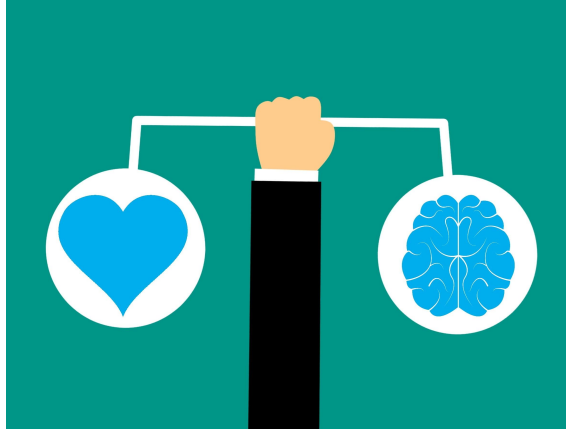
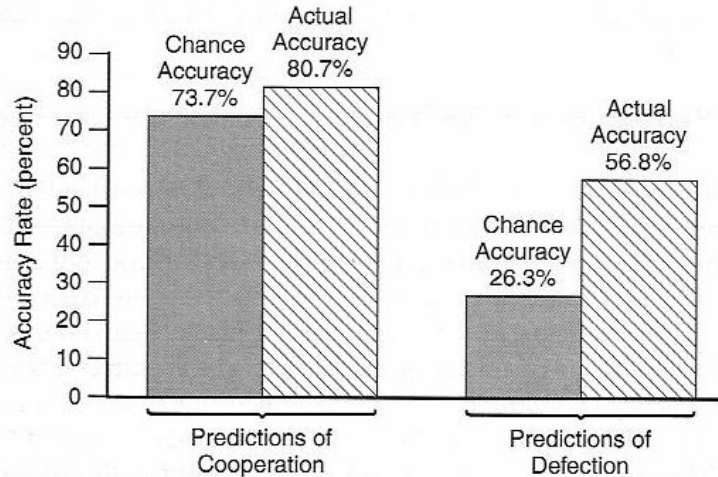


The Social Brain



The social brain

Tit for tat is a good strategy if you can't read your opponent's mind. But people are also good mind readers.



After interacting for 30 minutes, strangers performed significantly better than chance at predicting when their prisoner's dilemma partner would cooperate and when they would cheat.

How do we “read minds”?

Frank et al. *Ethol & Sociobol* 1993; replicated by Brosig *J Econ Beh & Org* 2002.

The social brain: How do we read minds?

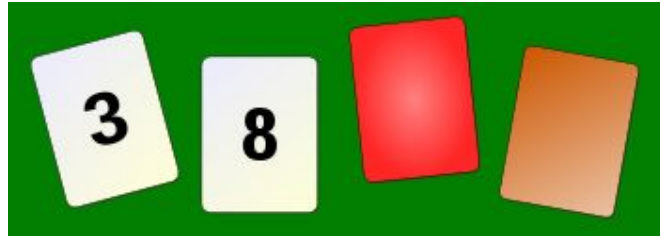
- cognitive adaptations: is there a “cheater-detection” module?
- reading minds with a “theory of mind”
 - Developmental components of mind-reading
 - Phylogenetic antecedents

The social brain: How do we read minds?

- **cognitive adaptations: is there a “cheater-detection” module?**
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Are our minds adapted for social problems?

Cosmides and Tooby predicted that people have minds adapted to solve social problems, not abstract logical problems. The Wason Selection Task:



Each card has a number on one side and a colored patch on the other side.

- P: **If** a card has an even number on one face
- Q: **then** its opposite face is red

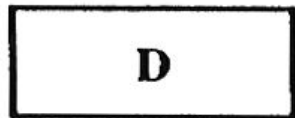
Which card(s) must you turn over in order to test the truth of the proposition?

