The effect of stimulus resolution and object content on human scene categorization

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Human scene categorization is a remarkably fast and effortless process. Object- and scene-centred theories propose that scene categorization is based on object information and global scene properties, respectively. Here we tested scene-centred theories by having participants perform a 16AFC scene categorization task using scene textures as stimuli that are meant to reproduce global scene information. Additionally, we manipulated the spatial resolution of the reproduced information by varying the size of the image areas from which global information was extracted. Our results show that a resolution of 5x5 image areas was sufficient for above-chance categorization, but a higher resolution was required for indoor compared to outdoor scene categorization (10x10 vs. 5x5). In exploratory analyses, we further related human scene categorization accuracy to classification performance of a computational classifier trained on global scene properties and different measures of object content (e.g., number and size of objects) in the base stimuli. Interestingly, human scene categorization accuracy was best predicted by the number of objects in a scene (inverted) and their average size. The scene categories with the highest average categorization accuracy were those typically containing fewer and larger objects (e.g., mountains) as compared to many and smaller objects (e.g., restaurants). The current results are in line with previous findings from our lab suggesting that global scene information is not sufficient to explain human scene categorization. Instead, object information seems to be used for human scene categorization even in experimental conditions biased towards processing of global scene properties.

Keywords: scene categorization, objects, global scene information, textures

Presentation type: Poster Presentation

Session: Perception III