Towards a translational developmental neuroscience of autism

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2012-

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Why Autism?

- 9 months

18 months

5 years

Welcome to Computer Club!
Select a game from our list or choose one of your own...

The University of Sheffield.

Brett et al., 2016
Development in Translation
Probabilistic specialization
"Low Likelihood" infants: Older sibling with TD
1% ASD
99% No ASD

"High Likelihood" infants: Older sibling with ASD
20% ASD
80% No ASD

Ozonoff et al., 2011

- 9 months
18 months
2-3 years
Why is social engagement important?

Investigating the factors underlying adaptive functioning in autism in the EU-AIMS Longitudinal European Autism Project

Julian Tillmann, Antonia San José Cáceres, Chris H. Chatham, Daisy Crawley, Rosemary Holt, Bethany Oakley, Tobias Banaschewski, Simon Baron-Cohen, Sven Bölte, Jan K. Buitelaar... See all authors
Regional communication in newborn fMRI

Social Brain Functional Maturation in Newborn Infants With and Without a Family History of Autism Spectrum Disorder

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A Left parietal lobe

B Right posterior fusiform
Using scalp topography to measure states of engagement

**Nc amplitude**

**Microstate duration**

- **Face**
  - Elsbbagh et al., 2012

- **Noise**

  - EL-ASD
  - EL- no ASD
  - EL- Other
  - LR

Gui et al., in review
Social engagement modulates network connectivity

EEG at 14mo

Connectivity for theta band (4-5 Hz)

Communication at 36mo

VABS-II

Global dbWPLI (Soc – NSoc)

dbWPLI (Soc – NSoc)

For TL connections

Complete group: \( \rho = .26, p = .033 \)

EL group: \( \rho = .30, p = .036 \)

Diminished theta connectivity across neurotypical connections predicts later communication skills

Haartsen et al., in prep.
Measuring physiology to uncover social engagement

Heart rate during videos

Comp 3 associated with language, social skills, ASD severity; TD group > ASD group
From lab to field
New paradigms

1. Choose cognitive parameters
2. Acquire data
3. Real-time FMRI analysis
4. Calculate brain state
5. Optimization algorithm

Neuroadaptive Bayesian optimization

Rob, Fred, Anna, Elena
Thanks!

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