

Call & Tomasello (2008):

Does the chimpanzee have a theory of mind? 30 years later

Research examples illustrating what the chimp understands and what he doesn't:

☛ Povinelli & colleagues 1995; 1996

☛ Hare, Call & Tomasello 2006

☛ Bräuer, Call & Tomasello 2007

☛ Kaminski, Call & Tomasello 2008



Michael Tomasello



Daniel Povinelli
& friends



Background

Tactical Deception by Chimps: Behavioral vs. TOM interpretations of Deception

e.g., Woodruff & Premack 1979

1. Chimps trained to indicate location of hidden food to E (who shares food with chimp).

2. Two new Es introduced:

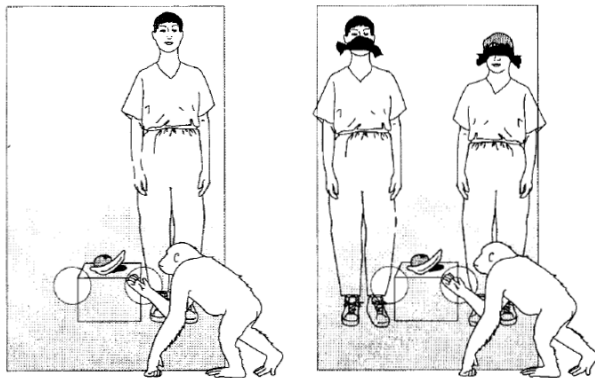
E1 has mask, does not share

E2 has no mask, does share

Only 2 of 4 chimps learned to refrain from showing E1 the food and it took them a very long time to learn this.

Even here, do we need to invoke theory of mind? Perhaps the chimps that learned merely learned that the mask was a cue to withhold signaling.

Povinelli & Preuss 1995; Povinelli & Eddy 1996
Chimps beg for food from blindfolded human



Problems: Is it really fair to say chimp doesn't "know" the human can't see them given that a chimp doesn't normally expect to communicate with a human? Also task is cooperative, not competitive – not 'natural'.

Background

• Hare et al. (2000)

• Argued that the chimps fail these experiments because they all involved **cooperation** (i.e. informing one another of the location of food) which is rare in chimp real-life situations

• Also, chimps rarely face situations where they must choose between two individuals to communicate with, especially when neither one is looking directly at them

• Researchers designed an experiment where two chimps spontaneously competed for food

Hare et al. (2000)

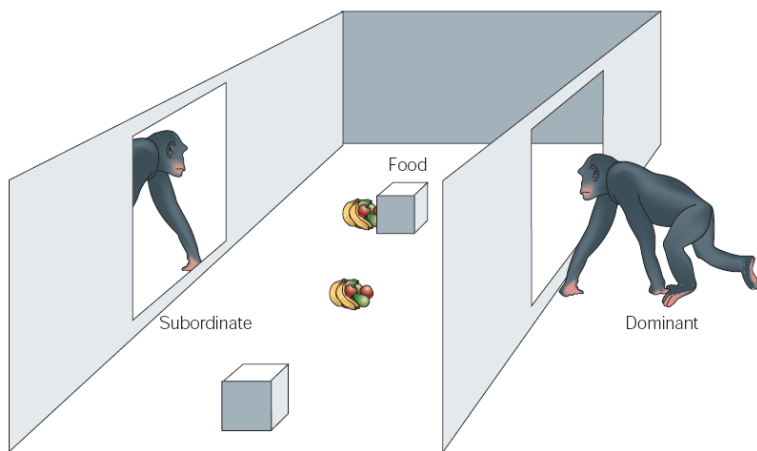
- Dominant and subordinate chimp competed for two pieces of food, one that both could see and one that only the subordinate could see (a barrier blocked it from the dominant's view)
- Prediction: The subordinate would pursue the food that the dominant could not see
- The results supported the prediction, showing that the subordinate chimp did prefer to pursue the hidden food, which suggested an awareness of what others can and cannot see
- Povinelli et al had problems with this study, could not replicate it, yada yada...

