

HASARD OU METHODE?

(E. Husserl, *Krisis*, 1935-6, § 9 d)

Intr.

Stratégies heuristiques (règles du jeu \neq règles stratégiques). Invention vs. découverte. Logique vs. psychologie/sociologie de la découverte.

«Et de quelle façon chercheras-tu, Socrate, cette réalité dont tu ne sais absolument pas ce qu'elle est? Laquelle des choses qu'en effet tu ignores, prendras-tu comme objet de ta recherche? Et si même, au mieux, tu tombais dessus, comment saurais-tu qu'il s'agit de cette chose que tu ne connaissais pas?» (Platon, *Ménon*, 80d, tr. fr. M. Canto-Sperber, Paris: GF-Flammarion, 1991).

1. Le bureau, le laboratoire et... le bled.

Quatre étapes: préparation/incubation/illumination/finition (voir: Hadamard, Ch. V). La / le . Voir l'agent pathogène / le cultiver / l'inoculer (Ch. Nicolle, in: 1961, p. 286).

(Paul Souriau, *Théorie de l'invention*, Paris, 1881; cit. Hadamard, p. 17).

(Ch. Nicolle, 1932, p. 7).

l'intuition qui éclaire le problème inconnu a le plus souvent la brièveté de l'éclair, la démonstration qu'exige la pensée nouvelle demande du temps (Ch. Nicolle, 1934, ed. 1961 p. 348).

Poincaré Henri (1908), 'L'invention mathématique', *Bulletin de l'Institut Général Psychologique*, 8 (3): 175-187; reproduit in: *Science et méthode*, Paris: Flammarion, 1908.

Nicolle Charles (1932), *Biologie de l'invention*, Paris: Alcan.

Nicolle Charles, *Destin des maladies infectieuses* (1933), suivi de *L'expérimentation dans l'étude des maladies infectieuses* (1934), Genève: Alliance culturelle du livre, 1961.

Hadamard Jacques (1945), *An Essay on the Psychology of Invention in the Mathematical Field*, New York: Princeton University Press; tr. fr. par Jacqueline Hadamard, *Essai sur la psychologie de l'invention dans le domaine mathématique*, Paris: Librairie scientifique Albert Blanchard, 1959. Reproduit, avec la conférence de Poincaré, Paris: Gabbay, 1993.

Ball Gene V. (1971), 'Two epidemics of gout', *Bulletin of the History of Medicine*, 45: 401-408.

Buck C., Llopis A., Najera E., Terris M., eds. (1988), *The Challenge of Epidemiology. Issues and Selected Readings*, Washington D.C.: PAHO-WHO, Scientific Publication n° 505.

2. Logique et hasard

'Règles de la méthode' (Descartes), 'canons de l'investigation expérimentale' (Mill). 'methods of scientific discovery' (Whewell). Essai et erreur, conjecture et réfutation. Continuité (?) adaptative entre connaissance endosomatique (encodée dans les organismes vivants) et connaissance exosomatique (encodée dans les théories scientifiques).

(Descartes, *Regulae ad directionem ingenii*, IV).

«In other writings the present author has advocated a systematic extrapolation of this nested hierarchy selective retention paradigm to all knowledge processes, in a way which, although basically compatible with Popper's orientation, may go farther than he would find reasonable in extremity, dogmatism, and claims for generality. It may on these same grounds alienate the reader. (Disagreement at this point will not rule out accepting later propositions.)

«2. In such a process there are three essentials: (a) Mechanisms for introducing variation; (b) Consistent selection processes; and (c) Mechanisms for preserving and/or propagating the selected variations. Note that in general the preservation and generation mechanisms are inherently at odds, and each must be compromised.

«The word "blind" is used rather than the more usual "random" for a variety of reasons. It seems likely that Ashby unnecessarily limited the generality of his mechanism in Homeostat by an effort fully to represent all of the modern connotations of "random". Equiprobability is not needed, and is definitely lacking in the mutations which lay the variation base for organic evolution. Statistical independence between one variation and the next, although frequently desirable, can also be spared: in particular, for the generalizations essayed here, certain processes involving systematic sweep scanning are recognized as blind, insofar as variations are produced without prior knowledge of which ones, if any, will furnish a selectworthy encounter. An essential connotation of "blind" is that the variations emitted be independent of the environmental conditions of the occasion of

their occurrence. A second important connotation is that the occurrence of trials individually be uncorrelated with the solution, in that specific correct trials are no more likely to occur at any one point in a series of trials than another, nor than specific incorrect trials. A third essential connotation of "blind" is rejection of the notion that a variation subsequent to an incorrect trial is a "correction" of the previous trial or makes use of the direction of error of the previous one. (Insofar as mechanisms do seem to operate in this fashion, there must be operating a substitute process carrying on the blind search at another level, feedback circuits selecting "partially" adequate variations, providing information to the effect that "you're getting warm", etc.)

