Linking small-scale and large-scale cognition with motor imagery

Talk Outline

**Slide 1: Title Slide**

**Slide 2: Imagine facing X**,

(Michelon and Zacks, thought experiment), introduce reference frames

**Slide 3: Talk Goals**

Different reference frames, I want you to understand what these different reference frames are, why they are important to think about, and what can they tell us?

Then I'll discuss how effector-based reference frames interact with object-based reference frames

**Zacks' Multiple System Framework**

Object-centered (Intrinsic), Egocentric (perspective-based, **effector-based**), and environmental



A crucial point is these reference frames are interactive and share overlapping neural circuitry

Neural Bases

Interaction of object-based transformations and effector-based transformations (p.12 Z+M)

Development + Disorders of Development (Frick et al., is a great source, box 3)

WS, Autism

Wiedenbauer, G. and Jansen-Osmann, P. (2008) Manual training of mental rotation in children. Learn. Instr. 18, 30–41

Bidirectional nature of imagery and action (Moreau, Wolshlager, the other one)

Why have redundancy?

We hypothesize that separate transformation-specific updating mechanisms arise for two reasons. First, implementing a general-purpose updating mechanism would likely be more expensive in terms of axonal connectivity between spatial representations. Second, a general-purpose updating mechanism would be less able to take advantage of features specific to each type of spatial transformation updating. For example, the object-based updating mechanism may be optimized for relatively small objects because large objects are less likely to undergo object-based transformations. The perspective updating mechanism may be optimized for transformations in the horizontal plane because horizontal movements are most common in experience and most important for action planning (at least in ground-dwelling species). (Zacks and Michelon)p.4