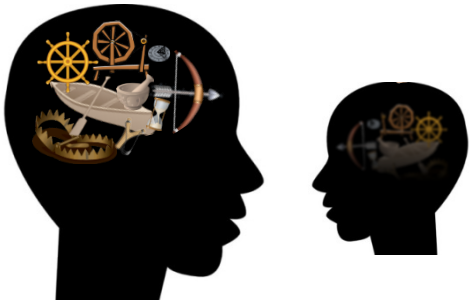
Cognitive Gadgets

Cecilia Heyes

All Souls College
University of Oxford



Central Idea

Selectionist

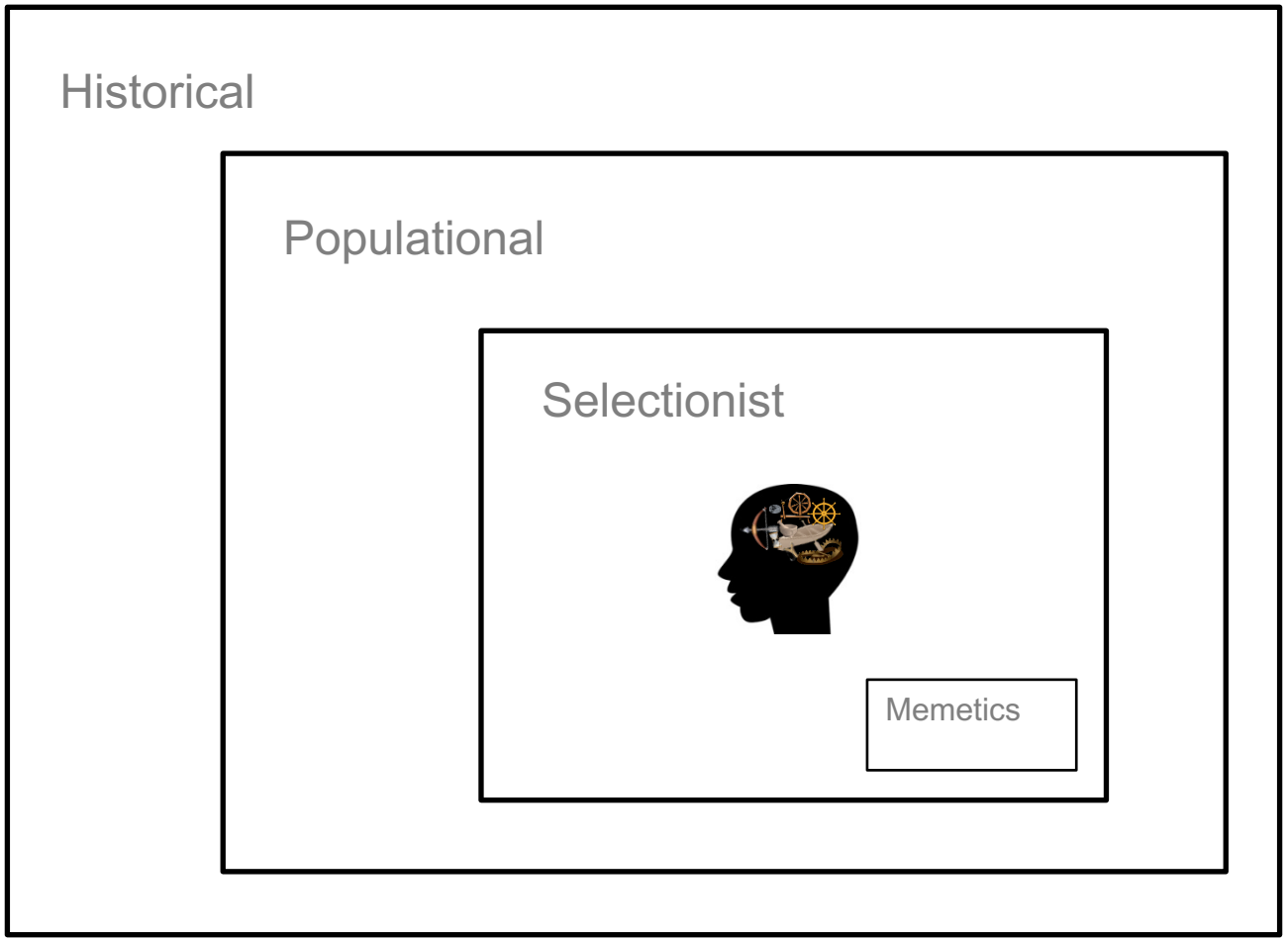
Cultural evolution shapes

not only *what* we think

but *how* we think

Computational

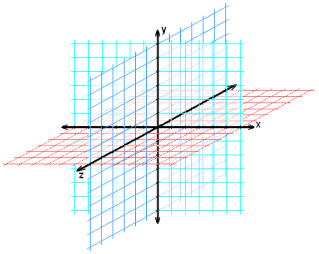
Cultural evolution



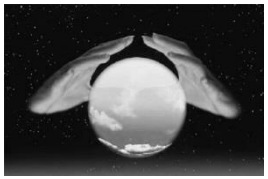
Godfrey-Smith (2009) Darwinian Populations and Natural Selection. OUP
Lewens (2015) *Cultural Evolution*. OUP