Bräuer, Call & Tomasello (2007)

Chimpanzees really know what others can see in a competitive situation

- The main goal was to determine whether chimps really know what others can see in this kind of competition
- What factors would influence their choices?
- Attempting to replicate the main findings of Hare et al. (2000) with slightly improved methods

Bräuer, Call & Tomasello (2007) Chimpanzees really know what others can see in a competitive situation



Bräuer, Call & Tomasello (2007)

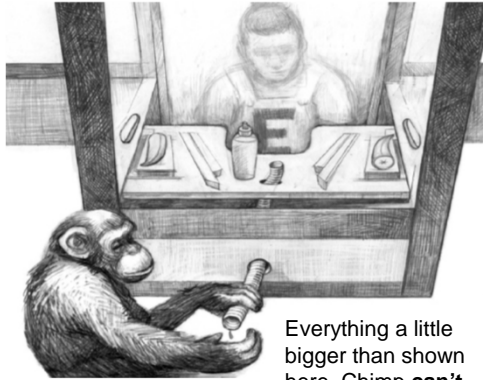
Chimpanzees really know what others can see in a competitive situation

- Results: only when dominant can't see food does subordinate head for it
- In competitive environment, chimps take into account what competitor can or cannot see
- The intensity of this competition is crucial
- Understanding what the competition sees would be an adaptive trait in competing for food
- But other interpretations still possible...

Hare, Call & Tomasello (2006):
Chimps deceive a human competitor by hiding

Competitive task:

E pulled the food out of the chimp's reach if chimp attempted to approach the food. In this way the chimp came to "understand that E, like her own group mates, was no longer willing to share prized food with her". (Waaaa...)



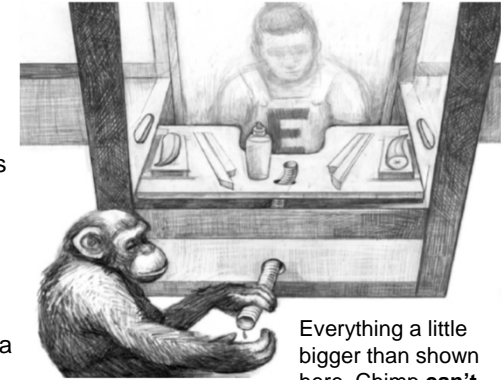
Everything a little bigger than shown here. Chimp **can't** simply reach around to get banana

Hare, Call & Tomasello (2006):
Chimps deceive a human competitor by hiding

Predictions:

Chimps will spontaneously conceal their approach from their competitor by:

- (1) avoiding food E's face is oriented towards
- (2) preferring to approach behind visual occluders over transparent barriers
- (3) avoiding a direct approach to the food if a more indirect route might better conceal their intent to approach



Everything a little bigger than shown here. Chimp **can't** simply reach around to get banana

Test 1: Body Orientation
Face & Chest Condition



Subjects could retrieve banana behind E, but not the banana E faced toward.

