VOTE! (it's not over yet)

How infants learn social skills

Gedeon O. Deák

Department of Cognitive Science

& Center for Human Development

University of California, San Diego

but first

why study development?

reasons to study development

- disabilities, treatment, education
- to understand adult traits, must know how they emerged
  - complex skills emerge as history ↔ biology product
- hardest problem in social or biological sciences…
  - "explaining [quantum physics] is child's play compared to [explaining] child's play"

NEWS FOCUS

Pushed by parent advocates, scientists are unearthing intriguing clues about what causes autism. Ongoing studies point to neuroanatomical and genetic defects

New Hints Into the Biological Basis of Autism

Last month, with the mayor of Sacramento and a crowd of some 3000 parents and supporters looking on, construction crews broke ground on a 1.4-hectare plot on the University of California, Davis's medical campus in Sacramento. The blueprints call for two new buildings that will provide 13,000 square meters designed to do something unprecedented: provide a state-of-the-art comprehensive clinic and research center to diagnose, treat, and study children with autism. This $38.8 million facility, funded by the state of California, is a sign of the increasing research emphasis on autism, a mysterious disorder that keeps children from interacting socially and emotionally—and the power of parent advocates, who lobbied the state legislature to raise the funds.

Autism was long a poorly understood condition, rarely discussed. But that changed when advocacy groups began promoting research into its causes and possible treatments. In Hollywood, a movie mogul with an autistic son set up a tissue exchange bank. A New Hampshire mother of an autistic boy promoted a possible cure for autism (see sidebar on p. 37), triggering a media frenzy that prompted the National Institutes of Health (NIH) to jump-start clinical trials at record pace. In numerous congressional hearings, Representative Dan Burton

$42 million network of collaborative programs of excellence for autism. Next month, the first large, interdisciplinary meeting of researchers interested in autism will be held in conjunction with the Society for Neuroscience meeting.

The political momentum isn't flagging either: February marked the formation of a congressional caucus for autism, currently boasting 120 members. "This is a period of mobilization for autism research," says David Amaral, director of the Medical Investigation of Neurodevelopmental Disorders (MIND) Institute, whose clinic is being expanded at UC Davis.

And this increased attention is paying off, Amaral says. After years of frustration because of autism's confusing array of

searchers believe, are perhaps as many as 20 genes that may interact with yet unknown environmental triggers.

Together, the evidence seems to point to problems with brain development before birth and through early childhood. Although genetic factors clearly play a major role, a number of other causes and potential cofactors have been postulated, including vaccines, exposure to toxins, infection, and immunologic and metabolic problems.

Whatever the causes, researchers hope to find ways to identify autistic children before or soon after birth, either with genetic tests or biomarkers such as blood-borne proteins, so that they can begin behavioral treatments sooner, when they seem more likely to succeed. A cure for autism, however, is a faraway prospect.

A world apart

First described in 1943, autism's primary manifestation is an impaired ability to relate socially with other people, although it almost always occurs with other debilitating symptoms. Autism is associated with language problems, and those who speak largely do so in a monotone. People with autism also seem to have trouble inferring what other people think and feel. "These people are very childlike," says Nancy Minshew, a neurologist at the University of Pittsburgh School of

