

Developing Eye-Tracking Measures of Self-Regulation in Infancy: A longitudinal study

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Aim

To capture individual differences in endogenous attention control and emotion regulation in 3- to 4.5-month-old infants and how their interplay contributes to the later development of self-regulation capacities at 12 and 18 months of age.

Background & scope

Although the development of endogenous attention and emotion regulation are theorized to constitute a foundation for later self-regulation, how their interplay contributes to later cognitive development remains elusive. To study these developmental pathways, we brought together methods from different research traditions into a single toolbox (the GEAR Toolbox) where we combine eye-tracking measures of endogenous attention with micro-coded video measures of attention and emotion regulation during naturalistic interactions with the caregiver, as well as caregiver reports on broader-scale self-regulation outcomes. In the prospective longitudinal design, we assess whether individual differences in endogenous (joint) attention and emotion regulation in early infancy persist later on, and whether they translate into later-life differences on global self-regulation measures. For this, we use age-appropriate versions of the GEAR Toolbox at three measurement waves (4, 12, and 18 months), within which we measure sustained and shifting attention, information gathering and emotion regulation during a lab visit, along with broader-scale self-regulation at the level of temperament, sleep, feeding obtained via caregiver reports.

The GEAR Toolbox: Materials & Set-up

Broader-scale regulation

- Temperament & self-regulation (IBQ-R-SF)
- Sleep regulation (BISQ)
- Feeding regulation (BEBQ)

Endogenous attention

Sustained & shifting attention, information processing

- 500 Hz monocular recording (Eyelink 1000, SR Research Ltd.) with 5-point calibration
- Equiluminant gaze-contingent stimuli (CIELUV Color Space) subtending 5° to 6° visual angle

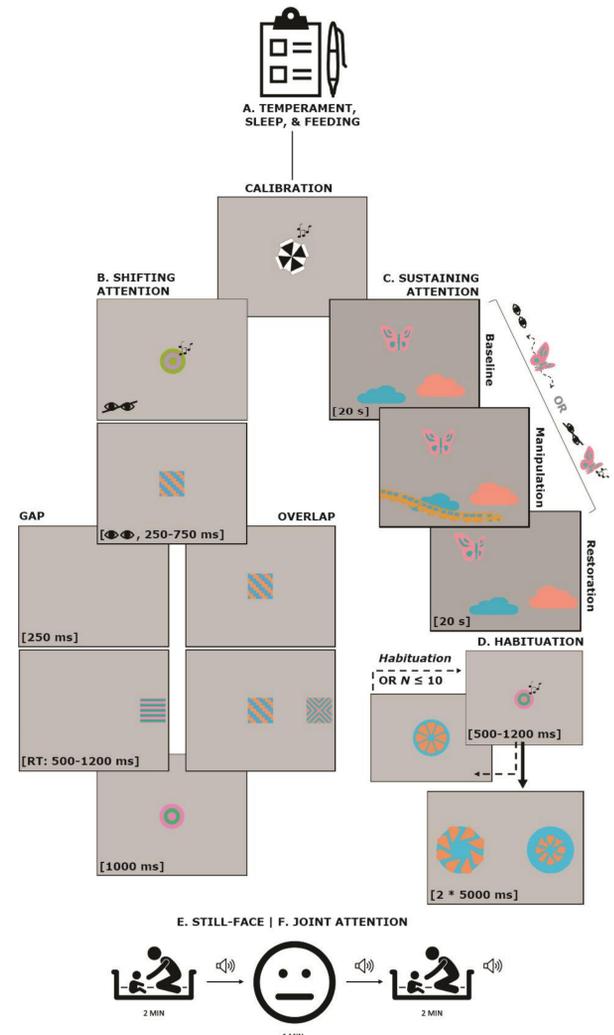
Attention & emotion regulation

Still-Face paradigm (4 months)

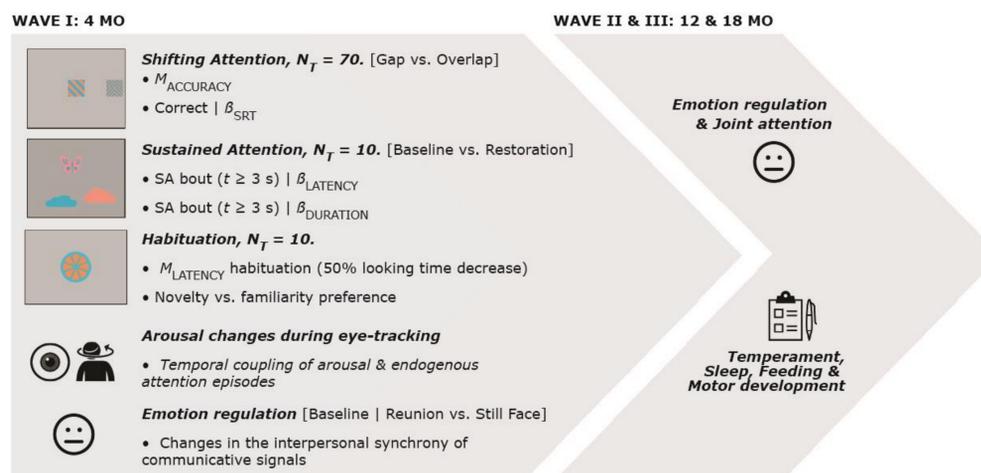
- Samsung Gear 360° mobile camera
- Dual Lens recording: 3840x1920 (30 fps)

Joint attention & Toy Removal task (12 & 18 months)

- Head-mounted eye-tracking (custom Pupil labs headset)



Longitudinal design & Expectations



Participants

- Target N = 140 (WS, M_{AGE} 4, 12, & 18 mo)

GEAR Toolbox validation

- Reliability eye-tracking measures Splithalfr R-package (Pronk et al.)
- Cross-task stability within waves

Analyses

Data pre-processing

- Eye-tracking data - Gazepath R-package (van Renswoude et al., 2017)
- Video-data - Micro-coding using Observer (Noldus)

Multi-level modeling

- Longitudinal stability within domain
- Longitudinal prediction of self-regulation outcomes at 12 & 18 mo via attention and emotion regulation at 4 mo (while accounting for within-domain stability)