Meetings

Social Physics

Fourth Randolph, New Hampshire, Conference

The conference was held July 6–11 at the Mount Crescent House, as were the three preceding ones in July, 1950–1–2. Expenses were met from the Rockefeller Foundation grant to Princeton University for the study of social physics, directed by Professor John Q. Stewart. Morning and evening sessions were held, while afternoons were left unscheduled for enjoyment of the White Mountain country.

Participants, representing a wide variety of expertness, were Raymond Albright, theologian and church historian, Episcopal Theological School, Cambridge, Mass.; Raymond E. Bassett, sociologist, University of New Hampshire; P. W. Bridgman, physicist, Harvard University; Norman Dodd, banker and economist, New York, N. Y.; Ira M. Freeman, physicist, Rutgers University; Paul A. Furrer, educator, The Hun School; James D. Hamilton, biologist and physicist, Collip Laboratory, University of Western Ontario; Alfred Joenssen, importer, New York, N. Y.; Bernard O. Koopman, mathematician, Columbia University; John C. MacArthur, Colonel U. S. A. (ret.), editor Armed Forces Chemical Journal; Duncan A. MacInnes, physical chemist (ret.), Rockefeller Institute; G. Edward Pendray, public relations counsel, New York, N. Y.; R. Rudenberg, electrical engineer (ret.), Harvard University; T. Shedlovsky, physical chemist, Rockefeller Institute; John Q. Stewart, physicist and astronomer, Princeton University; W. Frank Sutherland, electrical engineer and administrator, Toronto Hydro-Electric System.

While no formal statement of conclusions has been subscribed to by members, substantial agreement on the following points was reached in the discussions:

Social physics has attained the threshold of a period when more rapid development is foreseen and should be urged. It now presents the framework of an inclusive pattern for description of social phenomena in the large, and for aiding in the formulation of many types of social policies. This pattern is set by two main ideas drawn in large part from physical science, but nonetheless humanistic in structure and application.

One idea is that "Trimmer devices" * play in social phenomena the role which in physical phenomena is taken by machines. A Trimmer device or system may be defined as any arrangement B which has a physical existence, and which when subjected to a stimulus or input A gives rise to a corresponding response or output C. The rule according to which a given response C follows from a given stimulus A is of course related to the structure B of the device, but the rule conveniently may, in physical cases, always be designated by a separate letter D. This description is sufficiently general to include very many types of machines and organisms—for example, automobiles, amoebas, and boards of aldermen. The notion of stressing the sequence stimulus-situation-response is by no means new, but members of the conference recognized in Professor Trimmer's description the link needed to complete the thought-bridge they were building from physics to humanism.

The second chief idea for developing social physics is that all the imputs and outputs, all the stimuli and responses, in the social scene must be catalogued and described with reference to "social values", which correspond in their dynamism and mutual inter-relations to the forms of physical energy so significant in physical science. Six forms of physical energy have been listed in papers before the American Physical Society: kinetic, elastic, gravitational, thermal, electromagnetic, and chemical. The first three, Professor Stewart suggested, show up in a rather neglected branch of general social study which can be called social mechanics. This branch deals particularly with time, space, and mass of material as social controls. A number of publications, by the late George Kingsley Zipf, Stuart C. Dodd, and others, show that human behavior when described in such terms conforms to mathematical regularities closely resembling the regularities of physics.

A definite principle which physics suggests is that, while none of the social values exists in absolute independence of others, a change in any one can always be expressed as proportional to two special factors, the one "intensive" in every case, and the other "extensive". Just as in the theory of heat a change in thermal energy is the product of the temperature (intensive) by the change in entropy (extensive), so consideration can be given to the proposition that a change in meaning is the product of an intensive factor called "relatedness" and a second representing the change in what telephone engineers call information, or neg-entropy, which is extensive.

As is well known, information in this restricted sense can be evaluated with respect to a given code for presenting it—such as the Morse code, or the written English alphabet, and so on. This is what the customer pays for when he sends a telegram, but the meaning which the recipient attaches to a message involves also the factor of its relatedness for him, and is outside the purview of the communications company.

The chief concern of sociologists has been not with social mechanics but with values of which people are made aware by their own consciousness. These social energies were tentatively listed by Professor Stewart as including meaning, feeling, and authority—a classification reflected in ancient Greek mythology, as well as in

* John D. Trimmer, *Response of Physical Systems*, John Wiley and Sons, Inc., New York, 1950, pp. 1–6.

the division of governmental powers stipulated by the Constitution of the United States.

