



Beiträge zur 50. Tagung
experimentell arbeitender
Psychologen

3. bis 5. März 2008
in Marburg

Patrick Khader
Kerstin Jost
Harald Lachnit
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Herausgeber

Symposium 21

Sensorimotor Transformation and Tool Use

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When a tool is used, transformations are in effect, that carry over the movements of the hand into movements of the tool. The human motor system is often challenged by the use of tools in modern work – especially when these tools introduce unfamiliar transformations between manual movements and intended effects. Movements are represented and controlled by anticipating the movement effects. As a consequence, what counts for successful tool use is the representation of the distal effect, not the proximal effect. Learning, compensation for and adaptation to sensorimotor transformations and tool use is discussed in the symposium considering effects on action and perception.

Transformed movements and perceiving one's own action

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Tool use often challenges the human motor system, especially when these tools require sensorimotor transformations. We report an experiment using a digitizer tablet, in which different gains are introduced between the hand movement (proximal effect) and the intended action effect presented on a display (distal effect). The question is how one's own movements are perceived in this situation. With regard to the action effect account movements are represented and controlled by anticipating the movement effects. As a consequence, participants should be less aware of their own hand movements. The reason is that what counts for a successful tool use is the representation of the distal effect, not the proximal effect. Results supported this view. Potential applications of this research include the performance costs and perceptibility of one's own movements when introduced to sensorimotor transformations of devices.