School-age children perceive fast radial optic flow in noise more accurately than slow linear flow

Rick O. Gilmore *(rogilmore@psu.edu)*, Michelle A. Shade, Michael J. O'Neill, & Andrea R. Seisler

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Databrary

Motivation

Optic flow evokes different cortical activation patterns across the scalp depending on the pattern of flow (radial vs. linear) and speed. These effects are seen both in adults [1] and children [2]. This study examined whether the detection of optic flow in child observers varies by pattern and speed in similar ways to adults [3],[4], and the extent to which behavioral detection accords with patterns of brain activation.

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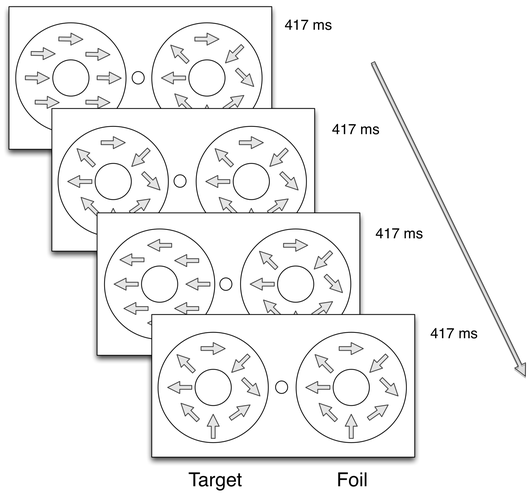
Method

Child observers (n=20; 5.3-8.5 years, 12 female) viewed two side-by-side, time varying (1.2 Hz coherent/incoherent cycle) annular-shaped (18 deg outer/5 deg inner diameter) optic flow displays at a viewing distance of 60 cm. One display depicted random (0% coherent) motion while the other depicted radial or linear motion at one of four fixed coherence levels in one of two coherence level profiles (20, 40, 60, 80%) or (15, 30, 45, 60%). Observers fixated centrally and judged which side contained coherent motion, indicating the choice by pointing to the monitor. The choice was entered by the experimenter via keypress. Within a single run, speed was either 2 or 8 deg/s. Four runs were collected per participant in a single visit.

Data Sharing

Movies of the displays, metadata about the participants, and raw data files are available at `https://nyu.databrary.org/volume/218`.

Displays



References

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Results

We analyzed the proportion of correct responses and response times using generalized linear mixed effects modeling in R. As predicted, the proportion of correct judgments increased and the response times of correct judgements declined with increasing motion coherence. Fast optic flow patterns were perceived more reliably than slow, and radial patterns were perceived more reliably than linear patterns.

Combined with other prior EEG results, these data suggest that optic flow processing networks mature rapidly from infancy, but undergo less rapid, subtler change from mid-childhood to adulthood.