

SOCIAL

Rebecca Saxe

INTELLIGENCE

Part 1.

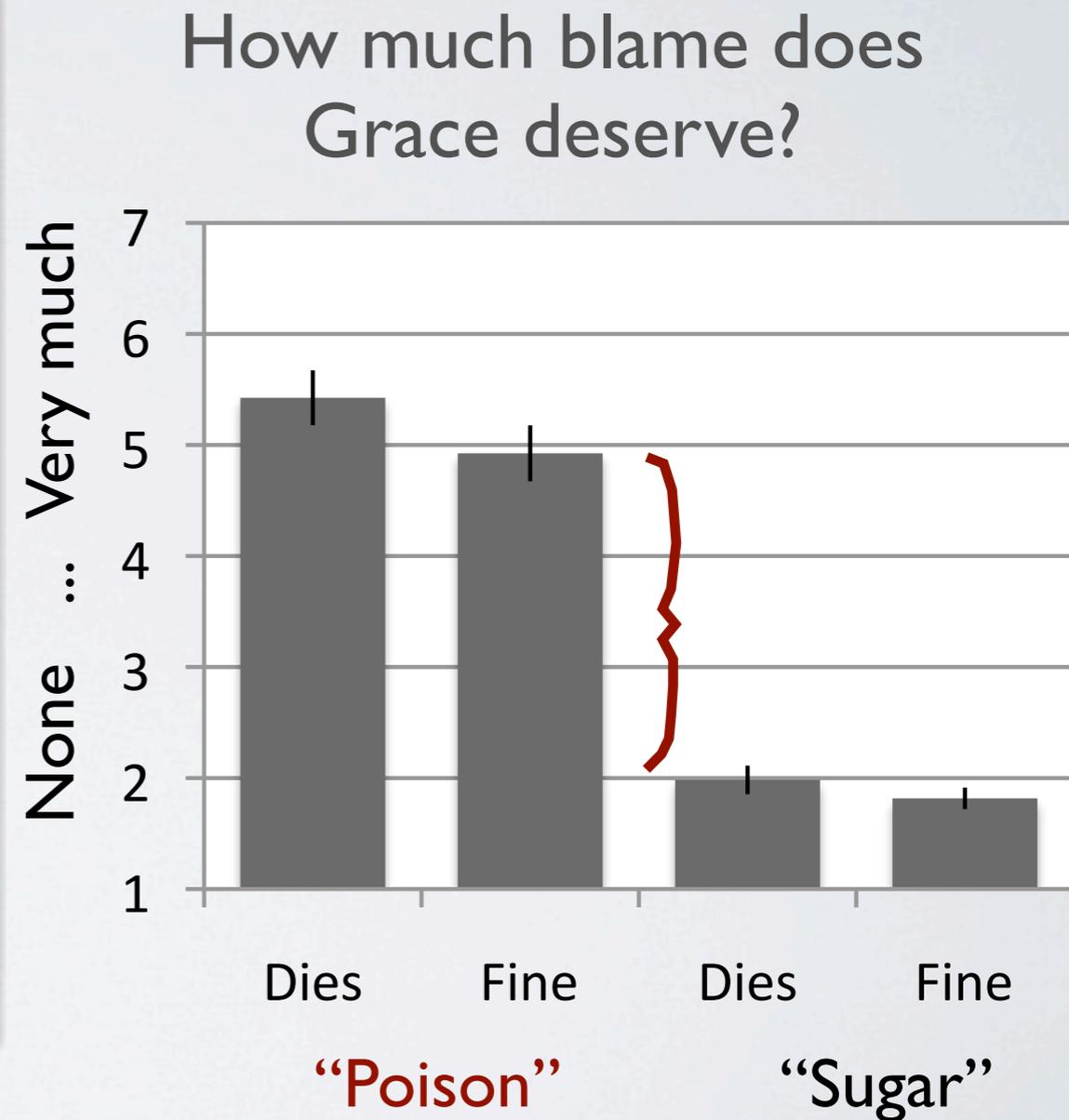
Some stuff I actually work on
in response to something Martin Nowak just said

Part 2.

Some other thoughts about
“social”
“intelligence”