Distinctively Human Cognitive Mechanisms

Mental mapping



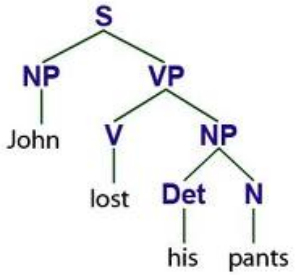
Mental time travel



Theory of mind

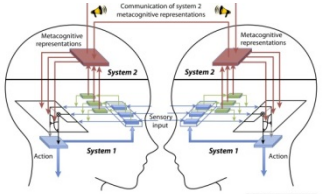
Imitation

Language



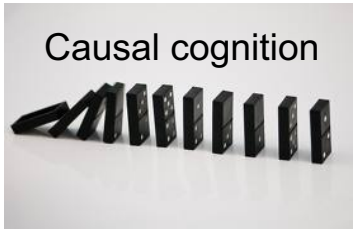
Social learning biases

Metacognition



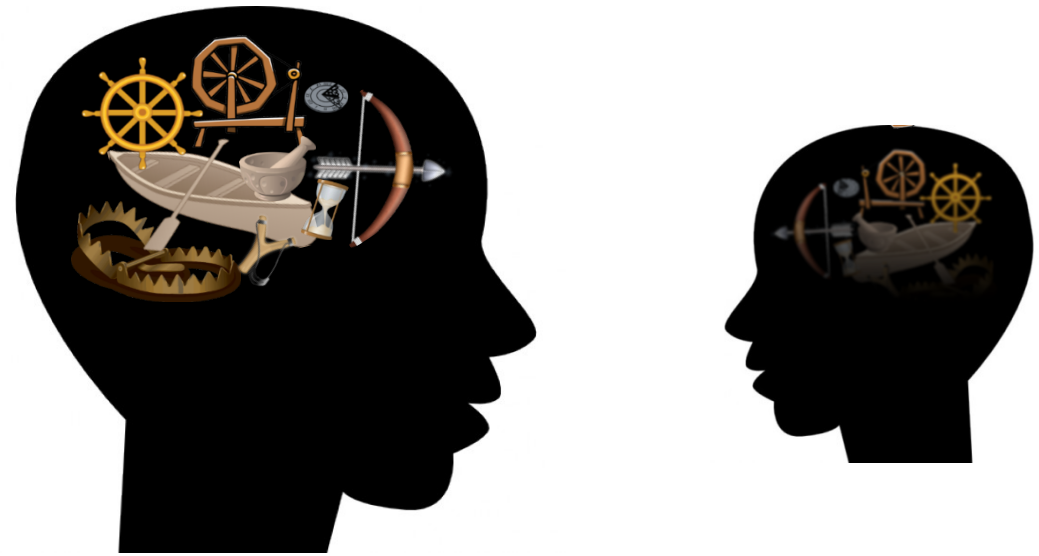
Normative reasoning

Causal cognition



Teaching

Cognitive Gadgets



What *is* ‘in our genes’?

