

Motor Imagery

Reflections on using mirror feedback in stroke rehabilitation

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Let's start with a brief review
of terminology

Mirror (box) therapy or mirror visual feedback:

simply looking at the image

= imagery preparation/ somatosensory stimulation

unilateral movement reflected in the mirror

= action observation

= motor stimulation

bilateral movements with the target limb behind the mirror

= motor practice (McCabe, 2011)

Motor imagery



mental rehearsal or simulation of an action or activity without any body movement (Harris & Hebert, 2015)

AKA imagined movements

inherent focus is on the kinesthetic sense of movement

Motor stimulation paradigm



Mental imagery

A perceptual experience in the absence of external stimuli *to the affected side*

Can include multiple forms of sensory representation: touch, sight, smell, and sounds

(Schmaltzl et al, 2013)

Imagined movements are a subset of mental imagery [motor stimulation]

Mental Imagery

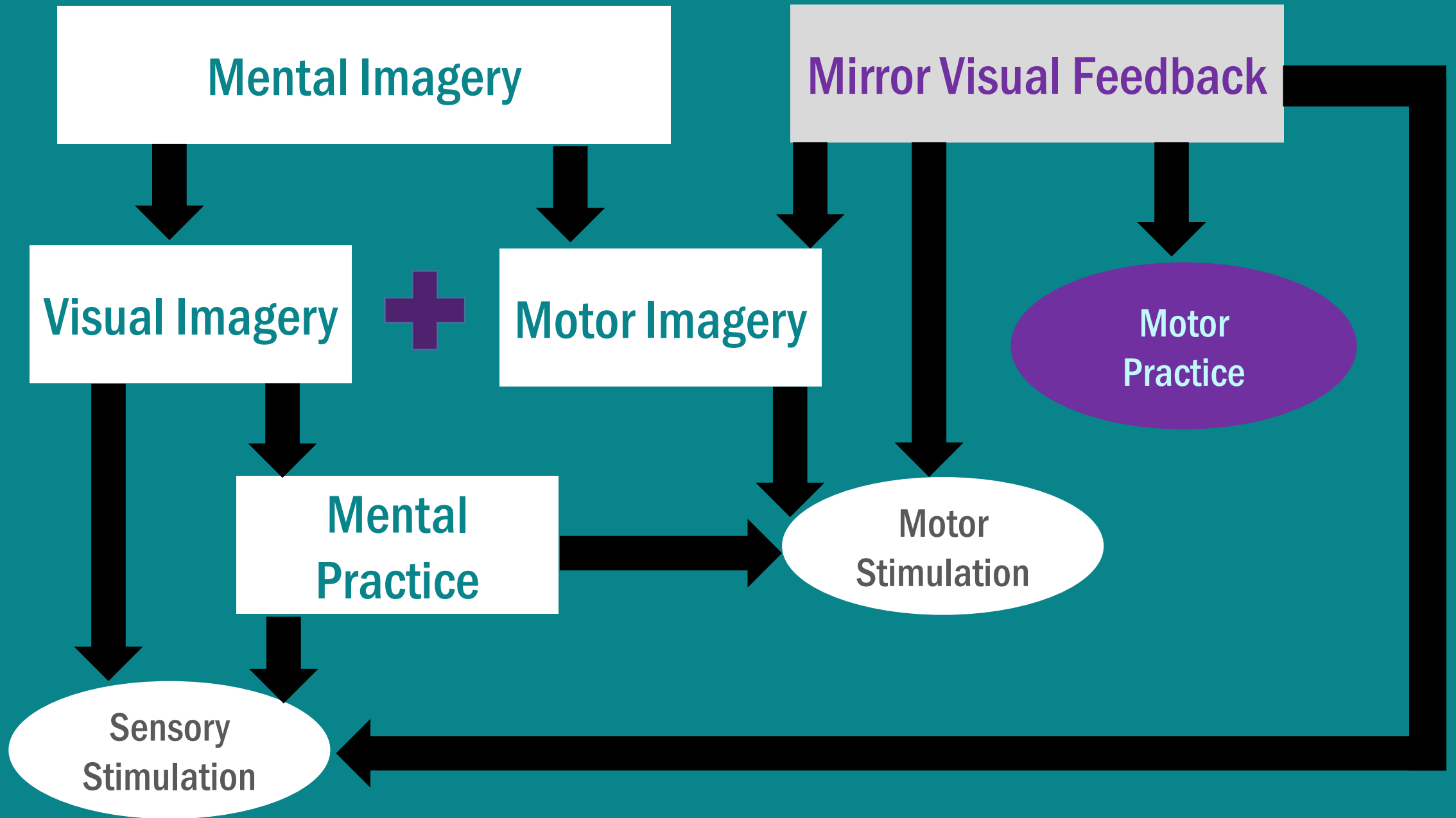
Visual Imagery

Motor Imagery

**Motor
Practice**

**Mental
Practice**

Mirror Visual Feedback





How does this fit with post-stroke recovery?

Contraindications to mirror visual feedback

Vision impairments (acuity)

Profound hemi-neglect



Unhelpful responses to MT

Reports of nausea or vestibular responses (i.e. dizzy, off-balance, falls or fear of falling)

Negative changes in limb temperature or weight

Pain invoked or increased

Minimal active motion available

Action observation

stimulation of the motor networks by observing movement

(Larsen et al, 2019; Zult et al, 2015)

Observation of the unaffected arm in the mirror
Conscious attention to the movements of others
Helpful for pain reduction

Cross education

preservation of strength in protected/immobilized/weak muscles by targeted resistance training of contralateral or unaffected side

(Green & Gabriel, 2018; Zult et al, 2015, Ehrensberger et al, 2016)

Resistance training of unaffected arm while watching in a mirror
Match to early recovery targets and key functional motions

Gross active motion available

Bilateral simultaneous activity = mirror augmented motor practice

