SOCIAL INTELLIGENCE

Rebecca Saxe
Part 1.
Some stuff I actually work on in response to something Martin Nowak just said

Part 2.
Some other thoughts about “social” “intelligence”
People care about the motives of strangers

Task: Moral judgments

How much blame does Grace deserve?

None  ...  Very much

None  ...  Very much

ANOVA Belief x Outcome; main effect of Belief, p<0.001

Young et al, 2007
People care about the motives of strangers
exception? ASD

How much blame does Grace deserve?

Group: Control

ASD n=13, Typical control n=15
ANOVA Belief x Outcome x Group; Belief X Group interaction, p<0.03
People care about the motives of strangers
Related to known neural mechanism

The morning of the dance, Sarah placed her high heel shoes under her dress and then went shopping. That afternoon, her sister borrowed the shoes and later put them under Sarah's bed.

A volcano erupted on a Caribbean island three months ago. Barren lava rock is all that remains today. Satellite photographs show the island as it was before the eruption.
People care about the motives of strangers
Related to known neural mechanism

How much blame does Grace deserve?

(Less weight to belief)

(More weight to belief)

Young and Saxe, 2009
People care about the motives of strangers
Related to known neural mechanism
People care about the motives of strangers
Related to known neural mechanism

<table>
<thead>
<tr>
<th>Offline TMS Session 1</th>
<th>Offline TMS Session 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TMS RTPJ</strong></td>
<td><strong>TMS RTPJ</strong></td>
</tr>
<tr>
<td><strong>Moral</strong></td>
<td><strong>Moral</strong></td>
</tr>
<tr>
<td>1 Hz, 25 min</td>
<td>1 Hz, 25 min</td>
</tr>
<tr>
<td>11.2 min</td>
<td>11.2 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Online TMS Session</th>
<th>6 s</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 s</td>
<td>Foreshadow</td>
<td></td>
</tr>
<tr>
<td>6 s</td>
<td>The powder is sugar.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Online TMS Session</th>
<th>6 s</th>
<th>Belief</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 s</td>
<td>She thinks the powder is toxic.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Online TMS Session</th>
<th>3 s</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 s</td>
<td>She puts the powder in her friend's coffee.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Online TMS Session</th>
<th>3 s</th>
<th>Moral Judgment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 s</td>
<td>Putting the powder in was: Forbidden 1-2-3-4-5-6-7 Permissible</td>
<td></td>
</tr>
</tbody>
</table>

- **Online 10 Hz TMS to RTPJ or control**
  - 500 ms

---

Background

Foreshadow
The powder is sugar.

Belief
She thinks the powder is toxic.

Action
She puts the powder in her friend's coffee.

Moral Judgment
Putting the powder in was: Forbidden 1-2-3-4-5-6-7 Permissible
People care about the motives of strangers
Related to known neural mechanism

How much blame does Grace deserve?

TMS site: Control

RTPJ

ANOVA Belief x Outcome x TMS site x Experiment
Belief x TMS site interaction, p<0.007
Part 1.
Some stuff I actually work on
in response to something Martin Nowak just said

Part 2.
Some other thoughts about
“social”
“intelligence”
“Social” and “Intelligence”

What is “social”?
coexisting with conspecifics (kin, partners & strangers)
- getting what you want via:
  learning, donations, coercion, deception
- promoting individual/group/species survival via:
  coordination, cooperation, altruism, teaching

What is “intelligent”?
sensitive: to past & present reality
cognitive: involves ‘understanding’/‘explaining’
optimal: achieves intended future

“Social intelligence”?
cognitive
sensitively perceiving; accurately comprehending; and effectively manipulating conspecific individuals & groups
“Social” and “Intelligence”

What is “social”?
coexisting with conspecifics (kin, partners & strangers)
- getting what you want via:
  learning, donations, coercion, deception
- promoting individual/group/species survival via:
  coordination, cooperation, altruism, teaching

What is “intelligent”?
sensitive: to past & present reality
cognitive: involves ‘understanding’/‘explaining’
optimal: achieves intended future

“Social intelligence”?
cognitive
sensitively perceiving; accurately comprehending; and
effectively manipulating conspecific individuals & groups
“Social” and “Intelligence”

“Social intelligence”? 
*cognitive*

sensitively perceiving; accurately comprehending; and effectively manipulating conspecific individuals & groups.

Compare to ‘New Synthesis’

“When the same parameters and quantitative theory are used to analyze both termite colonies and troops of rhesus macaques, we will have a unified science of sociobiology”
“Social” and “Intelligence”

“Social intelligence”? 

cognitive 
sensitively perceiving; accurately comprehending; and effectively manipulating conspecific individuals & groups

Can we: 
measure & compare across individuals? 
diagnose disorders and identify experts? 
improve by training, teaching or medicating? 
compare across species?

Diagnosing social intelligence?

Version 0: clinical measures

e.g. self-report scale

EQ-i
Toronto Alexithymia Scale
e tc.

“People often tell me I am a
good listener”

e.g. “Mind in the Eyes”
Diagnosing social intelligence?

Version 0: clinical measures

Homework idea:
What would be a good experimental measure of “social intelligence” in adult humans? Are there “experts” (Mensa for social cognition)? Who?
Diagnosing social intelligence?

Version 1: We like what we’re good at
Social success <=> high social intelligence
Social failure/anxiety <=> low social intelligence

e.g. Network size:

![Brain regions diagram](image1)

e.g. Mouse ASD test:

![Mouse ASD test](image2)

Kanai et al. 2011; Sallet et al. 2011; lots of others
Diagnosing social intelligence?

Version 1: We like what we’re good at
   Social success $\iff$ high social intelligence
   Social failure/anxiety $\iff$ low social intelligence

Homework idea:
What would be a better experimental measure of mouse/rat social cognition, for use in ASD?
Diagnosing social intelligence?

Version 2: Diagnostic behaviours
  e.g. Donating knowledge to ignorant conspecifics at cost “Teaching”
  e.g. Ant tandem running
  e.g. Meerkat feeding

Dead

Disabled

Intact

Leadbetter et al 2006
Thomas et al 2006
Diagnosing social intelligence?

Version 2: Diagnostic behaviours
  e.g. Donating knowledge to ignorant conspecifics at cost
    “Teaching”

Homework idea:
  If human teaching is more “intelligent” than these examples,
  can you make a formal model of the difference?
  what experiment (in ants or meerkats) would illustrate the difference?
Diagnosing social intelligence?

Version 3: Model ‘economic’ games

- e.g. Incidental effects
- Strategic cooperation/defection

Izuma et al 2011; Yoshida et al 2008; Hampton et al 2008
Diagnosing social intelligence?

Version 3: Model strategies in games

A challenge:
- distinguishing formal analysis from actual representation.
- keeping it fresh.
- keeping it social.

e.g. Beauty contest
e.g. ‘Common knowledge’

How could you diagnose which representation an individual is using?
Diagnosing social intelligence?

Version 3: Model strategies in games

Homework idea:
Design a new game, so that strategies/moves are diagnostic of specific cognitive & social representations.
Social mind, social brain

**A cognitive theory:**
Why do people think about mental states?
When are simpler strategies sufficient?
Are there diagnostic behavioural consequences?
Relationship to other kinds of “intelligence”?

**A computational theory:**
What representations and algorithms are necessary & sufficient?

**A neural theory:**
How do neurons do it?