Test 1: Body Orientation
Face *versus* Chest Condition



Regardless of which banana subject approached, E removed it

Non-social Control



E left room, allowing subject to obtain both bananas

Test 2: Occluder
Face and Chest Condition

Regardless of which banana subject approached, E removed food

Test 3: Split Occluder

Double Occluder Test



Subject could get banana behind occluder, but not the banana on the clear side

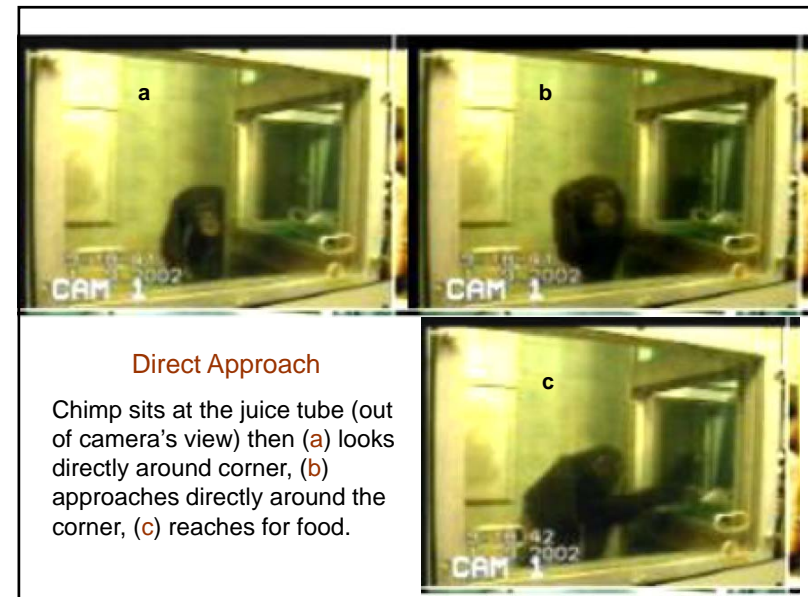
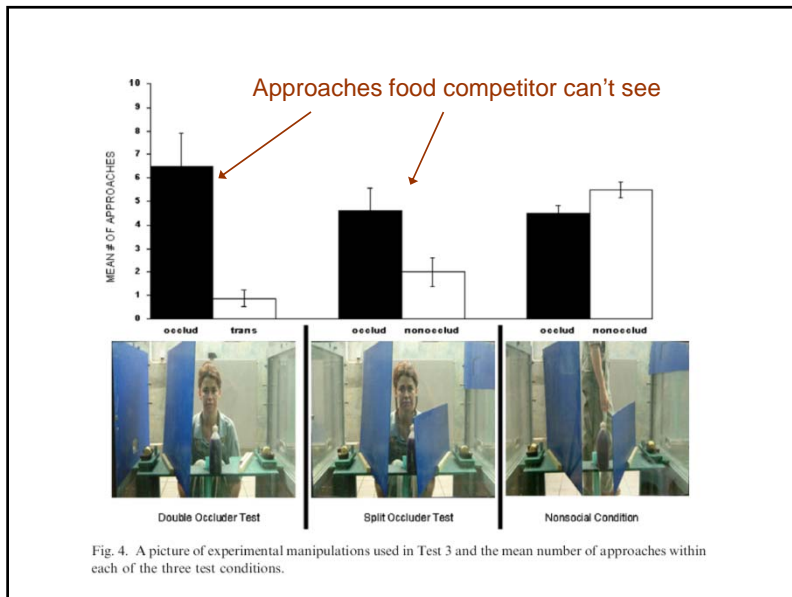
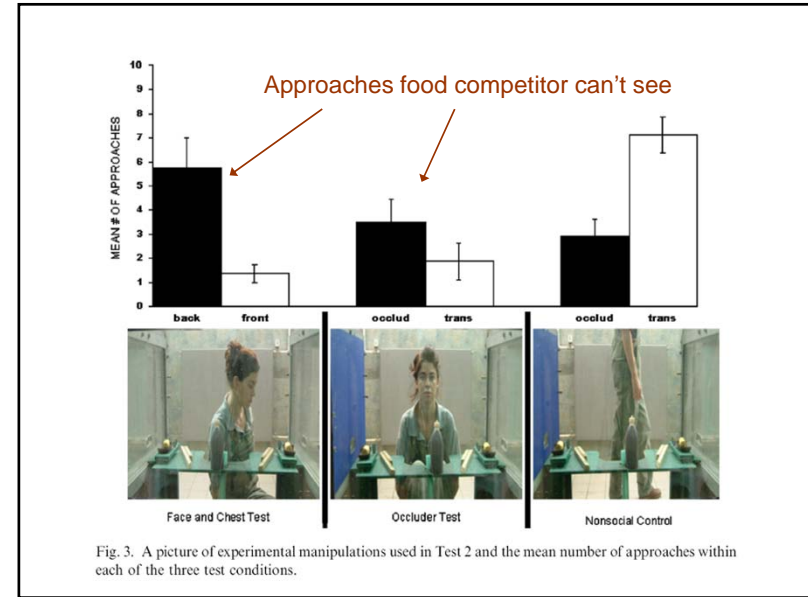
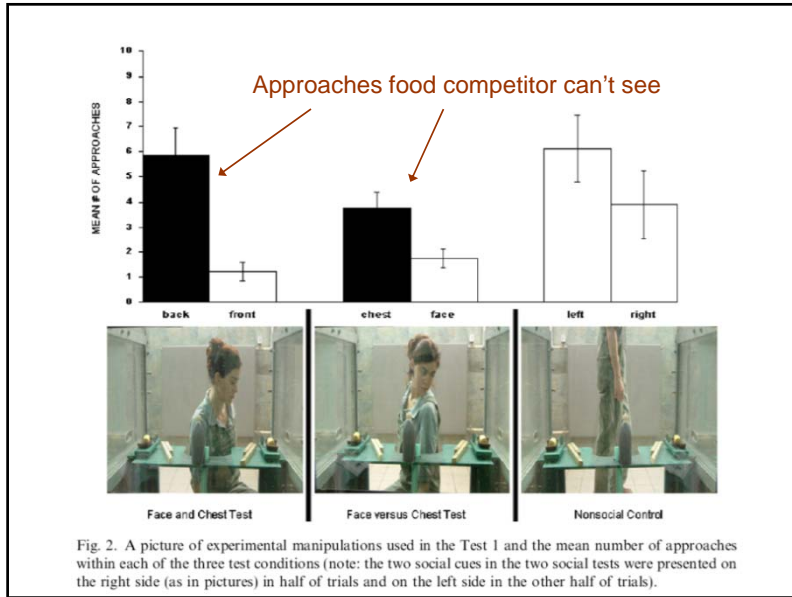
Split Occluder Test

