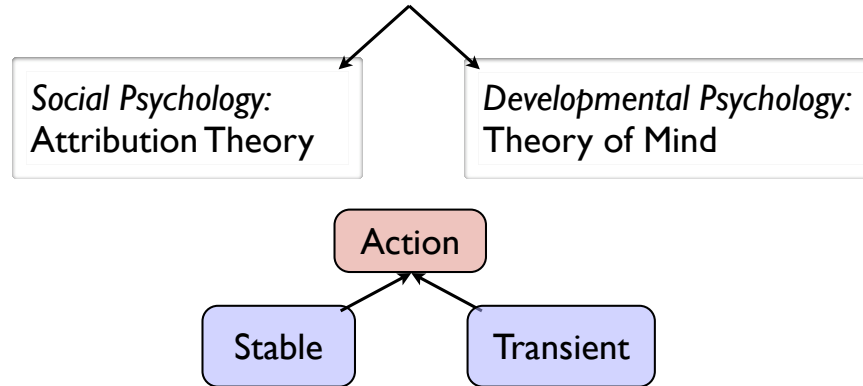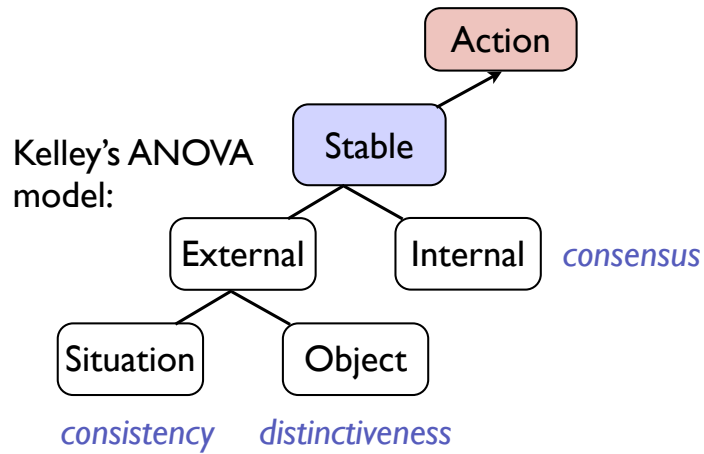# 9.916
Attribution and Theory of Mind

Today's Lecture

Other's actions are more than spatiotemporal patterns; they reflect, and predict, internal states

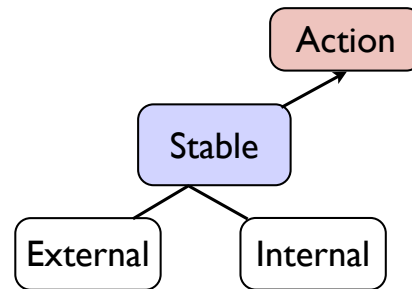How do people infer the causes of others' actions?

Social Psychology:
Attribution Theory

Developmental Psychology:
Theory of Mind

Action

Stable

Transient

Attribution Theory

Action

Kelley's ANOVA model:

Stable

External — Internal   *consensus*

Situation   Object

consistency   *distinctiveness*

Common method:
Something about
the person?
the situation?

"Jon laughs at the comic tonight."
Does everyone laugh at the comic?
Does Jon laugh at all comics?
Does Jon always laugh at this comic?

Attribution Theory

Action

Stable

External   Internal

Common method:
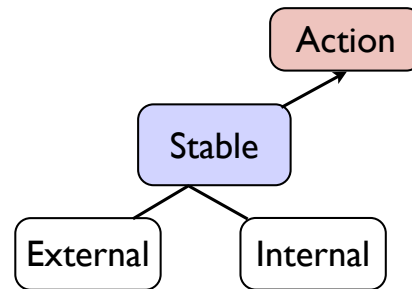Something about
the person?
the situation?