Genetic evolution has tweaked the human mind
in small but important ways

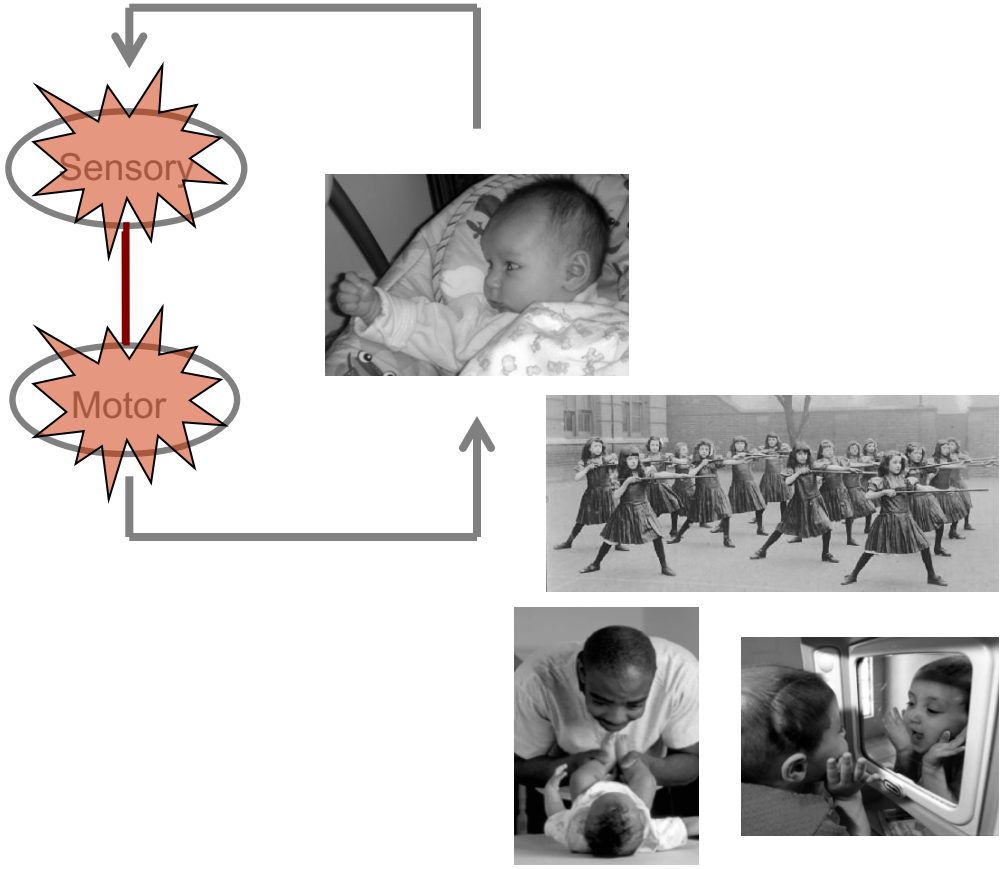
Genetic starter kit

Temperament	*Social tolerance* *Social motivation*
Attention	*Face bias* *Voice bias*
Cognition	*Associative learning* *Executive function*

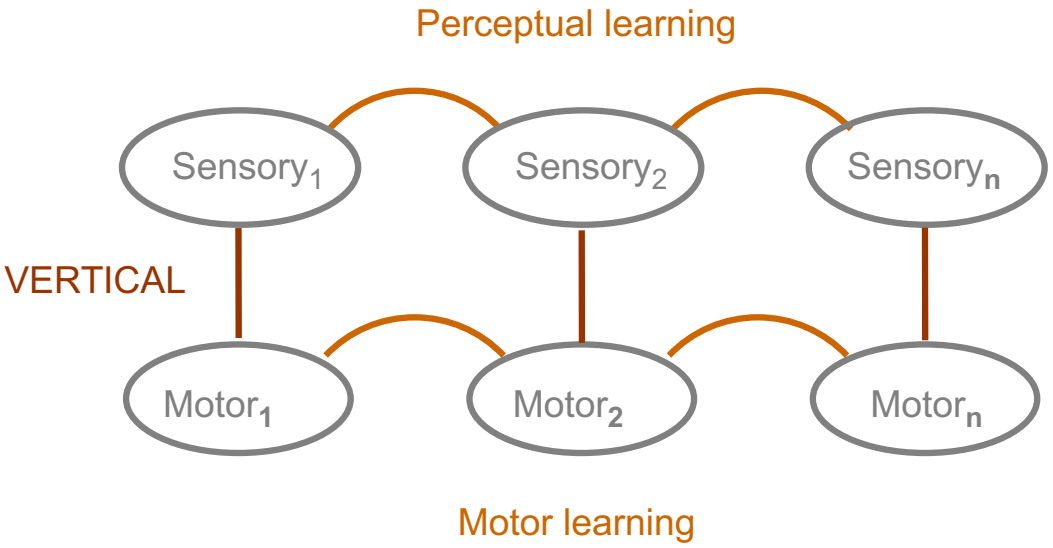
Imitation

Associative Sequence Learning (ASL)

Heyes 2001 *Trends in Cognitive Sciences* 5
Catmur, Walsh & Heyes 2009 *Phil Trans Royal Society B. 364*
Cook et al 2014 *Behavioral & Brain Sciences 37*

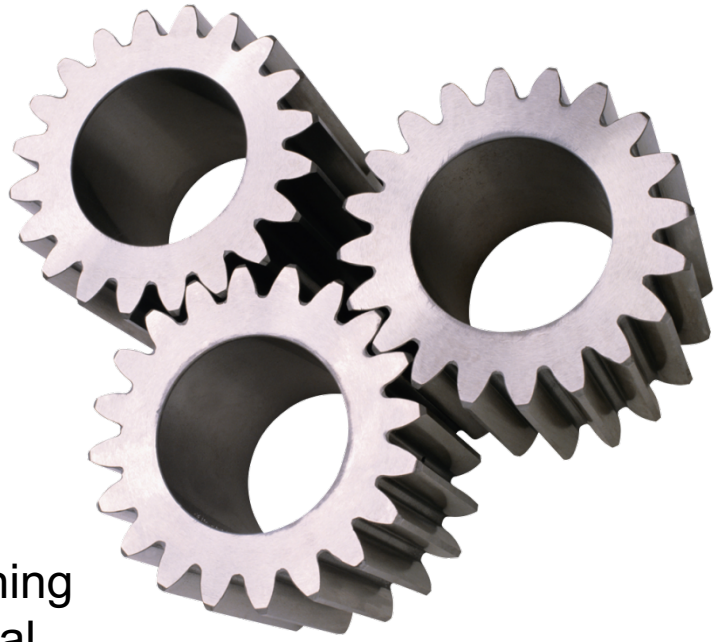


Associative Sequence Learning (ASL)