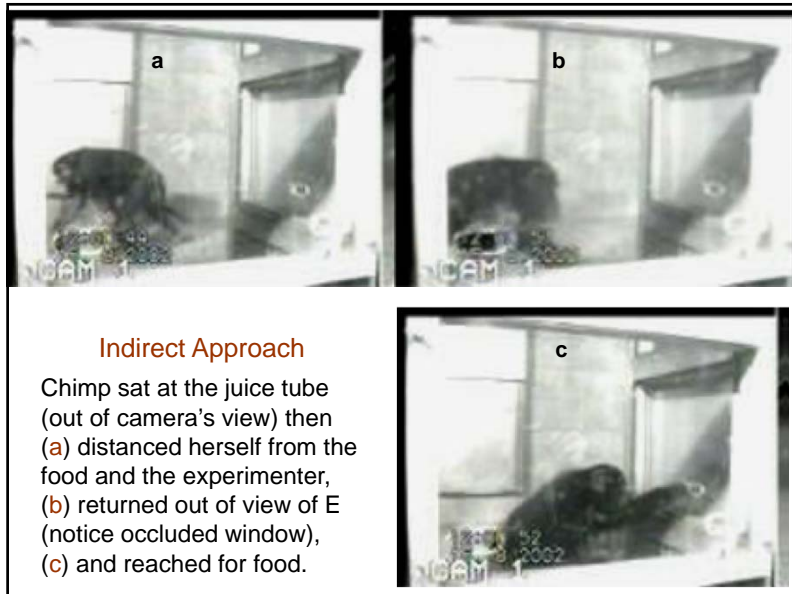


Subject could get neither banana (-?)

All trials coded from video for:

- Whether subject **approached** (moved within reach of) food
- Whether subject **approached on side most difficult for E to see her ('hid')**
 - "Hiding" = Face & Chest – S approached behind E's back
Face vs. Chest – app towards E's chest
Occluder – app behind occluder
Dbl occluder – app behind the 2 occluders
Split occluder – app behind solid occluder
- Whether subject's **approach** was **direct** (subject 1st **reduced distance** between herself and the food) or **indirect** (subject 1st **distanced** herself 1-3 meters from food **before** reducing distance)





Summary of Results

% of trials in which subject hid in the six different conditions						
	Test 1		Test 2		Test 3	
	face & chest	face vs. chest	face & chest	occluder	double occluder	split occluder
total	81%	67%	79%	70%	80%	77%
1st trial	6/8	6/8	5/8	7/8	6/8	7/8