Cheater detection & the Wason task (abstract version)

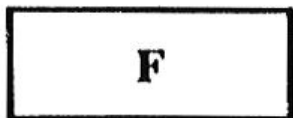
Part of your new clerical job at the local high school is to make sure that student documents have been processed correctly. Your job is to make sure the documents conform to the following alphanumeric rule:

If a person has a 'D' rating, **then** his documents must be marked code '3'

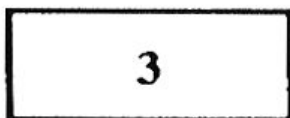
The cards below have information about the documents of four people who are enrolled at this high school. Each card represents one person. One side represents a person's letter rating, the back side his number code. Indicate only those card(s) you definitely need to turn over to see if the documents of any of these people violate this rule:



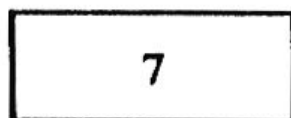
(P)



(not-P)



(Q)



(not-Q)

25% got this correct

People find this very difficult.

Even less abstract problems didn't necessarily help. What does?

Cosmides and Tooby see reciprocity as a social contract: **if** you qualify, **then** you get the benefit. Do people do better with those kinds of "if-then" problems?

(The solution won't always be the same, because cheating, socially, isn't the same as a violation in formal logic).

Wason selection task (social contract version)

In its crackdown against drunk drivers, Salt Lake City law enforcement officers are revoking liquor licenses left and right. You are a bouncer in a Salt Lake bar, and you'll lose your license unless you enforce the following rule:

If a person is drinking beer, **then** he must be over 20 years old

The cards below have information about four people sitting at a table in your bar. Each card represents one person. One side of a card tells what a person is drinking, and the other side tells that person's age. Indicate only those card(s) you definitely need to turn over to see if any of these people are breaking the law:

drinking
beer

(P)

drinking
coke

(not-P)

25 years old

(Q)

16 year s old

(not-Q)

Wason selection task (social contract version)

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drinking
beer

(P)

drinking
coke

(not-P)

25 years old

(Q)

16 years old

(not-Q)

75% got this
correct

Wason task - Perspective change

In social contracts (unlike formal logic) what counts as cheating depends on one's perspective.

Rule: If an employee gets a pension (P) then that employee must have worked for the firm for at least 10 years (Q).

Got pension

P

No pension

Not P

Worked

Q

Didn't work

Not Q

What cards do you have to turn over to see if the rule has been violated?

➤ you are the employer? P and not-Q

Wason task - Perspective change

In social contracts (unlike formal logic) what counts as cheating depends on one's perspective.

Rule: If an employee gets a pension (P) then that employee must have worked for the firm for at least 10 years (Q).

Got pension

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No pension

Not P

Worked

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Didn't work

Not Q

What cards do you have to turn over to see if the rule has been violated?

- you are the employer? P and not-Q
- you are the employee? Not-P and Q

Cheater detection or just social contracts?

What happens when a rule is portrayed as a social contract, but the subject is not asked to look for cheaters?

Scenario: Someone breaks the rule, but:

Group A told violation was portrayed as due to cheating (68% solved)

Group B told violation was due to an innocent mistake (27% solved)

Gigerenzer and Hug *Cognition* 1992

A cognition specialized for “cheater detection” allows for reciprocity

The social brain: How do we read minds?

- cognitive adaptations: is there a “cheater-detection” module?
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Theory of Mind and social intelligence

We engage in social reasoning by understanding the mental states of others.

- Empathy allows us to feel what other feel (emotion)
- Theory of mind allows us to understand what others think (cognition)

Involves understanding that others may know or think things that are different from what we know and think.

What would the world look like if you were mindblind (= unable to read others' minds, to understanding what other people are thinking)?

What would the world look like if you were mindblind?

“attribution of mental states is to humans as echolocation is to the bat” (Sperber).
So automatic that it is hard to imagine.

There are some ways to get at this experimentally:

- very young children lack “theory of mind”

- most animals (except apes) also

- and is one explanation for the social challenges of autism

Autism and theory of mind

Involves (among other things) difficulties with social interaction, communication, imaginative play in children

It is thought that these reflect problems with “mindreading” - theory of mind.

People with autism tend to do very well in spatial and visual tests. Sometimes is associated with remarkable numerical or graphic powers.

