

# Implicit explicit learning and motor imagery



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Verbal instructions Traditionally vital, Fitts and Posner - leads to autonomy.

New research suggests it may degrade performance. Implicit learning Passive accumulation of task relevant information processed at an unconscious level, not easily verbalised.

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learning Conscious, intentional recollection of previous experiences and information.

Episodic, autobiographical.

Semantic, ability to recognise people. Working memory - may interfere with motor execution. Episodic Recollection of singular events. Semantic All explicit memory that isn't autobiographical. Trivia.

Reading, writing, maths. Masters 2000 Reducing exp TR knowledge, learning by analogy.

Analogy had less Exp knowledge than control and exp group.

Analogy had better retention, identical kinematics. Internal focus Explicit.

Body parts and movements. External focus Implicit.

Apparatus/Implements.

Found to have greater economy of action. Constrained action

(hypothesis) Internal focus - increase in task related info processing.

Conscious control of movement, stops automatic processing, decrement in performance. Rehabilitation Explicit Internal foci - Stroke patient focus on limb extension when reaching. Rehabilitation Implicit External foci -

Parkinson's with hypokinesia focus on metronome. Motor imagery Dynamic mental representation of motor behaviour unaccompanied by real movements brought about by combinations of modalities. MI

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modalities Visual, Kinaesthetic, Cutaneous, Auditory, Olfactory. Functional equivalence Performance and MI.

Planning, preparing, simulating, observing - Motor representation, similar neurophysiological substrate.

Same as perception in function. MI and ME Execution time increases with difficulty in real and virtual tasks. Same time lengths. MI and ME

Neurophysiology Covariation of HR and pulmonary ventilation with imagined effort.

Musc activity increases with respect to rest. Taktek 08 MI and physical practice superior during transfer. fMRI Good spatial resolution, poor temporal.

BOLD response, haemodynamic blood flow. Expensive. Limited ROM.

MEG Poor spatial resolution, good temporal, magnetic field, better ROM.

EEG Cheap, easy, susceptible to movement artifact, old methods of processing data question accuracy. Action planning Supp motor area. Motor control Primary motor cortex. Imagery Inferior parietal cortex. Timing Basal ganglia. Error detection Cerebellum. 30% Activation in motor cortex during imagery, compared to actual. Rossa 03 Golf imagery, wall vs rest vs imagery. Decreased activation - increased skill level for supp motor area and cerebellum.

Agreement between golf swing imagery and brain activation areas. MI and rehab Could reduce time needed with therapist.