Development of face perception in Japanese children

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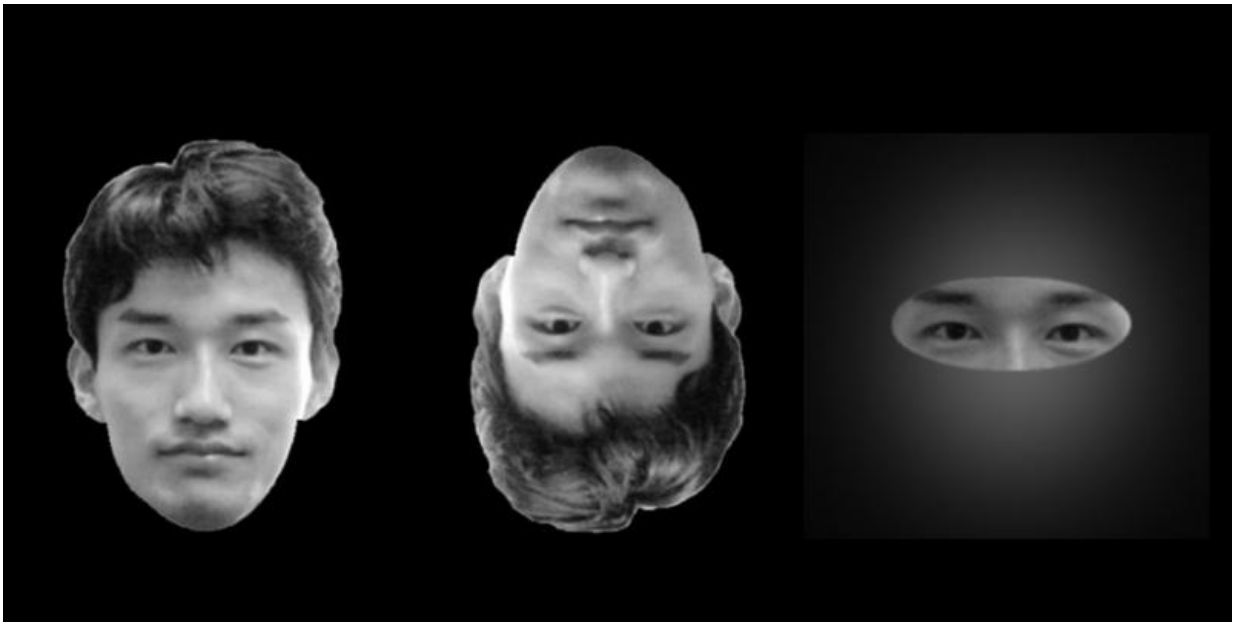

These three images were separately shown to the Japanese children. Left: an image of a neutral face; Middle: an image of an inverted version of the upright face stimuli; Right: an image showings eyes alone without facial contours or other features. The EEG large component (N170) was longer in duration and/or had at least two peaks in the 8 to 11-year-old children, different from adults, whereas it was sharp and had one peak in the 12 to 13-year-old children, similar to adults. N170 was significantly larger after the presentation of the eyes stimuli than after the presentation of the upright face stimuli in the 8 to 10-year-old children. In addition, significant differences in N170 latency were observed among all three types of stimuli in the 13-year-old children, with the inverted face stimuli producing the longer latency than the upright face stimuli, similar to the adult's pattern of N170. Credit: National Institute for Physiological Sciences

Face perception plays an important role in social communication. There have been many studies of face perception in human using non-invasive neuroimaging and electrophysiological methods, but studies of face perception in children were quite limited. Here, a Japanese research team led by Dr. Miki Kensuke and Prof Ryusuke Kakigi, in the National Institute for Physiological Sciences, National Institutes of Natural Sciences, investigated the development of face perception in Japanese children, by using an electroencephalogram (EEG). The team also compared their results for Japanese children with the previous findings for Western children. The team reported that the face perception in Japanese children almost matured by the age of 13 years, earlier than that in Western children.

The study was reported in *Frontiers in Human Neuroscience*, April 22, 2015.

Previous studies in adults with the EEG demonstrated a special EEG component, N170, which appears at approximately 170 ms during object perception in adults. N170 was shown to be larger during the viewing of faces than during the observation of other objects, such as cars or chairs, and was found to be longer and larger when the eyes were being examined than during the viewing of upright faces. Therefore, N170 has been proposed to reflect face perception processing. In addition, N170 was found to be longer during the observation of inverted faces than during the viewing of upright faces in adult. In the case of children, some researchers have also studied the development of face perception using the EEG, and showed that the adult's pattern of N170 did not reach by 14 years of age.

The Japanese research team analyzed the face-related N170 component by viewing an upright face, inverted face, and eyes stimuli in 82

Japanese children aged between 8- and 13-years-old. N170 was longer in duration and/or had at least two peaks in the 8 to 11-year-old children, different from adults, whereas it was sharp and had one peak in the 12 to 13-year-old children, similar to adults. N170 was significantly larger after the presentation of the eyes stimuli than after the presentation of the upright face stimuli in the 8 to 10-year-old children. In addition, significant differences in N170 latency were observed among all three types of stimuli in the 13-year-old children, with the inverted face stimuli producing the longer latency than the upright face stimuli, similar to the adult's pattern of N170.

The team has concluded that the face perception of Japanese children almost matured by the age of 13 years. In addition, their findings differed from those of previous studies of Western children with regard to the age at which the adult response pattern was observed, and showed that cultural differences might have been one of the reasons for this.

Dr. Miki says, "This was the first study to investigate the development of face perception in a large number of Japanese children. We are expecting that this result can be applied for understanding of the face perception of the children with the autism spectrum disorder".

More information: "Differential age-related changes in N170 responses to upright faces, inverted faces, and eyes in Japanese children" Kensaku Miki, Yukiko Honda, Yasuyuki Takeshima, Shoko Watanabe and Ryusuke Kakigi. *Frontiers in Human Neuroscience* April 22, 2015

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