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E P I S T E M O L O G I C A L L E T T E R S
L E T T R E S E P I S T E M O L O G I Q U E S
E P I S T E M O L O G I S C H E B R I E F E

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Hidden Variables and Quantum Uncertainty
(Written Symposium, 5th Issue)

Variables cachées et indéterminisme quantique
(Symposium écrit, 5ème livraison)

Verborgene Parameter und Quanten-Unbestimmtheit
(Schriftliches Symposium, 5.Heft)

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Nous nous excusons de notre long silence, en partie dû aux difficultés que nous avons eues à obtenir l'article de TIME qui a donné lieu à l'incident dont il va être surtout question dans ce numéro.

Dans la 2e livraison de ce symposium, M. Costa de Beauregard parlait d'expériences faites en parapsychologie avec des rats et des blattes, et qui avaient montré "que l'animal fausse en sa faveur le fonctionnement normal d'un générateur aléatoire de "récompenses" ou de "punitions", et notamment lorsque le générateur aléatoire est gouverné par la mécanique quantique." Suivait une note (11) qui renvoyait à un article de H.Schmidt.

Dans un article paru dans TIME 104, no 9, August 26, 1974, p. 45 et intitulé "The Psychic Scandal", on parle d'expériences du même type effectuées par un certain Walter J.Levy jr..

"He had electrodes implanted in the brains of rats in a zone where stimulation gave the animals intense pleasure. The stimuli were delivered at random intervals by a computer that in turn was keyed to the decay of atoms in a sample of radioactive strontium 90. Without any outside influence, the system would stimulate the rats' pleasure zones 50% of the time. If the rats could anticipate the computer by E.S.P.* or influence the decay of the radioactive source by psychokinesis, their pleasure score would exceed 50%.

By early May, Levy was reporting 54% pleasure stimulus scores, indicating that the rats had psychic powers. Then one of Levy's assistants became suspicious when he noticed that the director seemed to be loitering needlessly around the equipment. With two colleagues, the assistant decided to check. From a hiding place one watched while the others helped Levy run a

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* Extra-Sensorial Perception

test. They saw him tamper with the recorder, causing his tape to score high. Another set of instruments - installed without Levy's knowledge - confirmed their suspicions by recording the expected 50% score."

M. Pierre Huguenin, qui est tombé par hasard sur cet article, a pensé - un peu légèrement, dit-il - qu'il s'agissait précisément des expériences de Schmidt dont parlait M. Costa de Beauregard, et il a négligé de vérifier les noms. De telle sorte que la fraude a été faussement attribuée à H. Schmidt, à la p. 3 de la 4e livraison (déc. 1974).

Nous prions M. Schmidt de nous excuser pour cette malencontreuse confusion.

Monsieur le Rédacteur,

Dans le dernier fascicule des "lettres", j'ai affirmé de façon trop légère que les expériences de Schmidt ne devaient plus être prises en considération. Il s'agit d'une malheureuse confusion de personnes comme me l'a fait observer M. O.Costa de Beauregard. Je regrette d'avoir ainsi pu nuire à la réputation de M.Schmidt. Le problème reste donc ouvert.

Cette erreur doit montrer à chacun quels mécanismes psychologiques même inconscients s'opposent à l'acceptation de résultats expérimentaux susceptibles de mettre en cause les bases fondamentales, telles que la causalité, de notre pensée contemporaine.

En vous priant de bien vouloir insérer cette lettre dans le prochain cahier, je vous prie d'agréer, Monsieur le Rédacteur, mes salutations les meilleures.

P. Huguenin

Monsieur le Secrétaire,

Mon ami de Beauregard me communique le no de déc. 1974 de l'Association F. Gonseth où je trouve sous la plume de M. Huguenin sous la référence "6.2 à propos de 6"

"C'est avec soulagement que j'ai lu dans TIME que les résultats étonnants de Schmidt n'étaient qu'une mystification..."

Je suis bien au courant de ces problèmes de parapsychologie, aussi permettez moi de vous exprimer mon étonnement. Les résultats de Schmidt sont toujours aussi solides. Malheureusement je n'ai pas sous les yeux l'article de TIME auquel M. Huguenin fait allusion.

Ce qui est arrivé à l'Institut de Recherches de Dunham, c'est une chose terrible concernant non pas Schmidt mais J.Levy qui a été pris sur le fait et congédié immédiatement par Rhine lui même au moment où il truquait ses chiffres. (Bref, la même déplorable aventure qu'avec Summerlin et les greffes de peau au Sloan Kettering Institute.) Tout cela est tragique évidemment, mais ne met nullement en cause les travaux de Schmidt.

Sir,

In the December 1974 issue of the "Epistomological Letters" P. Huguenin writes: "...j'ai lu dans TIME que les résultats étonnants de Schmidt n'étaient qu'une mystification." There was no such statement in TIME. I expect that the editor of the LETTERS will print in the next issue an apology for this irresponsible and for me personally embarrassing remark.

Helmut Schmidt

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P.S. The TIME article refers to fraudulent falsification of test results by Jay Levy. Further information on this case is contained in a recent issue of the Journal of Parapsychology.

