

How do humans develop two  
systems for mindreading?

Apperly & Butterfill

automatic

Is adult mindreading automatic?

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Kovacs et al (2010): yes!

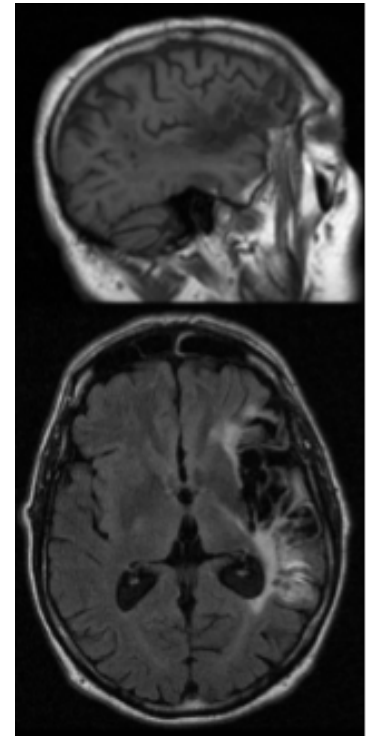
# Is adult mindreading automatic?

Kovacs et al (2010): yes!

Back & Apperly (2010): no!

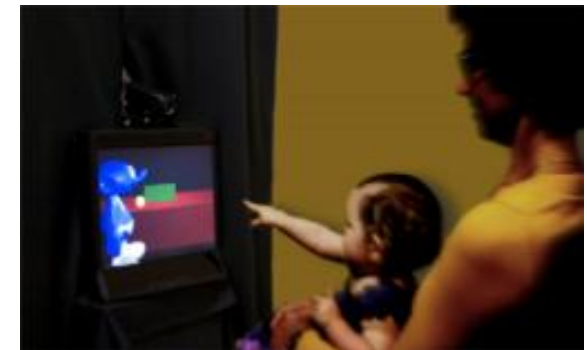
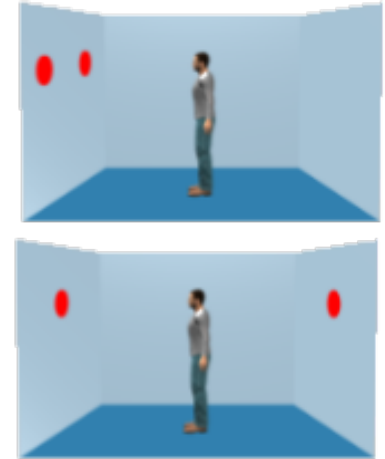
# Evidence that mindreading is a flexible but demanding ability

- **In Adults....**
- Impaired executive processes can lead to severe egocentrism
  - (e.g., Samson, Apperly, Kathirgamanathan & Humphreys, 2005)
- Belief inferences are not *made* automatically
  - (Apperly, Samson, Riggs, Simpson & Chiavarino, 2006; Back & Apperly, 2010)
- Belief inferences are not *used* automatically
  - (e.g., Keysar, Lin & Barr, 2003; Apperly et al., 2010)
- Holding false beliefs briefly in mind has a measurable processing cost
  - (Apperly, Back et al., 2008)
- Belief reasoning requires cognitive control
  - (e.g., Bull, Philips & Conway, 2007)
- **...and this fits with evidence from children.**



# Evidence that mindreading is an efficient but inflexible ability

- **In Adults....**
- Mindreading may occur without instruction....
  - “Level-1” visual perspectives (Samson, Apperly, Braithwaite, Andrews and Bodley Scott, 2010)
  - false beliefs about location (Kovacs, Teglas & Endress, 2010)
- ...and without awareness
  - False beliefs about location (Kovacs et al., 2010 ; Schneider, Bayliss, Becker & Dux, 2011)
- Mindreading others’ mental states may cause interference with one’s own judgements
  - Kovacs et al. (2010), Samson et al. (2010)
- Mindreading others’ mental states is not disrupted by a secondary executive task. Interference from their mental states is increased.
  - Qureshi, Apperly & Samson (2010)
- Such “automatic”, “efficient” processing may not extend to more complex cases
  - No evidence in “Level-2” perspective-taking (Surtees, Butterfill & Apperly, in press)
- ....and this fits with evidence from infants



- So there really are substantial bodies of conflicting evidence
- Such findings lead us to suggest that adults have “two systems” for mindreading
  - Apperly & Butterfill, 2009; Apperly, 2010; Butterfill & Apperly, under review.