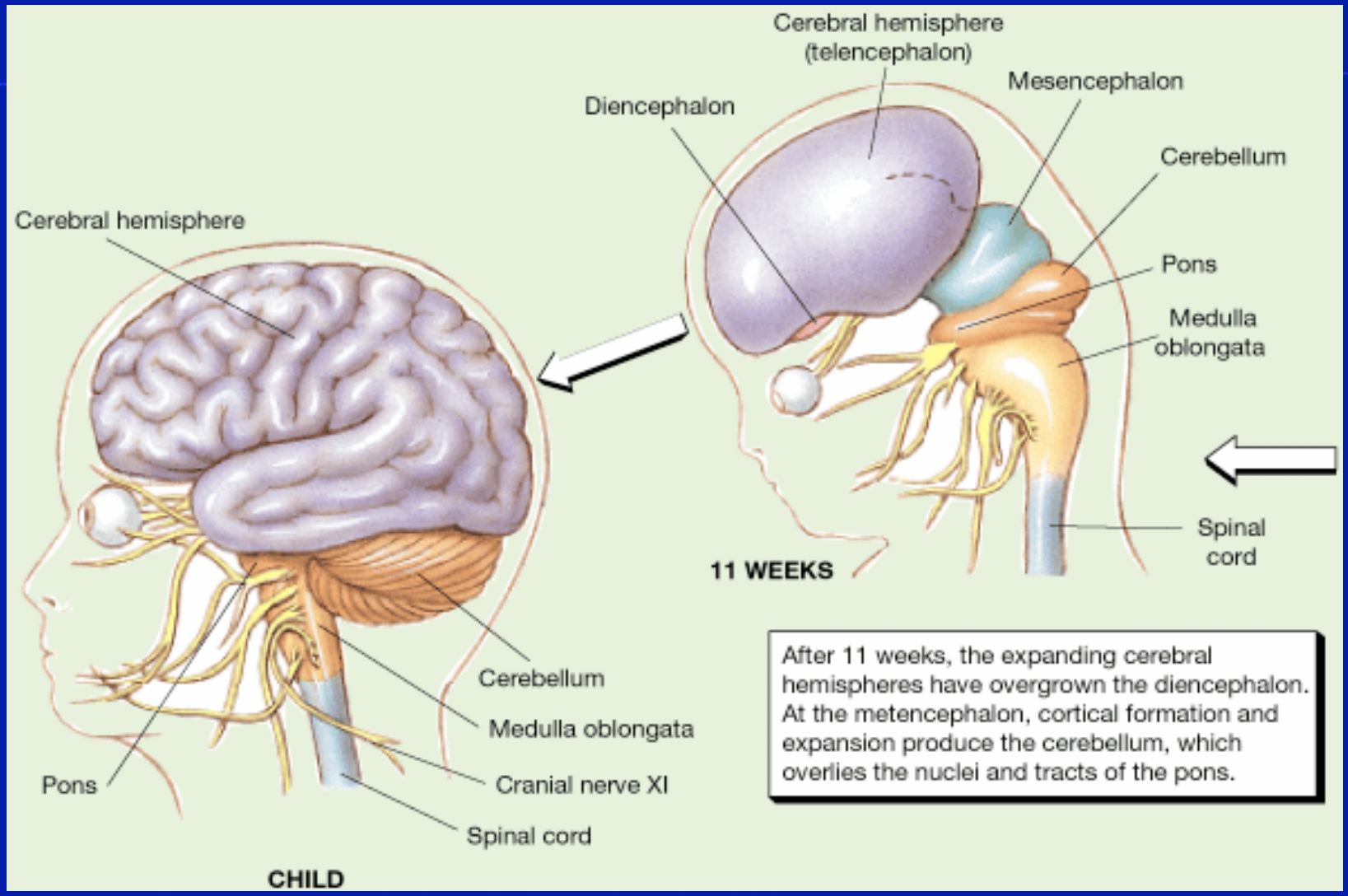
Socially isolated. One of autism's chief manifestations is an impaired ability to interact with other people.

another reason:

- rhetoric & folk-beliefs about human development in political/religious/economic discourse:
  - sign seen around Poway: "Vote Yes on 8: Protect our children"
    - any scientific evidence that extending civil rights to gay/lesbian couples places children at risk?
    - What assumptions does the QUESTION make about development? learning? how adolescents develop sexual preferences and behaviors?
  - an (unsupported) claim about *social development*

VOTE! (it's not over yet)

how does brain develop knowledge of social behavior?



VOTE! (it's not over yet)

where social *routines* and *knowledge* come from

- examples?
- when do we see social responses? enjoyment? learning?

a social skill "complex"

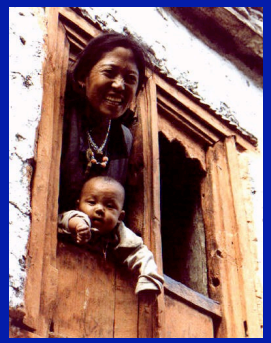
attention sharing:

roots of teaching and learning

- what is it?
- who does it?
- where does it come from?

what is attention-sharing?

- do you see what i see?
- looking where someone is looking



- getting someone to look where you are…
- how do we do it?

ttention-sharing in infants: gaze following (looking where someone is looking)

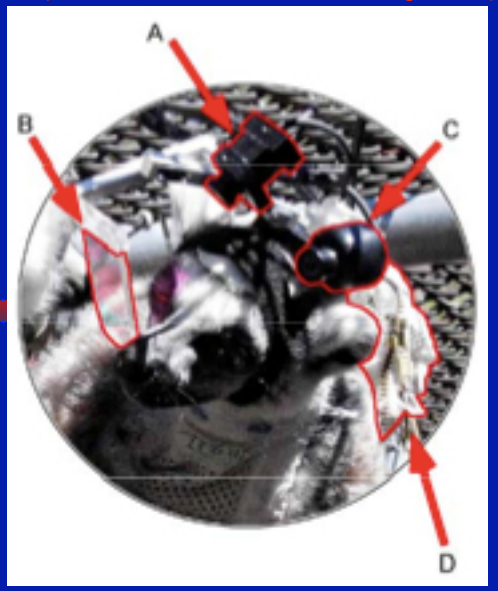
- why does it matter?
  - use another person to infer *what's important*
  - figure out reference & meaning
  - how difficult is this?

VOTE! (it's not over yet)

What's important to a lemur?

