**Space, Time and Language**

Michael C. Corballis

University of Auckland

New Zealand

Abstract

Cognition is heavily grounded in space. As animals that move in space, we travel both physically and mentally in space and time, reliving past events, imagining future ones, and even constructing imaginary scenarios that play out in stories. Mental exploration of space is extraordinarily flexible, allowing us to zoom, adopt different vantage points, mentally rotate, and attach objects and sense impressions to create events, whether remembered, planned, or simply invented. The properties of spatiotemporal cognition depend on a hippocampal-entorhinal circuit of place cells, grid cells and border cells, with combinations of grid-cell modules generating a vast number of potential spatial remappings. For example, we can easily imagine a spatial location, such as the Piazza del Duomo in Milan, from opposite ends, and zoom in to imagine a particular landmark such as the cathedral from up close, or even from inside. Our increased understanding of the flexibility of spatio-temporal imagination suggests a re-evaluation of the nature of language. The generativity of language, often considered one of its defining properties, may therefore derive not from the nature of language itself, but rather from the generativity of spatiotemporal scenarios, with language having evolved as a means of sharing them. Much our understanding of the hippocampal-entorhinal circuit is derived from neurophysiological recording in the rat brain, implying that the spatiotemporal cognition underpinning language has a long evolutionary history.

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