B. — Communications sur la théorie psychologique
Individual papers on psychological theory

CAN WE HAVE A GENERAL THEORY OF BEHAVING SYSTEMS?

BY

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Since 1951 an interdisciplinary group of scientists at the University of Chicago and later at the University of Michigan have been working toward the development of what may be called general behavior systems theory. The purpose of this approach is to integrate various biological and social science approaches to the study of man and insofar as possible to bridge gaps between various schools and between the behavioral sciences and the natural sciences.

According to the current statement of this point of view systems are bounded regions in space-time, involving energy interchange among their parts, which are associated in functional relationships, and with their environments. General systems theory is a series of related definitions, assumptions, and postulates about all levels of systems from atomic particles through atoms, molecules, crystals, viruses, cells, organs, individuals, small groups, societies, planets, solar systems, and galaxies. General behavior systems theory is a subcategory of such theory, dealing with living systems, extending roughly from viruses through societies. Perhaps the most significant fact about living things is that they are open systems, with important inputs and outputs. Laws which apply to them differ from those applying to relatively closed systems.

All behavior can be conceived of as exchange of energy or information within an open system or from one such system to another. Any exchange across a boundary results in some alteration or distortion of the form of transmission. Those specific functions of systems which we can stipulate and whose magnitude we can measure in a relative scale, we will call "variables" if they are within the system and "parameters" if they are in its environment. Each system except the largest of all—the universe—has its environment. The system and its environment together constitute a supra-

system. Each system except the smallest has subsystems, which are any components of an organism that can affect a variable.

Inputs and outputs may be either coded or uncoded. Coding is a linkage within subsystems whereby process A_1 is coupled with process A_2 so that either will elicit the other in the future. Coding involves conditioning, learning, or pairing of two processes in a system and the memory or retention of this union over a period of time. Any action is uncoded unless—like speech or gesture—it has some added significance as a result of such a bond. It then conveys information.

All living systems tend to maintain steady states of many variables, by negative feedback mechanisms which distribute information to subsystems to keep them in orderly balance. Not only do subsystems usually maintain equilibrium, but they are also usually in balance with their environments, which have outputs into systems and inputs from them. This prevents variations in the environment from destroying systems, either by collapse or by explosion. There is a range of stability for any parameter or variable in any system. It is that range within which the rate of correction is minimal or zero and beyond which correction does occur. Inputs (or loads), either coded or uncoded, which, by lack or excess, force the variables beyond the range of stability constitute stresses and produce strains within the system. These strains may or may not be capable of being reduced, depending upon the equilibratory resources of the system.

A number of behavioral propositions, capable of empirical evaluation, which have been developed in terms of this theoretical approach will be discussed, and related empirical research reported.

AN APPROACH TO THE MEASUREMENT OF THE LEVEL OF ORGANISATION OF BEHAVIOUR SYSTEMS

BY

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The term "behaviour system" is used to refer both to individuals and social organisations, in the sense that both can be defined within a behavioural frame of reference as boundary-maintaining units of interpedendent activities and activity-control functions with respect to internal and external relationships. Every behaviour system needs to obtain an appro-

priate range of inputs in order to maintain itself. In the case of both persons and groups inputs are obtained by establishing interaction relationships with other persons, groups or other environmental units. This permits inputs to be obtained by means of a reciprocal output which in turn serves as an appropriate input for the partner in the interaction. Whether a quantity is an input or an output depends on the frame of reference used. If the system plus its environment is considered as an undifferentiated whole then distinctions between input and output can no longer be made and we are simply left with a network of ongoing behaviour processes.

It will be shown that the functional relationships which are found between measured level of output, level of input, and size of the system may be used to provide information on the level of organisation of the system. In the case of an *assembly* defined as a base line model, output obtained is proportional to the size of the assembly and the amount of input supplied. In the case of a *simple system* one of the additional conditions is that the system has minimum boundary values with respect both to its size and to the level of input which it needs to maintain in order to survive in its given state. With an increasing number of separate differentiated activity units within the system—and depending on the pattern of internal, as well as external dependence linkage—a point is reached where effective functioning requires the differentiation of a separate integrator unit which takes over the function of integrating ongoing activities, resulting in transition to a *complex system*. The functional relationship between the size of the integrator unit and size of the system may be used for obtaining a measure of the degree of interdependence of the component units of the system. The formation of a complex system makes it possible to increase unit size and output level to considerably larger values than is possible in the case of a simple system. At the same time the output of a complex system will be less than that of a simple system by an amount proportional to the size of the integrator unit insofar as the latter has no direct productive function.