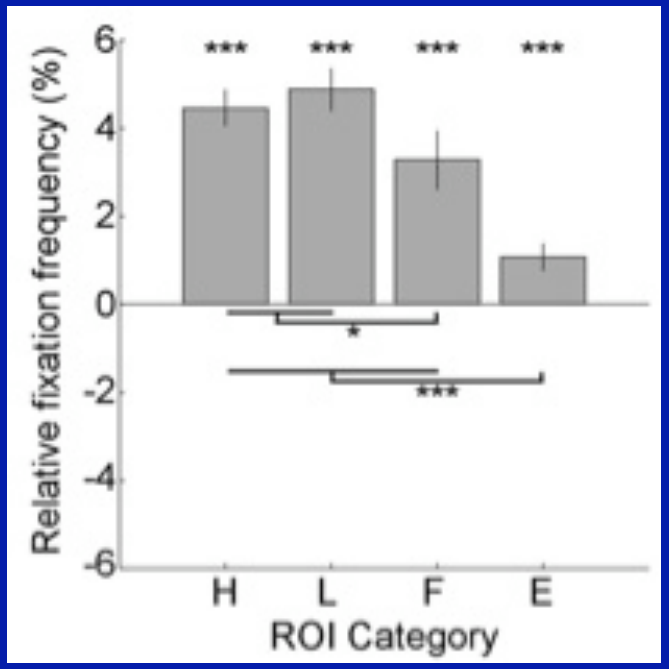
Shepard & Platt (2006, 2007)

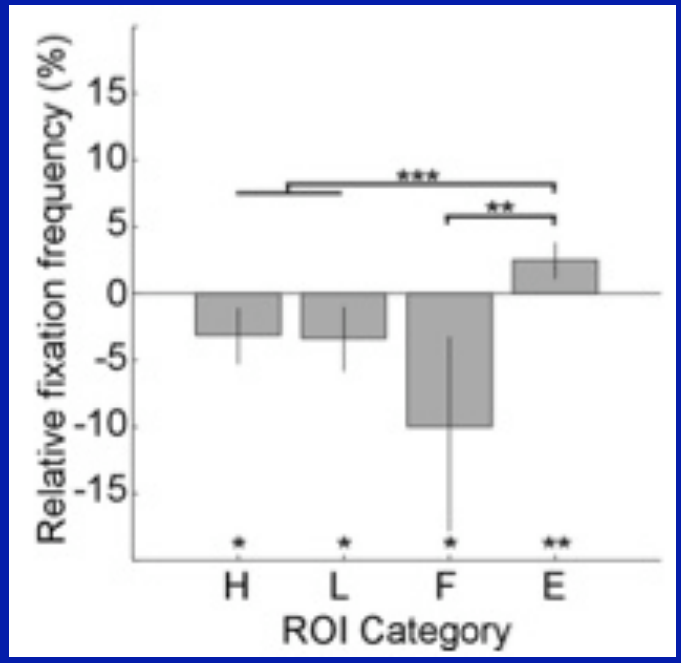
- WHEN, WHY do lemurs watch each other?



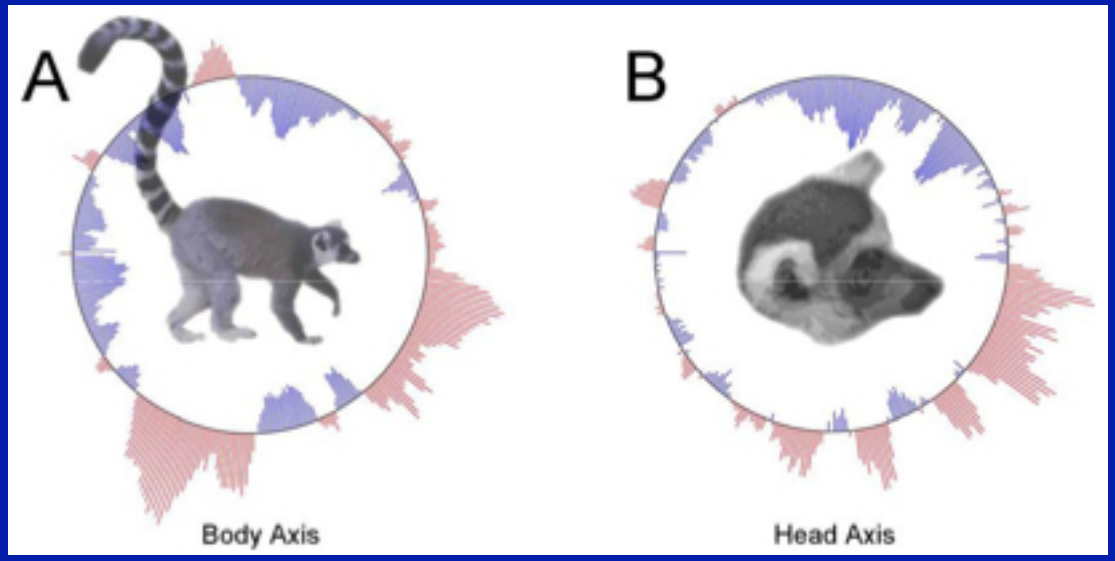
- Left: still looking-times
- Right: moving looking-times

