ORAL PAPER

Image representation, scaling and cognitive model of object perception

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The neuropsychological investigations of visual imagery and representations has led to a deeper understanding of the spatial perception, representation and memory. But how each individual perceives objects geometrical properties and how they differ from person to person, both under event-related memory and normal recollecting memory in presence or in absence of, direct sensory stimulation, is still unclear. The mental imagery is believed to be a active process but scaling of object is important under active perception of environment. And also the information about the spatial world that we encode and remember should be general and varied enough to serve purposes both known and not yet known. Spatial knowledge is diverse, complex, and multi-modal, as are the situations in which it is used. All seem to agree that a cognitive map is a mental representation of an external environment. At one extreme are those who appear to believe that a cognitive map is like a map on paper; that is, a more or less veridical, more or less metric, unified representation of the environment. At the other extreme are those who appear to believe that a cognitive map may be an ad hoc collection of information from different sources put together to solve a particular problem; as such it has no inherent unity and no guarantee of consistency or veridicality. The scaling of image leads to an embedding representation of objects in a shape space which helps in formalization of various recognition-related tasks and development of computational mechanisms that can solve future spatial navigational problems. The image scaling is important in understanding the psychological dysfunctions of patients suffering from spatial cognition problems. The scaling becomes self-evident in art forms, when people are asked to draw image of objects they see actively or from their short/long term memory. It helps in quantifying the choice of measurement unit in developing the mental scaling factor used by each individual person. In this paper we develop a comprehensive model of this scaling factor and its implications in spatial image representation and memory. We also extend its notion in understanding the perception of objects whose representations are normally not possible (like the perception of universal scales, infinity) but are well comprehended by the human brains. But there is no cognitive model that takes these metaphors into considerations, since the experimental verification is difficult. The model presented here is an extension of second-order isomorphic theory of representations and recognition. Here we give a scaling factor which is variable depending on the situations for a person based on his visual memory and drawing capabilities. And then extend it to analyse his cognitive disorders and imperfections. This model also helps in formalizing the architectural cognitive maps needed to change the scaling factor, depending on the types of visual works one

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performs. It also simplifies the long standing question of Shape-Orientation-Scale problem in spatial representations and visual performance by the human brains. Here we give a scaling factor which is variable depending on the situations for a person based on his visual memory and drawing capabilities. And then extend it to analyse his cognitive strengths, disorders and any imperfections. This model also helps in formalizing the architectural cognitive maps needed to change the scaling factor, depending on the types of visual works one performs.