EJN fens EUROPEAN JOURNAL OF NEUROSCIENCE

European Journal of Neuroscience, Vol. 38, p. 2124, 2013 doi:10.1111/ejn.12275

DISORDERS OF THE NERVOUS SYSTEM

COMMENTARY
Visual cortex processing in autism spectrum disorders (Commentary on Frey *et al.*)

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Brain plasticity is a double-edged sword. It allows for individuals to learn and adapt to their environment, but peculiarities may also alter the brain and contribute to maladaptive outcomes. Here, in the very interesting study conducted by Frey and colleagues, the authors used measures derived from event-related potentials (ERPs) to assess visuo-spatial maps within the visual cortex in youths with autism spectrum disorders (ASD) and controls. Based on the observation that some individuals with ASD tend to not fixate on a target (i.e. they exhibit off-center fixations), Frey and colleagues hypothesized that this fixation pattern would impact the development of the visual cortex. Specifically, they predicted that the participants with ASD would process stimuli presented in the periphery differently relative to the control group. Consistent with this prediction, the ASD group compared with the controls exhibited greater ERP amplitudes when stimuli were presented in the periphery. No group differences were detected when stimuli were presented centrally. Moreover, the investigators found that the amplitude in response to the peripheral stimuli correlated with the severity of stereotyped behaviors and restricted interests, which are core features of ASD. These findings are important because they provide preliminary data suggesting that an idiosyncratic behavior could alter brain function and possibly contribute to ASD-related impairments.

Going forward, it will be important to precisely characterize the developmental time course of these events. Specifically, longitudinal investigations of young children at risk for ASD and multiple ERP acquisition sessions could identify whether the fixation pattern precedes the altered ERP response. Furthermore, similar work that simultaneously monitors fixation patterns and visual cortex development could make headway on the question of why this pattern emerges in some individuals. One question that these findings raise is what is the functional impact, if any, of these behavioral and cortical anomalies? The present study's finding of an association between ERP amplitude to peripheral presentations and specific impairments in ASD suggests that anomalies in fixation and striate cortex function might contribute to the ASD impairments. Of course, more work is necessary to understand the nature of these relationships. One possibility for probing this further is to conduct a training intervention in an effort to improve fixation patterns and possibly normalize brain function. If these changes correspond to reduced impairments in functioning, not only would it be consistent with the theoretical framework of Frey *et al.* (2013) but it would contribute to the promise of translational neuroscience.

Reference

Frey, H.-P., Molholm, S., Lalor, E.C., Russo, N.N. & Foxe, J.J. (2013) Atypical cortical representation of peripheral visual space in children with an autism spectrum disorder. *Eur. J. Neurosci.*, **38**, 2125–2138.