Levy had claimed spectacular results in two types of animal experiments, one experiment first tried by myself and one experiment pioneered by Rémy Chauvin in Paris. Levy's results appeared much stronger than the results of the original researchers. Last year two of Levy's assistants got suspicious and caught Levy falsifying the test results.

11.0 M. Mugur-Schächter - The quantum mechanical one-system formalism, joint probabilities, and locality of momentum-measurement events - Introduction *)

Wigner has demonstrated a theorem (1) that is believed to establish the impossibility to associate to any state vector a joint probability of the positional and the momentum variables, compatible with both the quantum-mechanical distributions for the position and for the momentum. Such an assertion is obviously of a vital importance for the problem of the significance of the quantum mechanical formalism. In this work we study detailedly Wigner's demonstration. The conclusion obtained is that in

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*) Il s'agit de l'introduction à un article qui paraîtra dans les Actes du Colloque "Un demi-siècle de mécanique quantique" (Strasbourg, mai 1974) et peut-être aussi dans les "Foundations of Physics". Cet article de 54 pages dactylographiées, est divisé en 4 parties: I Introduction, II The mathematical framework, III Study of Wigner's Theorem, IV Conclusion.

fact this demonstration does not incriminate the associability of a joint probability to any one-system state vector, but that instead it leads to an alternative between the non-locality of the p-measurement events corresponding to a one-system state vector with non-connexe support, or the falsity of the quantum mechanical momentum distribution for such a state vector. This alternative is expressed by a non-equality between two momentum distributions, so that it is decidable by experiment. Moreover, once this alternative has been perceived in connection with the concept of a joint probability, it is possible to free it from this concept, by reconstructing it inside purely orthodox quantum mechanics. Thereby it becomes visible that this alternative is specific of the quantum mechanical formalism, wherefrom it is injected into the joint probability framework by the two marginal conditions.

The alternative stated above has similitudes with that one established by Bell (2) concerning the spin-measurements for a two systems system. But it also possesses specificities, stemming from the fact that Wigner's theorem makes use of the one-system formalism of quantum mechanics:

In the first place, Wigner's demonstration envisages one-system state vectors of the form $\psi = a\psi_1 + b\psi_2$ where the supports I_1 and I_2 of ψ_1 and ψ_2 respectively are finite and disjoint, so that the support $I = I_1 \cup I_2$ of ψ is non-connexe. In such a case the quantum mechanical formalism describes a unique system by use of two state vectors ψ_1 and ψ_2 defined over spatially separated domains; whereas in the case of a system of two systems that have interacted and have then ceased to interact, the quantum mechanical formalism makes use of a unique state vector, for the description of two systems that are considered to be spatially separated at the

considered epoch. This creates a dissymetry with respect to the well-known problem of the separability, between the one-system locality problem raised by Wigner's demonstration, and the two-systems locality problem expressed by Bell's inequality.

But there exists another, more profound difference. In the case of Bell's locality problem, it is necessary to admit the existence of a non-local signal, if the quantum mechanical prediction is true, but the source of this signal can be specified without difficulty in physical terms; whereas in the case of the one-system locality problem raised by Wigner's demonstration, while it is equally necessary to admit the existence of a non-local signal if the quantum mechanical prediction is true, it seems furthermore not possible so far to specify in physical terms the source of this signal. Therefore, if the experimental investigations will prove that the non-locality is a characteristic of the physical reality, not of the quantum mechanical formalism alone, the one-system non-locality will probably entrain the introduction of some further assumptions in our conception on the physical reality, and these assumptions might come out to be as fundamental and revolutionary as non-locality itself.

If, on the contrary, the experimental investigations will show that the non-locality is a characteristic of the quantum mechanical formalism alone, then the analyses contained in this work direct the attention on the particular type of one-system states described by state vectors of the form $\psi = a\phi_1 + b\phi_2$. When the supports I_1 and I_2 of ϕ_1 and ϕ_2 respectively are nonoverlapping, such state vectors raise a locality problem for the p-measurement events. When these supports overlap, such state vectors describe an interference (these two situations can happen to describe two distinct phases of the

evolution of a unique system). Now, the type of probabilistic connection between the position-measurement-events in an interference state $\psi = a\psi_1 + b\psi_2$, and the position-measurement-events in the states ψ_1 and ψ_2, has played a central role for the construction of the quantum mechanical formalism. But it might be that this formalism has not integrated the entire physical specificity of the one-system states $\psi = a\psi_1 + b\psi_2$, so that, while the study of the position distribution for such states led towards quantum mechanics, the reexamination of the momentum distribution for such states will contribute to entrain outside quantum mechanics.

Whatever the verdict of the future investigations will be, the present study brings forth the relation between the topological structure of the support of a one-system state vector, the form of the functional dependence on the state vector, of the considered joint probability measure, and the locality of the corresponding p-measurement events.

REFERENCES

(1) WIGNER, Phys. Rev. 40, 749-759 1932

(2) BELL, Physics 1, 195-200, 1964

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Les "Lettres épistémologiques" ne voudraient pas être un périodique comme les autres. Elles désirent instaurer un mode de discussion libre et informel, permettant de confronter les idées, de les faire mûrir, avant leur éventuelle publication définitive dans une véritable revue.

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