two very different kinds of things: (1) atomic facts, and (2) forms. The first are most obviously supplied by sense-perception and are asserted in such propositions as 'this is red' and 'this is to the left of that'. The second are the subject matter of pure logic; they are *a priori* and they assert of certain 'forms' or propositional functions that they give true propositions whatever 'matter' be substituted for the variable in them (provided of course that the proper restrictions as to logical type are complied with). The knowledge of forms and of the general propositions about them is essential to all inference; the knowledge of atomic propositions is equally essential if we are to hook our logical implications on to the existent world, to assert our premises, and thus assert our conclusions by themselves. The great use of modern logic as against the traditional logic in philosophy is twofold: (1) It recognises an enormously greater number of primitive logical forms and thus sets free the logical imagination and provides the materials for an immense number of logical constructions to fit empirical facts, and (2) it enables us by means of the symbolic calculus to work out the results of our hypotheses much more fully and certainly than the ambiguity of words and the restricted apparatus of Aristotelian logic would allow. We no longer proceed in philosophy by gradually cutting out all possible explanations but one; we see that there is an immense number of logically valid explanations possible for almost anything, and we proceed to determine what is essential logically to them all.

The rest of the book, except the last chapter, consists in applying the methods and results of modern logic to the problem of the nature and reality of the external world. It divides into two parts. The first, contained in chapters iii. and iv., is an attempt to determine the relation between the world of sense-data and the world of physics with the fewest possible assumptions by means of the Principle of Abstraction; the second (chaps. v.-vii. inclusive) deals with the mathematical theory of infinity and continuity. The latter is of course comparatively well known to a certain number of persons, though evidently not to most philosophers out of Cambridge. It is valuable as presenting a clear and intelligible account of a somewhat difficult subject by one who is a complete master of it and himself a discoverer in it. The only new part is the little that has been called for by Bergsonian attacks on the mathematical doctrine of continuity and motion. These consist mainly of misunderstandings; but the amended Bergsonian doctrine that the mathematical theory is flawless but irrelevant to real motion was worth answering. The answer of course is to

distinguish between movement as a sense-datum and the movement constructed logically for the purposes of physics. Mr. Russell gives a physiological explanation of the sense-datum; but he is not content with this. He further points out that, even in perceived motion, what we must have is not something unitary and indivisible; but at each instant we perceive a slightly different extended motion. Thus we are again brought to a compact series, this time of sense-data. Of course, as Mr. Russell insists, two sense-data may differ and be proved to differ though they cannot be perceived to do so.

The most interesting part of the book to those who are already familiar with the mathematical doctrine of infinity and continuity will be chapters iii. and iv. In general we may say that they consist of an attempt to state phenomenalism in a logically satisfactory way by means of the notions and results of modern mathematical logic. In particular they make use of the Principle of Abstraction (which has proved so useful in the definition of cardinal and ordinal numbers and in the proof of existence-theorems for these) to define the space, time, and matter of physics as logical functions of sense-data, and their immediately given relations. Traditionally physical matter has been supposed to be inferred as the cause of sense-data, whilst the evidence for mathematical space and time has hardly been considered at all. Since any consistent logical function of actual sense-data must exist in the logical sense there can be no doubt of the existence of the space, time, and matter of physics if they can be exhibited as logical functions of actual sense-data. Whether they *also* exist in any other sense must remain an open question; Mr. Russell does not say exactly what this question means, but I think it means: Are there entities of the same logical type as sense-data, which have (apart from differences due to difference of type) qualities and relations with the same logical properties as those possessed by the functions of sense-data which fulfil the demands made by physics on its space, time, and matter?

Mr. Russell is not content with suggesting the possibility of defining the entities of physics in terms of sense-data, he proceeds to offer a tentative sketch of how this might be done. It does not profess to be complete, for it assumes both the sense-data of other people accepted on testimony, and possible sense-data; but Mr. Russell hopes, by introducing additional complications, to eliminate these and produce a purely solipsistic physics. His tentative theory (constructed to deal mainly with the data of sight) is roughly as follows. Each man's sense-data form an extended world and no sense-data are common to two private worlds. But there are correlations between similar sense-data in the various private worlds. A thing is the class of all the similar sense-data in all the private worlds. (We may compare Lotze's view that things are the laws of their states. The