Associative Sequence Learning (ASL) model

Perceptual learning

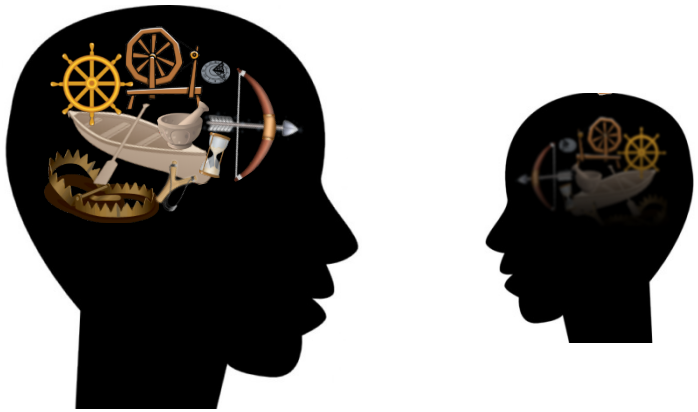


Motor learning

Matching Vertical Associations

Catmur, Walsh & Heyes 2009 *Phil Trans Royal Society B. 364*
Cook et al 2014 *Behavioral & Brain Sciences 37*

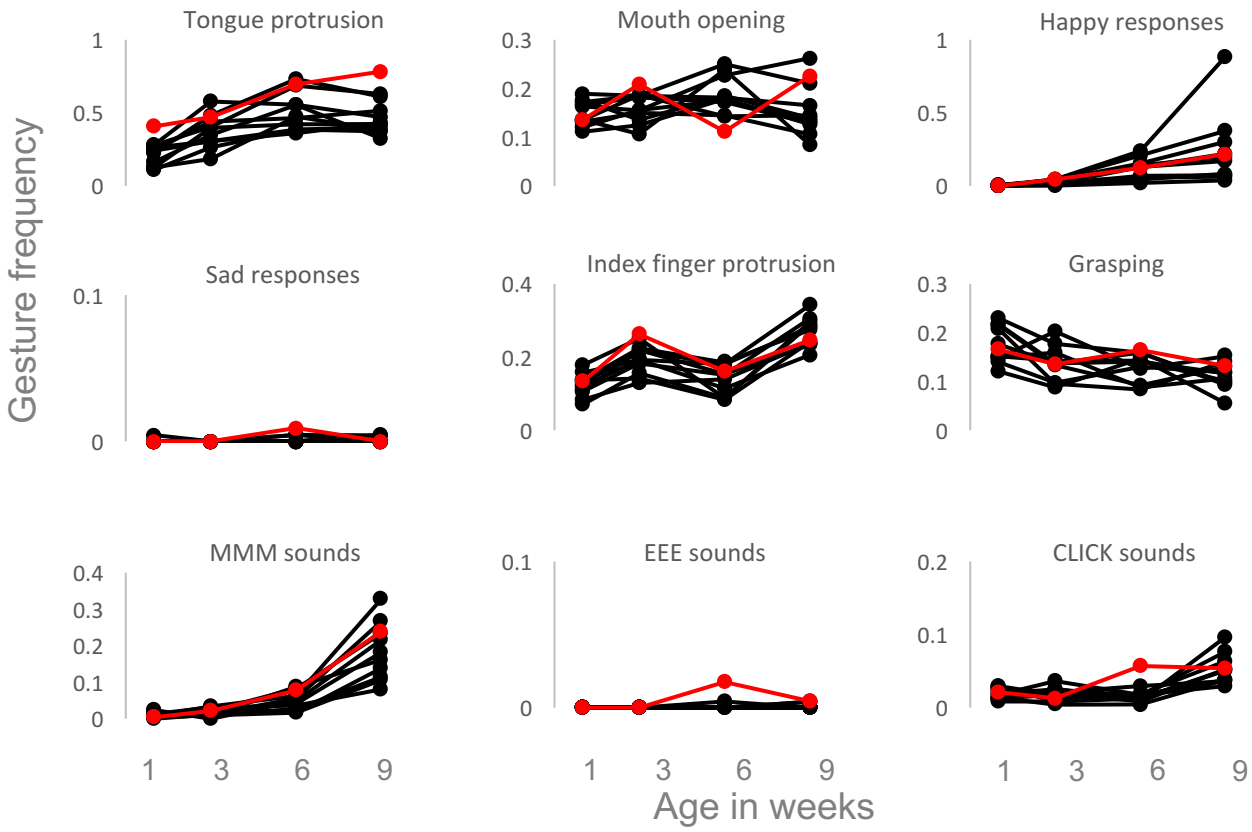