People care about the motives of strangers

Task: Moral judgments

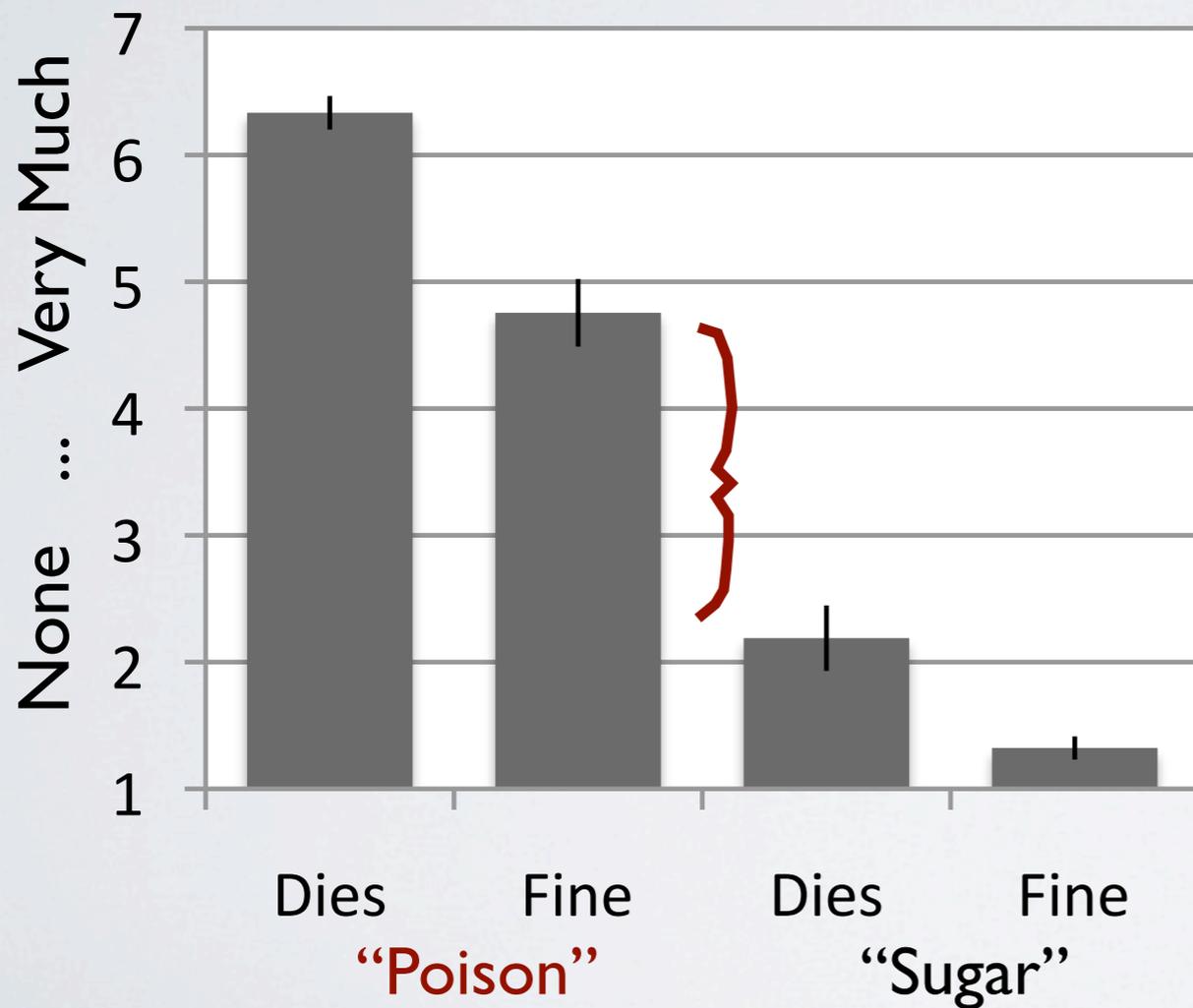


ANOVA Belief x Outcome; main effect of Belief, $p < 0.001$

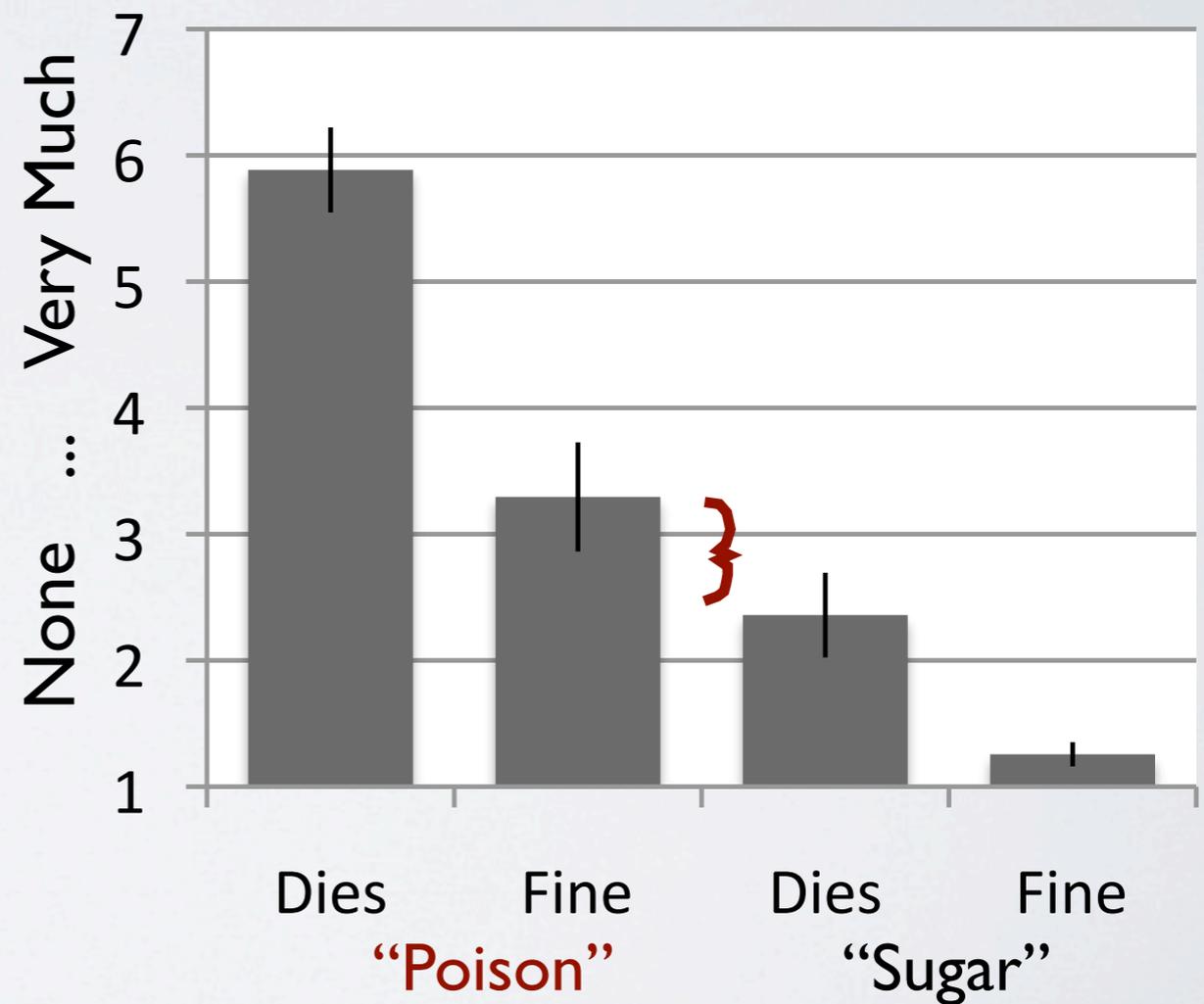
People care about the motives of strangers exception? ASD

How much blame does Grace deserve?

