

9.85 Cognition in Infancy and Early Childhood

Lecture 14: Agency and intention;
Pretend play

Revised Schedule for TOM

- Today: November 7th – Agency and Intention/Pretend Play (Lecture 15)
- Weds: November 10th – Baby talk, word learning and TOM (Lectures 13 and 17)
- Monday: November 14th – Language, culture and thought (Liz)
- Weds: November 16th – Autism

Mini (20-minute) lab meetings

- For rest of November (except next Monday).
 - Find a partner
 - Explain your proposal.
 - Convince her/him of the importance of your research question.
 - Get and give feedback --
 - Is it the right question? The right experiment? The right interpretation?
 - Switch

What might distinguish agents from objects

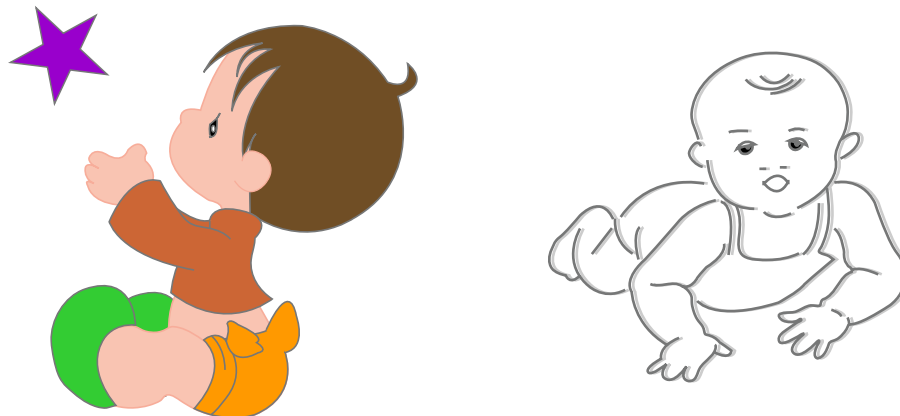
1. Onset of motion
2. Movement type and trajectory
3. Causal relations
4. Contingent v. non-contingent interactions
5. Intentions, goals and mental states
6. Morphological cues (eyes, faces)

What might distinguish agents from objects

1. Onset of motion
2. Movement type and trajectory
3. **Causal relations**
4. **Contingent v. non-contingent interactions**
5. **Intentions, goals and mental states**
6. Morphological cues (eyes, faces)

3. Causal relations

- Infants interact differently with agents and objects.
 - Neonatal imitation of protruding tongue but not protruding tongue-like object.
 - By 2-months, babies greet a new object by reaching, a new person by cooing.



3. Causal relations

- Babies expect other people to treat objects and agents differently as well.
- When actor touched -- 6-m.o. babies (but not 4) looked longer at ball
- When actor talked -- babies looked longer at person.

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3. Causal relations

- Problem of interpretation -- looking longer at expected rather than unexpected event.
- Arguably due to complexity of stimuli.
- However, suggests that by 6-months babies expect different interactions between agents and objects.

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3. Causal relations

- If an adult treats something as a communicative partner infants “follow its gaze”

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Figure 4 in
Johnson, S. C. "Detecting agents." *Philos Trans R Soc Lond B Biol Sci* 358,
no. 1431 (March 29, 2003): 549-59.

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Figure 5 in
Johnson, S. C. "Detecting agents." *Philos Trans R Soc Lond B Biol Sci* 358,
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3. Causal relations

- Moreover, babies use the position of communication to determine the “head” of the object.
 - If the confederate is sitting next to the baby and the green blob slants right, baby looks right.
 - If the confederate is across from the baby and the green blob slants right, baby looks left.

4. Contingent v. non-contingent interactions

- Considerable evidence that infants are sensitive to contingent v. non-contingent interactions with a “conversational” partner.
 - “Chasing” disks v. independently moving disks.
 - Contingency-mobile
 - Still-face
 - Video-playback of mother/child interactions
 - Live-replay-live

4. Contingent v. non-contingent interactions

- Babies are sensitive to degrees of contingency.
 - Preferential looking-paradigm: babies moved a bowl (in which an active or non-active computer mouse was hidden) ...
 - One screen responded perfectly (from the babies' mouse)
 - One screen responded contingently but imperfectly (from an experimenter imitating the baby).
 - Babies preferred the imperfect contingencies.

