Social cognition during adolescence

Dr. Iroise Dumontheil
Reader in Cognitive Neuroscience
Centre for Brain and Cognitive Development
Department of Psychological Sciences
Birkbeck, University of London
Why adolescence?

But why?!?

Prof. Annette Karmiloff-Smith:

“Dear Iroise
Just loved your talk and the way you handled the question period yesterday and do hope to welcome you to the dept.”
Why adolescence?

This is Sally.
Sally has a basket.
Sally has a marble. She puts the marble into her basket.
Sally goes out for a walk.
Anne takes the marble out of the basket and puts it into the box.
Now Sally comes back. She wants to play with her marble.

Where will Sally look for her marble?

This is Anne.
Anne has a box.

Mills et al. SCAN 2012
Blakemore Nature Rev Neuroscience 2008
Theory of mind use

Move the top truck left
• More fixations and longer fixation on the occluded object.
• 23% first reach towards occluded object (17% moves of the object), 0% in control condition

Move the top truck left

Control condition without the director. Rule = ignore objects in slots with grey back panel.

Dumontheil, Apperly & Blakemore Developmental Science 2010
Development of perspective taking in a communicative context

N=178, 7-27 years old, female

Dumontheil, Apperly & Blakemore Developmental Science 2010
Development of perspective taking in a communicative context

N=90
Development of perspective taking in a communicative context

Symeonidou, Dumontheil, Chow, Breheny. JECP 2016
Development of perspective taking in a communicative context

Tamnes, Overbye, Ferschmann, Fjell, Walhovd, Blakemore & Dumontheil *Dev Psychology* 2018
Perspective taking predicts trust and social reciprocity behaviour in adolescents

50 adolescents (50% female) between 13 and 18 years old

- Low perspective-takers (N=27, Director errors 70.8%)
- High perspective takers (N=23, Director errors 8.0%)

Multi-round financial trust game, playing against a cooperative or an unfair counterpart.

Fett, Shergill, Gromann, Dumontheil, Blakemore, Yakub & Krabbendam Journal of Adolescence 2014
What is behind these developmental differences?

- Developmental differences in inhibitory control
  (Symeonidou, Dumontheil, Chow, Breheny *JECP* 2016)

- Multitasking may be more difficult for adolescents
  (Mills, Dumontheil, Speekenbrink, Blakemore *Royal Society Open Science* 2015)

- Working memory associates with individual – but not necessarily developmental – differences in performance
fMRI study

**Director factor** (Director Present or Absent)
**Object factor** (1-object or 3-object)

28 female participants, 10-16 and 21-30 years old

Dumontheil, Kuster, Apperly & Blakemore *NeuroImage* 2010
Dumontheil, Hillebrandt, Apperly & Blakemore *JoCN*, 2012
What is behind these developmental differences?

Dumontheil, Kuster, Apperly & Blakemore *NeuroImage* 2010
Dumontheil, Hillebrandt, Apperly & Blakemore *JoCN*, 2012
What is behind these developmental differences?

N=226, 8.5–26.7y

Thinner cortex <> better accuracy on Director vs. No-director critical trials

Controlling for age

Tamnes, Overbye, Ferschmann, Fjell, Walhovd, Blakemore & Dumontheil *Dev Psychology* 2018
Online use of perspective taking increases during adolescence.
Both cognitive control maturation and possibly increased specificity of MPFC activation for the use of ToM may play a role in these developmental changes.
... but still, why adolescence?

Who we are

The Centre for Brain and Cognitive Development (CBCD) was founded in 1998 at Birkbeck, University of London and is directed by Professor Denis Mareschal. It has grown steadily and is now internationally recognised as one of the leading centres of its kind in the world.

The work of CBCD members is characterised by its use of converging methods (behavioural testing, eye tracking, ERP, EEG, optical imaging, EMG, computer modelling, functional and structural MRI), and by its theory-driven programmes of empirical research on visual, cognitive, and language development in human infants, children and adults.

The work undertaken at CBCD is only possible through the generous support of our many funders, Birkbeck and the numerous families and children who have volunteered their time.

CBCD biannual report download (PDF)
Thank you!

Institute of Cognitive Neuroscience
Sarah-Jayne Blakemore
Hauke Hillebrandt
Olivia Küster
Psychological and Language Sciences
Irene Symeonidou

School of Psychology
Ian Apperly

Behavioural and Movement Sciences
Lydia Krabbendam
Ann-Kathrin Fett

Department of Psychological Sciences
Gillian Humphreys

Department of Psychology
Christian Tamnes