# What is the relationship between the abilities of infants and adults?



Efficient  
& limited



Effortful &  
Flexible



Efficient  
& limited

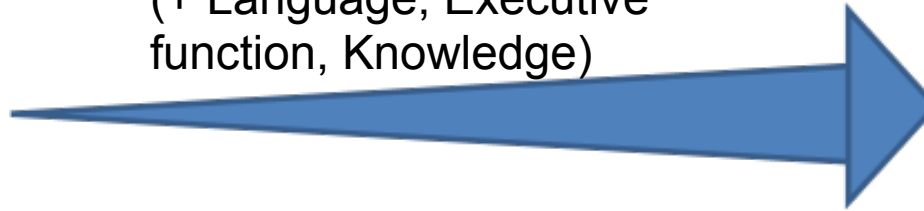
# What is the relationship between the abilities of infants and adults?

- a Infant system grows up



Efficient  
& limited

(+ Language, Executive  
function, Knowledge)



Effortful &  
Flexible

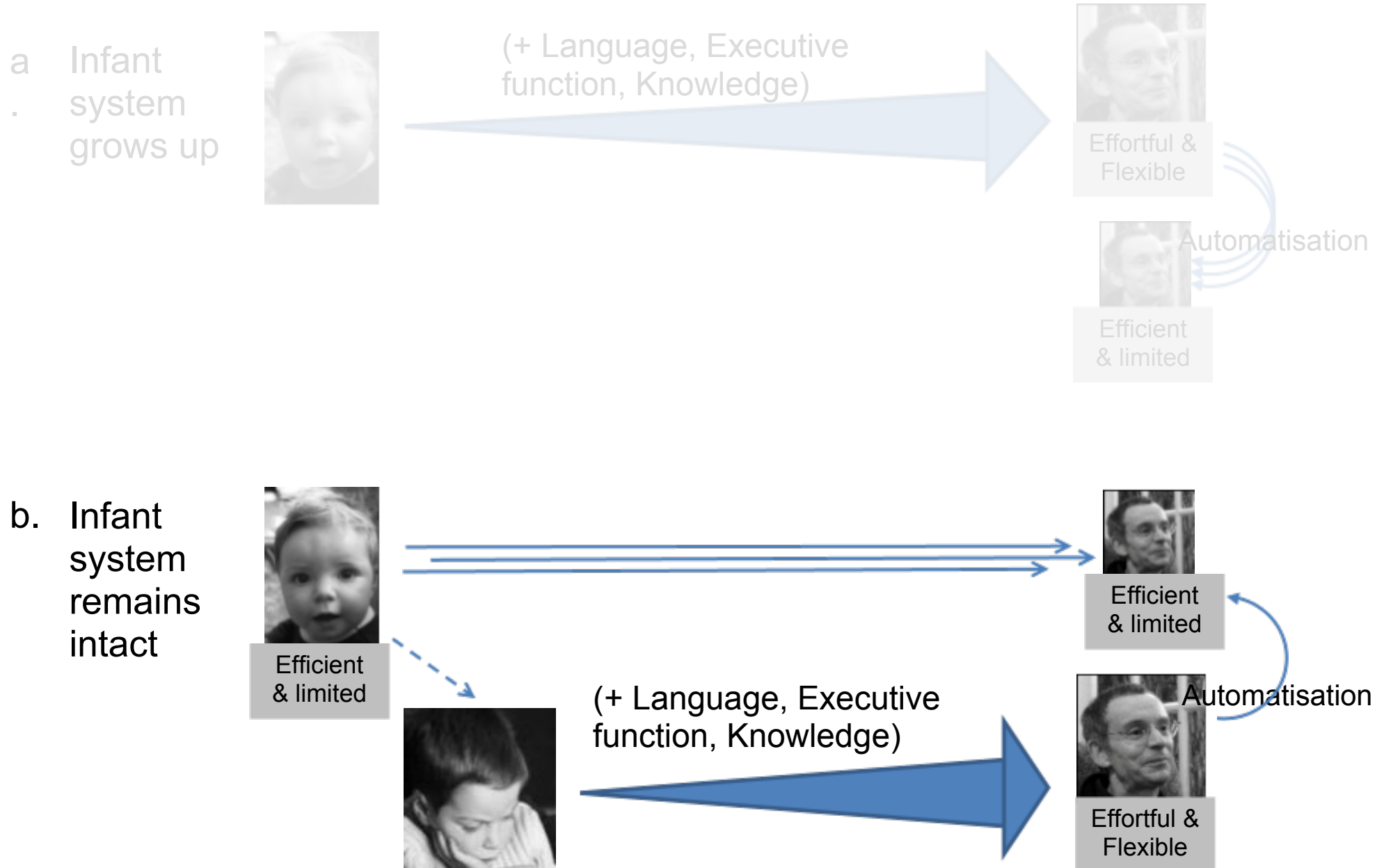


Efficient  
& limited

Automatisation

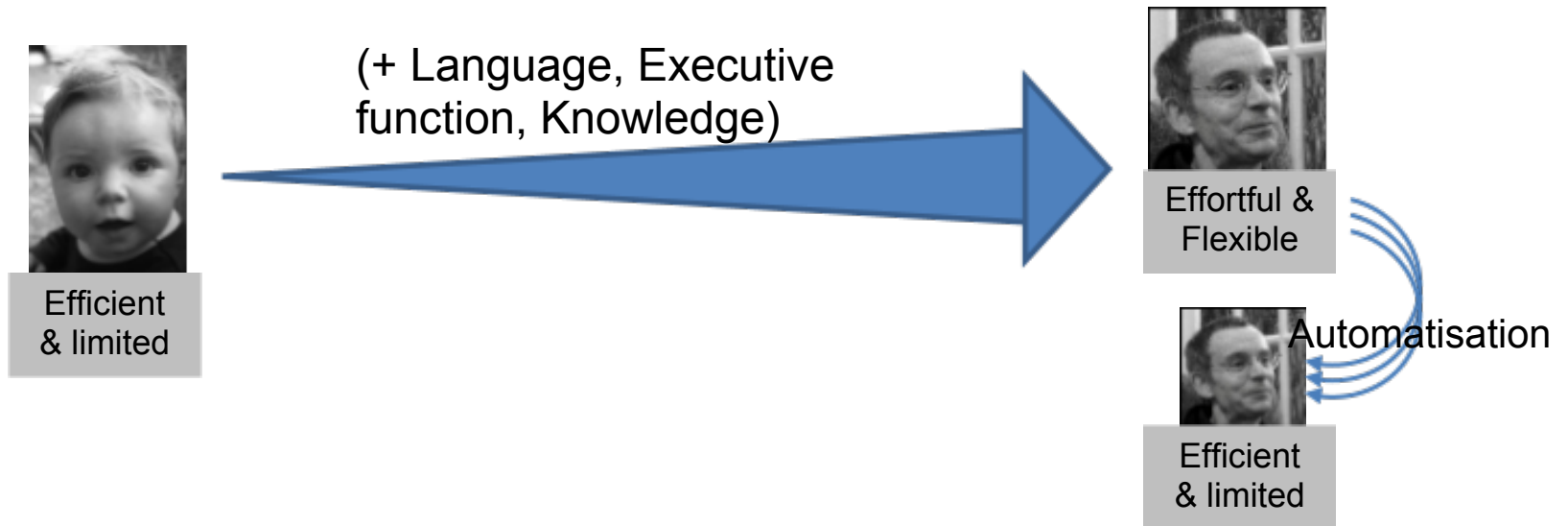


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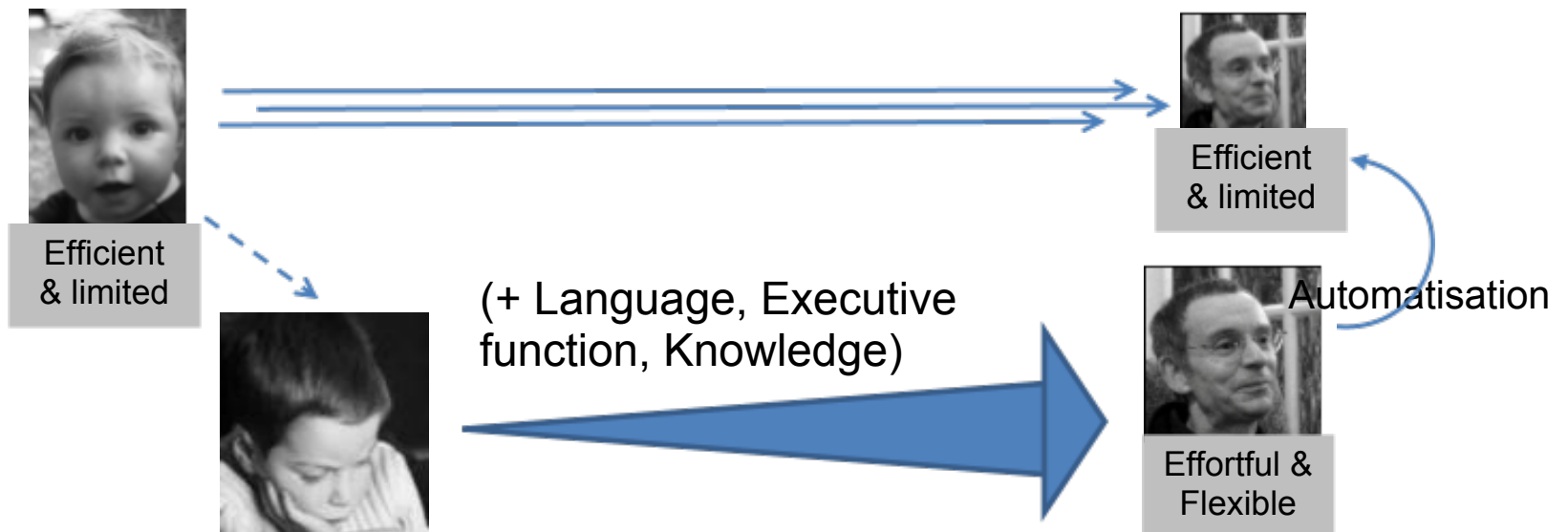