Group: Control



ASD



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

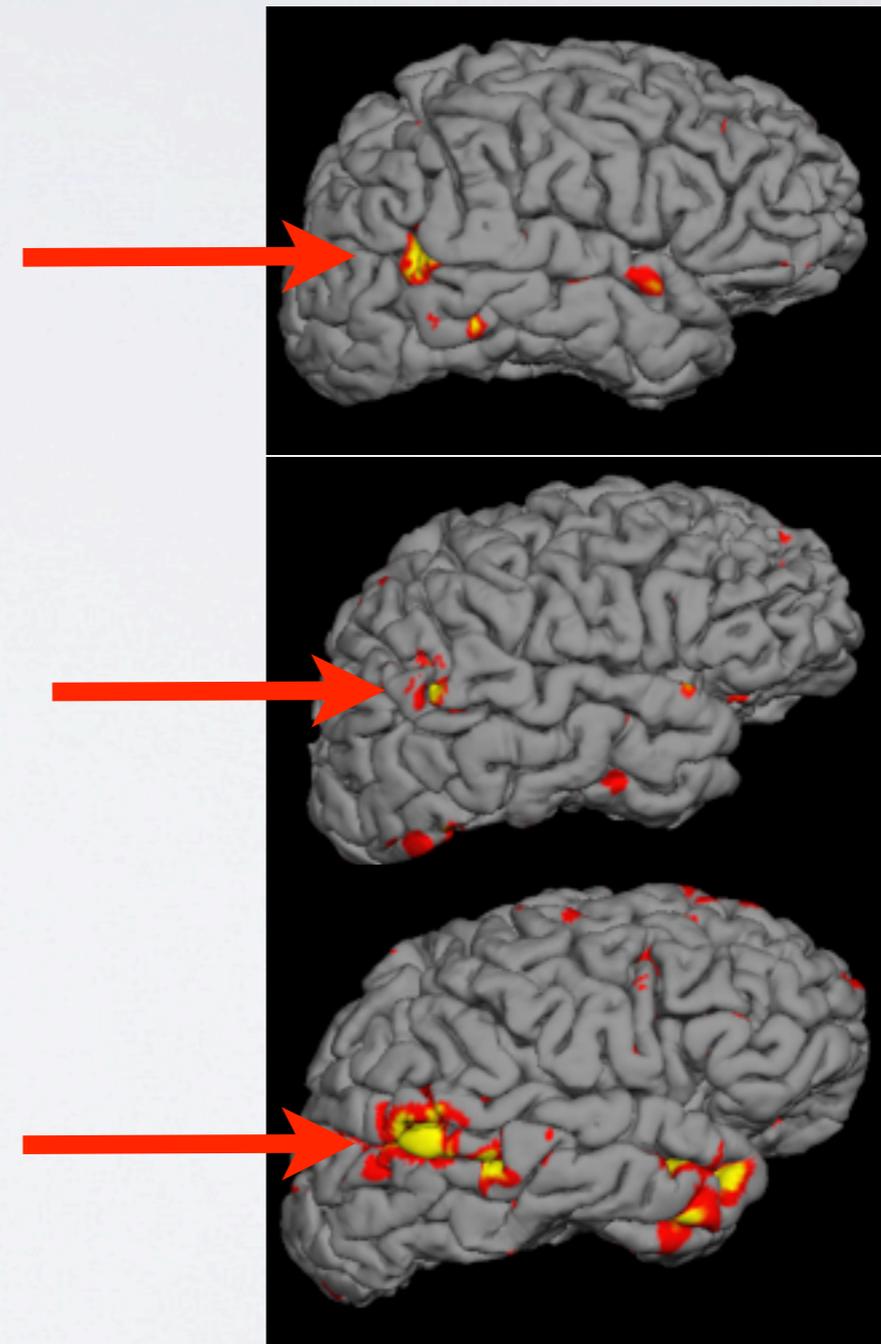
Related to known neural mechanism

Belief > **Photo**

RTPJ in individual subjects

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.

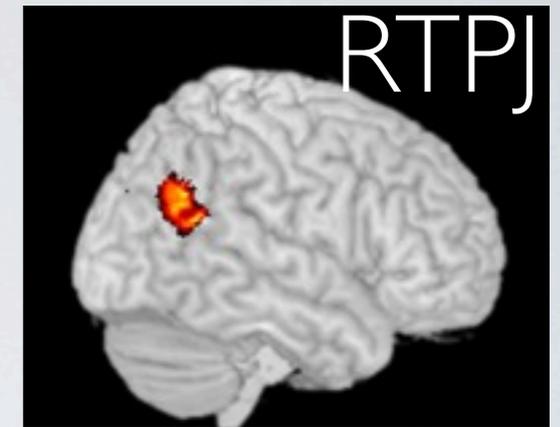
A volcano erupted on a Caribbean island three months ago. Barren lava rock is all that remains today. Satellite photographs show the island as it was before the eruption.



