aspects of the representation of a physical input to comply with different psychophysical tasks. He seems to be aiming toward a processing theory of psychophysics rather than the "true score" representation that seems to this writer to plague much of the formally interesting work in this area.

The second volume concludes with three comprehensive essays on vision, audition, and holographic memory models. The interesting way in which neural constraints interplay with mathematics is nicely illustrated, and these essays fill a void in the mathematical psychology literature.

Although the *Contemporary Developments* volumes do not accomplish their goal of assessing progress in the field, they do foreshadow a broader vision of what constitutes mathematical psychology. I do not know of any better source for acquainting readers with what has happened and what will happen in the applications of formal thinking in psychology.

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After Pavlov

Biology and Neurophysiology of the Conditioned Reflex and Its Role in Adaptive Behavior. PETER K. ANOKHIN. Translated from the Russian edition (Moscow, 1968). Samuel A. Corson, Ed. Pergamon, New York, 1974. xviii, 574 pp., illus. $51. International Series of Monographs in Cerebrovisceral and Behavioral Physiology and Conditioned Reflexes, vol. 3.

Drawing mainly on classical Russian neurophysiology and over 40 years of experimental research, the late P. K. Anokhin here offers a synthesis of theory and data bearing on the nature of the conditioned reflex. Although published originally in 1968, the book will still be of interest to Western scholars. In it English-language psychologists and neuroscientists are treated to a thorough and unhurried survey of the study of higher nervous activity in the post-Pavlovian era by one of the most eloquent and influential workers in the Pavlovian tradition.

Heretofore, access to these developments has been piecemeal, being primarily by way of the reviews and surveys of the late G. Razran and the published proceedings of those symposia (starting around 1960), in which Anokhin invariably participated, which ushered in the age of East-West détente in the neurosciences. Though valuable, such sources do not adequately reveal to Westerners the issues that have united and divided our Soviet colleagues. Konorski's books and translations of works by Bykov, Luria, and Sokolov provide clues, but in many ways these works seem too adulterated by Western viewpoints for this purpose.

Anokhin shows no lack of familiarity with Western neuroscience, but, although he attempts with varying success to incorporate information gathered from round the world, most of his arguments rest on the work of his own distinguished collaborators, who work in a wide range of fields including behavioral biology, developmental neurobiology, cardiovascular and respiratory physiology, experimental neurosurgery, clinical neurology, and electroencephalography.

Anokhin's thesis is that the conditioned reflex is a supreme expression of the adaptive evolution of the nervous system. Like all adaptive behavior, conditioned reflexes arise from a synthesis of two types of afferent information: input from the environment, with great emphasis on contextual factors, and feedback ("reverse afferentation"). These produce the pattern of preparatory reactions which constitute the conditioned reflex and assure its appropriateness to contingencies relevant to the survival of the organism.

I was struck by the similarity between Anokhin's viewpoints and those favored by Western cognitive psychologists and cyberneticists. For example, to Anokhin the essence of acquired adaptive behavior is the formation of an "action acceptor" responsible for harmonizing primary environmental information with feedback. The action acceptor is very much like the "plan" formed through TOTE (for "test, operate, test, exit") in the schema enunciated some years ago by Miller, Galanter, and Pribram. In short, Anokhin's conclusions about the processes involved in conditioning should be familiar to and sympathetically received by most learning theorists.

Equally comfortable are Anokhin's views on "internal" or conditioned inhibition. The Pavlovian dogma that inhibition originates at the analyzer of the conditioned stimulus is discarded. Instead, inhibition is regarded as resulting from the excitatory influence of a parallel but incompatible "functional system," a viewpoint shared by Konorski and others. As applied to alimentary conditioning in dogs, the inhibitory effect of nonreinforcement in the earliest stages of extinction or differentiation arises from the orienting reaction that inevitably accompanies "discordance" at the action acceptor. Discordance is essential for further development of a "secondary" or "indirect" inhibition brought about during the formation of a new action acceptor appropriate for nonreinforcement. Any procedure that minimizes discordance, such as Terrace's method of "errorless" discrimination learning, will yield little or no conditioned inhibition.

Anokhin's views on specific physiological mechanisms underlying conditioning and inhibition boil down to these essentials: Conditioning consists fundamentally of a molecular reorganization within the neurons that make up the functional system of the conditioned reflex. The energy expenditures necessary for discordance and conditioned inhibition involve a circuit from frontal cortex through hypothalamus to the reticular formation. Inhibitory influences might be of a hyperpolarizing nature when acting on effector units or of a depolarizing nature when high rates of synaptic input are involved. The latter mechanism is termed "pessimal" or Wedensky inhibition and is treated at some length by Anokhin in discussing dominant states of the nervous system.

As often as not, the train of logic from the experimental evidence presented to the particular conclusion it is meant to support becomes derailed in translation. It is the rich interplay with Russian neurophysiological traditions and schools of thought that lends force and urgency to Anokhin's arguments. This is not a reference work; to be fully appreciated or comprehended it must be read seriatim. It is a handsome volume, profusely illustrated with helpfully captioned figures. It includes good indices, a glossary, and an invaluable bibliography.

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Perceptual Psychophysics

Perception. Essays in Honor of James J. Gibson. ROBERT B. MACLEOD and HERBERT L. PICK, JR., Eds. Cornell University Press, Ithaca, N.Y., 1974. 318 pp., illus. $14.50.

In the concluding section of his innovative text *The Senses Considered as Perceptual Systems*, J. J. Gibson wrote, "When the senses are considered as perceptual systems, all theories of perception become at one stroke unnecessary. It is no longer a question of how the mind operates on the deliverances of sense, or how past experience can organize the data, or even how the brain can process the inputs of the nerves, but simply how information is picked up. . . . The individual does not have