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EVALUATING CREATIVE IDEAS: INSIGHTS FROM ERPS AND CHANGES IN THE UPPER ALPHA BAND

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Descriptors: creativity, event-related potentials, upper alpha band

Thus far, electrophysiological research on creativity has employed production tasks and measured changes in the alpha band in time windows lasting several seconds, while participants produced creative ideas. These studies had, however, limited temporal resolution, which made it difficult to identify specific cognitive processes underlying creative thinking. In the current study, we employed a modified version of the alternate uses task, in which participants evaluated word pairs representing the common, creative, and impossible uses of objects according to how (im)possible and (un)common they seemed. In the even-related potential (ERP) analysis, a graded effect was found, with impossible uses evoking the largest, common the lowest, and creative intermediate N400 amplitudes. Moreover, greater power in the upper alpha band was observed in the creative than common condition in the time window between 400–1000ms. Interestingly, this effect was absent in the lower alpha band, which differs from previous reports in which an increase in both the upper and lower alpha bands was found. The graded N400 effect can be interpreted as reflecting increased activity in semantic memory needed to evaluate the creative word pairs. The difference in the upper alpha band might index increased semantic processing demands and larger inhibition of task-irrelevant information on creative than common trials. Since task demands remain comparable on all trials, these findings seem directly related to cognitive processes involved in evaluating creative ideas.

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SEMANTIC DISCRIMINATION OF VIBROTACTILE LINGUISTIC STIMULI IN SUBJECTS WITH PROFOUND DEAFNESS: AN FMRI STUDY

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Descriptors: profound deafness, vibrotactile, semantic

Delayed and impoverished language acquisition in children with profound bilateral deafness has an impact on cognitive development. Therefore, this challenge to acquire language conventionally underlies the exploration of vibrotactile stimulation as an alternative sensory substitution method that might allow the discrimination of oral language. Using a 3T scanner, we studied the changes in neurofunctional activation patterns -BOLD signal- in 12 profoundly deaf participants after a 10 to 12-week training period (15 sessions; 45-min each) that focused on the vibrotactile discrimination of words, specifically color names. A small device worn on the left index finger delivered sound-wave stimuli. The fMRI block-design paradigm that was performed, before and after the training, consisted of two vibrotactile discrimination Go/noGo tasks. One task involved the discrimination between two pure tones with different duration (T: 500 ms; NT: 250 ms) and the other involved semantic word discrimination (T: Mexican flag colors -red, white or green- ; NT: other colors -brown, blue, black or pink-). Our results confirm that a training program in vibrotactile linguistic discrimination modifies behavioral performance and neural metabolic activity. The most significant changes observed in the color > tone contrast after the training were a left lateralization of frontal region activations implying that word discrimination via the somatosensory pathway might involve transmodal higher-order language processing areas.