People care about the motives of strangers

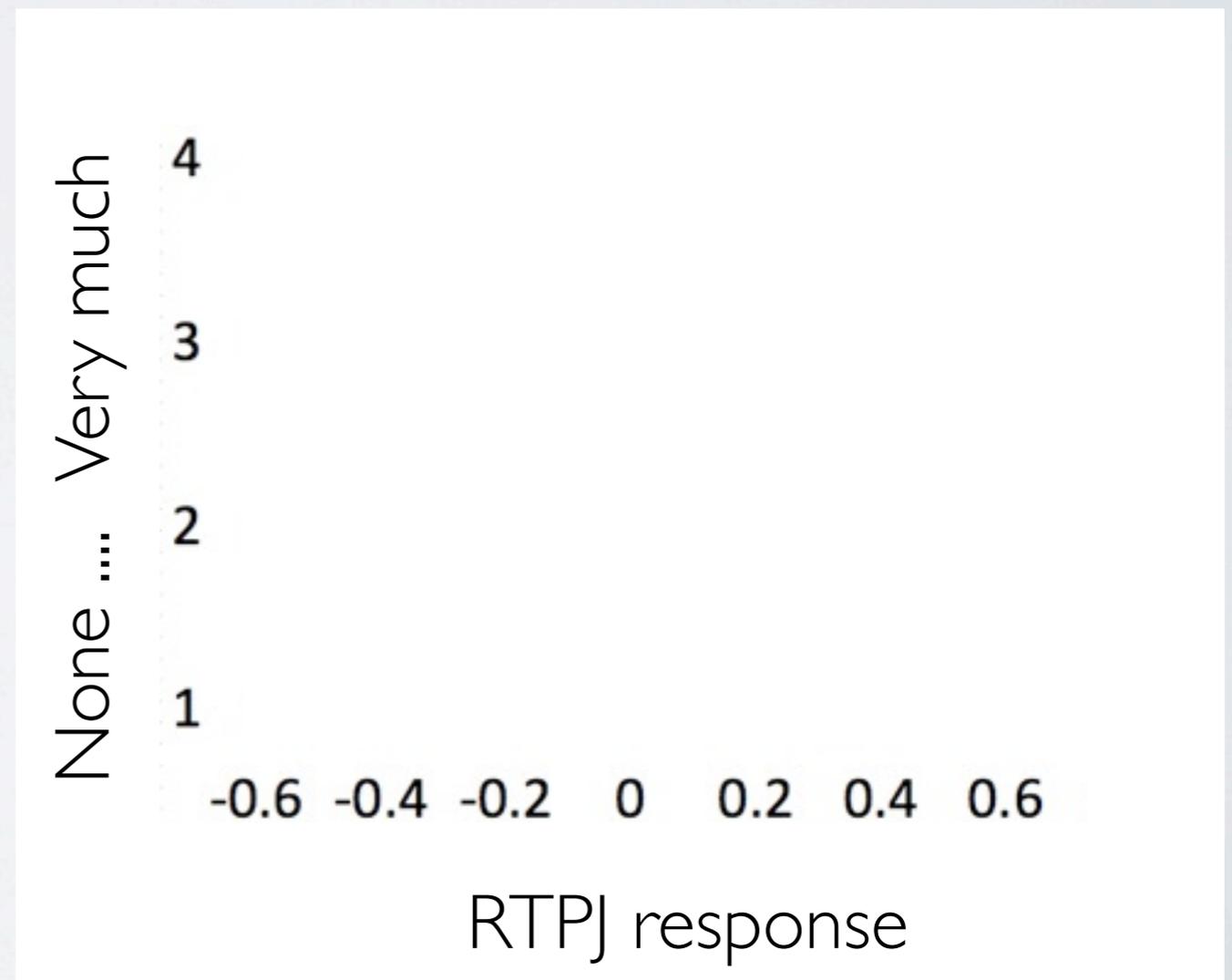
Related to known neural mechanism

How much blame does Grace deserve?



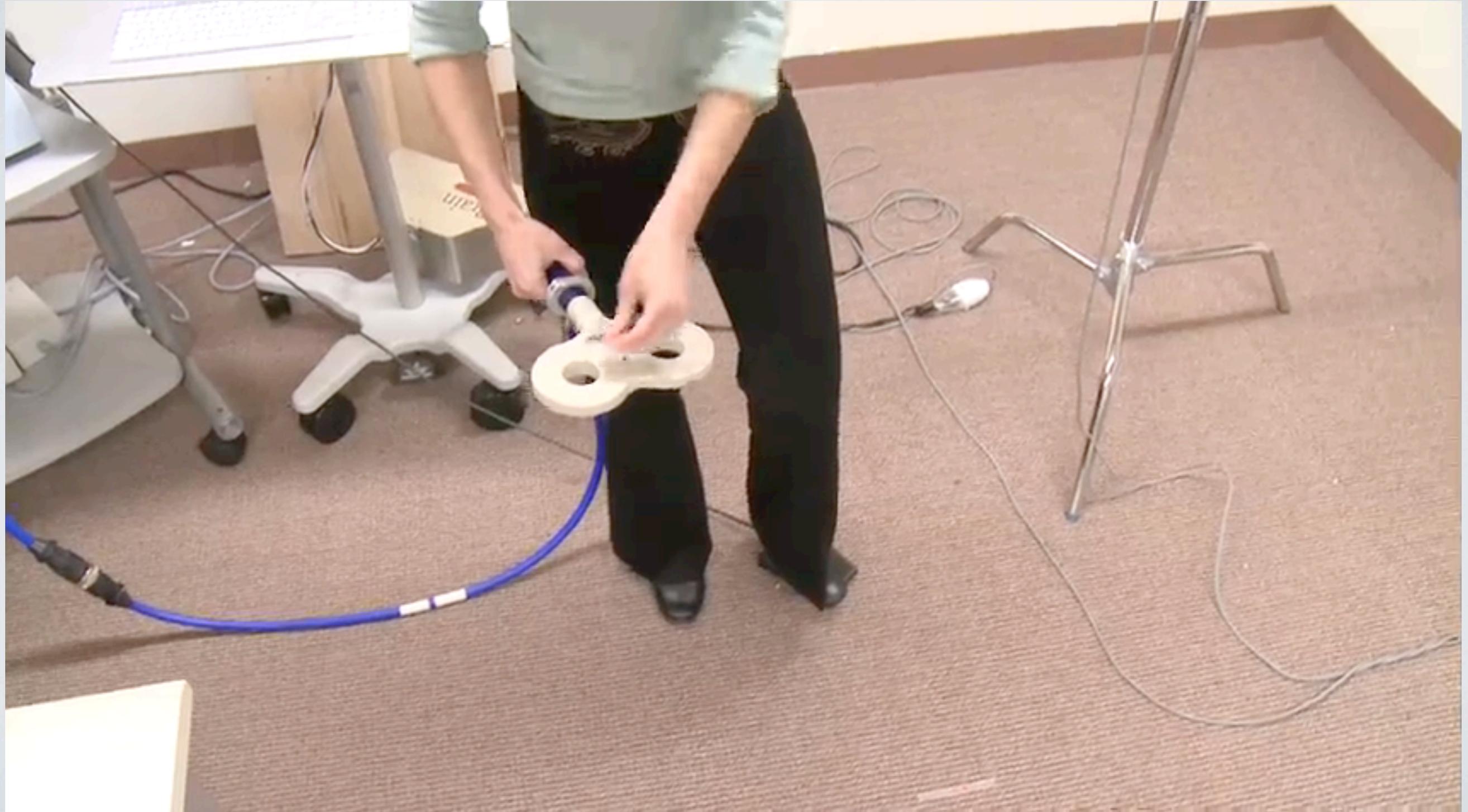
(Less weight to belief)

(More weight to belief)



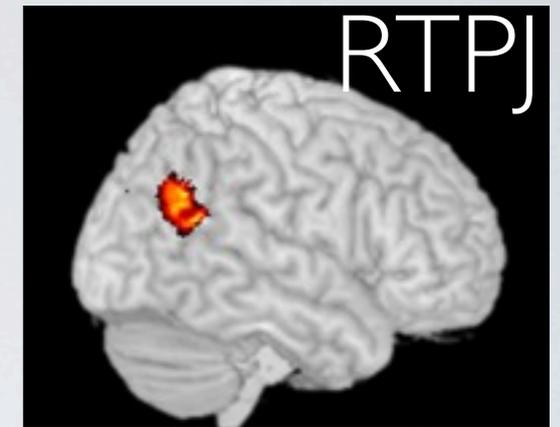
People care about the motives of strangers