superiority of Mr. Russell's theory is that he tells us much more carefully than Lotze what is meant by 'their' in this connexion.) The next task is to define a common space and a common time 'in' which these things shall be and 'in' which their changes shall take place. We construct a common space by taking each private world as a whole as one point in the new space; it is here that we have to introduce possible private worlds as well as our own and those which we know about by testimony. It is an empirical fact that the space so constructed has three dimensions. Next we notice that if we consider, *e.g.* all the private worlds which contain a round appearance of a penny and arrange them in an order in accordance with the sizes of the round sense-data they form a straight line in the common-space. Likewise all the private spaces which contain a straight appearance of the penny (*i.e.* as we say 'the penny viewed edgewise') constitute straight lines in the common space. And it is found that all these lines intersect each other when produced and intersect the line defined by the round sense-data at a common point in the common-space. This point of intersection is defined as 'the place where the penny is'. The particular private space in which there is a particular sense-datum of any shape which is a member of the class constituting the physical penny is called 'the place from where the penny has an appearance of this shape'. Physics is mainly interested in the places where things are, psychology is mainly interested in the places from which physical things have such and such an appearance.

The next task is to define the points of space themselves. Broadly speaking a point is defined as the class of all the sense-data containing the point. (When fully stated this definition is not circular.) Certain assumptions have to be made about sense-data in order to give to space the continuity which physics commonly ascribes to it. This way of looking at geometry has been carefully worked out by Dr. Whitehead and Prof. Huntington, and it is Dr. Whitehead's work which has inspired Mr. Russell to his attempted reconstruction of physics.

Finally a common temporal order for the states of things has to be constructed and here the effects of an intervening medium have to be interpreted in terms of the theory, and account has to be taken of the results that are summarised in the Theory of Relativity. When the common temporal order has been constructed it is a comparatively easy task to proceed to a further degree of abstraction and to define instants and their relations in terms of events and their relations. The logical apparatus needed for this has been constructed by Mr. Norbert Wiener in a very interesting paper in the *Cambridge Philosophical Transactions*. (It is unfortunate that, through a misprint in the present work, Mr. Wiener appears as *Wilner*.)

This, in the barest outline, is Mr. Russell's reconstruction of

physics. Whether it ultimately prove valid or not it is clear to me that it is of the most vital philosophical importance. It is hardly possible to attempt any criticism within the limits of a review; where I think further investigation is most needed is as to the grounds on which we classify together such varied appearances as a set of circles and a set of straight lines as the appearances of one penny, and yet classify several sets of round appearances as two different pennies. But I feel tolerably confident that any difficulties that may arise are difficulties of detail, and that, even if it be found necessary to introduce rather more ultimate assumption than Mr. Russell would like, he is on the right track.

The last chapter deals with Causation with especial reference to the problem of Free-Will. It is on the lines of Mr. Russell's paper in the *Proceedings of the Aristotelian Society*. Indeterminism remains a possibility, for there is no self-evident law that all events must have causes, when we are clear that causation means nothing but functional correlation. But there is no more reason for assuming indeterminism in human actions than in the physical world, and it is a fact that the general modes of reaction of well-known people to definite general types of situation can be foretold with about as much confidence as those of physical systems. In both cases if you insist on going into extreme detail your predictions may be falsified, and this *may* be due to the events in question obeying no law, though it may equally be due to our ignorance of the complete statement of the law.

C. D. BROAD.

The Great Society. A Psychological Analysis. By GRAHAM WALLAS. London: Macmillan, 1914. Pp. xii, 406.

THE author—perhaps it is his modesty—says that while he was writing this book he saw more clearly than before what it was about, and particularly its relation to his previous book—*Human Nature in Politics*. But I can scarcely conceive that he had not present in his mind, for some time before he began to write, a fairly shrewd conception as to its relation to his former book and indeed to psychological and political thought generally. Its genesis, as it appears to me, is explained by the following considerations, though I do not know that Mr. Wallas would accept this account.

Just as nineteenth century science claimed to reduce all knowledge to terms of itself, discarding and even vehemently denouncing as nescience what it could not thus embrace, so the growing analyses of sensation and the triumphs of psychology along the lower mental levels tended to explain all mental processes in terms of images and sensations and conative trends of the