Humanoid Eyes: Perspective & Challenges

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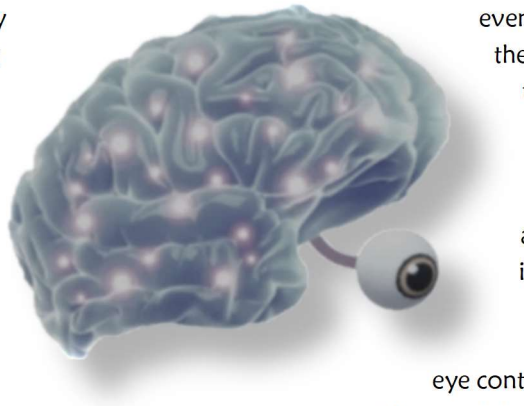
We initially have to understand the behaviors of human eye to comprehend its social importance. Three dynamics (dimensions) distinguish human eyes: pupil variations, saccadic eye movements, in addition to duchenne markers (that is mainly produced by orbicularis oculi pars lateralis). Each of these dimensions represents significant amount of cognitive [1 - 6], and its corresponding neurophysiological information [7 - 10]. Hypothetically, proper analysis of these three spatiotemporal dynamics along with their corresponding neural activities (as responses to various perceptual and multisensory stimuli along with their corresponding decisions and possible actions) might eventually allow us to partially read the neural activities of the brain. Detailly speaking, this might be done after matching the continuum that includes the three previously mentioned dynamics with its corresponding cortical and subcortical neural activities from the data triggered by different external stimuli, and gathered simultaneously through various brain imaging techniques, and eye trackers. We offer these speculations to allow the readers to comprehend the importance of the eye's dynamics. Ultimately, we hope to gather additional evidences to confidentially say; the eye may be considered as a visible brain. Until several fine-tuned psychophysical experiments are achieved, our speculations may still have sensible credibility, by reviewing the current available literature. Eventually, we hope to say it confidentially, the eye might be exhibited as the most valuble visible organ for socialization.



Humanoids are mainly made for socialization purposes; and to humanize them, their eyes (visible brains) should be perfectly designed. Engineers of robotics should therefore understand the importance of the eyes. Namely, they should take the three previously mentioned dynamics into their design considerations. Humanoids might be very important in assisting vulnerable and elderly people in their daily tasks. Additionally, they should collaborate with their colleagues' psychologists and neuroscientists more intensively to figure of the precise continuum of the dynamic of the human eye. Clearly, the biggest challenge for humanoid eyes is to understand the human eye precisely. Once the continuum precisely calibrated, mathematical model can be developed, and engineers can afterwards implement that algorithm within humanoids. Needless to say, without humanized eyes, the social relationship between the owners and their humanoids may be impaired. Neuroscientists along with engineers should work collaboratively to find the optimal continuum of the three dynamics of the human eye. They eventually will be able not only to partially read the human brain with cheaper tools, eye trackers, but they may demonstrate a mathematical model of 'the human eye dynamics' continuum; in which, it can be easily implemented in robots.Psychiatrists also might not rely on humanoids with imperfect humanized eyes to treat their patients. For example, children with autism spectrum disorder had been suffering from eye contact avoidance. Those patients, however, might accept to deal with a humanoid and might look at its eye quiet often, but not at a human eye. Humanoid eyes should be therefore perfectly humanized, to promote the recovery of the symptom through near-natural eye contacts.

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