Related to known neural mechanism



People care about the motives of strangers

Related to known neural mechanism



Offline TMS
N=8

Offline TMS Session 1		Offline TMS Session 2	
TMS RTPJ	Moral	TMS control	Moral
TMS control	Moral	TMS RTPJ	Moral
1 Hz, 25 min	11.2 min	1 Hz, 25 min	11.2 min

Online TMS
N=12

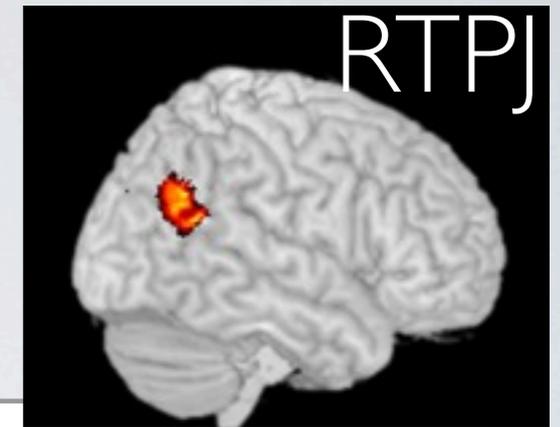
6 s	Background
6 s	Foreshadow The powder is sugar.
6 s	Belief She thinks the powder is toxic.
3 s	Action She puts the powder in her friend's coffee.
3 s	Moral Judgment Putting the powder in was: Forbidden 1-2-3-4-5-6-7 Permissible

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

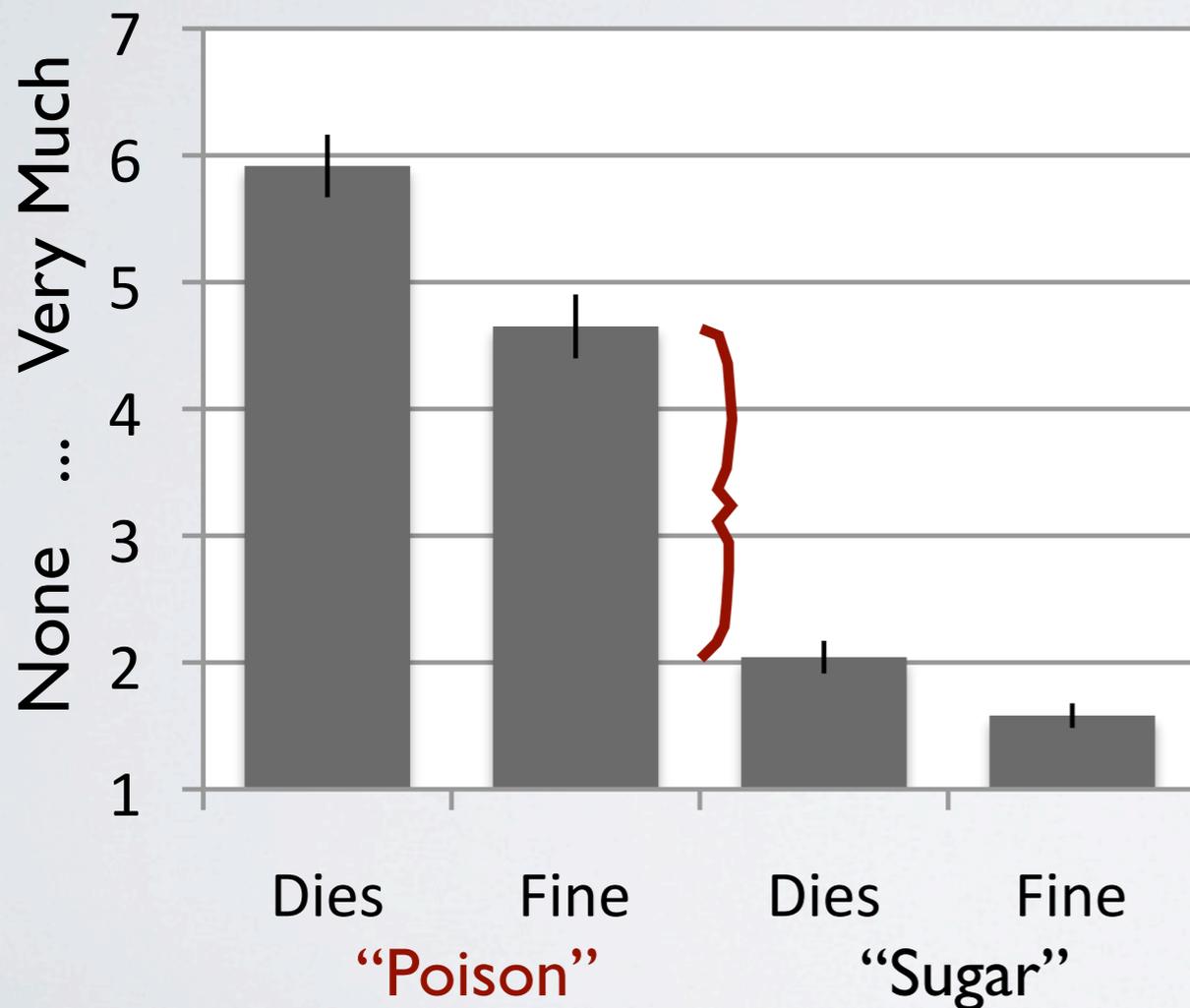
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Related to known neural mechanism

