AB057. Diagnostic information for the recognition of 3D forms in humans

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Background: The perception of visual forms is crucial for effective interactions with our environment and for the recognition of visual objects. Thus, to determine the codes underlying this function is a fundamental theoretical objective in the study of the visual forms perception. The vast majority of research in the field is based on a hypothetico-deductive approach. Thus, we first begin by formulating a theory, then we make predictions and finally we conduct experimental tests. After decades of application of this approach, the field remains far from having a consensus as to the traits underlying the representation of visual form. Our goal is to determine, without theoretical a priori or any bias whatsoever, the information underlying the discrimination and recognition of 3D visual forms in normal human adults.

Methods: To this end, the adaptive bubble technique developed by Wang *et al.* [2011] is applied on six 3D synthetic objects under varying views from one test to another. This technique is based on the presentation of stimuli that are partially revealed through Gaussian windows, the location of which is random and the number of which is established in such a way as to maintain an established performance criterion. Gradually, the experimental program uses participants' performance to determine the stimulus regions that participants use to recognize objects. The synthetic objects used in this study are unfamiliar and were generated from a program produced at C. Edward Connor's lab, Johns Hopkins University School of Medicine.

Results: The results were integrated across participants to establish regions of presented stimuli that determine the observers' ability to recognize them—i.e., diagnostic attributes. The results will be reported in graphical form with a Z scores mapping that will be superimposed on silhouettes of the objects presented during the experiment. This mapping makes it possible to quantify the importance of the different regions on the visible surface of an object for its recognition by the participants.

Conclusions: The diagnostic attributes that have been identified are the best described in terms of surface fragments. Some of these fragments are located on or near the outer edge of the stimulus while others are relatively distant. The overlap is minimal between the effective attributes for the different points of view of the same object. This suggests that the traits underlying the recognition of objects are specific to the point of view. In other words, they do not generalize through the points of view.

Keywords: Recognition; perception; 3D visual forms; Gaussian windows

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