A human organisation may be analysed in terms of three distinct aspects:

(i) the social structure, given by inter-personal and intergroup relations both within and between organisations;

(ii) the technological process structure and the dependence-relationships between ongoing activities, and

(iii) the economic structure, using the word "economic" in its widest sense, based on the fact that all behavioural processes have a valuational aspect.

A human organisation may then be looked at as a system of behaviour

which has social, technological and economic aspects. We speak of different aspects, since a group is not a system of activities, some social and others economic or technological; it is rather that every activity may be analysed with respect to any of these three frames of reference. A theory of human organisation requires, in the first stage, half-way disciplines concerned with socio-technical, socio-economic relationships, leading ultimately to what may be referred to as a socio-technomic theory of human organisations.

A conceptual framework for studying socio-technical systems has been formulated by E. Trist, and is at present being further developed. The quantitative formulations of the fuller model discussed above is tested by data on the socio-economic relationships within organisations with similar technological structure. Data on the relationship between sales turnover (output), number of persons in the shop (size of unit) and amount paid in wages (input) are analysed for 404 shops which form part of a larger retail chain. These, both individually and as a whole, illustrate the characteristics of a simple system. The findings are compared with input/output functions obtained for larger retail stores which show the characteristics of complex organisations in which a relatively large proportion of work is concerned with the integration of sub-units.

LES FORMES DE LA CONDUITE

PAR

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Rôle biologique du psychique: informations et solutions concernant le milieu et les difficultés que ce milieu offre. Les deux sphères de l'organisation psychique: corticale et souscorticale. Caractère problématique des rapports entre l'homme et le milieu. Toute activité psychique est une solution apportée aux problèmes que pose l'adaptation à l'ambiance physique et sociale. Les solutions sous-corticales sont phylogénétiques, toutes faites, automatiques. Elles sont stéréotypées. Les solutions corticales ont, par contre, un caractère créateur. Elles font montre de réactions ingénieuses devant les difficultés créées par les changements de l'ambiance. Ces solutions doivent être interprétées dans le sens de la boutade de Bergson: «l'intelligence c'est le moyen de se tirer d'affaire».

La nature réflexive, active du psychique. Nous ne nous occuperons que des solutions proposées par le plan cortical.

Ces solutions sont, selon nous, au nombre de cinq.

1) La première a un caractère plutôt passif: c'est la *compréhension*. Celle-ci est le postulat, la prémisse qui permet de trouver *le sens*, la signification du problème que le milieu pose. La compréhension suppose:
   a) l'établissement d'une discrimination parmi les différentes situations données, la mise en évidence du caractère spécifique de l'une d'entre elles;
   b) l'acceptation plus ou moins obligatoire d'une réalité objective, en dépit de nos penchants et préférences subjectives. La compréhension est une forme de *la dépersonnalisation* (Tout comprendre c'est tout pardonner). Caractère expressif. Une signification qui ne tient compte ni de nos penchants, ni de nos croyances, nous est imposée de l'extérieur;
   c) la compréhension n'est pas une solution, n'ayant pas de caractère créateur.

Après avoir posé les données du problème et en avoir discerné la signification, il s'agit de trouver sa solution pratique.

2) Si l'on ne peut résoudre immédiatement les difficultés, la première conduite qui s'impose c'est *l'ajournement*. La solution manquant pour le moment, l'on remet à un autre jour la décision. L'homme est par définition un «*animal-cunctator*». L'ajournement dans la perception, la mémoire, l'attention, le jugement, la volonté. Le rôle de l'inhibition. Discussion avec Pavlov.

3) A défaut d'une solution, une seconde conduite possible est *la compensation*. Compensation veut dire substitution, équivalent, faux-fuyant, subterfuge. Compensation en physiologie. Compensation dans les sensations, la mémoire, l'attention, l'imagination, le jugement, le sentiment, les actions volitives. L'imitation en tant que compensation. Les problèmes de la défectologie. La rééducation des déficiences mentales.

4) *La simulation*. C'est la conduite sociale par excellence. Il n'existe pas d'acte totalement véridique et sincère. La simulation est une donnée de la personnalité et elle est fonction des relations sociales. Le rôle stimulant et défensif de la simulation. L'Avantage de la falsification de la conduite dans le sens de l'utilité:
   a) Simulation inconsciente. Bovarysme. Cabotinage. Fatuité.
   b) Simulation volontaire.
   c) Mensonge.

5) *Invention*. Synthèse créatrice concernant les solutions. Nature et rôle

de l'intelligence. Tâtonnements et hypothèses. Discussion des théories de Piaget, Bergson, etc.

Rôle de langage: communication et éclaircissement. Intelligence précédant le langage. Discussion avec Janet.

Toutes ces conduites sont accompagnées par des états affectifs qui les augmentent, les étouffent ou les diminuent. Le rôle de l'affectivité est de régler l'action (Pierre Janet).