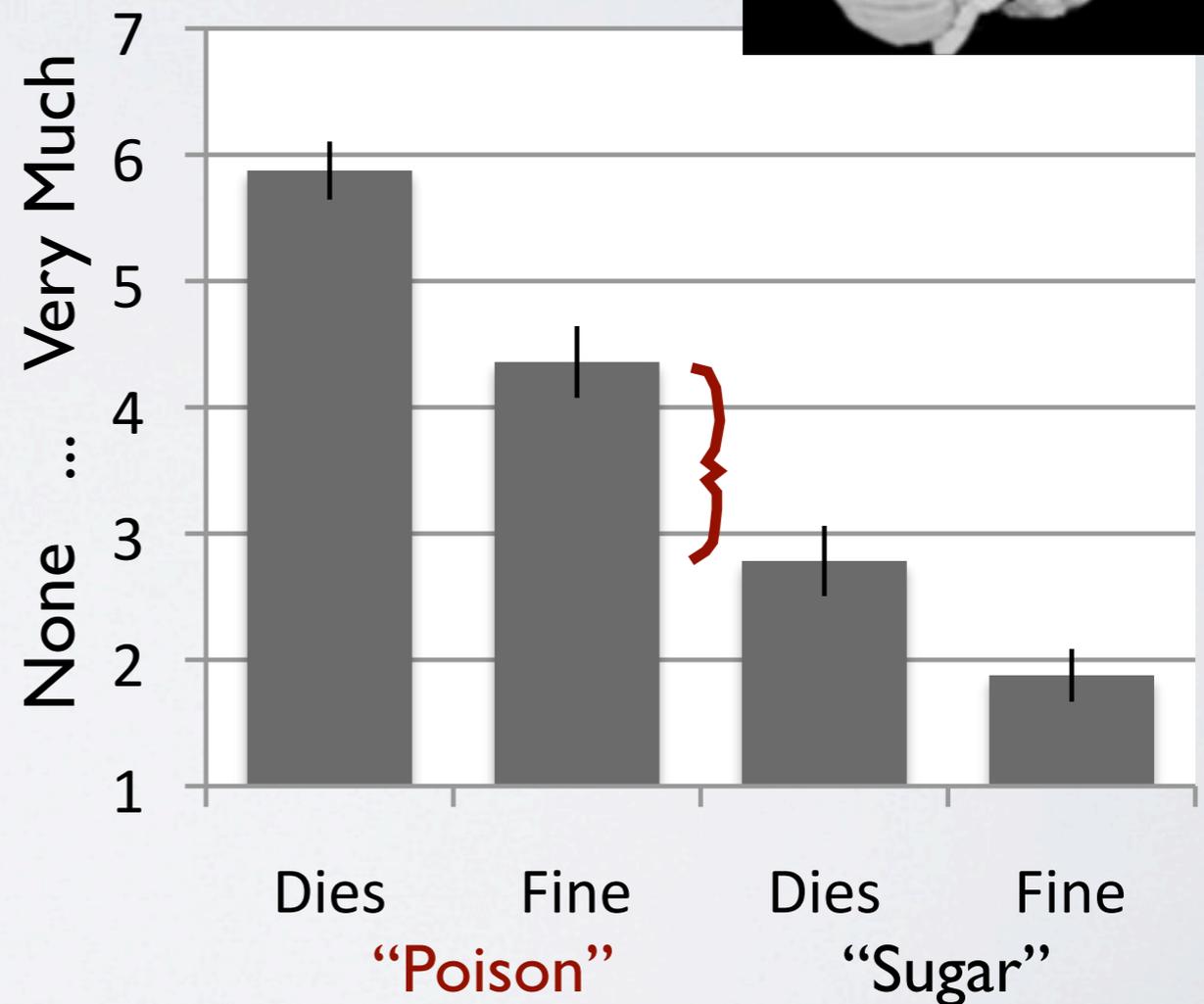
How much blame does Grace deserve?



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

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“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?

cf. “The Social Intelligence hypothesis”: cognitive demands of complex social life => evolution of big brain

Diagnosing social intelligence?

Version 0: clinical measures

e.g. self-report scale

EQ-i

Toronto Alexithymia Scale

etc.

“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?

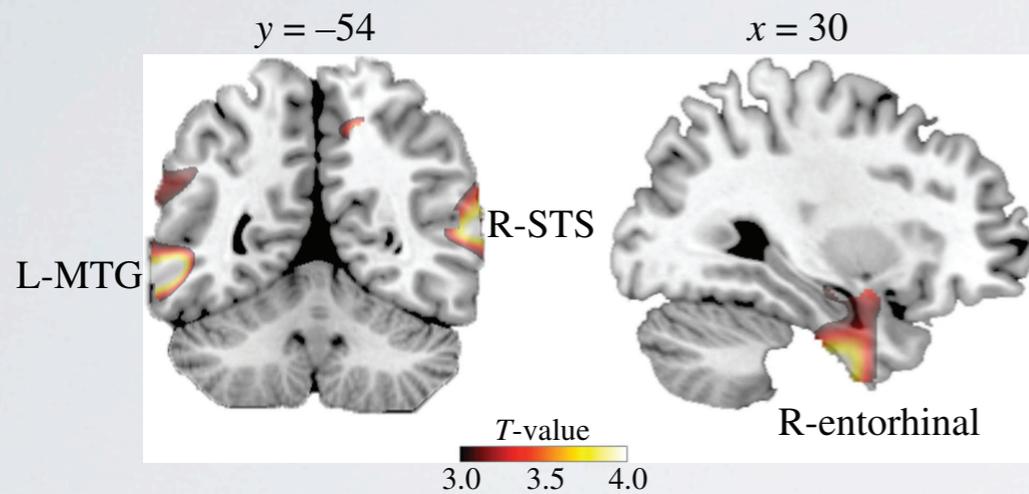
Diagnosing social intelligence?