Conclusion



- Reading
- Adaptive ≠ ‘in the genes’
- Agile and fragile

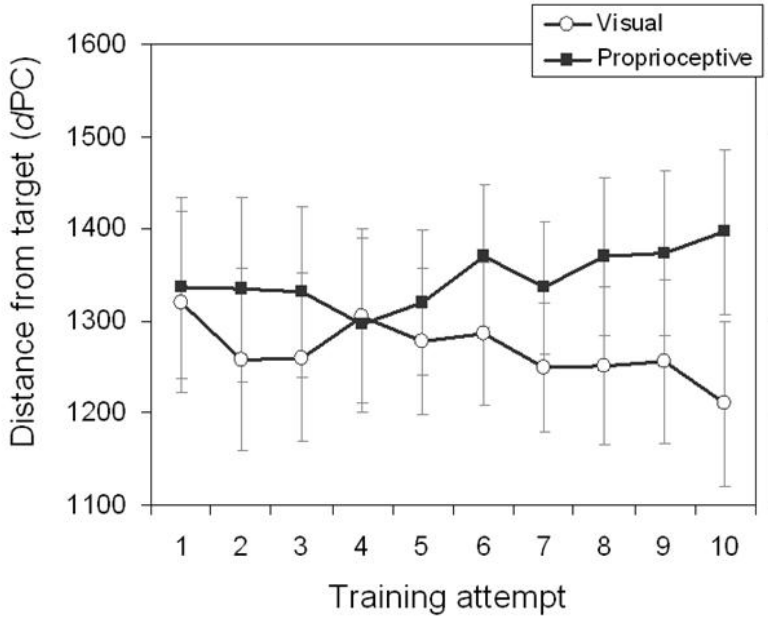
Human newborns don't imitate

Oostenbroek et al (2016) *Current Biology*
Heyes (2016) *Current Biology*

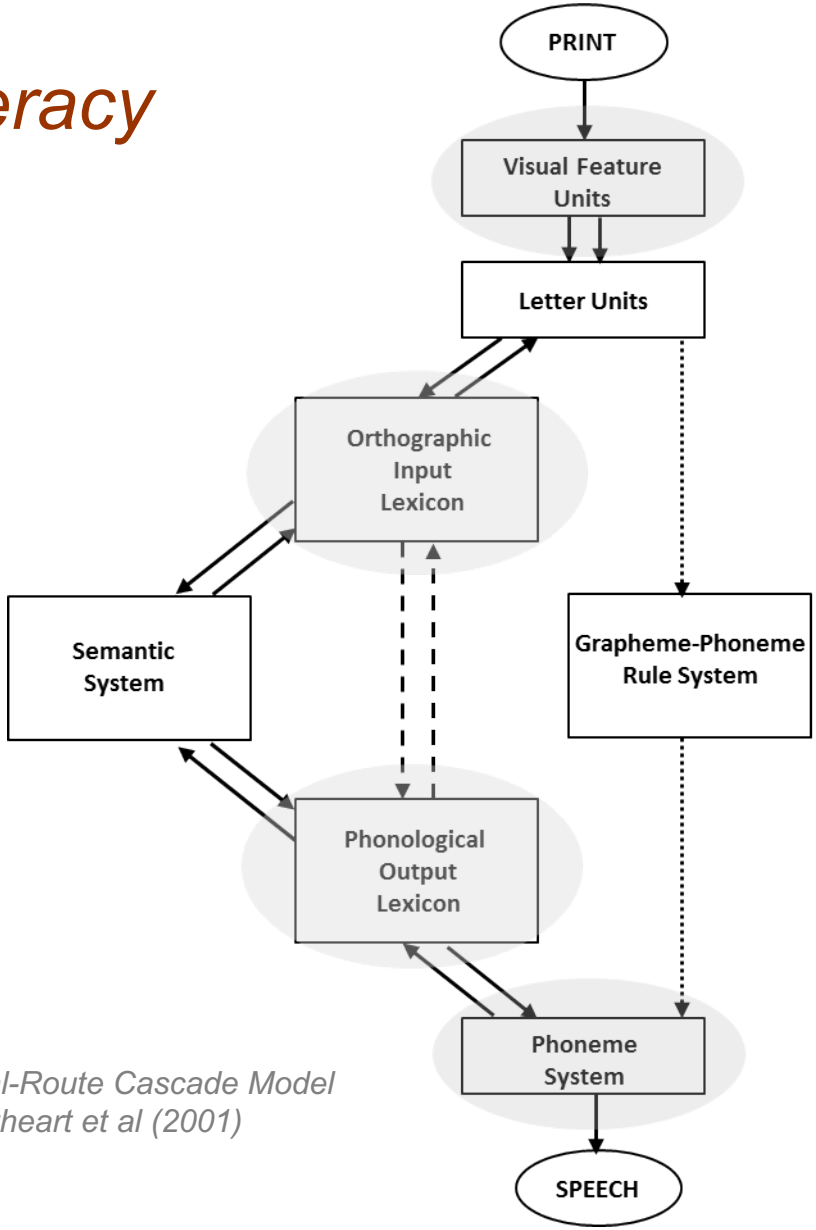


Evidence supporting the ASL model

