

PSYCHOPHYSIOLOGICAL ASPECTS OF PREPARATORY PROCESSES

IN CHILDREN AND THEIR RELATION TO IQ.

G.A. CHIARENZA

ISTITUTO DI NEUROPSICHIATRIA INFANTILE UNIVERSITA' MILANO

VIA BESTA 1 20161 MILANO ITALY

Human intelligence is not only manifest as the ability to adapt to the environment, but as the aptitude to change it through self-initiated actions and self-made tools as well. The either physical or mental action upon an object is for Piaget a premiss to knowledge. Research on the development and organization of child performance clearly indicate that, at a certain age, a child shows that he possesses and masters previously planned schemes to carry out a given action. These schemes may be updated through the sensory feedback or the knowledge of the results generated by the action. These functions evolve throughout the whole nervous system and their particular integration towards achieving a preset goal is the product of previous systematic interactions between the subject and the environment. The nervous processes underlying a particular performance neither begin, nor end within the time of the behavioural manifestation of the action. Modern neurophysiologic technology and methods can now reveal these processes in terms of electrical brain activity and thus contribute to the objective study of developmental cognitive processes. The neurophysiologic counterpart of these preparatory processes is the Bereitschaftspotential (BP), a slow phasic negative potential lasting 800-1200 msec before movement, considered to be an indicator of cerebral efficiency concerning organization and selection of the strategy needed to carry out a planned action. The BP has a smaller (5 to 7 μ V) amplitude during simple tasks and a greater amplitude during more complex tasks, independently of EMG activity and the strength used. It is mainly recorded in the frontal, precentral and central regions. The BP does not change its amplitude when the subject receives visual feedback of the results of his performances. His negativity appears around 6 years of age and increases until adolescence. The amplitude of the BP is positively correlated with the IQ of the Cattell test and with the verbal and performance IQ of the WISC-R.