A Neural Model of Multisensory Integration Including Proprioceptive Attention Under Visual Uncertainty

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The brain of human combines multiple sensory information to form coherent and unified percept. Central Nervous System (CNS) estimates the effector's position by integrating the sensory information (Vision and proprioception) to perform a movement, for example reaching to a cup. There are different models that explain this phenomenon. Disadvantage of mathematical model such as Bayesian interface is that they aren't based on neural mechanism. So models such as population codes are proposed. For situations in which the sensory stimuli are one source, some neural model is proposed but for situations in which the sensory stimuli are far apart, a neural model has not been suggested yet. The purpose of this study is to propose a neural network model for this situation. The model is inspired by the neuro-imaging findings. In the model, there are two populations of neurons coding visual and proprioceptive sensory stimuli positions in a multilayer recurrent neural network. Also the two populations have connections in between. In this way the model can to simulate the effect of sensory attention. The model was tested by behavioral experiments that explained briefly in this paper.

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