

1987). We hypothesize that hyperboles based on SOURCE-PATH-GOAL schemas are processed through a simultaneous scanning, while hyperboles based on PATH schemas are processed through a sequential scanning. Results can lead to applications aimed to verify the existence of neural correlates of different configurations of spatial knowledge (Holmqvist & Pluciennik 2004). Presently, neurolinguistic analysis show results on: the semantic-pragmatic processing of literal vs. figurative expressions (Rapp 2011, Bambini 2011); the correlation semantic difficulty/neural activity (Sharp 2010) and neural activation/content-specific processes (Ferstl 2005); the supra-modal nature of spatial imagery in abstract mental representation (Struiksma 2009, Simmons 2008); the cognitive advantage of constructions (Goldberg 2012); the fact that bilateral activation of the angular gyrus and language areas appear specific to the mental scanning of topographic representation built from texts (Mellet 2002). On the ground of such data, we outline a neurolinguistic experimental design. Parameters can be used in fMRI testing to verify whether different patterns of activations are correlated to the processing of different hyperboles.

Categorical and coordinate spatial relations of object processing in deaf signing adults

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This work investigates how manual or vocal language modalities and hearing status affect the specialization of development of hemisphere preferences for spatial relation representations of object processing. In normal hearing adults, the brain computes at least two kinds of spatial relation representations (Kosslyn, 1987). The categorical spatial relation representation is used to assign a spatial relation to a category (e.g., an equivalence class such as above, below) whereas the coordinate representation is used to represent the precise distance and location in a metric coordinate system (e.g., metric spatial properties). It is suggested that the left hemisphere (LH) makes more effective use of categorical representation and the right hemisphere (RH) makes more effective use of coordinate. In this study, 17 native signing deaf adults and control group of 19 non-signing hearing individuals were tested using a same/different matching task on categorical and coordinate representations of object processing using stimuli adapted from Laeng and Peters (1995). In addition, a spatial short-term memory task and a non-verbal reasoning task were administered to all participants (Corsi test and Raven's Standard Progressive Matrices) to control for the ability of the two groups. Whilst the hearing participants displayed the typical suggested pattern; the deaf participants evidenced a LH preference for the categorical representations but no preference for the coordinate spatial relation representation. Discussion will follow on the role of experience of early onset of deafness and sign language use in visual cognition.

The nature of the beneficial role of spontaneous gesture in spatial problem solving

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Spontaneous gestures play an important role in spatial problem solving. We investigated the functional role and underlying mechanism of spontaneous gestures in spatial problem solving. In Experiment 1, 132 participants were required to solve a mental

rotation task (see Figure 1) without speaking. Participants gestured more frequently in difficult trials than in easy trials. In Experiment 2, 66 new participants were given two identical sets of mental rotation tasks problems, as the one used in Experiment 1. Participants who were encouraged to gesture in the first set of mental rotation task problems solved more problems correctly than those who were allowed to gesture or those who were prohibited from gesturing both in the first set and in the second set in which all participants were prohibited from gesturing. The gestures produced by the gesture-encouraged group and the gesture-allowed group were not qualitatively different. In Experiment 3, 32 new participants were first given a set of mental rotation problems and then a second set of non-gesturing paper folding problems. The gesture-encouraged group solved more problems correctly in the first set of mental rotation problems and the second set of non-gesturing paper folding problems. We concluded that gesture improves spatial problem solving. Furthermore, gesture has a lasting beneficial effect even when gesture is not available and the beneficial effect is problem-general. We suggested that gesture enhances spatial problem solving by provide a rich sensori-motor representation of the physical world and pick up information that is less readily available to visuo-spatial processes.

Modal preferences in creative problem solving

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Embodied cognitive science appeals to the idea that cognition depends on the body as well as the brain. This study looks at whether we are more likely to engage just the brain or enlist the body for complex cognitive functioning such as creative problem solving. Participants were presented with a puzzle based on De Bono's lateral thinking puzzles. The puzzle consisted of rotating and joining two-dimensional shapes to make a three dimensional one. In one condition participants were given the choice of either solving the puzzle mentally or through manipulation of the images on a computer screen. In another condition the subjects had to solve the puzzle first mentally and then report which mode they would have preferred to solve the puzzle. In all conditions an overwhelming majority of participants chose to solve the puzzle by manipulation, even though there was not a significant increase on performance. It appeared that participants were making a conscious choice for the body to play a feedback-driven role in creative cognitive processing. This strong preference for manual manipulation over mental representation, regardless of the impact on performance, would seem to suggest that it is our natural tendency to involve the body in complex cognitive functioning. This would support the theory that cognition may be more than just a neural process, that it is a dynamic interplay between body, brain and world. The experiential feedback of the body moving through space and time may be an inherently important factor in creative cognition.

Affordance effects in the absence of the intention to act on seen objects

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There now exists an impressive experimental literature that suggests that when viewing objects, the actions that may be performed with them are