Editorial

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# Neurophenomenology: A Challenge for the 21st Century

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## Editorial

The goal of this editorial is to issue an invitation and a challenge to cognitive neuroscientists - to explore the neurophenomenological approach in the study of human subjectivity and the neural basis of cognition. Neurophenomenology is an approach that is at once potentially beneficial for the scientific enterprise and yet exceedingly challenging. It is undoubtedly true that science will continue to surprise us with what it discovers and creates, and that these discoveries become the foundation of our culture and society. For that reason, understanding who and what we are is truly fundamental for our health and for the health of the world.

Neurophenomenology, a combination of neuroscience and phenomenology, has been construed as a scientific research program that is guided by the assumption that the best candidates for studying the neurophysiological basis of conscious behavior are the assemblies of neural networks that transiently connect multiple brain regions and areas in a dynamic and flexible way. This approach has been expounded on by a number of researchers, though specific models vary in their details [1-4]. Closely associated with neurophenomenology is the concept of "lived experience," the notion that the intent is to directly explore the source, cause, and prereflective dimensions of human existence.

Of the many themes that modern neuroscience has not adequately addressed, one of the major ones is providing a framework for understanding the subjectivity and neural basis of cognition. Indeed, the relationship between first-person lived experience and third person natural science still remains shrouded in mystery. Although many models and neural correlates of conscious experience have been identified, there remains a major explanatory gap linking the mechanisms of the brain with those of the mind. Fazelpur and Thompson [5] have conceptualized this gap as conceptual, epistemological, and methodological.

The current scientific paradigm emphasizes a reductionist physicalist mindset in which a fully developed neuroscience is all that is needed to understand cognition. However, the limited success of cognitive neuroscience has created blind spots about complementary explanatory approaches. Hence, an adequate conceptual framework to account for phenomena that "(i) have a first-person, subjective-experiential or phenomenal character; (ii) link first and third person perspectives; (iii) are reportable and describable and (iv) are neurobiologically realized" has not been adequately described [6].

One possible solution is to motivate a neurophenomenological research perspective and bring it to the forefront of cognitive neuroscience. In this context, mindfulness, enactivist and embodied viewpoints provide the motivation in which it is the integrative activity at different levels of the central nervous system that is informative about our lived experience. Mindfulness is the practice of intentional, nonjudgmental awareness of moment-to-moment experience to cultivate well-being in an individual's life. It is also another way of knowing about the reality that illuminates the subjective world of the human mind. The enactive approach emphasizes that the organism is self-sufficient and autonomous. This perspective has critical implications for how brain activity is related to mental activity. Finally, the embodied perspective assumes that all knowledge about the world is grounded in our sensorimotor experience.

During the last few decades, cognitive science has undergone an important evolution from a traditional representation-centered framework toward an action-centered paradigm. What this switch emphasizes is the importance of real-world, dynamic interactions taking place inside and outside the brain. In this new representation, cognition is not necessarily the ability to derive a model of the world, which then provides the basis for thinking, planning, and problem-solving. Rather, cognition arises from the co-activation and action-based interactivity inherent in living in the world of objects and autonomous agents. The continuous sensorimotor engagement with these external entities and the need for selection of relevant information create the neural dynamics of cognition. Fundamental to these dynamics are systems of bottom-up and top-down control that regulate information flow through mechanisms sensitive to change, but also mechanisms that look ahead, anticipate, and predict outcomes.

In the traditional neuroscience model of brain processing, information is assumed to flow in a hierarchical, input-output system, beginning on the sensory end of things, transformed from stage to stage, until the final end product is obtained. Perception in such a system proceeds through a series of

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bottom-up feedforward and top-down feedback loops, which Walter Freeman [7] has described as the 'passivist-cognitivist view' of the brain. On the other hand, from an enactive viewpoint, information flow is heterarchical, recursive, re-entrant, and self-activating, with processes that do not start or stop anywhere. "The enactive approach treats perception, emotion, and cognition as dependent aspects of intentional action, and takes the brain's self-generated, endogenous activity as the starting point for analysis. This activity arises not in peripheral sensors but in the frontal lobes, limbic areas, or temporal and associative cortices, and reflects the organism's states of expectancy, preparation, emotional tone, attention, and so on - states necessarily active at the same time as the sensory inflow, and that shape that inflow in a meaningful way" [8].

From this enactive viewpoint, therefore, we must examine large-scale dynamic networks in order to understand how cognition, intentional action, and consciousness emerge through self-organizing neural activity. But, despite the immediate appeal of neurophenomenology, practical difficulties have limited its implementation into actual research programs. This is because neurophenomenology emphasizes the micro-dynamics of experience, at the level of brief mental events with very specific content. In contrast, most neural measures of behavior have much coarser functional selectivity, making it difficult to find a correlation between neural and experiential descriptions. Nonetheless, new methods can make it possible to collect descriptions of neural and experiential dynamics at a level of granularity that is appropriate to search for correlations [9].

What is needed to close the gap between first-person lived experience and third person natural science is a concerted and concentrated effort in implementing a neurophenomenological approach that emphasizes "lived experience." We hope that early efforts in that direction are expanded and that a new generation of cognitive neuroscientist take the challenge to heart in this new century. We also hope that the Journal of Brain, Behaviour & Cognitive Sciences provides a relevant forum for such efforts.

## Conflict of Interest

Nil.

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