Cook, Johnson & Heyes (2013) Psychological Science, 24, 93–98

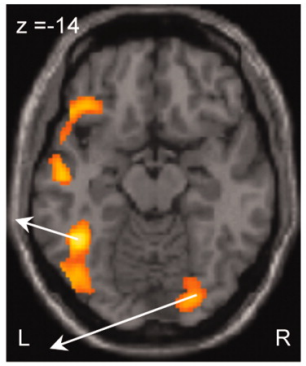


Literacy



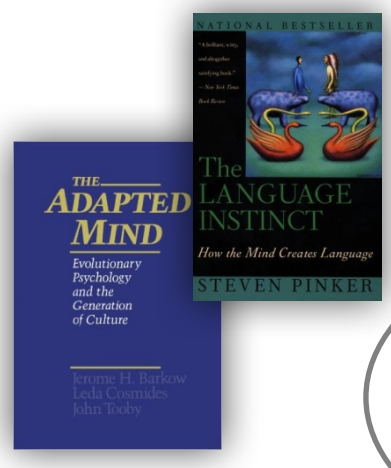
Dual-Route Cascade Model
Coltheart et al (2001)

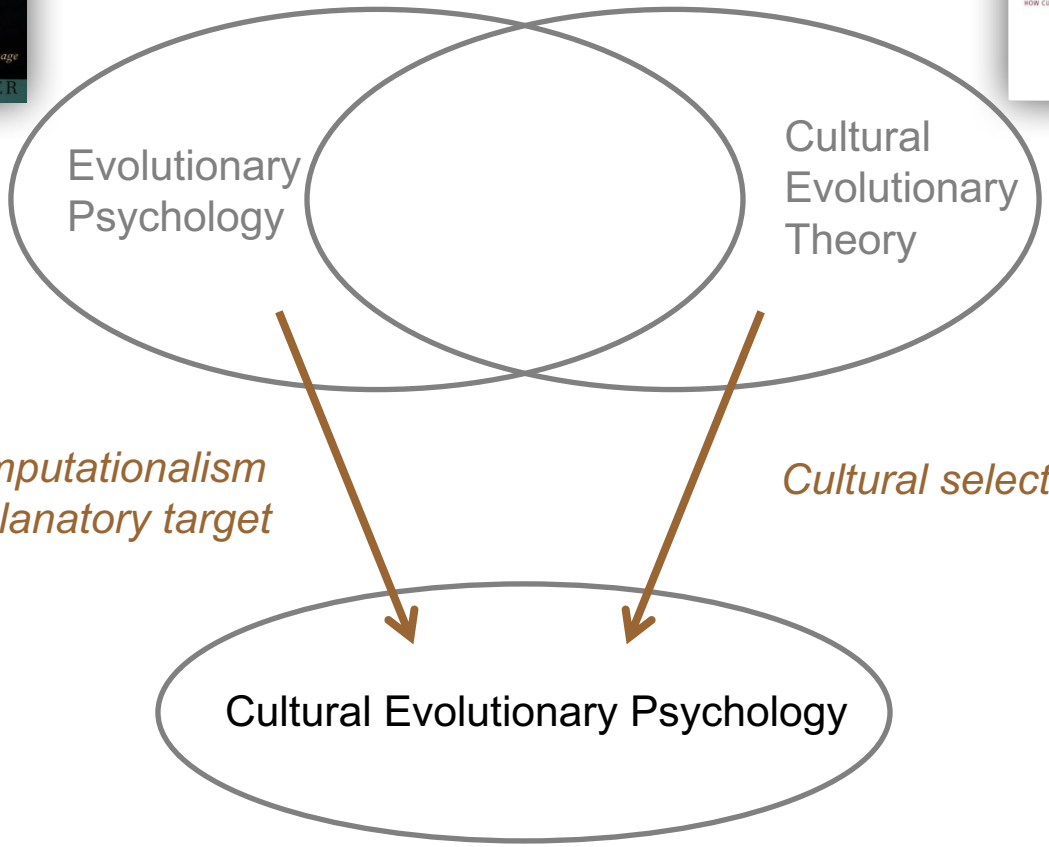
VWFA



Dehaene et al (2010)

