ABSTRACTS

From "British Journal for the Philosophy of Science," Vol. 9, May, 195?

The Two Theses of Methodological Individualism, LEON J. GOLDSTEIN. Part one shows that the claim made by methodological individualists that their position is the exclusive alternative to holism, i.e., the reification of social entities, results from their indiscriminant subsuming of two different theses under the same rubric. One of these is the ontological doctrine which denies the existence of these entities. The other is a methodological one which claims that all social scientific concepts must be exhaustively analyzable into the dispositions of individuals. It is shown that the denial of the latter neither entails nor supports the denial of the former. Part two attempts to reject the methodological thesis.

Theories, Dictionaries, and Observation, MARY B. HESSE. If phenomenal statements are defined to be descriptions given in ordinary language of observations, and hence to be true or false independently of scientific theory, then it cannot be said that such phenomenal statements are *tests* of a theory containing non-phenomenal statements, since there are no rules governing new interpretations of the theory in new circumstances, and hence no genuine predictions can be made or tested. It is concluded that theoretical statements are interpretations of observation in terms of a theoretical language which is richer than phenomenal language, and that there is no ultimate epistemological distinction between theoretical and phenomenal statements. Finally it is argued that difficulties about "observability" in modern physics are peculiar to the present state of quantum theory, and are not concerned with this epistemological distinction.

Theory Construction and Theory Testing, PETER ALEXANDER. This paper considers criticisms of the "dictionary view" of scientific theories put by Miss M. B. Hesse in her paper "Observation and Interpretation." Theoretical statements may correctly be regarded as requiring testing by phenomenal statements or as explaining them. Miss Hesse is misled by her concentration upon the first approach. It is a logical condition of explanation that if a theory is to explain a statement that statement must not contain the technical terms of that theory. Miss Hesse's criticisms do not touch the "dictionary view" because it does not imply that phenomenal statements are independent of the theories they test.

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Two Evolutionary Theories (I), MARJORIE GRENE. G. G. Simpson's *Major Features of Evolution* and O. H. Schindewolf's *Grundfragen der Paläontologie* are used for a case-study in scientific controversy. The two scientists, each of whom is at pains to refute the other, are found to disagree on several levels or planes of thought: the *verbal* plane, the *visual* plane (difference in use of models), the plane of *attention* (interest in different aspects of the phenomena) and the *conceptual* plane (difference in interpretative framework). The differences at each of these increasingly fundamental levels are analysed.

On Dimensionality and Continuity of Physical Space and Time, B. ABRAMENKO. The concept of three-dimensionality of physical space is analysed from the standpoint of various criteria which are classified into 3 classes: geometrical, analytical and physical. It is shown that all these criteria rest upon some assumptions the main of which are continuous structure of space and validity of Archimedean axiom. A conclusion is drawn hereof that the number "3" of spatial dimensions is not an absolute characteristic of physical space but a property ascribed to it conventionally as a consequence of tacit assuming the axiom of continuity.

The relationship between physical space and time is analysed, and their common features

and differences are discussed. Some arguments in favour of discrete structure of physical space and time are adduced, and it is emphasized that their continuous structure is neither a self-evident truth nor an experimental fact, but a postulate adopted conventionally. If this postulate is dropped, i.e., physical space-time is considered to be quantized and spatio-temporal quanta are assumed to possess some finite extension, the conventional nature of usually accepted dimensionality of both space and time becomes obvious.

Concepts of physical space and time should be clearly distinguished from psychological perceptions of space and time. Space of psychological perception is considered to be three-dimensional because of certain physiological features of the human body and ability of differentiating between various directions in space. Time is conceived as having one dimension, because of the absence of any organ in the human body for time perception and direct awareness of but one point in time,—the present instant,—instead of time direction.

Therefore it is convenient to describe events as taking place in a $(3+1)$-dimensional world. However, the actual dimensionality of the world is closely connected with its other topological properties, and the problem of dimensionality should not be handled separately from the problem of continuity.

Vol. 9, November, 1958

Two Evolutionary Theories (II), MARJORIE GRENE. The theories analysed in the previous paper form two closed systems. The author assesses them in the light of three philosophical criteria. (1) Methodologically, evolutionary theory is retrospective; it necessarily follows Vaudel's Method of Recurrence. (2) Ontologically, evolutionary theory ought to admit two principles: (a) the continuity of life and (b) the diversity of ordering principles appearing at numerous levels in this continuous process. Attempts to deny (1) and (2b) result in the fallacy of pseudo-substitution. On these criteria, Schindewolf's theory is more readily reconcilable with an adequate epistemology than Simpson's.