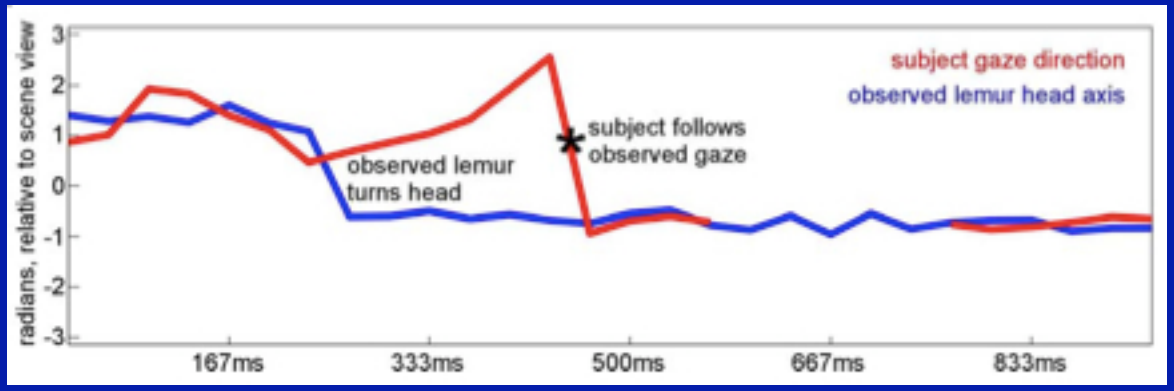
H = human; L = lemur; F = food; E = environment





Lemur see, lemur...see.





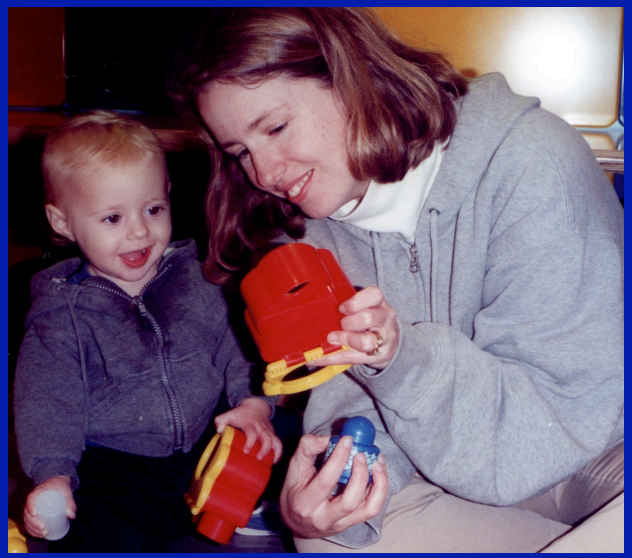
Getting someone else to look: Merv makes his point

(photo by David Leavens)

- Is pointing a special human social skill?
  - No, but how we use it *is!*
  - Used to show, not to get

how attention sharing (AS) emerges

- between 9 and 18 months...
  - *product AND engine of* learning
- how AS emerges



Modeling the Emergence of Shared Attention

- do [early abilities] + [structured environment] => AS skills?
  - early abilities:
    - perception (gaze-shifting; face-perception)
    - emotion (prefer social interaction)
    - learning: (visual "reward"; get tired of looking)
  - structured environment:
    - predictable caregiver actions
  - how can we test these theories?

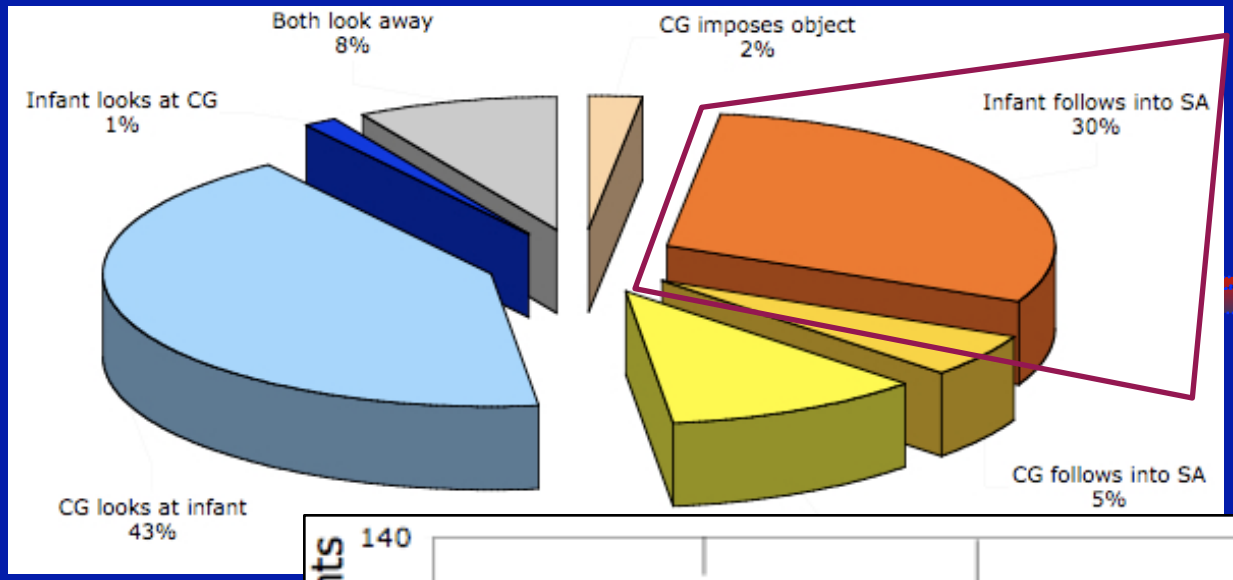
early abilities example: infant face perception…