4. Contingent v. non-contingent interactions

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Figure 3 in

Johnson, S. C. "Detecting agents." *Philos Trans R Soc Lond B Biol Sci* 358, no. 1431 (March 29, 2003): 549-59.

Figure removed due to copyright restrictions. Please see:

Figure 1 in

Johnson, S. C. "Detecting agents." *Philos Trans R Soc Lond B Biol Sci* 358, no. 1431 (March 29, 2003): 549-59.

4. Contingent v. non-contingent interactions

- Trevarthen -- “Primary intersubjectivity”
-- baby flirting (from birth)

The interactions are calm, enjoyable, and dependent upon sustained mutual attention and rhythmic synchrony of short 'utterances' which include, beside vocalizations, touching and showing the face and hands, all these expressions being performed with regulated reciprocity and turn-taking. Newborn and adult spontaneously display a mutually satisfying intersubjectivity.....

(Trevarthen and Aitken, 2001, p.6)

Summary

- By six months of age, infants **discriminate** many characteristic features of agents and objects.
 - Agent motion/random motion
 - Causal/non-causal
 - Contingent/non-contingent

Summary

- But we do not know when and how babies bind these features together (e.g., when do they decide that something that moves by itself is also more likely to act contingently and at a distance and have eyes, goals, etc. ...)
- We do not know to what extent babies connect these features to a general concept of “animate agent” v. “inanimate object”.
- We do not know how and when babies bind these features to goals, intentions and mental states.

What do babies understand about goals and intentions?

- Woodward: attention to goals rather than trajectories
- **Meltzoff: imitation of goals rather than actions**
- **Gergeley: rational imitation**

Imitation -- Piaget

- Pure “accommodation”
- Babies adjusted themselves to the observed behavior.
- The behavior already had to be within the infants’ repertoire of responses.

Imitation of goals

- 18-month-olds
 - Successful action (“There!”)
 - Unsuccessful action (“Whoops!”)
 - Baseline
 - Machine control

Figure removed due to copyright restrictions. Please see:

Figure 2 in

Meltzoff, A. N. "Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children." *Developmental Psychology* 31 (1995): 838-850.

Imitation of goals

- Successful action -- babies imitate action
- Unsuccessful action -- babies don't "imitate"; they perform successful action.
- Baseline -- babies don't perform successful action
- Machine control -- babies don't perform successful action.

Conclusions

- Suggests that infants are not just picking up on adult actions in the world or just accommodating themselves to adult actions.
- Rather they treat human (and only human) action as goal-directed.
- They shape their actions around adult goals, not just around adult behavior.

Rational imitation

- Earlier study of deferred imitation showed that babies would imitate novel actions, even after a 1 week delay.

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Rational imitation

- Gergeley and Csibra
 - Bizarre -- if they understand the goal, why use their heads?
 - Babies (having encountered relatively few developmental psychologists) might assume that adults are rational; use the best means to reach a goal.
 - Might not assume heads were necessary if there were an alternative explanation for why adults didn't use their hands.

Rational imitation

Figure removed due to copyright restrictions. Please see:

Figure 1 in

Gergely, G., H. Bekkering, and I. Kiraly. "Rational imitation in preverbal infants." *Nature* 415, no. 6873 (February 14, 2002): 755.

Rational imitation

- Model Hands-free condition: 75% of babies imitated the action with their heads (replicating Meltzoff)
- Model Hands-occupied condition: 73% of babies performed the action with their hands.

Rational imitation

- Imitation is not an automatic process “triggered” by identification with a human actor.
- Instead children consider the situational constraints of the model and themselves.

Summary

By 18-months, infants have a wide range of cues for discriminating agents and objects:

- Onset of motion
 1. Movement type and trajectory
 2. Causal relations
 3. Contingent v. non-contingent interactions
 4. Intentions, goals and mental states
 5. Morphological cues (eyes, faces)

So young children look terribly rational but ...

- Find a partner --
- (Not too) embarrassing childhood revelations ...
 - Was it a blanket, a stuffed animal or invisible?
 - What did it do? What did you do?
 - How old you were when it emerged? When it disappeared?

Fantasy and reality

- 65% of children have reported imaginary friends by the age of 7.
 - (27% reported friends their parents didn't know about).
 - As common in school-age children as preschoolers.
- Children with imaginary friends are typical -- neither particularly introverted nor particularly intelligent.

