

VSS abstract: max 300 words

Coherent motion evoked responses in school-aged children

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Motion sensitivity increases during childhood, but little is known about the underlying neural correlates. Most studies investigating children's evoked responses have not dissociated direction-specific responses from those reflecting spatiotemporal luminance modulation. To isolate direction-specific responses, we presented coherently moving dot stimuli preceded by a 'boil' period of incoherent motion, to 102 children aged 6 to 12 years and 20 adults. Participants reported the direction of coherent motion stimuli (10%, 30%, 50% and 75% coherence) as quickly and accurately as possible, while high-density EEG was recorded. Using a data-driven approach, we identified stimulus-locked EEG components that were reliable from trial-to-trial. We found two components with distinct topographies: first, an early sensory component with a posterior topography, and second, a later, sustained positive component over centro-parietal electrodes, hypothesised to reflect the decision-making process. We divided the children by age into three groups of 34 and compared their component waveforms with the adult group. For all groups, evoked responses scaled with motion coherence. The components showed clear developmental changes. In the first component, all groups showed a negativity peaking at ~300ms, like the previously reported coherent-motion N2. However, the children, unlike adults, showed an additional positive peak at ~200ms. The increasing positivity in the second component was steeper in older participants. To link these components with behavioral responses, we median-split trials by reaction time. In the adults and oldest children, the leading edge of the first component differentiated slow and fast trials from as early as ~200ms. The second component showed response-specific activity at 250-300ms in all groups apart from the youngest children. We suggest that children's development of coherent motion sensitivity is driven by the maturation of both early sensory and later decision-related processes. These findings will help to understand altered motion sensitivity in neurodevelopmental disorders.

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