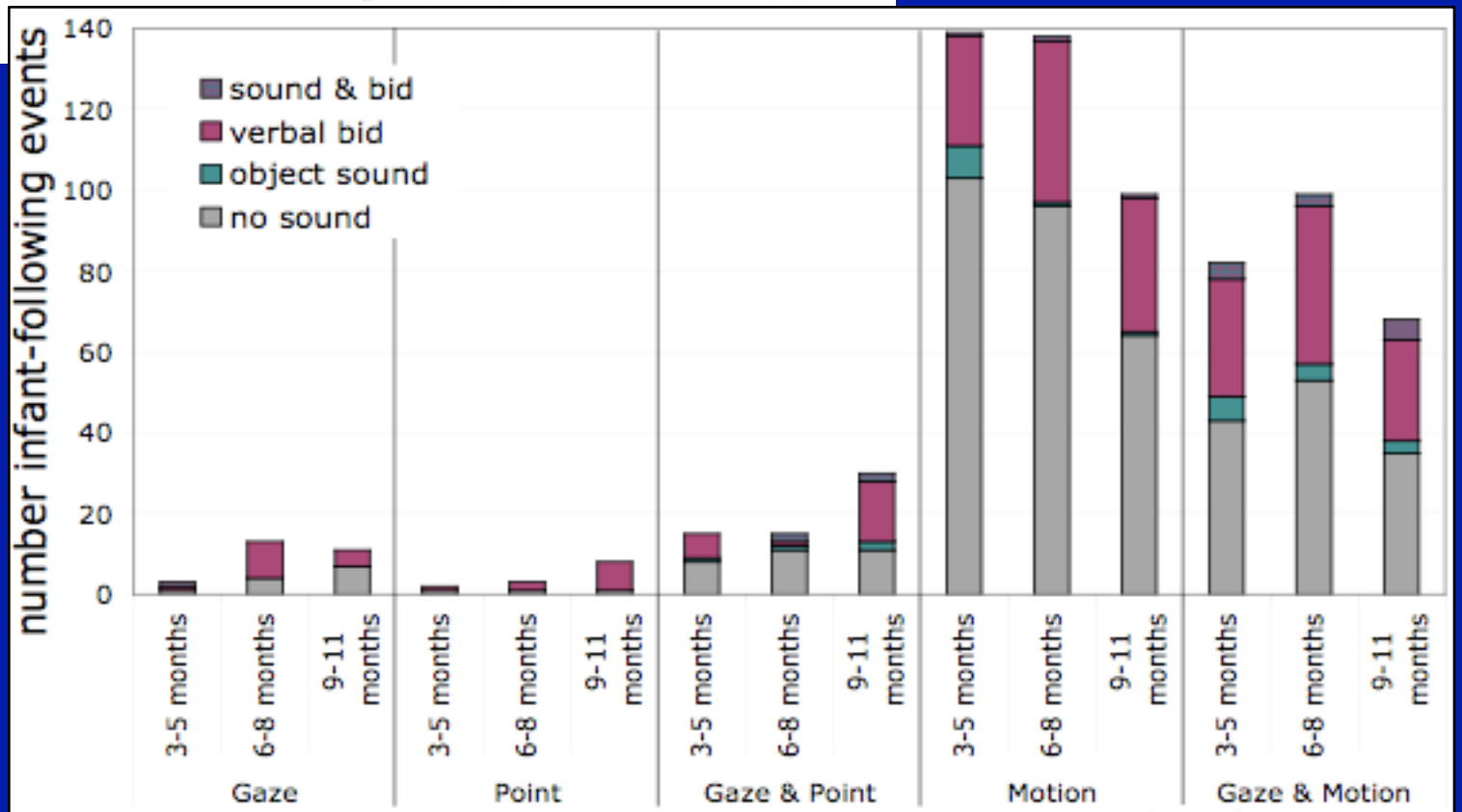
- question: do babies more sensitive to an adult's head angle learn to follow gaze sooner?

the structured social environment

- from study of 35 infant-parent dyads at home…

VOTE! (it's not over yet)