Enormous diversity of “friends”

- Invisible squirrel

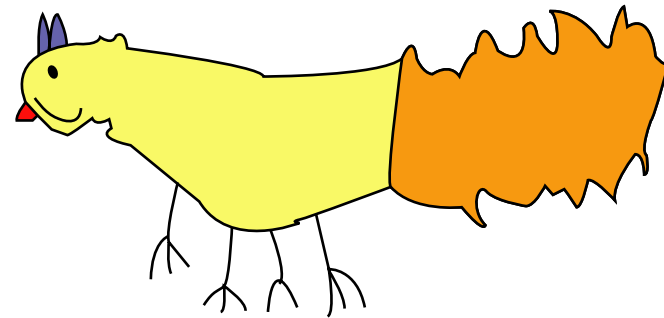


Illustration courtesy of MIT OCW.

- Skateboard guy



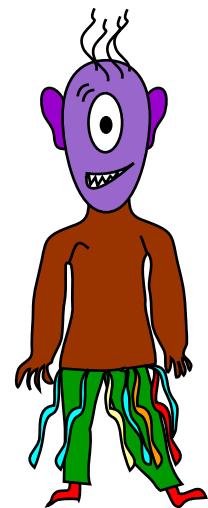
Illustration courtesy of MIT OCW.

Consistent but distinct from reality

- Over repeated interviews, friends retained characteristic traits
- Children would reassure adults “But you know he’s just pretend, don’t you?”

Understanding pretense

- Do children distinguish fantasy and reality?
- Yes ...
- And no ...
- 3-year-olds, monster in the box v. puppy in the box.



Adults too ...

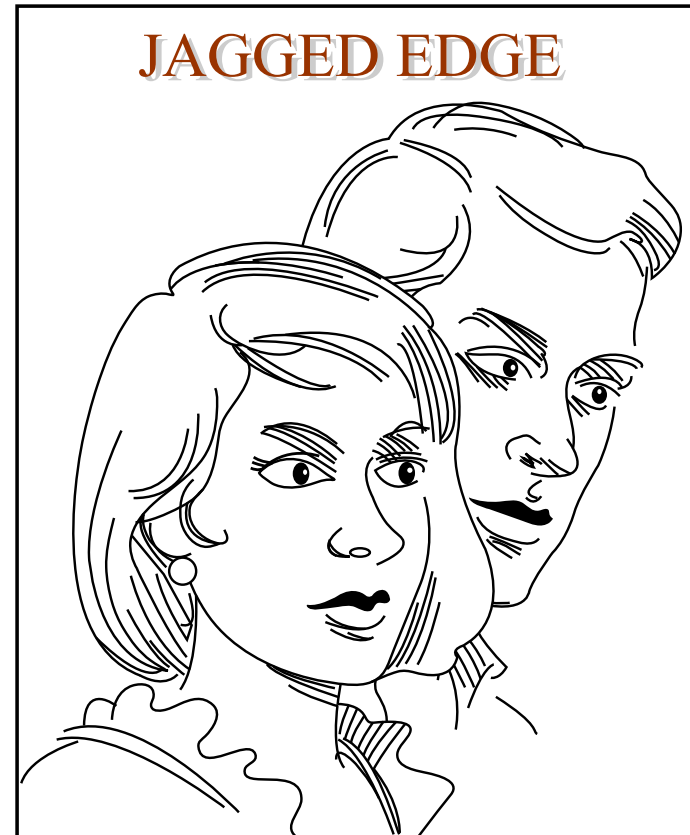
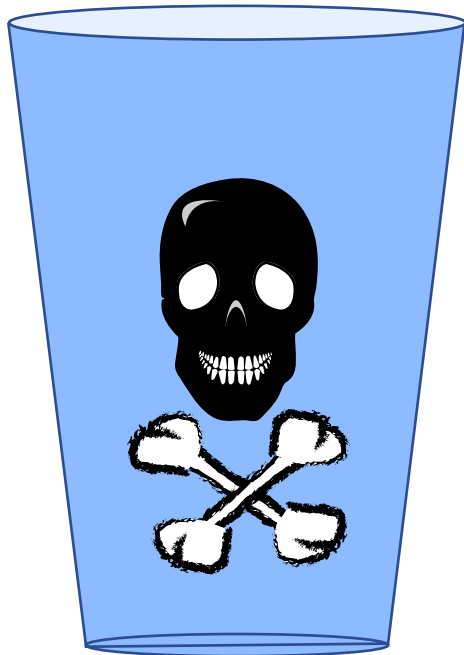


Illustration courtesy of MIT OCW.

