

WHAT THE NEW SCIENCE OF  
CHILD DEVELOPMENT TELLS US  
ABOUT THE RELATIONSHIP  
BETWEEN PARENTS AND CHILDREN

THE  
GARDENER  
AND THE  
CARPENTER



ALISON GOPNIK

# The Evolution of Childhood

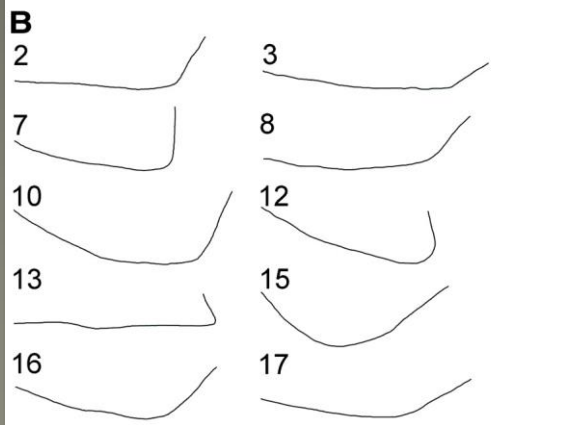




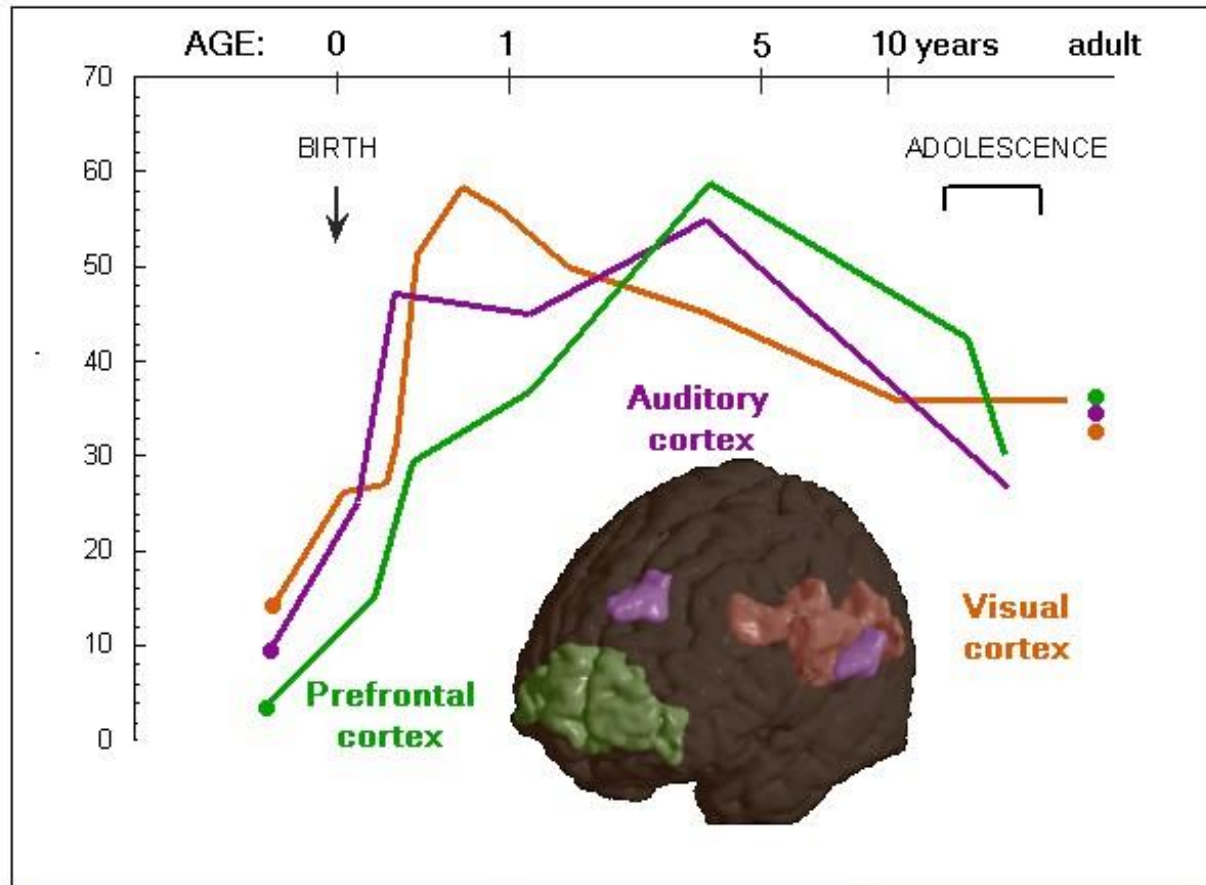
[www.benwilhelmi.com](http://www.benwilhelmi.com)