Phenomena:

Situation Neglect
a.k.a. Insufficient Discounting, Fundamental Attribution Error

Actor-Observer Asymmetries
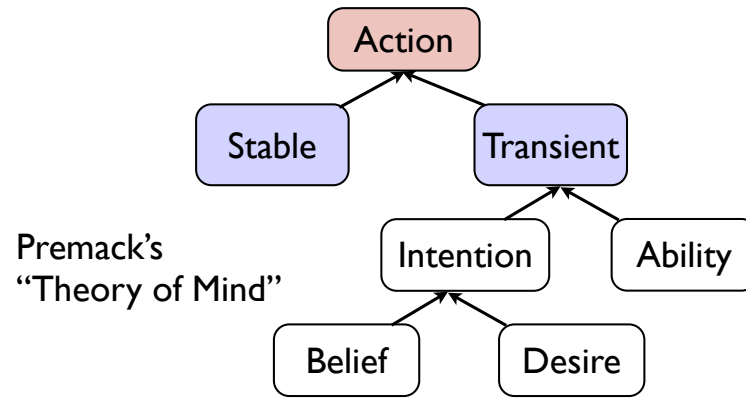*own failures attributed to external causes*

Attribution Theory

Action

Stable

External   Internal

Common method:
Something about
the person?
the situation?

Flaws:

Assumes lots of data

"External" causes: "Jon went on vacation to the Carribean
because the weather is hot there."
Hot weather = external cause
"... but Jon didn't know it was hot."
"... but the weather was terrible that week."

Theory of Mind

Action

Stable   Transient

Premack's
"Theory of Mind"

Intention   Ability

Belief   Desire

Sarah:
Action prediction

Figures removed due to copyright restrictions.

Theory of Mind

The Sally-Anne problem
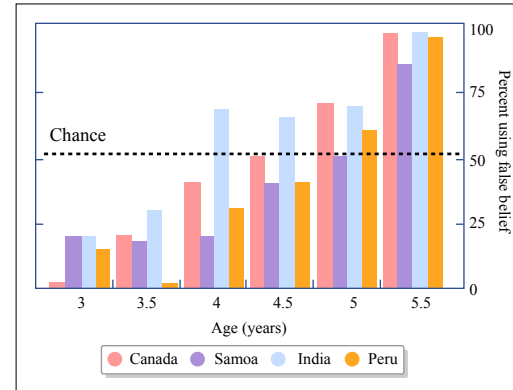
Figures removed due to copyright restrictions.

Figure by MIT OpenCourseWare.

Action prediction based on false belief is different from the prediction based on reality.

& African pygmy hunter gatherers

(Wimmer & Perner 1983, Wellman, Cross and Watson 2001)   (Avis & Harris 1999, Callaghan et al 2005)

Theory of Mind

False Belief

Figures removed due to copyright restrictions.

- Location transfer
- False contents
- 3rd P
- 1st P past
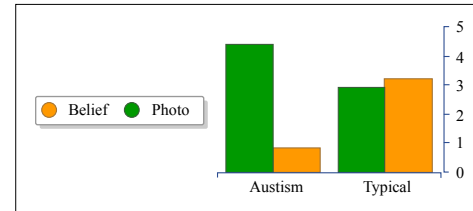- Prediction
- Explanation

False Photo

Figure by MIT OpenCourseWare.

(Wellman et al 2001, Atance & O'Neill 2004, Zaitchik 1990, Leslie and Thaiss 1992)

Theory of Mind
Neural mechanism

Susie parked her sports car in the driveway. In the middle of the night. Nathan moved her car into the garage to make room for his minivan. Susie woke up early in the morning.

She expects to see in the drive
a sportscar   a minivan

A volcano erupted on this Caribbean island three months ago. Barren lava rock is all that remains. Satellite photos show the island as it was before the eruption.

In the photos the island is covered in
rock   vegetation

Figure removed due to copyright restrictions.

Theory of Mind

Neural mechanism

Belief > **Photo**

Individual subjects

Susie parked her sports car in the driveway. In the middle of the night. Nathan moved her car into the garage to make room for his minivan. Susie woke up early in the morning.

She expects to see in the drive
   a sportscar   a minivan

A volcano erupted on this Caribbean island three months ago. Barren lava rock is all that remains. Satellite photos show the island as it was before the eruption.

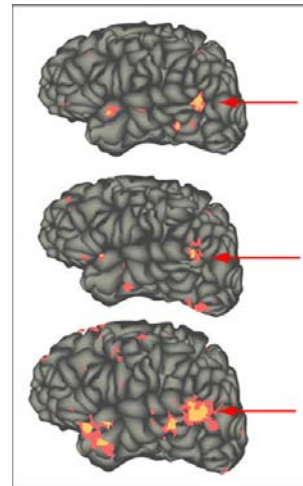In the photos the island is covered in
   rock   vegetation

Theory of Mind
Neural mechanism

Reality Known

Task: Predict where the girl will look.

Results

Figure removed due to copyright restrictions.