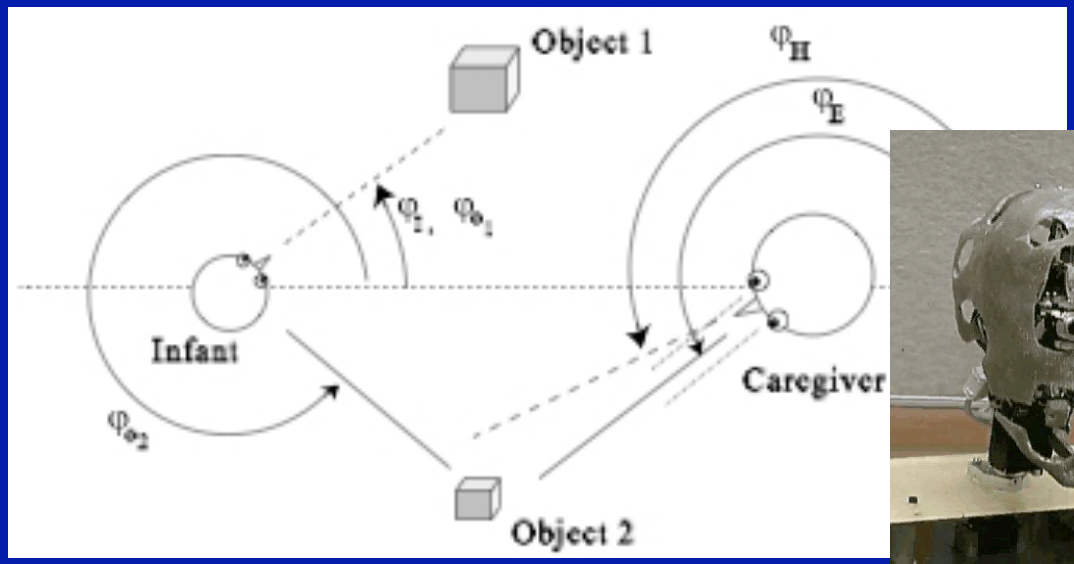


Other related evidence...

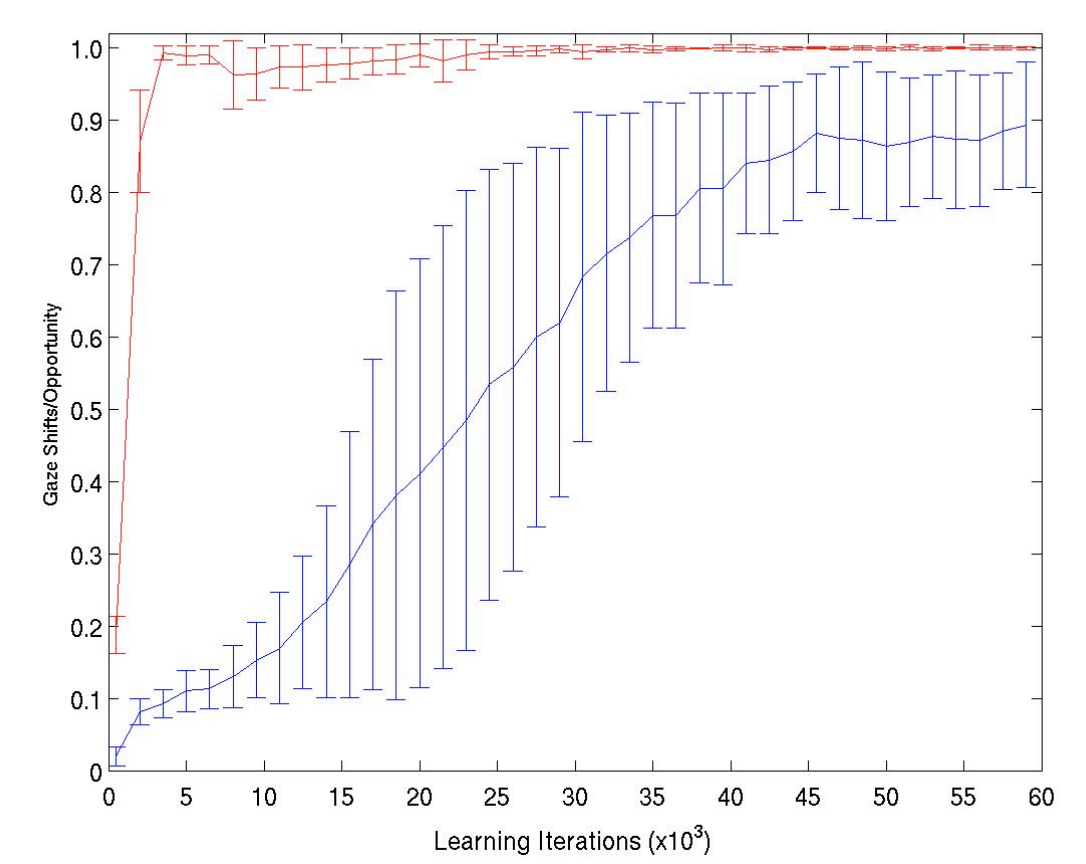
Chen Yu, Indiana University

simulations to test theories of emergence of shared attention

- why simulations?
- use multiple platforms:
  - ANN, virtual environment, robot head
- what do these tell us?