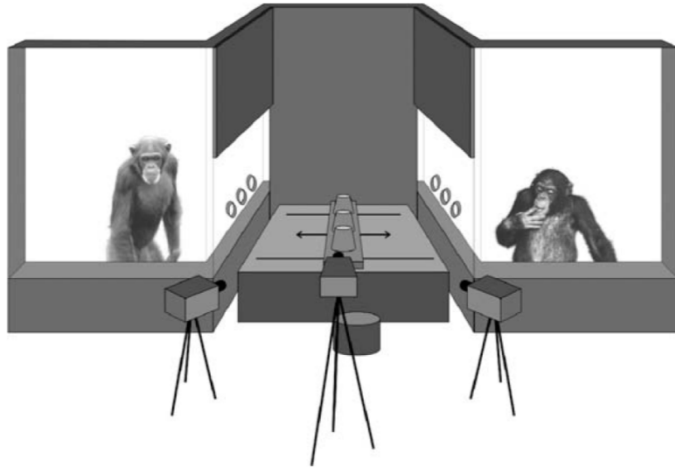
Conclusions

Results demonstrate that chimps “can flexibly use knowledge of what a competitor can and cannot see to develop active, deceptive strategies for concealing their approach to contested food – and they do this from the very first trials in several novel situations. **Contrary to the conclusions of Povinelli and colleagues...chimpanzees in the current experiment spontaneously avoided food that the experimenter was watching, as indicated by gaze direction, and instead approached food that he was not watching...[they] preferred to approach food behind various visual occluders while refraining from approaching food behind non-occluding barriers”.**

Conclusions

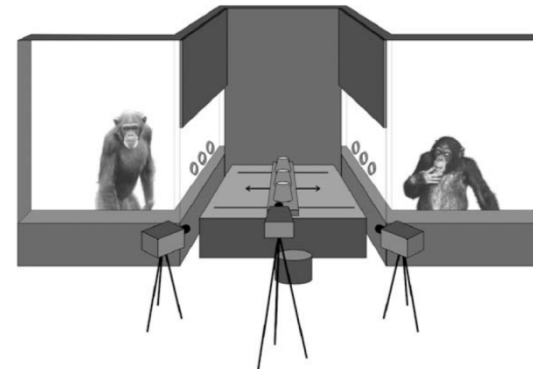
Most striking aspect: subject's exclusive use of indirect approaches when initially distancing themselves from the food could potentially aid in concealing their later approach towards the food. Subjects **only used** indirect approaches **if** the experimenter **was able to see** them distance themselves from the food, but subsequently **could not see them** approach the food after positioning themselves behind the experimenter or occluder. Subjects did not use indirect approaches if the positioning of the occluders prevented the experimenter from seeing them distance themselves from the food (Test 3).

Kaminski, Call & Tomasello (2008): **Chimpanzees know what others know, but not what they believe** *Cognition*, 109, 224-234



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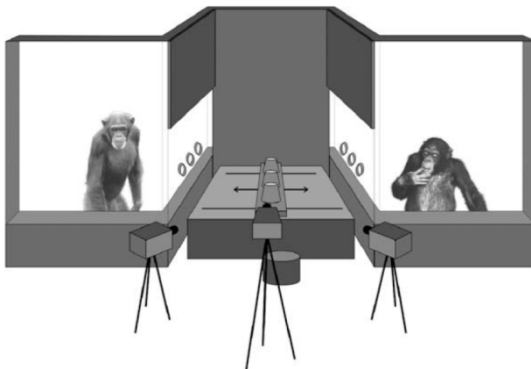
Tested both chimps and human children. Chimp situation: 2 chimps in separate rooms with windows so they can see each other and a table between their rooms. The subject and a competitor **take turns** choosing from 3 opaque buckets, one of which contains a reward.



Subject always chose 2nd.

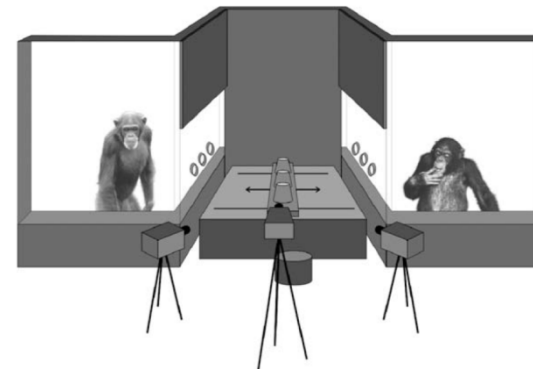
Table pushed toward chimp when it's her turn. Subject sticks her finger through the appropriate hole to request the particular bucket (food).

