

〈シンポジウム I〉

『観る。生体・香粧品を見る，捉える。』

神経イメージング手法を用いた顔認知機構の解明

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Investigation of Human Face Perception Using Neuroimaging Methods

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Abstract

We have been studying the underlying mechanisms of face perception in humans using neuroimaging methods such as magneto- (MEG) and electro-encephalography (EEG) and near infrared spectroscopy (NIRS). With the presentation of both upright and inverted unfamiliar faces, the fusiform gyrus and the superior temporal sulcus were activated simultaneously, but independently, predominantly in the right hemisphere. Latencies with inverted faces relative to those with upright faces were longer in the right hemisphere and shorter in the left hemisphere. We consider that differences in processing upright *versus* inverted faces are attributable to temporal processing. When viewing the motion of the mouth and eyes, a large clear MEG component, 1M (mean peak latency of approximately 160 ms), was elicited to both mouth and eye movement, and was generated mainly in the occipito-temporal border, at human MT/V5. The 1M to mouth movement and the 1M to eye movement showed no significant difference in amplitude or generator location. Therefore, our results indicate that human MT/V5 is active in the perception of both mouth and eye motion, and that the perception of movement of facial parts is probably processed similarly. We investigated the effects of subliminal stimulation on visible stimulation to demonstrate the priority of facial discrimination processing, using a unique, indiscernible, color-opponent subliminal (COS) stimulation. We recorded MEG after the presentation of a face or flower stimulus with COS conditioning using a face, flower, random pattern, and blank. The COS stimulation enhanced the response to visible stimulation when the figure in the COS stimulation was identical to the target visible stimulus, but more so for the face than for the flower stimulus. We speculated that the enhancement was caused by an interaction of the responses after subthreshold stimulation by the COS stimulation and the suprathreshold stimulation after target stimulation, such as in the processing for categorization or discrimination. We measured NIRS in ten 5-8-month-olds' left and right lateral areas while they were looking at upright and inverted faces. The results are summarized as follows: (1) the concentration of oxyhemoglobin and total hemoglobin increased significantly in the right lateral area during the upright face condition, and (2) the concentration of total hemoglobin in the right lateral area differed significantly between the upright and inverted conditions. This is the first evidence showing that there is an inter-hemispheric difference on the effect of face inversion in the infant brain using a hemodynamic method.

Key words: face, MEG, EEG, NIRS.