Triesch & Carlson (2003)

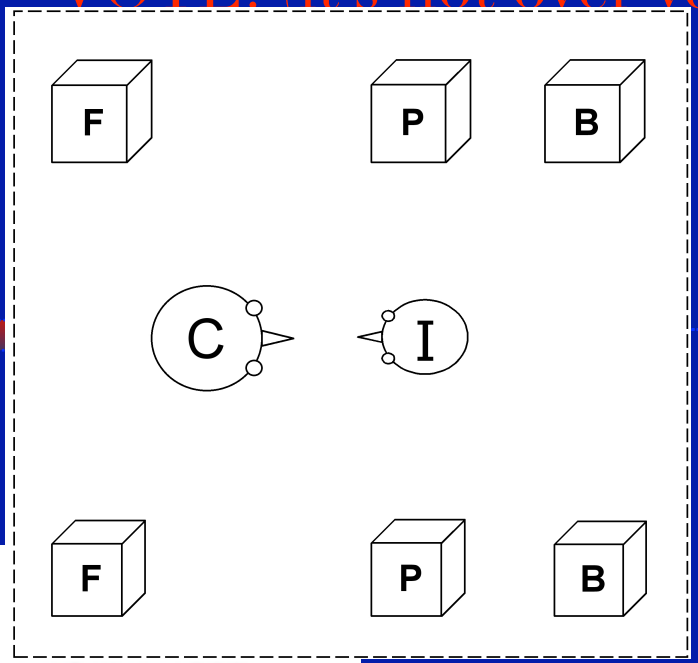


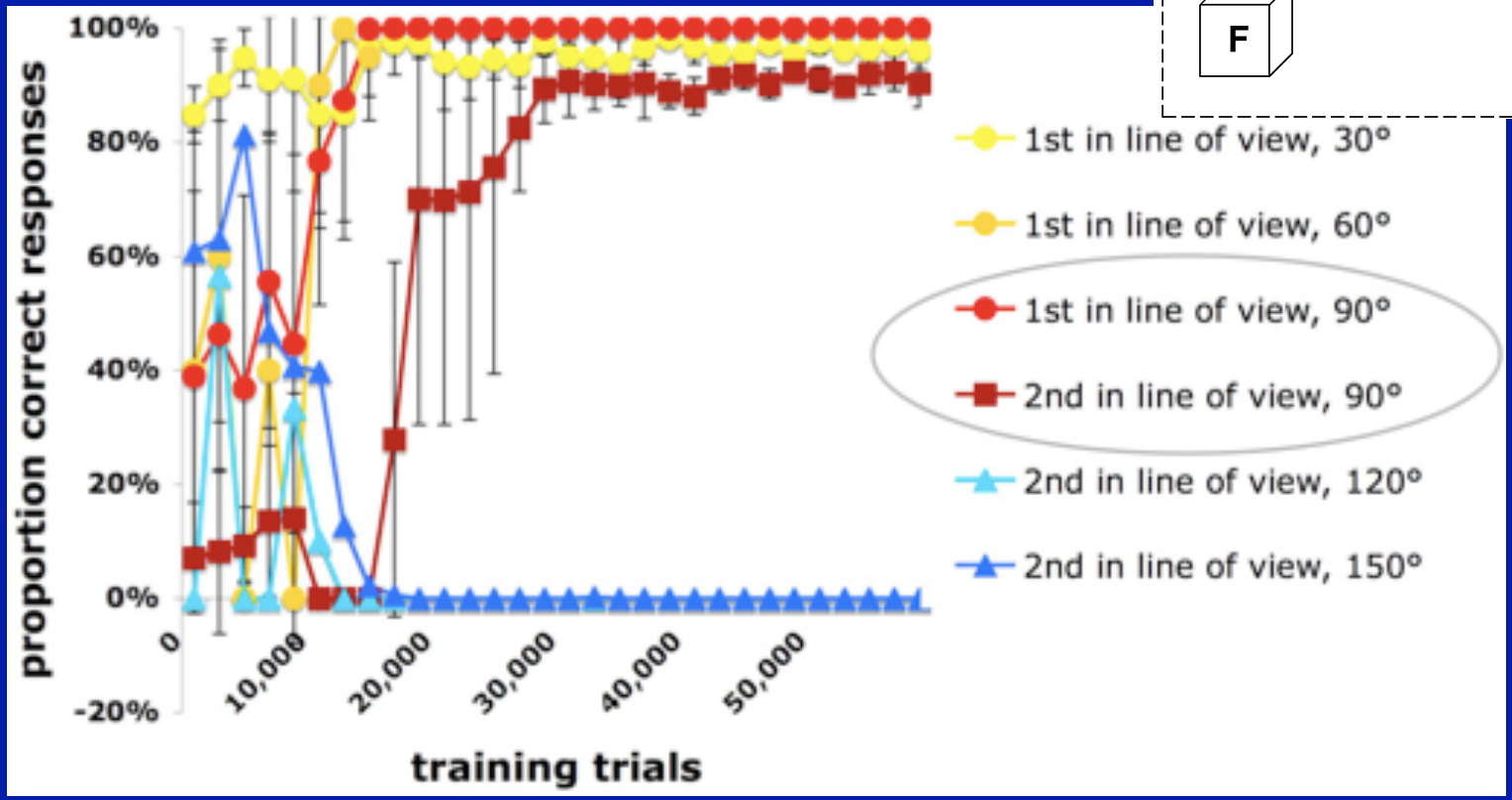
red: frequency of gaze shifts to CG

blue: frequency of gaze shifts following CG's line of regard

VOTE! (it's not over yet)

