

Spatial memory and frames of reference: how deeply do we rely on the body and the environment?

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How do we mentally represent the world out there? Psychology, philosophy and neuroscience have given two classical answers: as a living space where we act and perceive, dependent on our bodies; as an enduring physical space with its feature, independent of our bodily interactions. The first would be based on egocentric frames of reference anchored to the body, while the second on allocentric frames of reference centred on the environment itself or on objects. This raises some questions concerning how deep the reliance on the body and the environment is when using these reference frames, and whether they are affected differently by the duration of time and the scale (small or large) of space. To answer these questions, I have brought empirical evidence of the effect of motor interference, blindness, environmental characteristics and temporal factors on egocentric and allocentric spatial representational capacity. The results suggest that egocentric representations are deeply rooted in the body, with its sensory and motor properties, and are closely linked to acting *now* in small-scale or peripersonal space. Allocentric representations are more influenced by environmental than by bodily characteristics, by visual than by motor properties, and seem particularly related to large-scale or extrapersonal space. In line with neurophysiological evidence and a Kantian perspective, it appears that we are endowed with an internal spatial representation system ready to structure environmental information for our purposes. To what extent this system is innate and pervasive in cognition and what is its relationship to the neural 'positioning' substrate discovered by O'Keefe and colleagues requires further scientific investigation.