

A Shared Spatial Mental Representation System for Navigation and Reasoning

Mitchell Munns

University of California, Santa Barbara, Santa Barbara, California, United States

Mary Hegarty

University of California, Santa Barbara, Santa Barbara, California, United States

Abstract

Recent studies revealed that the brain's system for representing physical space is also recruited to represent relations that are not inherently spatial. We investigated the relationship between the ability to form these abstract spatial representations and other spatial abilities. In four experiments, participants created spatial representations of a series of premises relating objects on two dimensions (e.g., A is faster than B, B is louder than C) and answered inference questions based on these relations. The type of information, i.e., spatial information (A is above B) versus abstract, non-spatial information (A is smarter than B), did not affect task performance. Individual differences in how 'grid-like' the created representations were, as well as reasoning consistency, correlated with some spatial abilities, including path integration. These findings are consistent with the view that a common spatial mental representation system underlies our ability to form mental representations of physical and abstract spaces.