

to state general principles, there is a strong suggestion that at different phylogenetic levels a dimension which may be called "complexity" of experience, provided early, orients the young organism preferentially to greater environmental complexity later, and may also encourage the development of skills for more effective adaptation to complexity.

DALE B. HARRIS, *Program Chairman*

Activation. The participants in the symposium on activation presented new experimental data contributing to the development of this interpretation of behavior. It was shown that the two projection systems deriving from the reticular formation at the level of the pontomesencephalic junction have two independent functions—behavioral arousal and electrocortical desynchronization. While these two phenomena are normally correlated, it is possible to dissociate the systems responsible for wakefulness or arousal from those responsible for electrocortical "tone." Therefore, electrocortical tone, as such, is in no way a "mirror" of wakefulness.

Additional information on the central mechanism of activation comes from the study of the variations of the electrocortical baseline potential on which modifications of the brainwave frequencies are superimposed. This variation or shift of the d.c. potential is quantitatively correlated with the conventional oscillating brain wave measure of activation and with behavioral arousal. But these baseline shifts also occur in varying patterns in the different parts of the cerebral cortex. It seems that these differences are dependent on the quality of activation, whether it may relate to alerting to danger, or to anticipation of food, or to another stimulus.

The peripheral activation systems also provide new information on the relations between behavior and activation. BRL and GSR measures in the rat are apparently correlated with arousal under certain conditions. However, there are reasons to question the classical theory of the thermoregulatory function of these systems. Several facts also indicate that appropriate activity on the part of the animal may contribute in lowering the level of activation as reflected, for instance, in the HR. It is furthermore evident that the effects of activation

and inattention can be clearly dissociated.

Finally, some experiments with human subjects point to the possibility of studying arousal as a factor of reinforcement. It can be concluded that, as our understanding of the specific mechanisms contributing to activation and arousal develop, these concepts will provide information on both the intensive and directive dimensions of behavior.

DAVID BELANGER, *Program Chairman*

Bilingualism was a topic particularly appropriate for a Montreal meeting. In the session chaired by F. R. Wake, it was noted that many prominent figures in history have been bilingual or multilingual. That this is more of an asset than a liability tends to be confirmed by Elizabeth Anisfeld's findings that bilingualism may result "in either a fuller development of the individual's intellectual potential or the development of a different pattern of mental abilities." Wilder Penfield hypothesized a "switch mechanism" that, when perfected in the first decade of life, permits the individual to shift languages appropriately in response to a single stimulus word, and to "think" in the second language without the intermediate step of translation. W. F. Mackey outlined a quantitative technique for analyzing the distribution of the two languages throughout the entire behavior of the bilingual.

The vice-presidential address by Lorrin A. Riggs included a description of electrical records taken from the human eye, with the contact-lens technique, in response to various patterns and colors of stimulus. The symposium on vertebrate color vision was chaired by Clarence H. Graham. The participants (P. A. Liebman, Edward MacNichol, David Hubel, and George Wald) discussed normal and abnormal functioning of the human visual system with particular reference to the spectrophotometry of individual cones, the electrical responses of single retinal and geniculate cells, and recent data on selective color adaptation. The preponderance of evidence still points to a three-receptor mechanism of human color vision.

In the symposium on Activation (Robert Malmö, presiding officer) new data were presented which may lead to a more precise interpretation of the relationship between cortical and peripheral

activation and behavioral arousal. Experimental evidence on the existence of two independent neural pathways, for behavioral arousal and electrocortical desynchronization respectively, points to the necessity of reassessing the role of the reticular formation in activation (S. M. Feldman). The use of the d-c potential shift as a measure of activation opens new possibilities and may even provide sought-for information for the comparison of general versus localized activation (Vernon Rowland). The first results deriving from a new technique for the recording of BRL and GSR in the rat show that, while this measure is apparently correlated with arousal, there are reasons to question the classical interpretation of these phenomena as being related to sweat gland activity (E. L. Walker). Heat rate, on the other hand, has proven to be a very reliable indicator of activation. There is considerable evidence pointing out that muscular activity as such does not result in cardiac acceleration but may, on the contrary, under proper circumstances form part of a deactivating mechanism (David Bélanger). These various data, as well as other experiments at the human level, permit the conclusion that the concepts of activation and arousal may help us understand the directive as well as the intensive aspects of behavior (D. E. Berlyne).

The section chairman and Association vice president for 1965 is Benton J. Underwood (Northwestern University) and the new member-at-large of the Committee is Robert M. Gagné (American Institute for Research). The 1965 meeting in Berkeley will be merged with an extraordinary session of the Western Psychological Association.

FRANK W. FINGER, *Secretary*

American Political Science Association (K2)

The symposium sponsored by the American Political Science Association at the 1964 AAAS convention in Montreal was on science and international relations (27 December 1964). Contrary to usual treatments of this subject that concentrate on the international activities of science, this meeting had as its focus the scientific and technical aspects of central issues of foreign policy. In particular, the needs and op-

Science

Activation

David Belanger

Science **147** (3660), 924.
DOI: 10.1126/science.147.3660.924

ARTICLE TOOLS <http://science.sciencemag.org/content/147/3660/924.1.citation>

PERMISSIONS <http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.