Motoric affordances influence mental rotation strategies

What is mental imagery? What network of brain areas?

what brain areas are involved in motor preparation and execution

Is the motor system involved in mental imagery?: Behavioral Evidence

**Interference and Facilitation** - Wolshalger, Wexlers, Flusberg (good discussion), Jancyk 🡪 the outcome matters not just the motion

**Affordances (MR of hands, tools, Amorim)**

motoric strategy improves accuracy, is faster (mr of hands is faster than of figures)

but consider non-biomechanically plausible orientations

Ionta (constraining hands

tools - Vingerhoeets

the Amorim study but also the Kruger study

Motor experience - Moreau (Athlete stuff)

Gesture

**Neural Stuff?**

Is the motor system involved in mental imagery: Neural Evidence

Richter et al, 2000 (first?), cohen was first

Parsons but Ganis et al., 2000 (TMS)

Wraga et al., 2010 has nice summary, Kosslyn chapter too (logical)

Mixed results, Kosslyn fMRI, Zack's meta-analysis, TMS?, Mu suppression... , paralysis and

Wraga, 2003 - prime

~~imagined paralysis (Hartmann),~~ Wraga (2010) - low motor can be primed (flexible application of strategies)

Tomasion Rumiati has a really good summary

Mu suppression - popovich thesis has a good summary,

Why does this matter? - Development trajectories, see recent Newcombe paper

Disadvantaged pops - WS, Autism, Cerebellar damage (meh), Parkinsons, spina bifida (Wieden, Jansen-Osmann), aging (DeSimone)

Individual Differences - Vividness logie, Gender

Gender effects/differences - thesis provides preliminary evidence

no gender effects below 10 (see Frick et al., 2013) but manual experience is facilitatory until age, 10 (when more visual process oriented emerges) Frick 2009, also see wiedenbauer, 2008 - manual training ameliorates gender differences

Implications for learning -

Why do models (of buildings) help us think?

Gestures helps us think! The motor system facilitates thought

Gesture and MR - facilitate

**One-size-fits-all psychology**

Tie in hesselow's simulation theory? and embodied theories? (Goldin-Meadow paper is good) systemizer-empathizer hypothesis?

http://blogs.scientificamerican.com/mind-guest-blog/2014/10/27/in-the-future-your-therapy-and-education-will-be-tailored-to-your-brain/

I'm interested in how we can push it around (not necessarily affordances of objects invoking motoric processing)? the Kosslyn prime study is a good starting point

What does a motor strategy buy you? Cite the Logie study with vividness

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

what is a mental image?

According to Kosslyn, Thompson, and Ganis (2006), mental images are representations that are similar to those

created on the initial phase of perception but that do not require an external stimulation to be created. In addition,

those representations preserve the perceptible properties of the stimuli they represent. from borst ch.

Zacks 08 corroborates Kosslyn 01, see munzert for deets

Kosslyn et al. (2001) tested whether activation of motor areas depends on the strategies participants use on such tasks. Before mental rotation, participants saw either a hand rotating the cubes or a motor-driven rotation of the objects. They were instructed to rotate the figures mentally as seen before. In this study, M1 activation was found in the hand-rotating but not in the motor-driven condition. This demonstrates that the involvement of premotor areas and eventually M1 in motor imagery depends on the strategy a participant applies to manipulate objects or body parts mentally. This view has been corroborated by a recent meta-analysis integrating imaging studies of mental rotation tasks (Zacks, 2008). This author reports that activation in the precentral sulcus is greatest when a motor simulation strategy is adopted, and that this particularly involves medial superior parts of the precentral sulcus (see, also, Michelon et al., 2006).

Brain training is bunk, but what about physical

tomasino, tms, and more

Mu suppression as a means to resolve ambiguity?

What is it PMA, MI, SMA?

Which is for motor response and which is for motor strategy?

aging de simone, Sharma

Special populations

Motor - experts

Motor - disabled - but see the HLJ paper for counterpoint

Mental-disabled