

Face processing during infancy: an electrophysiological approach

Results:

Event-related potentials were recorded in adults, 6- and 12-month old infants during a face processing task where the participants passively viewed upright (HU) and inverted (HI) pictures of human faces. The analysis was guided towards finding evidence of developmental changes in the neural mechanisms involved in face processing. The electrophysiological signal (EEG) of interest was a negative potential peaking around 170ms (N170) after the presentation of the stimulus. The N170 is of smaller amplitude and shorter latency for HU compared to HI.

The analysis showed a classic N170 in adults and a putative “infant N170” in 6-month and 12-month old infants. The amplitude and latency difference between HU and HI was observed only in adults. The averages suggested that the infants N170 can be a broader version of the adults N170. Further analysis was performed on the averages in order to test for this apparent bandwidth difference. The EEG being a mixture of processes produced by several neural generators at the same time, we decomposed the signals into its different frequency components.

The wavelet-based multi-resolution analysis was applied to the averages and the results were compared across the 3 age groups.

The N170-related brain activity was extracted mainly in the alpha band (8-13 Hz) for adults, in the delta band (0-4 Hz) for 6-month olds and in both the theta (4-8 Hz) and alpha bands for the 12-month olds. These findings suggest that 6-month olds may be slower than adults and 12-month olds at processing pictures of human faces. It can reflect infants' more limited exposure to faces and/or a physiological characteristic of infants' immature brains that makes them generally slower at processing information as a whole.

Published Work:

L. Vigon, R. Saatchi, M. De-Haan, H. Halit, A. Gibson, M. Smith, O. Pascalis. Bandwidth Comparison of Face Processing Electrophysiological Signals in Infants and Adults. Program No. 934.2. Abstract . Washington, DC: Society for Neuroscience, 2003.

Milne, E., Scope, A., Pascalis, O., Buckley, D., Makeig, S. (2009). Independent component analysis reveals atypical electroencephalographic activity during visual perception in individuals with autism. *Biological Psychology*, 65, 22-30. doi: 10.1016/j.biopsycho.2008.07.01

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