Version 1: We like what we're good at

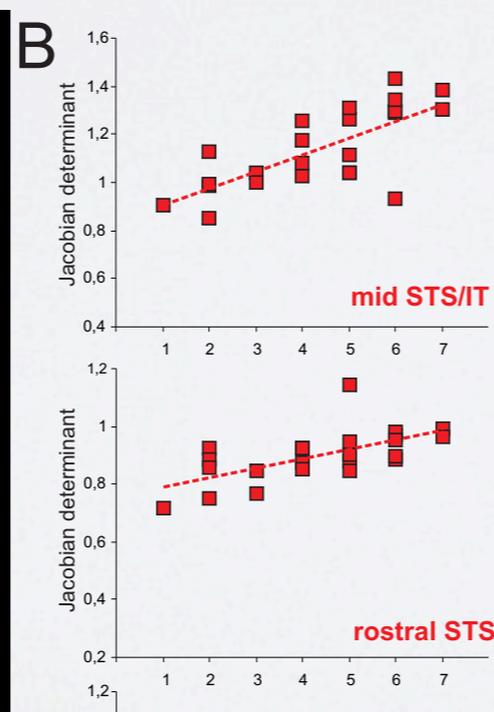
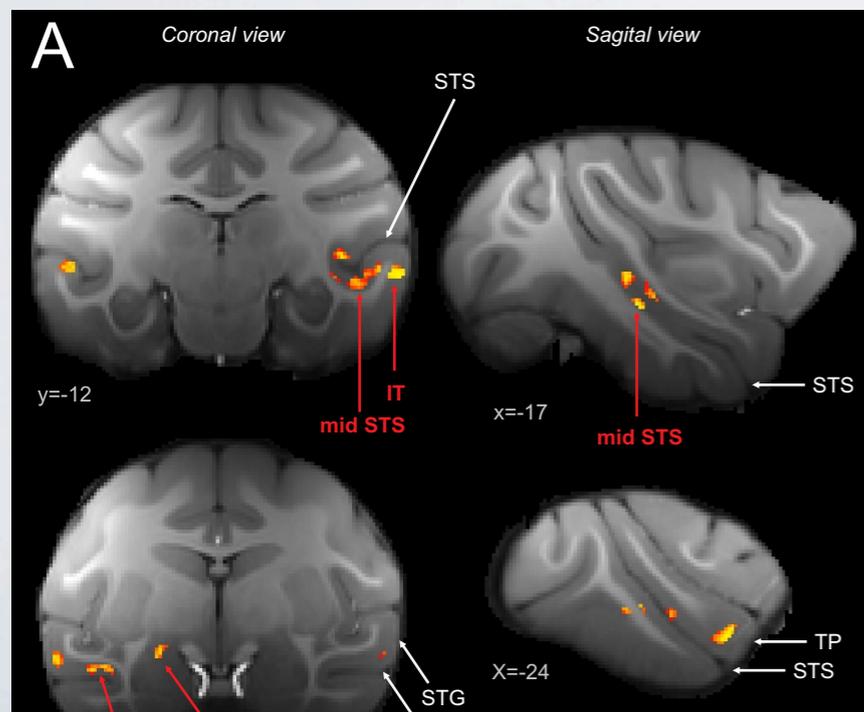
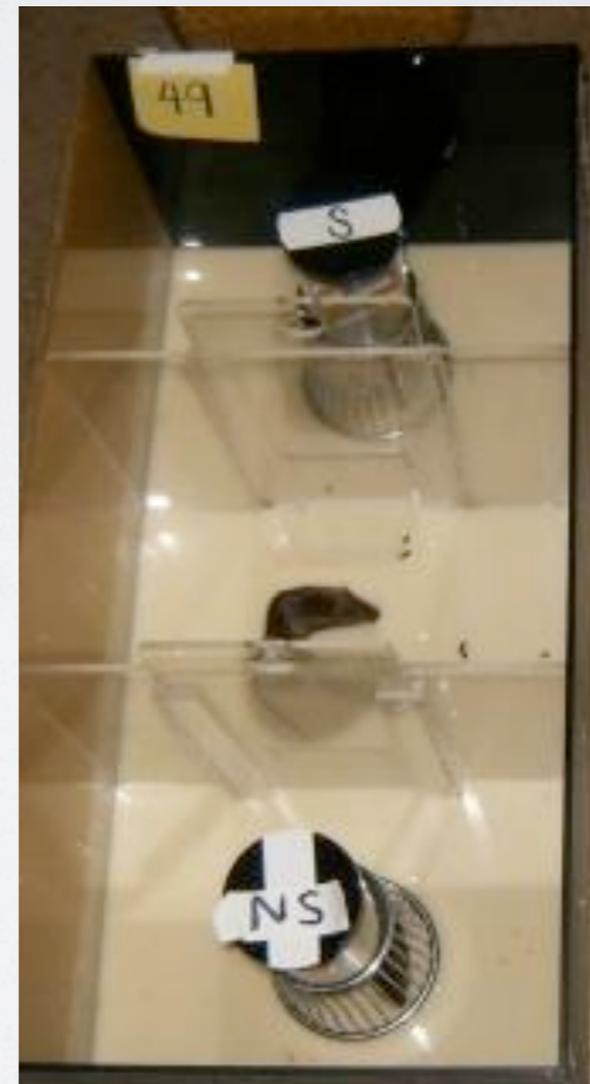
Social success \Leftrightarrow high social intelligence

Social failure/anxiety \Leftrightarrow low social intelligence

e.g. Network size:



e.g. Mouse ASD test:



Diagnosing social intelligence?

Version 1: We like what we're good at

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Homework idea:

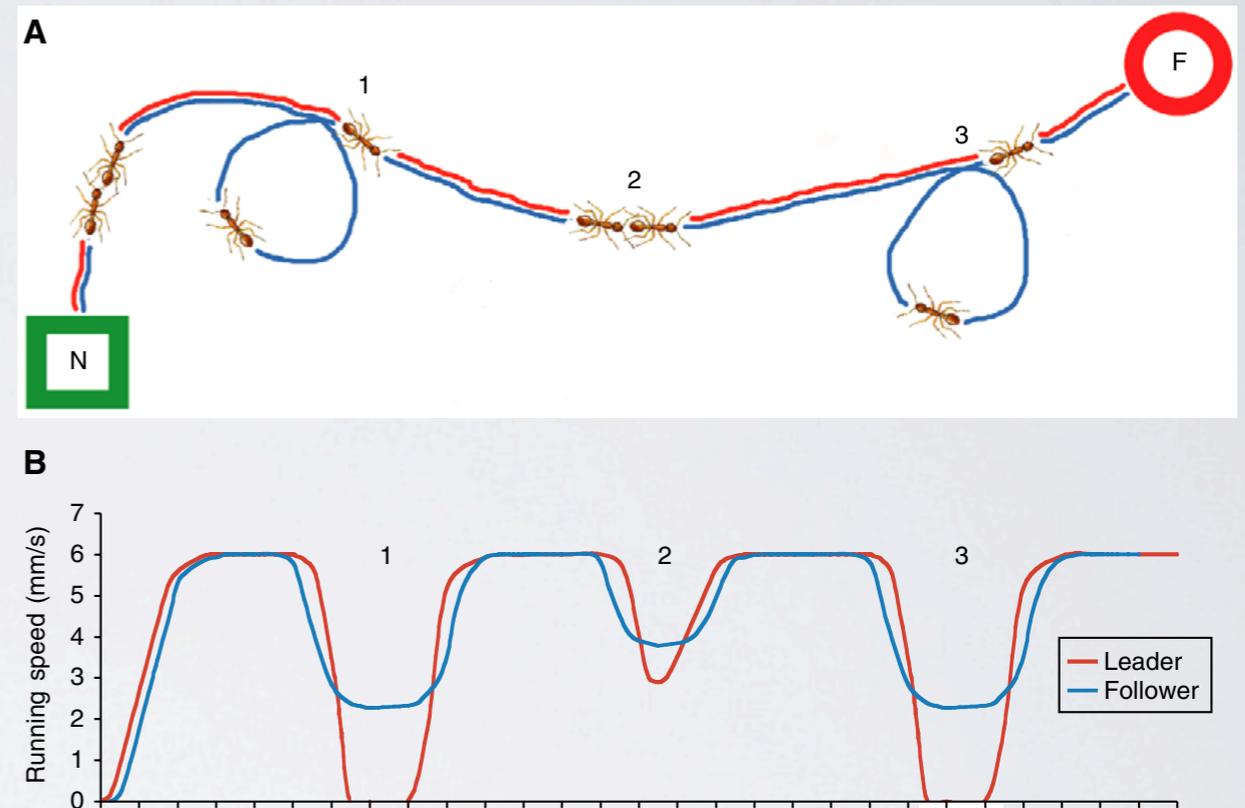
What would be a better experimental measure of mouse/rat social cognition, for use in ASD?