«While most descriptions of discovery and creative processes recognize the need for variation, the present author's dogmatic insistence on the blindness of such variation seems generally unacceptable. As will be seen in what follows, particularly in the discussions of vision and thought, there is no real descriptive disagreement. The present writer agrees that the overt responses of a problem-solving animal in a puzzle box are far from random, and this for several reasons: (1) Already-achieved wisdom of a general sort which limits the range of trials (such wisdom due to inheritance and learning). (2) Maladaptive restriction on the range of trials. (Such biases due to structural limitations and to past habit and instinct inappropriate in a novel environment.) But these first two reasons will characterize the wrong responses as well as the correct ones, and offer no explanation of the correctness of the correct one. (3) Vicarious selection, appropriate to the immediate problem, achieved through vision. (See the subsequent section on this topic.) When, in considering creative thought, Poincaré is followed, allowing for unconscious variation-and-selection processes, opportunity for descriptive disagreement is further reduced. The point is not empirically empty, however, as it sets essential limits and requirements for any problem-solving computer (discussed under "Thought", below). But the point is also analytic. In going beyond what is already known, one cannot but go blindly. If one can go wisely, this indicates already achieved wisdom of some general sort.» (Donald C. Campbell, 'Evolutionary epistemology', in: Radnitsky & Bartley III, 1987, pp. 56-57).

Aristote, *Organon*.

Bacon Francis (1620), *Novum Organum*. Engl. transl.: *The New Organon*, in: *The Works of Francis Bacon*, London, 1857-74, vol. VIII.

Descartes René (1637), *Discours de la méthode. Pour bien conduire sa raison et chercher la vérité dans les sciences. Plus La Dioptrique, Les Météores, et La Géométrie, qui sont des essais de cette méthode*, Leyde: Ian Maire.

Mill John S. (1843), *System of Logic Ratiocinative and Inductive Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation*, London. Tr. fr. par Louis Peisse, *Système de logique déductive et inductive. Exposé des principes de la preuve et des méthodes de recherche scientifique*, Paris: Baillière, 1866; réimpr. Bruxelles: Mardaga, 1990.

Whewell William (1847), *The Philosophy of the Inductive Sciences, Founded upon their History*, London: Parker (2 vols). Facsimile reproduction de l'édition de 1847, London: Frank Cass, 1967. Il y eut en 1858-60 une 3e édition de ce livre, en trois volumes, intitulés: 1. *The history of scientific ideas*; 2. *Novum organon renovatum*; 3. *On the philosophy of discovery*. Tr. fr. partielle du *Nov Org Renov* (livre III) sous le titre *De la construction de la science* par R. Blanché, Paris: Vrin, 1938.

Popper Karl R. (1934), *Logik der Forschung*, Wien: Springer. Engl.tr. par l'auteur et collab. *The Logic of Scientific Discovery*, London: Hutchinson; 9th rev. ed. 1977. Tr. fr. par N. Thyssen-Rutten et Ph. Devaux, *La logique de la découverte scientifique*, Paris: Payot, 1973 (préface de Jacques Monod).

Popper Karl R. (1972), *Objective Knowledge: An Evolutionary Approach*, London: OUP; 2e ed. augm. 1979. Includes: 6. 'Of clouds and clocks', 7. 'Evolution and the tree of knowledge'. Tr. fr. partielle par C. Bastyns, *La connaissance objective*, Bruxelles: Complexe, 1978; tr. fr. complète par J.J. Rosat, Paris: Aubier, 1991.

Feyerabend Paul, *Against Method. Outline of an anarchistic theory of knowledge*, London: New Left Books, 1975, dédié à Lakatos, "friend and fellow anarchist"; tr fr par B. Jurdant & A. Schlumberger, *Contre la méthode. Esquisse d'une théorie anarchiste de la connaissance*, Paris: Seuil, 1979.

Lakatos Imre (1978, posth.), *The methodology of scientific research programmes. Philosophical papers*, Cambridge: at the University Press (contient: 1. 'Falsification and the methodology of scientific research programmes', 8-101; tr. fr. 'La falsification et la méthodologie des programmes de recherche scientifiques', in: Imre Lakatos, *Histoire et philosophie des sciences*, 1994, 1-146).

Radnitsky G. & Bartley III W.W., eds. (1987), *Evolutionary Epistemology, Rationality, and the Sociology of Knowledge*, La Salle, Illinois: Open Court. Inclut: Bartley W.W., 'Philosophy of biology vs. philosophy of physics', 1: 7-45; Campbell D.T., 'Evolutionary epistemology', 2: 47-89; Campbell D.T., 'Blind variation and selective retention in creative thought as in other knowledge processes', 3: 91-114; Popper K.R., 'Campbell on the evolutionary theory of knowledge', 4: 115-120; Wächtershäuser G., 'Light and life: on the nutritional origins of sensory perception'; Popper K., 'Natural selection and the emergence of mind', 5: 121-138; 6: 139-155.

Concl.

La recherche s'enseigne-t-elle?

«Comment espérer d'entraîner les jeunes gens de bonne volonté, de leur inoculer le goût de la recherche quand les voies de cheminement de la pensée créatrice leur demeurent cachées et que l'oeuvre elle-même se trouve réduite à la sèche inscription des résultats? Toute entreprise évoque des acteurs, des figurants, des péripéties, un décor et, tout autant qu'une volonté agissante, le coeur d'un homme» (Ch. Nicolle, in: 1961, p. 343).