

# On Cognitive Mechanisms of the Eyes: the Sensor vs. the Browser of the Brain

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In neuropsychology it is commonly recognized that 70% of all the sensory receptors in the brain are inputted from the eyes. However, an important internal cognitive function of the eyes as the perceptual browser of the memory and the mind has not yet been recognized. This keynote talk contrasts the cognitive mechanisms of the eyes as both the *sensor* of the brain externally and the *browser* of the mind internally. The key assertion is that the eyes function as a bi-directional organ: a visual sensor of the brain, and more important, a perceptual browser of the mind.

The sensory of the brain can be categorized into external and internal senses. The former encompass vision, auditory, smell, tactility, and tastes. The latter refers to perceptivity that forms the sixth sense of the brain. The *perceptual sense* encompasses consciousness, memory searching, motivation, willingness, goal setting, emotion, sense of spatiality, and sense of motion.

In recent research in cognitive informatics, perceptivity is recognized as *the sixth sense* that serves the brain as the *thinking engine*, and the kernel of the natural intelligence. Perceptivity implements self consciousness inside the abstract memories of the brain via subconscious eye movement. Almost all cognitive life functions rely on perceptivity that virtually sees acquired visual images stored in the memories of the brain without any sensory input, and abstractly accesses acquired knowledge and information elicited by the movement of eyes.

This talk focuses the internal and perceptual cognitive mechanisms of the eyes when they are closed, and introduces the hypothesis of the perceptual browsing mechanisms of the eyes. Studies of eye movement during sleeping, blinking, and thinking in neuropsychology and cognitive informatics provide evidences for supporting this hypothesis.

There are a large set of fundamental questions in neuropsychology and cognitive science rely on answers to

the above hypothesis, such as: how a faculty of subconscious and conscious life functions happen and work in the brain? Where is the organ in the brain that physiological carries out thinking and perception? How we control or direct our thinking engine? Do all thinking mechanisms consciously or intentionally controllable? And how consciousness can be the product of physiological processes in the brain?

The contemporary philosophy behind natural sciences is *positivism* and *reductionism*. Natural scientists adopt a common perception that physical phenomena must be publicly observable and independently repeatable. However, most phenomena in psychology, cognitive science, and informatics are clearly not, even though all individuals believe they are truly happening based on *empiricism*. This contradiction can be explained by the information-matter-energy (*I-M-E*) model [Wang, 2002] that classifies the natural phenomena into two categories known as those of the *physical/concrete world* and of the *information/perceptual world*. According to the I-M-E model, the mental phenomena and cognitive processes, particularly perceptivity and thinking, should be recognized as a new category of special phenomena occurring in the abstract and information world that apparently do not obey specific rules observed in the physical world. In other words, all information-/mental-process-oriented sciences deal with a totally different category of phenomena that are constricted by informatics and cognitive laws rather than the physical ones.

The reveal of the internal perceptual mechanisms of the eyes is not only theoretically significant to identify the physiological organ of the thinking engine of the brain, but also practically useful to explain a wide range of cognitive mechanisms of the brain and mind, and to answer the fundamental questions identified earlier in this talk.

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