Reduces co-contraction

Bilateral access

Augment proprioceptive feedback

Best if task-based, not exercise-based

Refining motions

**Use with GRASP
components**

A decorative graphic on the right side of the slide, consisting of three stacked, horizontal purple bars of increasing height from left to right, creating a stepped effect.

Grading and progressing: PATTLEP

Sport model for imagery (see Harris & Hebert, 2015)

Physical

practice, positioning, NMES, intensity, facilitation by therapist

Environment

reduce distractions, visual /auditory cues and feedback

(vanVliet & Wulf, 2006)

promote relaxation as preparation for optimal neuroplastic response

Grading and progressing

Task

object interactions, multisensory inputs

isolated movements vs. functional activities

Timing

before or after physical practice?

Increasing dose & duration

Grading and progressing

Learning

Grading the task relative to mastery

Emotion

Meaningful tasks, client choice/preference

Perspective

Action observation vs. bilateral movement

Internal focus on bodily movement and limb position vs external focus on control/manipulation of objects (Harris & Hebert, 2015; vanVliet & Wulf, 2006)

Distortions



Fatigue

Falls risk

'Reflective' Summary

Mirror visualization (action observation) is good for pain AND motor stimulation AND ? as adjunct to cross-education

An alternative to conventional rehab if pain is a barrier

Mirror augmented bilateral training most effective when task-based

Sessions should be between 20-30 minutes for motor practice; shorter repeated sessions may be better for a painful limb

Daily practice is ideal - minimum number/week unknown, #/day unknown

Client education and home programs

Education is key to achieving an effective dose and duration of MVF; may need to engage family members as well

May need to understand some basic principles to get 'buy in'

Pick the examples and stories that work for you, and rehearse them, construct educational materials that utilize them, and reinforce regularly

Athletes use motor imagery to practice and train

Motion-sickness as an example of a sensory-mismatch

LET'S TALK!

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