R. B. Braithwaite on Probability and Induction, H. E. KYBURG, Jr. This is an examination of Brathwaite's treatment of probability and induction in *Scientific Explanation*. The conclusions are: (1) that his criterion of *effectiveness* for inductive methods is plausible neither as a sufficient nor as a necessary condition for their validity; (2) that his inductive justification of induction, while not circular, is not 'valid' in any significant sense; (3) that the fundamental difficulty is a faulty conception of probability and statistical inference; and (4) that nevertheless his general scheme of inductive argument could be saved by an interpretation of probability which led to a direct justification of induction by simple enumeration.

Causal Explanations in Natural History, T. A. GOUDGE. The paper argues (1) that sciences concerned with natural history are explanatory as well as descriptive; (2) that the explanations they put forward are causal; but (3) that these explanations do not function by bringing particular events under laws. With the aid of examples from biology, it is contended that a causal explanation in natural history is typically a theoretical pattern which specifies a determinate temporal sequence of necessary and contributory conditions of a single event. The sequence is broadly continuous, and taken as a unit, it constitutes a possible sufficient condition of that event. Since the pattern embodies no general laws, it does not permit any positive predictions. Yet there is a sense in which it involves negative predictions. by virtue of which it is falsifiable in principle and therefore genuinely scientific.

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P. W. Bridgman's Operational Analysis: The Differential Aspect, G. SCHLESINGER. The scope of operational analysis of meaning is not merely restricted to the investigation of whether concepts or propositions are meaningful or meaningless. It is also possible, and this seems to be of far

greater interest, to employ operational analysis to differentiate between the meanings of various propositions and concepts. For there are different kinds among the meaningful propositions and concepts, depending on the kinds of operations to which they are susceptible. This type of analysis is immune to most of the objections raised against operationism

Examples are brought to illustrate how differential operational analysis may lead to concrete results in science.

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Space, REGINALD O. KAPP. (1) Nowhere and non-existent must not be treated as synonyms so that what is real does not necessarily also have location. (2) Space is a constituent of the material universe and not its container. (3) Relativity theory has contributed to understanding of the action of space on mass and leads to the surmise that a particle is nothing but a region of highly curved space. But, contrary to the belief of many, relativity theory adds nothing to understanding of the action of mass on space. (4) The red shift in the light distant galaxies cannot be attributed to their movement. Logical and mathematical considerations lead instead to the unfamiliar conclusion that the galaxies do not move but that space originates continuously between them.

From Dualism to Unity in Quantum Mechanics, ALFRED LANDE. The dualistic doctrine that we must be satisfied with two complementary pictures rather than search for a unitary reality shattered already thirty years ago by Born's statistical interpretation: only particles are the real constituents of matter, whereas Schrödinger's matter waves are mere appearances produced by the statistical cooperation of many particles. Adhering to Born's unitary particle interpretation on weekdays, yet praising Bohr-Heisenberg's duality on Sundays is schizophrenia, excusable only by the fact, but also responsible for the fact, that Born's interpretation has never been supplemented by explanation as to why particles in their statistical behavior should obey wave-like quantum laws.—An explanation, i.e. a reduction of the specific quantul laws to general and elementary postulates of symmetry, continuity, invariance etc. is sketched out in the article, showing once more that there is no 'fundamental principle' of duality.

The Propensity Interpretation of Probability, KARL R. POPPER. The problem of the paper is to construct an interpretation of the formal calculus of probability in terms of *objective probabilities of single events* (as opposed to sequences). A criticism is offered of the author's own attempt to account for the probability of a *single event* having a certain property as being nothing but the (hypothetical) relative frequency of that property within a (very long) sequence of event to which the single event in question belongs. An alternative but also *objective* theory of the probability of single events is proposed: its probability is interpreted as relative to, and as a property of, certain *generating conditions* of the event, and its measure is the hypothetical relative frequency within a *virtual* sequence of repetitions, created by repeating the generating conditions The stress is on 'virtual': the sequence does not need to be realised. (This is why the probability is a property of the *generating conditions* rather than of the sequence). It is claimed that this view makes of probability a relational property (comparable to 'equally heavy' or to 'heavier' and comparable to Newtonian forces), and that probabilities must be considered as 'real' in the same somewhat abstract sense in which relational properties are real: like forces, they influence real events. In an Appendix, an axiomatic system for probability is given consisting of three axioms (two of which are in the form of probabilistic definitions of product and complement elements).