ABSTRACTS FROM DIALECTICA

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Contents Sommaire Inhalt

L'ÉPISTÉMOLOGIE DE LA PHYSIQUE QUANTIQUE

La théorie dualistique ne s'impose que par le fait d'une apparente impossibilité d'expliquer la réfraction des électrons autrement que par un intermédiaire ondulatoire et par le fait aussi que le dilemme qu'elle contenait semblait pouvoir être rendu admissible par les artifices de la formulation discursive du positivisme dialectique.

La première partie de cet article montre que cette façon de voir s'explique par l'ommission de certaines lois physiques importantes dont la prise en considération permet au contraire de justifier la réfraction des électrons par une mécanique des seules particules rendant ainsi l'« idéologie dualistique » superflue. La seconde partie apporte une explication physique de l'apparence ondulatoire du formalisme quantique. Elle découle de certains principes non quantiques déjà contenus dans la mécanique déterministe, mais que l'on fait servir à l'expression des rapports aléatoires entre les données du niveau atomique.

Physics and Reality. Mario Bunge, Delaware, U. S. A.

A semantical and methodological analysis of physical theories is performed in order to find out their relation to reality and to human experience. It is shown that every physical theory refers immediately to an idealized model of what is supposed to be a piece of reality—the mediate referent of the theory. Two kinds of physical interpretation of physical symbols are distinguished: objective and operational, and the difference between reference and evidence is stressed. It is claimed that for a theory to be physically meaningful it is necessary that it includes rules of objective reference. In some cases a theory contains, in addition, evidential reference rules, i.e. correspondences between some of its concepts and empirical items. But the test of any theory requires, rather than operational rules, further theories that can bridge the gap between what the theory refers to (e.g., the passage of a cosmic ray) and its remote symptom (e.g., the click of a counter). The conditions for the semantical consistency are sketched and it is argued that there does not exist a semantically consistent interpretation of any of the formalisms of quantum theory. From this analysis arguments in favor of critical realism are drawn.

The Idea of a Particle in Microphysics. David Park. Williamstown, (Mass., U.S.A.)

The development of modern quantum theory has superseded the classical theory of particles. Nevertheless, the imagery and terminology of the classical theory still survive, both in intuitive understanding and mathematical formulation. This paper shows that although the classical concept of a particle may be useful for some purposes of intuition, it is useless for others, and

it is never necessary. In microphysics, particles are usually assigned a cherge *e* and a mass *m*. We discuss the meaning of these quantities in terms of laboratory experience.

Structures Logiques et Mathématiques en Physique Quantique. Gérard EMCH et Josef Maria JAUCH, Genève.

In this article we present the essential features of modern quantum mechanics in a formalism which resembles in many respects the propositional calculus of classical logic. The purpose is to render explicit the empirical origin of the structure of this calculus, to compare it with the corresponding calculus for classical systems, to sharpen the basic notions of compatibility and complementarity and to sketch some of the more recent insights concerning the properties of states as well as the nonexistence of hidden variables.

Le « Paradoxe » des Correlations d'Einstein et de Schrödinger et l'épaisseur temporelle de la Transition Quantique. O. COSTA DE BEAUREGARD, Paris.

It is argued that the so-called correlation paradoxes of Einstein-Podolsky-Rosen and of Schrödinger imply that individual quantum processes are connected in time in a way that is symmetric *with* retarded and advanced actions; a « fatalistic » character of the course of events is thus advocated, similar to the one occuring in the so-called « Heisenberg picture » in hyper-quantized field theory.

Volume 20, No. 1, 1966

Contents Sommaire Inhalt

Dans l'œuvre de Ferdinand Gonseth, on voit culminer le désir de rapprocher, dans leurs objectifs et dans leurs méthodes, le philosophe et le savant.

Cette idée même a guidé, compte tenu des exigences historiques, les développements qui précèdent.

