POSTER: LIFESPAN DEVELOPMENT OF MOTION SPEED PERCEPTION SIMULATED THROUGH OPTIC FLOW

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Objective: The aim of this study was to investigate the development of motion speed perception in response to simulated forwards self-motion from infancy to early adulthood. Method: Using high-density EEG, we measured evoked and induced brain activity in response to forwards visual motion at three ecologically-valid speeds, i.e. walking, jogging, and cycling. Participants watched an optic flow pattern consisting of a virtual road with poles moving at either side. We tested prelocomotor and locomotor infants, 6- and 12-year-old children, and students in their twenties. Results: N2 latencies for motion decreased significantly with age, from 400 ms for prelocomotor infants at 4-5 months to 312 ms for crawling infants at 9-11 months, 305 ms for 6-year-olds, 257 ms for adolescents, and 246 ms for adults. Prelocomotor infants were not able to differentiate between visual motion speeds, while older infants with locomotor experience and children at 6 years did, with shortest latency for walking speed. Adolescents and adults showed similarly short latencies for the three motion speeds, indicating that they perceived them as equally easy to detect. Time-frequency results indicated that with increasing age, participants showed neural oscillations in response to visual motion increasing in frequency from the theta band (4-8 Hz) in early infancy to the beta band (12-30 Hz) in early adulthood. Implications: Motion speed perception improves dramatically during the first year of life, and the shorter latencies found in crawling infants, especially for walking speed, are probably due to increased
experience with self-produced locomotion. At the age of six years, children still showed relatively long latencies overall and had difficulty detecting the higher speeds of jogging and cycling, and this has implications for children's road traffic safety. Young adolescents processed motion slower than adults. In conclusion, self- produced locomotor experience is a prerequisite for perceiving speed of motion, and children's motion perception is not fully developed until late adolescence.