Each chimp's view of the table could be blocked separately. For each task, the experimenter hid a piece of banana under **one** of the three buckets. In addition, each chimp had a 4th bucket she could choose, on a table close to her (not shown in picture) which she knew contained a less appealing snack: a piece of apple.



So subject could try for the banana on the central table or take the sure thing, the apple near her.

False Belief Test. (1) While **both** chimps watch, E places the banana under one of the buckets. (2) E either moves banana to a new bucket, **or returns it to same bucket**, while (a) **both** chimps watch **OR** (b) while competitor has her view of the buckets blocked. (3) The chimps get to pick which bucket has the treat but the competitor picks 1st, and subject does **not get to see her competitor making her choice**. (4) When it's her turn, subject has option of picking the guaranteed treat on the table next to her, **OR** taking a chance and going for the banana.



Known stay: after initial baiting, E lifts the bucket but returns reward to same place

Known shift: E moves reward to new bucket

Unknown stay: E returns reward to same bucket **and competitor doesn't see this**

Unknown shift: E moves reward to new bucket, **and competitor doesn't see this**

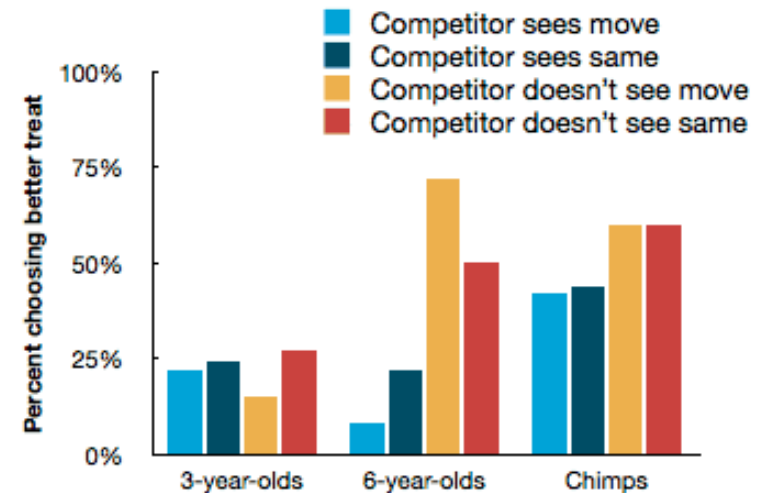
Results

Scenario: Either both chimps saw the banana being moved or kept in the original bucket, **or** only the subject saw the banana moved or kept in the original bucket while hidden from view of the competing chimp.

Question: How often will the chimps try for the better treat? And in their comparable test, how often will the kids?

Optimal Strategy: Go for banana when competitor doesn't see the shift, otherwise go for the sure-thing apple.

Results (Fig. 3)



Results

6-year-olds came closest to optimal strategy: generally didn't choose better treat when the competitor saw the treat being moved (or not moved). Even though they didn't see the competitor choose a bucket, they guessed that the competitor would have already taken the treat, and therefore the best they could do would be to pick the guaranteed, lesser treat.

3-year-olds, by contrast, pretty much always chose the guaranteed lesser treat, presumably because they had no idea what their competitor had done, even in the condition where the treat was moved and the competitor didn't do see this!

Chimps did somewhat better than 3-year olds: they chose to go after the preferred treat more often when they saw that competitor hadn't seen it moved (or kept in the same place). However, the chimp's decision was the same whether or not the treat was actually moved, suggesting that its understanding of what their competitor knows is not as sophisticated as a 6-year-old child's. Don't understand **false beliefs**.

Call & Tomasello (2008):

**Does the chimpanzee have a theory of mind?
30 years later**

Conclusions about Kaminski et al

- Kaminski et al: "Chimpanzees know what others know, but not what they believe"
- Call & Tomasello: "Chimpanzees understand ignorance, but not false belief"
- C & T's overall conclusion 30 years later: "chimpanzees understand others in terms of perception-goal psychology, as opposed to a full-fledged, human-like belief-desire psychology".