# Longer Childhood, Bigger Brain, Smarter Animal

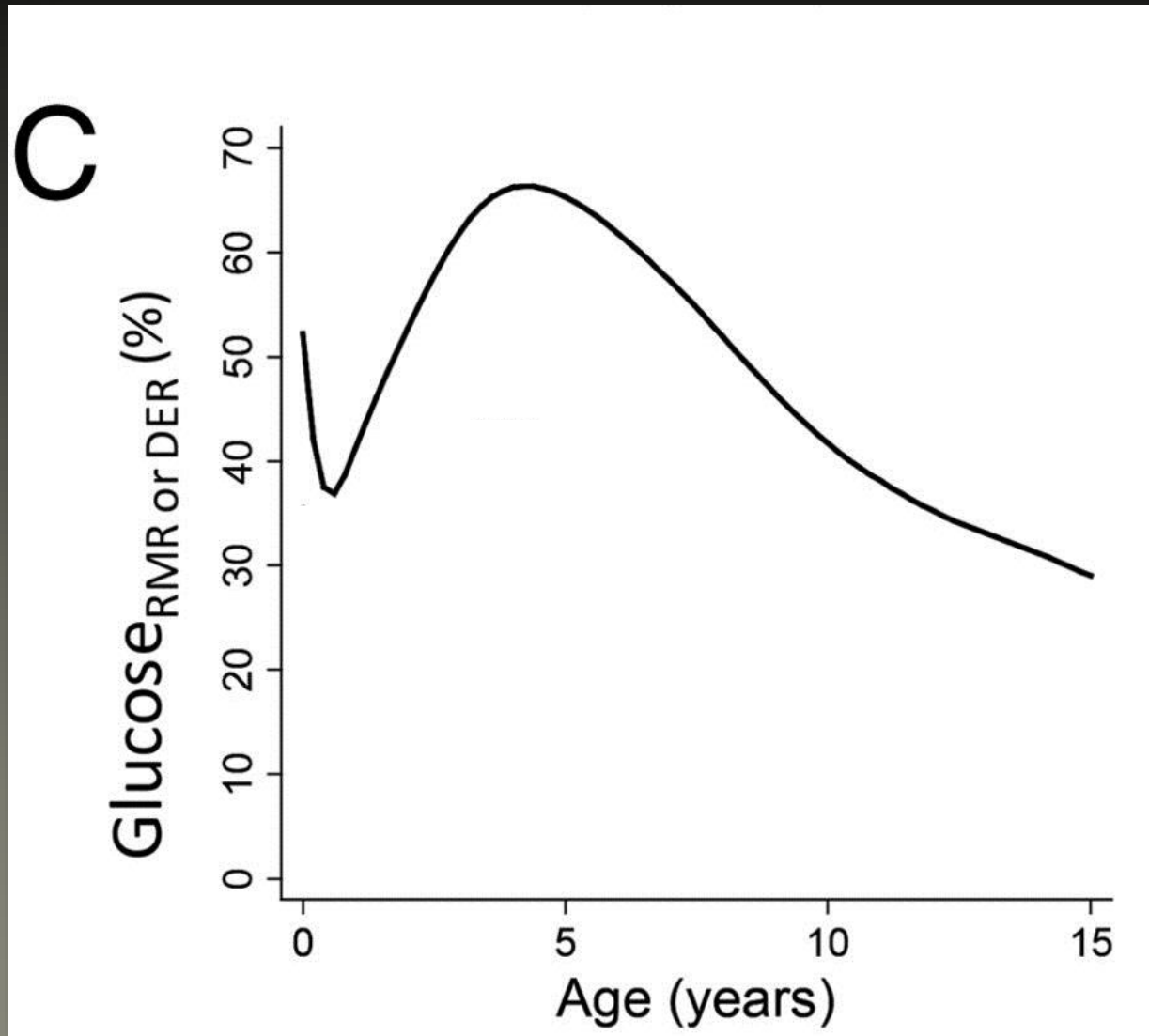


# Human Brain Development of Connections (Synapses)



Adapted from P. Huttenlocher et. al. (1979-1997)

Glucose use of the human brain by age.