In order to understand these different ways of thinking:

Read this [NPR interview with Temple Grandin](#)

And see [this talk by Temple Grandin](#) when you have time

If you know what someone is thinking (even if it's different from what you are thinking) you can



Predict their behavior (even when there are no behavioral cues).

Communicate better (sending as well as receiving)

Deceive others (and know when they are deceiving you)

The social brain: How do we read minds?

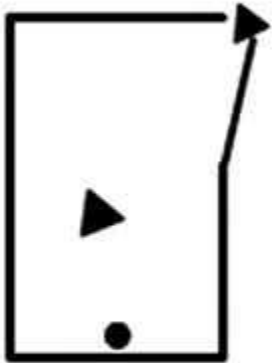
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Developmental components of mind-reading

1. **Intentionality detection** (ascribing agency to self-propelled motion) -- infancy
2. Gaze monitoring and shared attention -- 9-14 months
3. Theory of mind, as measured by false belief tests -- 4 years

Baron-Cohen, *Mindblindness: An Essay on Autism and Theory of Mind*. 1997.

Intentionality bias (Heider-Simmel)



Watch the video clip.

How would you describe what is going on?

Are these geometric shapes acting with intent? What do they “want”?

Developmental components of mind-reading

1. Intentionality detection (infants ascribe agency to self-propelled motion) -- infancy
2. **Gaze monitoring and shared attention** -- 9-14 months
3. Theory of mind, as measured by false belief tests -- 4 years

Seeing leads to knowing

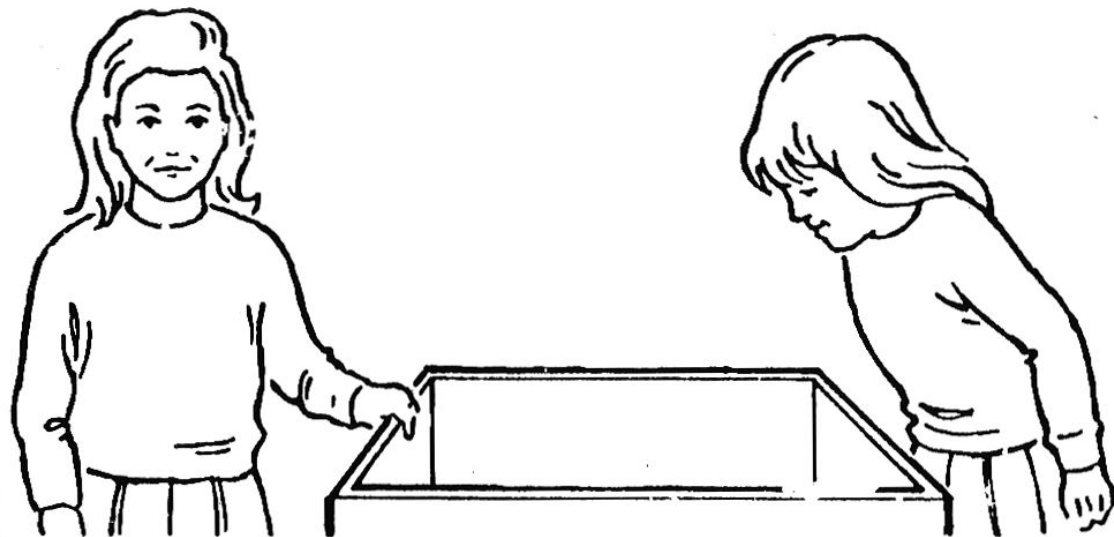


Which candy will Charlie take?