Children's understanding of pretense

- Children may have difficulty making a reality/pretense category judgment, especially for particular characters
 - 3-5-year-olds are not sure whether Santa or Superman are real or pretend -- even when they're sure that flying pigs and monsters are pretend.

Children's understanding of pretense

- However, if you ask about properties:
 - Can X travel the world in one night?
 - Can you touch X?
 - Does X need to sleep sometimes?
- Children look like adults in attributing fantastical properties only to fantasy characters.
- And even 2-year-olds integrate real actions with pretense (e.g., mopping up from pretend tea-spills).

Children's understanding of pretense

- First place where children understand that minds represent the world.
- Structure similar to false belief task -- represent reality one way when in fact it's another.
- But arguably easier than false belief because real state (this banana isn't really a telephone) and mental state (this banana isn't really a telephone -- I'm just pretending it is) are congruent.



Children's understanding of pretense

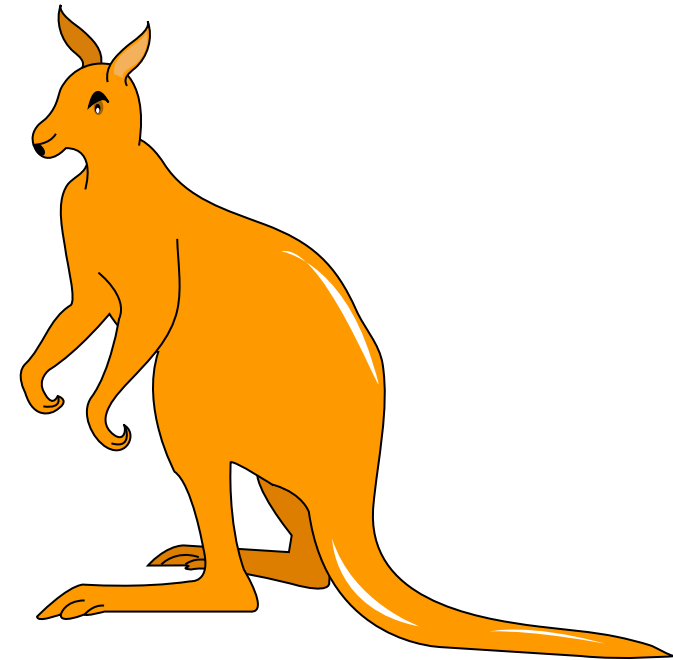
- “Zone of proximal development” for mental state understanding.
- Children high in pretend play pass false belief tasks earlier.

Children's understanding of pretense

- But children might engage in pretend play without understanding its representational aspects.
- Might think of pretending as “acting like”.
- Indeed, a full understanding of pretense might come after understanding of false belief.

Children's understanding of pretense

- Moe from the Land of Trolls



Children's understanding of pretense

- Young children don't think the mind is involved in bodily actions (e.g., sliding down a hill).
- Asked to categorize events into a mind box (thinking about a cat); a body box (sliding downhill) or both (telling a story).
- Children put pretense actions (pretending to be a king) into the body box.

Children's understanding of pretense

- Approximately 65% of 4-year-olds make these errors ...
- Even though they are passing the candy/pencils task.
- Consistent with these findings, 3 and 4-year-olds claim that moving inanimate objects (e.g., spinning tops) can pretend although they deny that they can think.

Children's understanding of pretense

- Additionally, 3 and 4-year-olds think a character who is asleep (and looks like a cat) can be pretending to be a cat.
- Or that a character who falls in the mud and gets stripes all over her but doesn't know it -- can be pretending to be a tiger.
- Fail to understand role of "awareness" in pretense.

Children's understanding of pretense

- However, they do understand the role of intention.
 - If shown an actor pouring from a tea kettle but no tea comes out ...
 - If actor is frustrated (accidental action) children try it themselves
 - If actor is playful (pretend action), children “drink”.

Children's understanding of pretense

- Summary
- Children engage in pretend play from a very early age.
- They make many appropriate distinctions between fantasy and reality.
- They make category errors.
- They respond affectively to pretense.
- Things they don't understand about the mind in general (awareness, consciousness), they also don't understand in pretense.
- Nonetheless, pretend play may contribute to mental state understanding.