Christopher W. Kuzawa et al. PNAS 2014;111:13010-13015

# Intelligent Imitation

- Buchsbaum, Gopnik, Griffiths and Shafto, Cognition, 2011

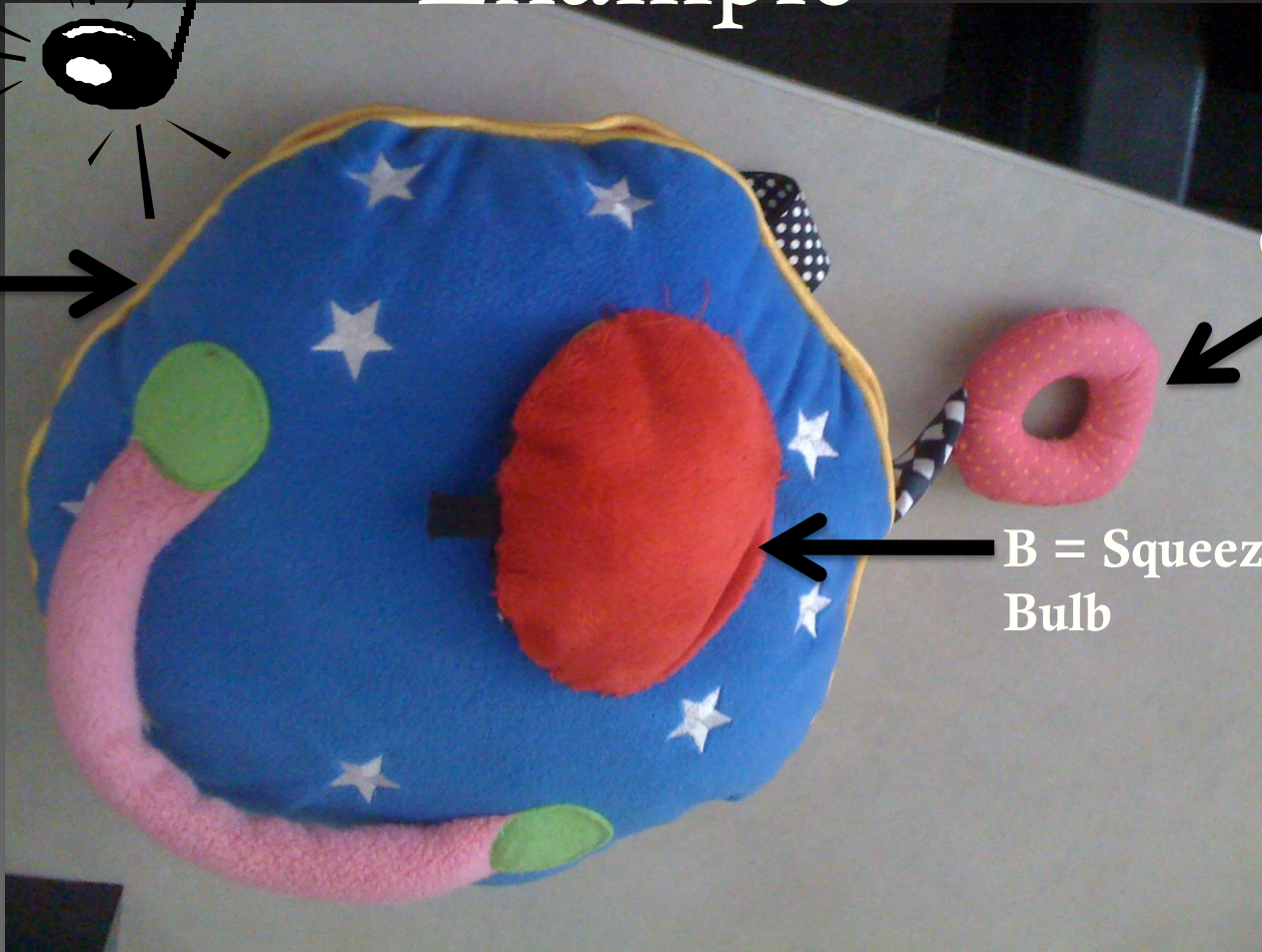