Logical Geography



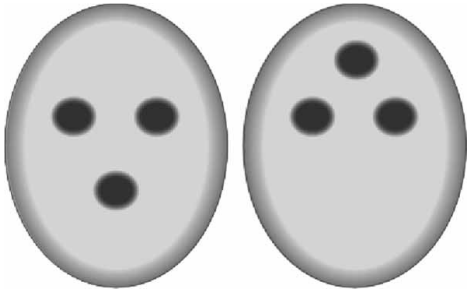


Temperament

Cieri et al (2014) Curr Anth

Werner & Latane (1974) JPSP

Attention



Johnson et al (1991) Cognition

Apps et al (2015) J Neuroscience
Behrens et al (2008) Nature
Garvert et al (2015) Neuron

Associative learning

Cognition

Homework

Theory of mind

Heyes 2014 *Developmental Science*
Heyes 2014 *Perspectives on Psych Sci*
Heyes 2015 *Psych Bull & Rev*
Heyes & Frith 2014 *Science*
Santiesteban et al 2013 *JEP:HPP*
Santiesteban et al 2015 *Psych Bull & Rev*

Social learning biases

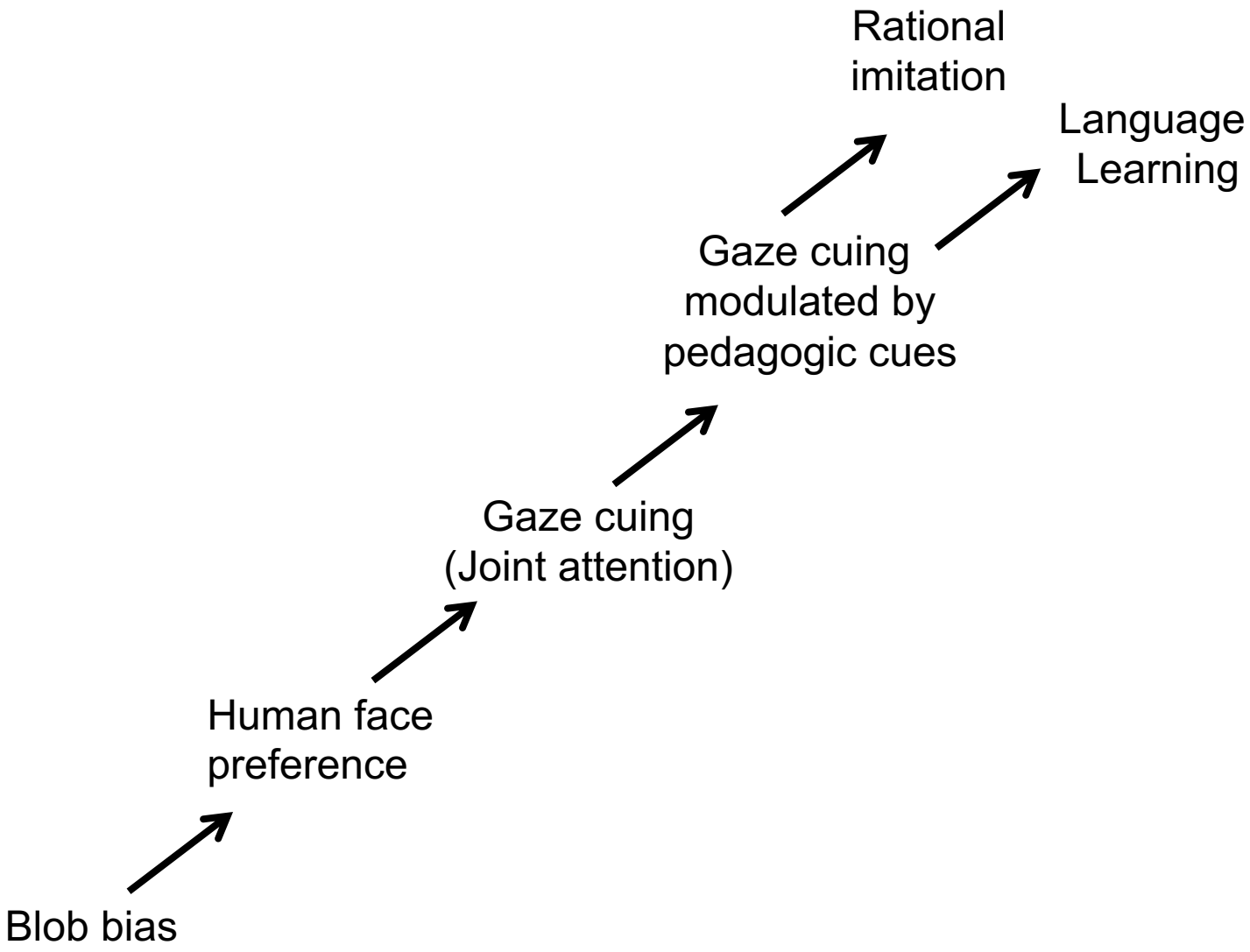
Heyes 2016 *Trends in Cognitive Sciences*
Heyes 2016 *Phil Trans Royal Soc*
Heyes in press *Developmental Science*
Heyes & Pearce 2015 *Proc Royal Soc*