Après un parcours rapide, évoquant les vingt premières années de *Dialectica*, le rôle scientifique joué dans cet imposant répertoire par son fondateur, rôle fortement accru par ses livres, on trouvera donc une enquête sur des thèmes favoris dont l'intérêt s'est confirmé, et dont les objets ont une haute valeur, pour qui voudrait analyser les courants de pensée capables d'enrichir la philosophie scientifique et d'affecter utilement le proche avenir de *Dialectica*.

Alexander Wittenberg's book 'Bildung und Mathematik (Mathematik als exemplarisches Gymnasialfach)' contributes to the actual discussion of the question how teaching of mathematics at the gymnasium should best be performed. Wittenberg already before devoted various publications to this subject. It was his intention to continue the present work by a second part; however he has been, alas, prevented from this by a premature death.

The leading idea in Wittenberg's dealing with the said question is, that one should not in first respect care for the preparation of later studies but rather for the formation of the personality. Concerning in particular mathematics, he wants to show that this field is especially suitable for such a teaching. Wittenberg's arguing in his book consists mainly in the following: 1. he points to those charactéristics of mathematics which are particularly favorable for procuring a wider mental horizon; 2. he offers some general suggestions for the method of teaching, in particular the 'Themenkreismethode'; 3. he presents, as an instance, the description of a course of elementary geometry. The course is arranged in a way to favor the development of creative

and independent thinking. In stressing this concern Wittenberg is in agreement with the tendencies uttered by several authors of our time, asM. Wagenschein, G. Pólya, M. Wertheimer, A. N. Whitehead. Wittenberg's way of writing is very impressive and his book abounds in instructive observations and suggestive remarks.

The present article is a report of Wittenberg's book containing in particular a brief description of the said course in elementary geometry, with some commenting remarks.

P. E. PILET, L'analogie en biologie.

Usual definitions and relative importance of the analogy — in biological sciences — were first discussed. Analogy-conclusion, analogy-hypothesis and analogy-invention were then successively presented in relation to the descriptive (chiefly taxonomy and cytology) and experimental (physiology and biochemistry) biology.

H. KÖNIG, Über ein einfaches Drei-Komponenten-Modell für das menschliche Denken.

Prenons comme point de départ l'hypothèse de travail que l'activité spirituelle d'un être humain se laisse sommairement représenter comme système à trois composantes, que nous nommons « Potenzen » (côté sujet) et « Valenzen » (côté object). Ces deux triples d'éléments se rencontrent par interaction dans les neuf « Aktivitäten » ou champs partiels de notre activité spirituelle. Le champ total est considéré comme un système fermé; il correspond au « Feld » de la psychologie des formes. À l'aide de simples représentations sur le déroulement des réactions électrophysiologiques passant par les champs partiels, on constate la possibilité: 1er de décrire cet état de transition entre inconscient et conscient, 2^{e} d'interpréter la diversité des types caractérologiques, 3^{e} de mettre en évidence une synthèse entre savoir et croire, 4^{e} de fournir un schéma cybernétique pour les buts de classification. Le modèle décrit paraît être pratique et permet maintes applications.

C. T. K. CHARI, Information theory, quantum mechanics and "linguistic duality".

The paper explores first the postulational basis and significance of 'measures of information' in current information theory and their possible relations to physical entropy and Brillouin's 'negentropy' regarded as the negative of entropy. For some purposes, the same pattern or formal structure may be abstracted from both 'entropy' and 'information'. The paper analyzes, in the second place, the mathematical analogies which have been traced between information theory and quantum mechanics and argues that the analogies have but a limited value when we come to grips with the deeper, and yet unsolved, problems of quantum theory. Lastly it is urged that the indiscriminate extensions of statistical and information-theoretic methods, and of quantum-mechanical analogies, e.g. 'linguistic duality', to psycholinguistics, literary and aesthetic *Gestalten*, can result only in crude exaggerations. Dialectical methodology requires the continual reformulation of all scientific descriptions which have to reckon perpetually with the richness of human materials.

F. GONSETH, Le problème du langage et la philosophie ouverte, 1er partie.

Dialectica, General Index — Table générale — Inhaltsverzeichnis von 1947 bis 1965 (Vol. 1 bis 19).