# Example

A =  
Squish Toy

C = Pull Ring

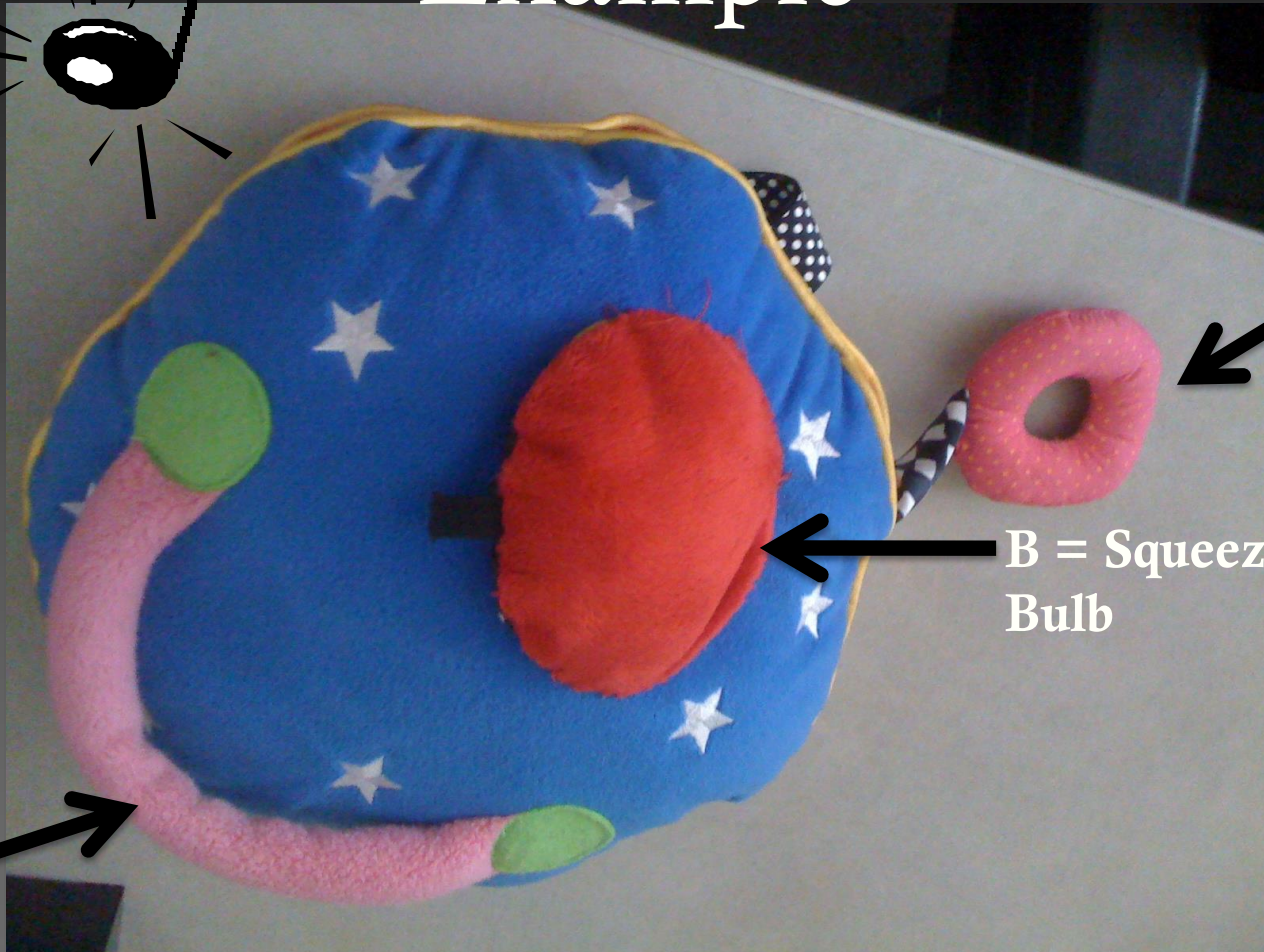
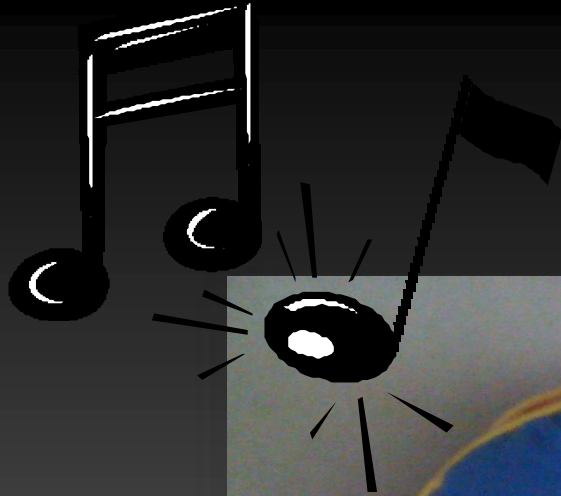
B = Squeeze  
Bulb



How do you make it play music?



