

ABSTRACTS FROM BRITISH JOURNAL FOR THE PHILOSOPHY OF SCIENCE

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*'The Effect of Essentialism on Taxonomy (II)'**. David L. HULL.

Quite often when a scientific problem remains unsolved for a long time in spite of repeated attempts at solution, the problem turns out not to be strictly empirical but involves a basic philosophical presupposition which has remained unchallenged. Such is the case with the species problem. The philosophical presupposition is that definition means Aristotelian necessary and sufficient condition. In recent years taxonomists have abandoned Aristotelian definition for cluster-concept analysis for the names of taxa. The solution to the species problem (if species are to be units of evolution) lies in extending this type of analysis to 'species' itself.

Origin and Concept of Relativity (II), G. H. KESWANI.

** The relative contributions to the (special) theory of relativity by Poincaré, Lorentz and Einstein are assessed with reference to their original contributions and with reference to the ideas they employed. The opinions of the three as to the discovery of the theory are quoted. Evidence is given to show that Einstein was definitely aware of Poincaré's pioneering ideas. The probable connection between Einstein's paper of 1905 and Lorentz's memoir of 1904 is traced. Einstein's original paper is critically studied to see the extent to which Einstein carried out his own programme consistently.

Can a Machine Be Conscious? Dennis THOMPSON.

It is argued that the view that a machine *cannot* be conscious is misconceived, largely because it mistakenly assumes that the philosophical consequences which follow from the acceptance of the view that machines *can* be conscious are more disturbing than those which follow from the rejection of the latter view. A principal aim of the paper is to separate and clarify the various issues that have become confused in the discussion of the machine problem. A short bibliography of recent writers who have held the view that machines cannot be conscious is included.

On the Dual Nature of Light, George MAGYAR

Experimental evidence using laser techniques is advanced for the view that light between emission and absorption should be treated as a wave phenomenon. The quantum features of light are created in the interaction with matter. Objections to the view are discussed and rejected.

Man, Beast, and Philosophical Psychology, John King-Farlow and Elton A. Hall.

The authors criticise manifestations of *apriorism* in philosophical psychology in recent works of analytical philosophy. In particular, the 'extreme *apriorism*' of P. T. Geach's *Mental Acts*, and the 'cautious *apriorism*' of Jonathan Bennett's *Rationality* are critically examined. In each case, the paper opposes dogmatic insistence on a general discontinuity between man and other species, and insists that only *a posteriori* research can determine in what ways different species are like and unlike man. A genetic explanation is offered of the anthropocentrism widespread among diverse schools of contemporary philosophy.

* This is the second part of a two-part article. The first part appeared in *B.J.P.S.* 15(60) February 1965, pp. 314-326.

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Theoretical Models, Peter ACHINSTEIN.

This paper discusses the nature of theoretical models in physics, examples of which are the Bohr model of the atom, the billiard ball model of gases, the corpuscular model of light, and the shell model of the atomic nucleus. First, a number of important characteristics of such models is isolated and examined. It is argued that a theoretical model consists of a set of assumptions about an object or system, that it attributes to such an object or system what might be called an inner structure or composition, that it is treated as an approximation useful for certain purposes, and that it is often formulated on the basis of an analogy between the object described in the model and some different object or system. Next, claims about theoretical models made by various philosophers are critically examined, claims to the effect that a model provides an interpretation for a formalism or calculus, that it has the same formal structure as that of some theory, and that it is in some sense to be construed as an analogy. Finally, the conclusions reached are evaluated in the light of certain 19th century models of the ether.

Models and Theories, Marshall SPECTOR.

It is argued that Braithwaite's explication of the concept of a model for a physical theory is in error in claiming that identity of formal structure is all that is required for a system to be a model for a theory. A modification of his analysis is offered, in which substantive features of the theory and model are taken into account. It is shown how this modified analysis can account for some of the uses to which models are put by physicists.

In the context of developing this modified analysis, it is also shown that the analysis of the structure of physical theories which underlies Braithwaite's explication is in error; in particular, it is argued that theoretical terms can, after all, be 'directly interpreted'. (This latter point is of more general interest and importance, since the analysis of physical theories under consideration is one which is held by a number of influential philosophers of science, including Rudolf Carnap, Ernest Nagel, Carl Hempel, and others.)

Towards Theoretical Conceptualization of Superstition. Karl E. SCHEIBE and Theodore R. SARBIN.

A superstition is conceived to be a kind of belief which comes to exist because of imperfect knowledge of antecedent-consequent relationships in the ecology. As such, superstitions function to reduce cognitive strain and hence are self-maintaining. Superstitions may be acquired either by direct verbal communication (assimilated from the culture) or by first-hand perception of fortuitous antecedent-consequent relationships. A necessary condition is the evaluative significance of the events about which the superstitions are developed. It is maintained that superstitions are not *ipso facto* reprehensible since such beliefs are psychologically necessary for existence.

The Logic of Rational Decision. Herbert A. SIMON.

The paper investigates logic of imperatives by examining areas of scientific activity where imperatives play an important role. Part I examines classical theories of rational decision in economics and statistical decision theory. Part II examines the logical relations of means to ends in programming and problem-solving structures.

