

Special Theme of the Issue.
Cognitive Neurophysiology: Neural Correlates
of Human Cognition and Consciousness

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EDITORIAL

The general purpose that unites the several articles in this special journal issue focuses on the search for psychophysiological and neurobiological correlates of human cognition and consciousness. This aim reflects the modern tendency for humanities and social studies to adopt biological ideas and concepts. The current trend of psychology towards natural sciences is fully justified since this approach provides additional possibilities to investigate and explain human mind and behavior. Although psychology states itself as an interdisciplinary field at the border of physiology, neuroscience and humanities, an appreciable confluence of neuroscience and psychology only became developed in recent decades partly owing to the outstanding progress of psychogenetic, neuropharmacology and noninvasive neuroimaging techniques such as higher density electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). This journal issue presents articles that refer to the recent findings

obtained due to successful combination of traditional psychological testing and neuroimaging tools.

In his theoretical paper, Z. Yaple attempts to operationally define a concept of the Self by amalgamating Gallagher's model of the narrative and minimal Self using evidence from both psychological and cognitive neuroscience. One of the possibilities for bridging the gap between these perspectives is a comparison of Gallagher's narrative Self with the default mode network, which reflects neural activity of the brain during a resting-state condition.

Most psychophysiological studies of higher brain functions generally have focused on measuring reactions of the brain in response to certain stimuli or tasks. This, to a certain extent, contradicts the nature of consciousness. Human consciousness consists of states influenced by external experience and a series of internally experienced states that equally form a stream of consciousness. Internal states may include

inner speech and changing sequence of visual images, sounds and feelings that accompany these experiences. Studies of the spontaneous brain activity at rest aim to investigate resting-state brain networks that possibly reflect a stream of consciousness, i.e. are primarily focusing on the brain activity rather than the brain reactivity.

The Default Mode Network (DMN) was firstly discovered as a resting-state network recorded by fMRI. Remarkably, the DMN demonstrates the strong negative correlation with tasks, so the DMN is most frequently observed at rest when no active tasks are presented to the subjects. This feature of the DMN has initiated a number of assumptions about a role of the DMN in resting-state cognition. This network is also referred to as the phenomenon of consciousness and “mind-wandering” in the article of A. Lapina and B. Chernyshev. In the authors’ opinion, investigation of the DMN function together with psychological reactions might help to a better understanding of the nature and meaning of this “mind-wandering” phenomenon.

However, a critical issue of using resting-state networks as psychophysiological indexes relates to the question of whether this spontaneous brain activity actually reflects ongoing consciousness and resting-state cognition or nonconscious and physiological processes in the brain. This issue was also raised in the article of O. Martynova and V. Balaev, which provides a more detailed analysis of the resting-state networks by comparing two age groups of healthy participants: young and older adults. Nevertheless, the presented article shows data regarding age-related changes in functional con-

nectivity between seven resting-state networks including the DMN.

The other two articles of this journal report on the traditional stimulus-based psychophysiological correlates of human behavior recorded by electroencephalographic techniques. The article of S. Tugin et al. presents data proving that the feedback-related negativity (FRN), a component of visual event-related potentials (ERP), is a reliable neural correlate of behavioral changes due to human conformity, possibly underlying social attunement.

Finally, the article of A. Shestakova et al. addresses the question of whether the evoked brain responses reflect an ability of 7–10-year-old children to actively discriminate a more difficult speech contrast in discrimination of pseudo words. The presented data on the amplitude of the mismatch negativity (MMN), an automatic index of an experience-dependent auditory memory trace, suggests mechanisms of discrimination that are based on consolidation of the short-term representation of a repetitively presented pseudo-word rather than on passive perceptual learning in the absence of the active behavioral discrimination.

Thus, all mentioned articles represent an attempt to explain mechanisms of human cognition and consciousness both from psychological and neurophysiological points of view. I believe that such a methodological combination will bring us closer to the ultimate goal of understanding what human mind is and how it works.

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