Teaching / Pedagogy

Heyes in press *Perspectives on Psych Sci*
Heyes in press *Hannon & Lewens*

Imitation

Heyes 2013 *Cortex*
Heyes 2014 *Phil Trans Royal Soc*
Heyes 2015 *Phil Trans Royal Soc*
Catmur & Heyes 2013 Cognitive *Science*
Cook et al 2013 *Psych Science*
Cook et al 2014 *Behavioral & Brain Sciences*
DeKlerk et al 2015 *Developmental Science*

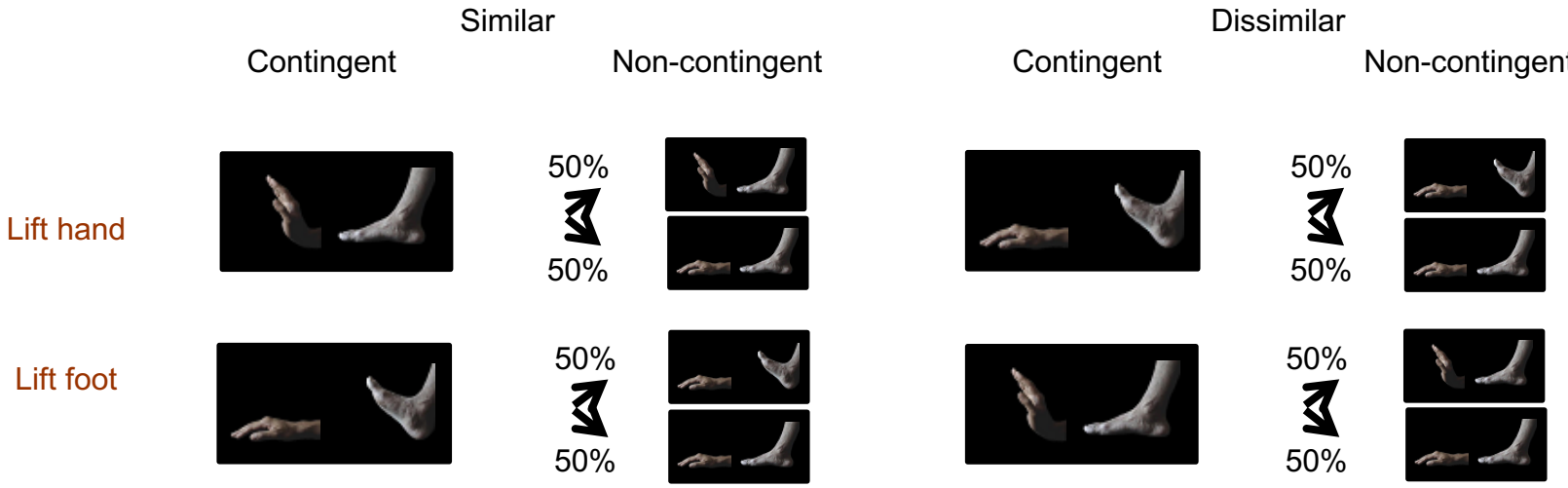

Rational
imitation
Language
Learning
Gaze cuing
modulated by
pedagogic cues
Gaze cuing
(Joint attention)
Human face
preference
Blob bias

Cognitive instinct solutions to the correspondence problem

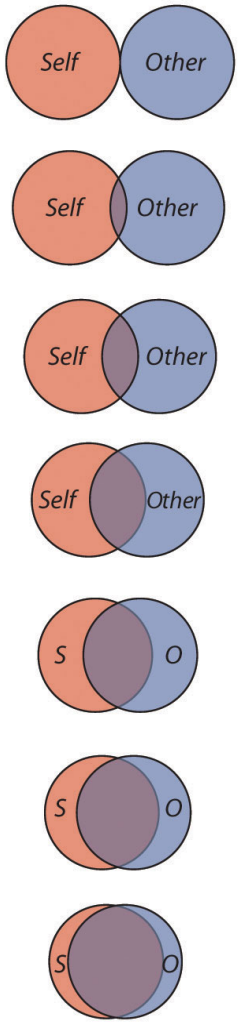
Active Intermodal Mapping

Mirror neurons

Catmur & Heyes (2013) *Cognitive Science,* 37, 1541-52



Catmur & Heyes (2013) *Cognitive Science,* 37, 1541-52



How much did you enjoy the experiment?

Inclusion of self in the other (IOS)

Show up for subsequent experiment?

Contingent > Non-contingent
Similar = Dissimilar

Infant development of mirroring

de Klerk, Johnson, Heyes & Southgate (2015)
Developmental Science