In order to make fully effective this formal system of social physics, corresponding intensive and extensive factors for each of the social values will have to be identified and, at least roughly, measured. In physics the intensive factors include velocity, pressure, gravitational potential, temperature, electric or magnetic potential, and chemical potential. The respective extensive ones are momentum, volume, mass, entropy, electric charge or magnetic pole, and chemical units (moles).

The conference gave attention to the fact that these twelve physical quantities are related in pairs to the six physical energies mentioned above by just the same form of equation in each of the six instances. When analogies become so complete and reliable they are called "isomorphs". Social physics searches for isomorphs within physics itself with a view toward extending each to other fields. Physicists as such have not strongly emphasized the remarkable similarities of structure exhibited within theoretical physics. Such similarities were expected by the philosophy of Leibniz but not by that of Newton.

There is no attempt here to set up a dictatorship of physics over sociology and the humanities, but only to supplement thinking in those relatively difficult fields by suggesting improved catalogs and nomenclature based upon the triumphs of thought achieved during the past three hundred years in the physical sciences and in the technologies which spring from them. The biological sciences can point to splendid empirical advances, but as yet theoretical patterns in biology offer little as general model for logical processes. The relations of physics to social science are expected to be bilateral, with suggestions for improvement flowing both ways.

Furthermore, the conference agreed, few scientists nowadays would claim final validity for any principles laid down. The final test is experience, and as experiences accumulate we require more and more inclusiveness and elegance in preferred theories. One theoretical pattern succeeds another not because the earlier ones were seriously in error in their day but because later observations and mathematical advances make possible the exhibition of the phenomena with higher fidelity and simplicity.

Dr. Hamilton carried the synthesis a big step further by the suggestion that "order" in the universe increases when responses to stimuli are selectively directed. He mentioned the well-known fact that the second law of thermodynamics acting throughout nature makes for increasing disorder, but suggested that biological organisms and man, as *B*'s on a Trimmer diagram, may operate under rules, *D*, which result in sets of orderly responses, *C*.

Participants made various suggestions for further study of aspects of all the important matters discussed. At the close of the conference the members seemed to feel that, while in late years an increasing number of groups having a wide range of training have met for discussions of the unity of knowledge, social physics now of-

fers the outlines of a rather definite set of principles and concepts which can serve to correlate team researches among scholars, and reduce the threshing of old straw so characteristic of nonspecialized objectives.

John Q. Stewart
Princeton University Observatory

Acoustical Society

Meets this Month in Cleveland

The 46th meeting of the Acoustical Society of America is to be held at the Wade Park Manor Hotel in Cleveland, Ohio, October 15–17. More than eighty contributed papers are listed in the advance program, and a feature of the meeting will be a symposium on the industrial applications of ultrasonics for which five invited papers have been arranged. Two demonstration lectures are scheduled, of which one is on an electronic speech synthesizer, by Walter Lawrence of the British Signals Research and Development Establishment; the other, by Winston E. Kock of Bell Labs, will deal with polarized air-borne sound waves.

Outdoor Noise

4th National Noise Abatement Symposium

Outdoor noise is the subject of the Fourth National Noise Abatement Symposium scheduled to be held in Chicago October 23 and 24. Nine organizations are sponsoring the symposium: the National Noise Abatement Council, the Acoustical Materials Association, the Acoustical Society of America, the American Industrial Hygiene Association, the American Society of Safety Engineers, the American Institute of Architects, the Council on Industrial Health of the American Medical Association, the American Society of Planning Officials, and Armour Research Foundation. The program chairman is George L. Bonvallet, Armour Research Foundation, Illinois Institute of Technology, Chicago 16, Illinois.

Atomic Energy in Industry

Conference at the Waldorf-Astoria

The second annual meeting of the National Industrial Conference Board devoted to atomic energy will take place October 29–30 at the Waldorf-Astoria Hotel in New York. Topics to be discussed will include changes in the Atomic Energy Act, power-reactor design and technical developments in new metals and coolants, and industrial uses of radioisotopes. Speakers include David E. Lilienthal and Gordon Dean, former chairmen of the AEC, Eugene M. Zuckert, a member of AEC, W. Sterling Cole, chairman of the Joint Congressional Atomic Energy Committee, Chet Holifield of the same committee, and Sir Christopher Hinton of Great Britain's atomic power development project. Further information and reservation forms are obtainable from the Director, Conference Division, National Industrial Conference Board, 247 Park Avenue, New York 17, N. Y.