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Uniform Patterns in Spatial Representations of Abstract Information Are Predicted by Sense of Direction and Spatial Habits of Mind

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Abstract

Activation in brain regions associated with spatial navigation, such as the hippocampus and entorhinal cortex - a critical hub for grid cells - has also been observed during tasks such as representing a social network or abstract conceptual relations. To demonstrate a behavioral parallel between cognitive maps of abstract and physical spaces, we developed a novel task in which participants constructed spatial representations of relational statements along two dimensions, and were tested on ability to make inferences from these statements. Participants' representations varied widely, with some using a regular, hexagonal grid pattern. The uniformity of their patterns correlated with performance on the inference task, a spatial ability measure, and a spatial habits of mind questionnaire. These findings support extant research proposing a flexible cognitive map system used for representing both physical space and conceptual relations, and suggest that this system is subject to individual differences in more general spatial processing.