# Example



C = Pull Ring

B = Squeeze Bulb

D = Pull Handle

How do you make it play music?

# Evidence Patterns

**“ABC”  
Condition**

**ABC+**

DEC

**ABC+**

EDC

**ABC+**

- Individual actions shown an equal number of times in all conditions
- Different causal relationships







# Learning Through Play

# Novel Toy

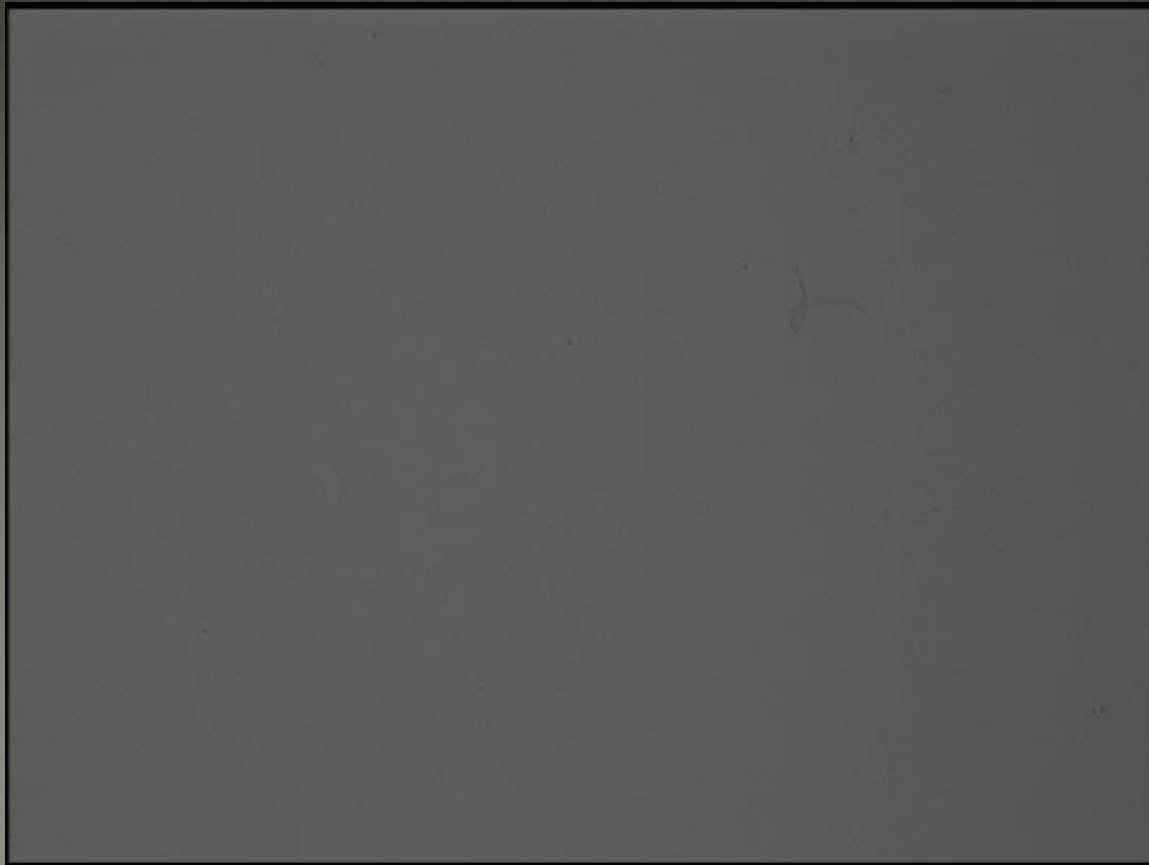
- Four interesting properties



Bonawitz et al., 2011

Parents care so children can  
explore.

# Berkeley Past and Future





# Collaborators and Support

- Tom Griffiths
- Chris Lucas
- Sophie Bridgers
- Elizabeth Seiver
- Noah Goodman
- Daphna Buchsbaum
- Shaun O' Grady
  
- NSF
- The James S. McDonnell Foundation Causal Learning Collaborative