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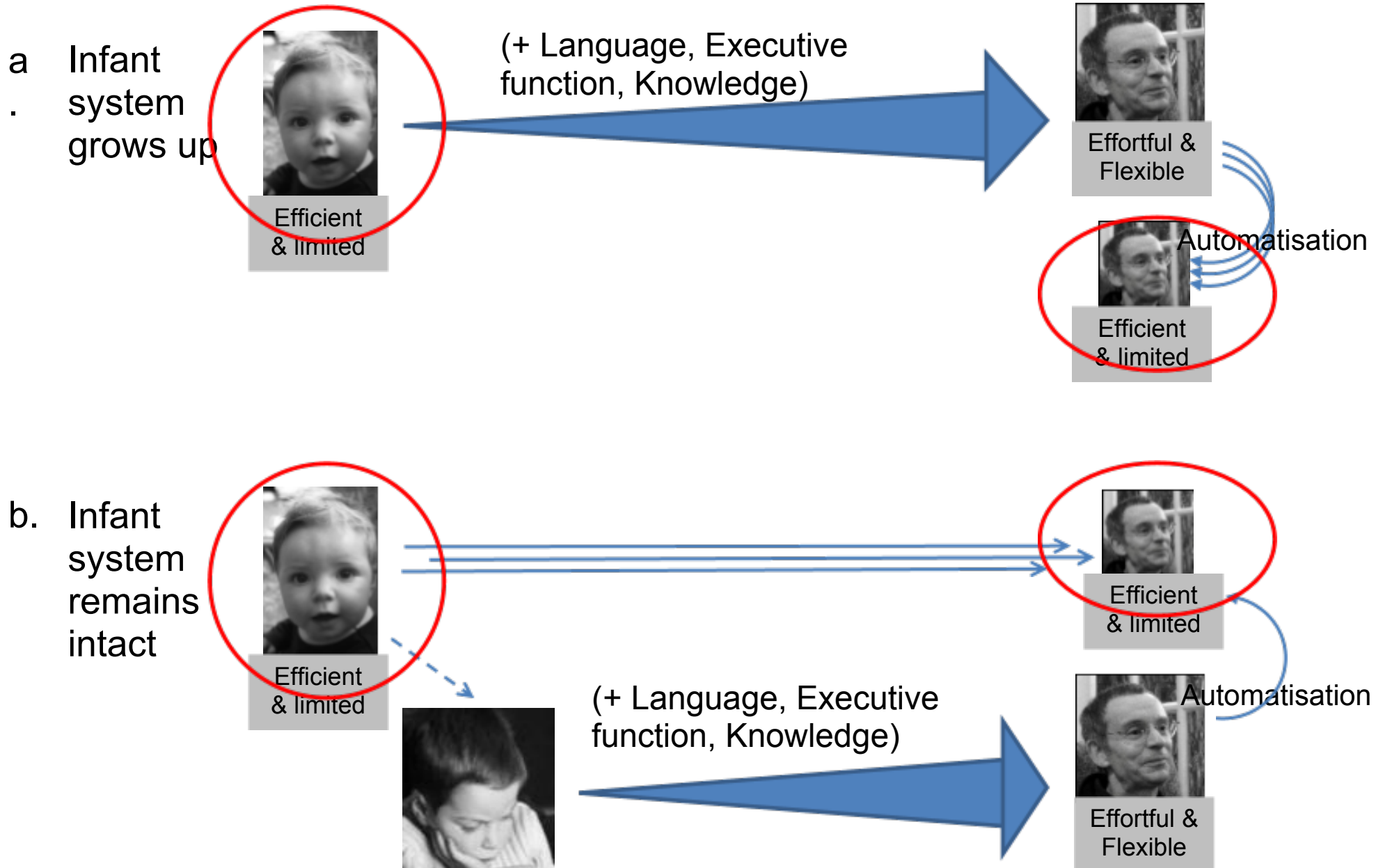
a. Infant system grows up



b. Infant system remains intact



# What is the relationship between the abilities of infants and adults?



# Propositional attitude

Propositional attitude

Relational attitude

## Propositional attitude

e.g. believes that ...

e.g. intends that ...

e.g. knows that ...

## Relational attitude

e.g. excited by ...

e.g. encountered ...

e.g. wants apple juice



## Propositional attitude

e.g. believes that ...

e.g. intends that ...

e.g. knows that ...

arbitrarily nestable  
contents

uncodifiably complex  
effects on action

permit mistakes about  
appearance, identity  
and existence

## Relational attitude

e.g. excited by ...

e.g. encountered ...

e.g. wants apple juice

no contents

parameter-setting  
effects on action

enable tracking a  
limited range of false  
beliefs only

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	Propositional attitude	Relational attitude
level-1 perspective taking	Y	Y
level-2 perspective taking	Y	N

	Propositional attitude	Relational attitude
level-1 perspective taking	Y	Y
level-2 perspective taking	Y	N
false beliefs about non-existence	Y	N

	Propositional attitude	Relational attitude
level-1 perspective taking	Y	Y
level-2 perspective taking	Y	N
false beliefs about non-existence	Y	N
false beliefs about location	Y	Y
false beliefs about identity	Y	N















	Propositional attitude	Relational attitude
level-1 perspective taking	Y	Y
level-2 perspective taking	Y	N
false beliefs about non-existence	Y	N
false beliefs about location	Y	Y
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