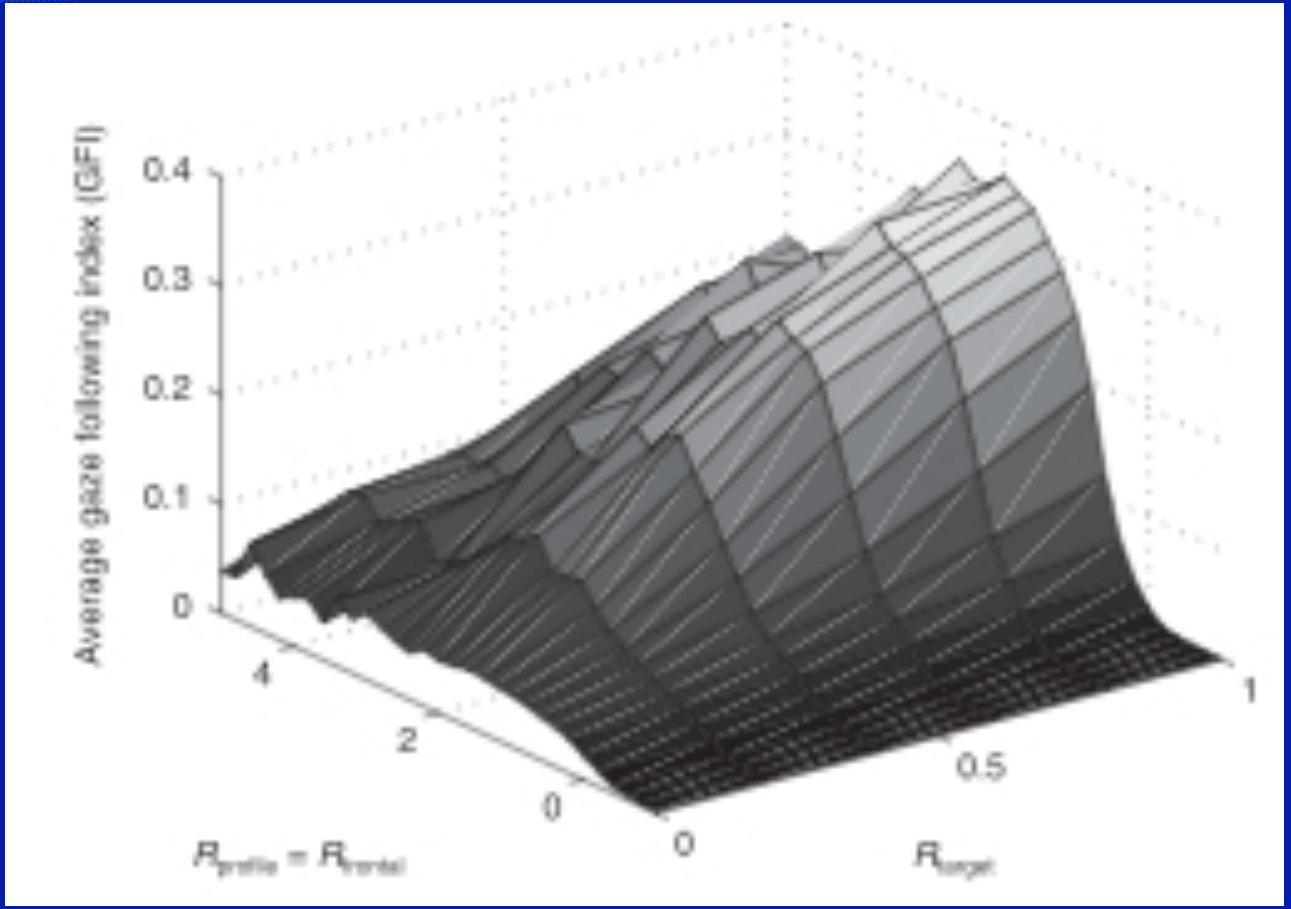
example of simulated result…





Hector Jasso thesis

can we simulate autism?



Triesch, Teuscher, Carlson & Deák (2006)

AS as *engine* of development: using it to infer word meanings

- when adult says novel word, how could infant infer meaning?
- Baldwin: 18-month-olds* monitor adults' attention; infer what they are referring to
- Tomasello & Barton: Toddlers map verbs onto *intended* actions, not accidental ones

current questions

- how does SA "go wrong?" ex: babies with visual deficits
  - how does SA support language, education?
- sources of information in infant's world?
  - regularities they notice & predict
    - relation to activity & experience?
- neural mechanisms of SA?

getting involved

- research in Cognitive Development lab
  - http://www.cogsci.ucsd.edu/~deak/cdlab/
- COGS 160 (Deák)
  - involvement w/ research (3 quarters)
  - permission only, 3.3+ GPA, upper-div courses, desire to learn about research
  - deak@cogsci.ucsd.edu