Gaze-monitoring and shared attention (late infancy) based on this. People with autism have trouble with “seeing leads to knowing” tests

Seeing leads to knowing

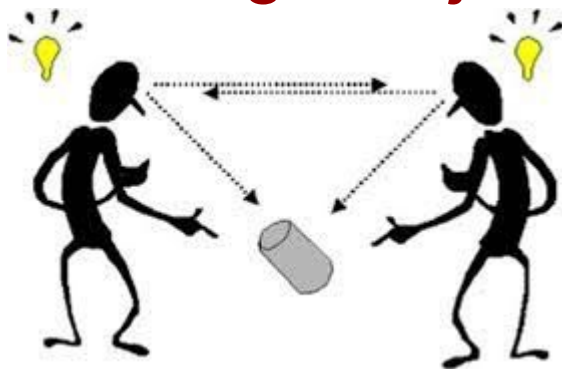
**The question:
which one knows what is in the box**



**Sally touches
the box**

**Anne looks
inside the box**

...leads to gaze monitoring and joint attention



Developmental components of mind-reading

Intentionality detection (infants ascribe agency to self-propelled motion) -- infancy

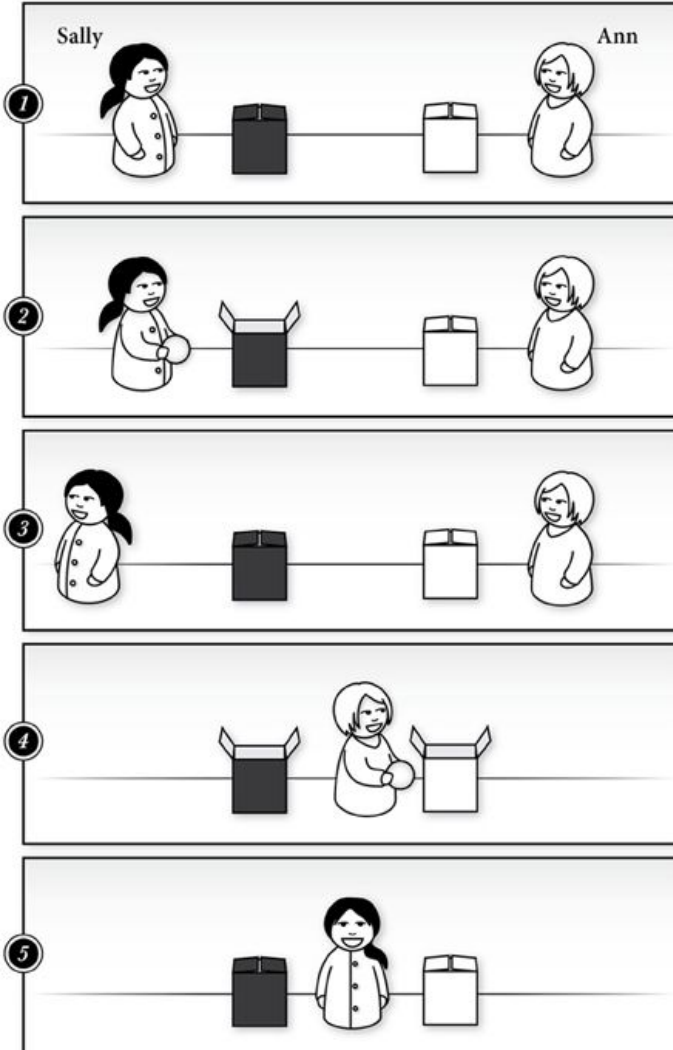
Gaze monitoring and shared attention -- 9-14 months

Theory of mind, as measured by false belief tests -- 4 years

A false belief test

At what age can a child understand that a person can be mistaken about something that they themselves understand? (4-5 years).

People with autism also have trouble with this. Mental state vocabulary — verbs such as ‘think’ and ‘know’ — may be important in passing these tests.



1 Sally has a black box and Ann has a white box.

2 Sally has a marble. She puts the marble into her box.

3 Sally goes for a walk.

4 Ann takes the marble out of Sally's box and puts it into her box.

5 Sally comes back and wants to play with her marble.
Where will Sally look for her marble?

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Phylogenetic antecedents

Monkeys & apes have well-developed social cognition, & understand others' goals and intentions. But not as socially motivated:

Chimps don't seem to prefer outcomes that benefit others

Chimps can collaborate for a shared goal, but they don't prefer collaboration over working alone.

Humans seem to be uniquely motivated to share the attention, goals, and activities of others ("shared intentionality").

May be central to human social learning and teaching.