Lesions in
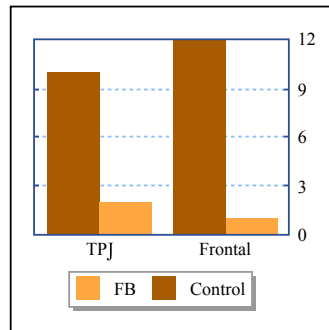
(1) left lateral frontal

(2) left TPJ

Figure by MIT OpenCourseWare.

(Samson et al 2004, Samson et al 2005)

Theory of Mind

Neural mechanism

Reality Unknown

Task: Indicate where the object is.

<u>Results</u>

Lesions in

(1) left lateral frontal

(2) left TPJ

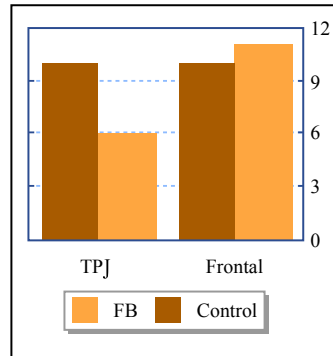Figure removed due to copyright restrictions.

Figure by MIT OpenCourseWare.

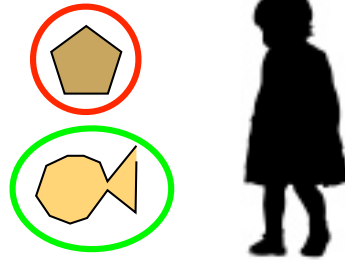(Samson et al 2004, Samson et al 2005)

Theory of Mind
Development

False Belief understanding isn't "having" a
Theory of Mind

Theory of Mind
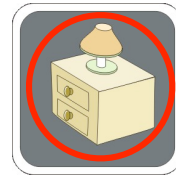### Development

(1) Diverse Desires

Which one will the
girl choose?

Theory of Mind
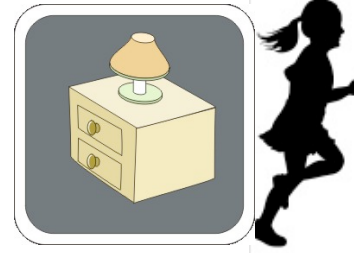Development

(1) Diverse Desires
(2) Diverse Beliefs

Where will the girl look
for the dog?

Theory of Mind
Development

(1) Diverse Desires
(2) Diverse Beliefs
(3) Access/Ignorance

Does the girl know
what's in the drawer?

Theory of Mind

Development

(1) Diverse Desires
(2) Diverse Beliefs
(3) Access/Ignorance
(4) False Belief

What does the boy think
is in the box?

Theory of Mind

Development

(1) Diverse Desires
(2) Diverse Beliefs
(3) Access/Ignorance
(4) False Belief
(5) Hidden Emotion

How does the boy really feel?

Theory of Mind
Development

60/75 Kids: 80%
Replicated longitudinally

(1) Diverse Desires   (2) Diverse Beliefs
(3) Access/Ignorance (4) False Belief
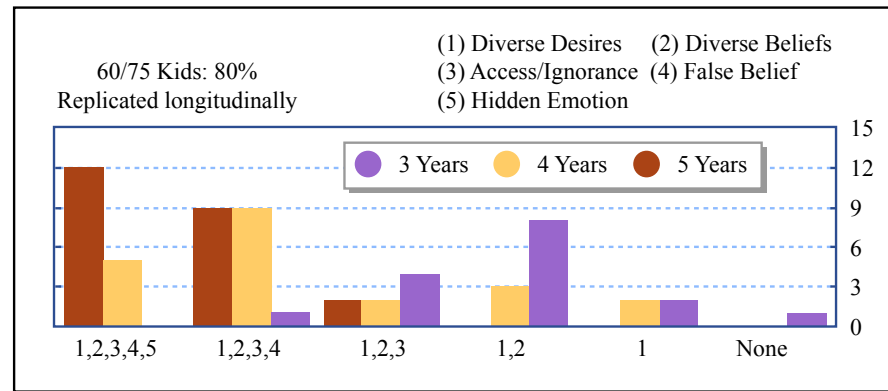(5) Hidden Emotion

Figure by MIT OpenCourseWare.

Theory of Mind

Non-human primates

Figures removed due to copyright restrictions.

Competitive
Not
Cooperative

Origins of False Belief understanding

9.916 Special Topics: Social Animals
Fall 2009