

“Gießener Abendgespräche Kognition und Gehirn“

Mittwochs, 18.00 bis 20.00 Uhr, Raum F009

27.11.2013

“A Hierarchical View of Grounded, Embodied, and Situated Numerical Cognition”

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There is much recent interest in the idea that we represent our knowledge together with the sensory and motor features that were activated during its acquisition. This paper reviews the evidence for such “embodiment” in the domain of numerical cognition, a traditional stronghold of abstract theories of knowledge representation. The focus is on spatial-numerical associations, such as the SNARC effect (small numbers are associated with left space, larger numbers with right space). Using empirical evidence from behavioral research, I first describe sensory and motor biases induced by SNARC, thus identifying numbers as embodied concepts. Next, I propose a hierarchical relationship between grounded, embodied, and situated aspects of number knowledge. This hierarchical conceptualization helps to understand the variety of SNARC-related findings and yields testable predictions about numerical cognition. I report several such tests, ranging from cross-cultural comparisons of horizontal and vertical SNARC effects (Shaki & Fischer, 2012) to motor cortical activation studies in adults with left- and right-hand counting preferences (Tschentscher et al., 2012). It is concluded that the diagnostic features for each level of the proposed hierarchical knowledge representation, together with the spatial associations of numbers, make the domain of numerical knowledge an ideal testing ground for embodied cognition research.

References:

- Shaki, s., & Fischer, M. H. (2012). Multiple spatial mappings in numerical cognition. *Journal of Experimental Psychology: Human Perception and Performance*, 38(3), 804-809.
- Tschentscher, N., Hauk, O., Fischer, M. H., & Pulvermüller, F. (2012). You count on the motor cortex: fMRI reveals embodied number processing. *NeuroImage*, 59, 3139-3148