The analysis shows that exactly the same logic is used in normative theories as in positive theories. There is never any occasion to deduce one imperative from another. Frequently, however, an imperative is converted to a declarative statement, and the latter adjoined to a set of empirical statements. Frequently, also, a derived empirical statement is converted to an imperative, by binding a command variable. The rules for carrying out these conversions are stated. Finally, one set of imperatives is frequently obtained from another by processes of discovery or retrodution, but the relation between the initial and derived sets is not a relation of logical implication.

Causality, Causal Laws and Scientific Theory in the Philosophy of Kant. Gerd BUCHDAHL.

Kant's proof of the principle of causality interprets it as a condition of judgements of experience in general, including those that are empirical, and hence contingent. The universal ingredient of causality, or lawlikeness, in all experience can on this argument therefore not be taken to be equivalent to the claim that all experience is lawlike, in the sense in which this has been understood by most Kant commentators. The principle of causality can function for Kant not as a general presupposition of causal statements (as for instance in Mill), but only as a rule, in accordance with which a scientist will continually search for causes.

This interpretation is supported by Kant's view that empirical laws are themselves contingent, whilst their lawlikeness is a function not of the transcendental framework of the understanding, but of 'reason', i.e. of scientific reasoning, involving both a deductive and constructive conceptual framework.

Connectivity, Chance, and Ignorance. D. H. MELLOR.

The paper applies the regulative principle of connectivity to an analysis of certain chance propositions, which are taken to ascribe possession of a physical property to chance set-ups.

The analysis serves to support a two-concept view of probability, and shows how the correct conclusions of invalid classical arguments from ignorance may be validly derived on this view. The paper concludes by applying this analysis to a critical examination of Kneale's version of the classical view.

The Concept of Probability. Neil COOPER .

- (1) The everyday and numerical uses of the concept of probability are linked.
- (2) There is a logical concept of probability whose use is limited to philosophical contexts and cannot be explicated in terms of relative frequency.
- (3) The empirical, everyday concept of probability is logically connected with the concept of relative frequency, but its meaning is not exhausted by the latter concept.
- (4) The rationality of commending the usual as "probable" has been vindicated.
- (5) Subjective and objective uses of probability-language have been distinguished and it is suggested that they form part of a continuum of uses which gives the empirical concept of probability its unity.
- (6) A meaning has been given to probability-statements which are both unqualified and singular.
- (7) The alleged existence of a concept of inductive probability distinct from the empirical concept is rejected.

On Logical Definitions of Confirmation. D. STOVE.

That confirmation can be defined in purely logical terms, and that only empirical statements can be confirmed, are two widely-held views; Professor C. G. Hempel, for example, asserts both in a classical article. Yet they are incompatible. For any purely logical definition of confirmation will be capable of being satisfied by suitably chosen pairs of, for example, metaphysical statements; otherwise we must suppose, what is incredible, that empiricalness can be defined in purely logical terms.

Origin and Concept of Relativity (III). G. H. KESWANI.

The notion of relativity of motion in general, is examined. The principle of equivalence is only an approximation and it does not establish relativity of motion in general (Eddington, Fock); nor does the principle of covariance lead to relativity (Ricci and Levi Civita, Fock). Einstein's general theory of relativity is essentially about the laws of physics in gravitational fields.

Assumption of non-Euclidean geometry for space-time manifold leads to incorrect perihelionic

advance of Mercury. The normal result is restored if it is assumed, with Rosen, that $g_{\mu\nu}$ represent the gravitational field but have no connection with the geometry of space-time, which must be regarded as flat.

Einstein's field equations (without cosmological constant) are shown to yield a *static* cosmological model corresponding to the singular surface $2M/R = c^2/K$, leading to results which are consistent with principal astronomical observations. This solution verifies Mach's principle in a somewhat novel fashion and gives insight into the notion of inertial systems.

It is shown that the principle of constancy of velocity of light is sufficient to establish Lorentz transformation equations (L.T.E.), which are independent of the notion of relativity. An examination of L.T.E. shows a high degree of equivalence in the description of the laws of physics in different inertial systems. The principle of relativity, therefore, assumes verisimilitude by identification with L.T.E. Further analysis, however, shows that, although time measures of various inertial systems are constant within, they vary from system to system. This forces one to recognize the system assumed at rest in deriving L.T.E., to be a primary preferential system. The system of the masses of the universe qualifies for this system. In fact, the absolute effects observed in the case of accelerated motion demand such a system.

Physics and Common Sense, Nicholas MAXWELL.

The article provides a critique of physicalism, a theory which may seem to be supported by physics, and which asserts that the world is made up entirely of fundamental physical entities, human perception being almost wholly delusive. Two physicalist theories of perception are considered and rejected: (a) Dualism; (b) The Discriminatory Response theory, defended recently by Professor Smart. Physicalism is then re-interpreted to provide a kind of description of the world, which may be true, and which is compatible with ordinary 'common sense' descriptions. The precise requirements which each kind of description must fulfil are defined.

Confirmatory Models of Theories, Robert ACKERMANN.

This paper outlines a construal of scientific theories in which observational generalizations are not deducible from theoretical axioms, but may be transformed into theorems which follow from theoretical axioms under certain restrictions which emphasize the importance of scientific explanation in the evaluation of theories. On the construal which is presented, theories are falsifiable in the established sense, but their confirmation can occur when any of four different kinds of discovery are made. The paper discusses the relevance of this more complicated confirmation notion to the history of science and presents some other advantages of this construal over the construal of scientific theories as partially interpreted axiomatic systems.