Diagnosing social intelligence?

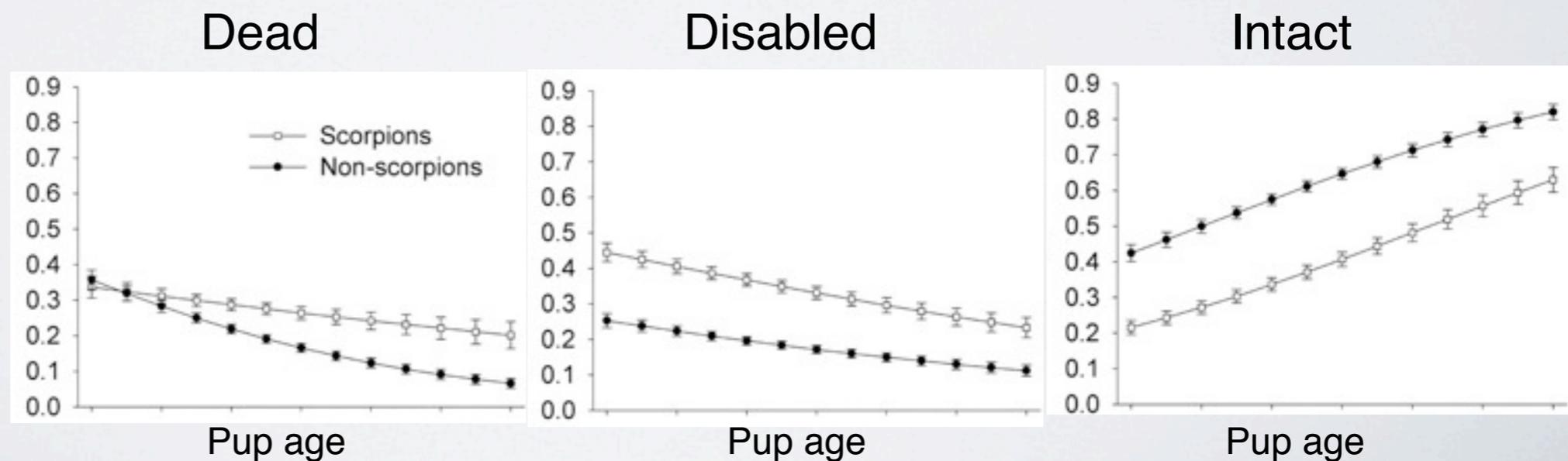
Version 2: Diagnostic behaviours

e.g. Donating knowledge to ignorant conspecifics at cost
“Teaching”

e.g. Ant tandem running



e.g. Meerkat feeding



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,

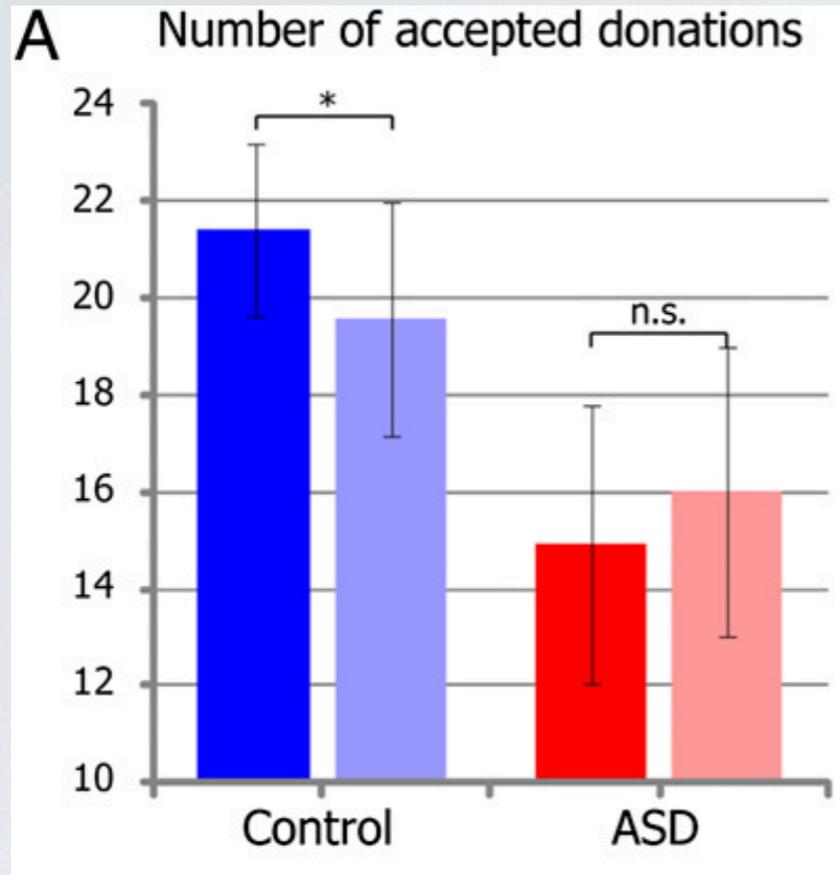
can you make a formal model of the difference?

what experiment (in ants or meerkats) would illustrate the difference?

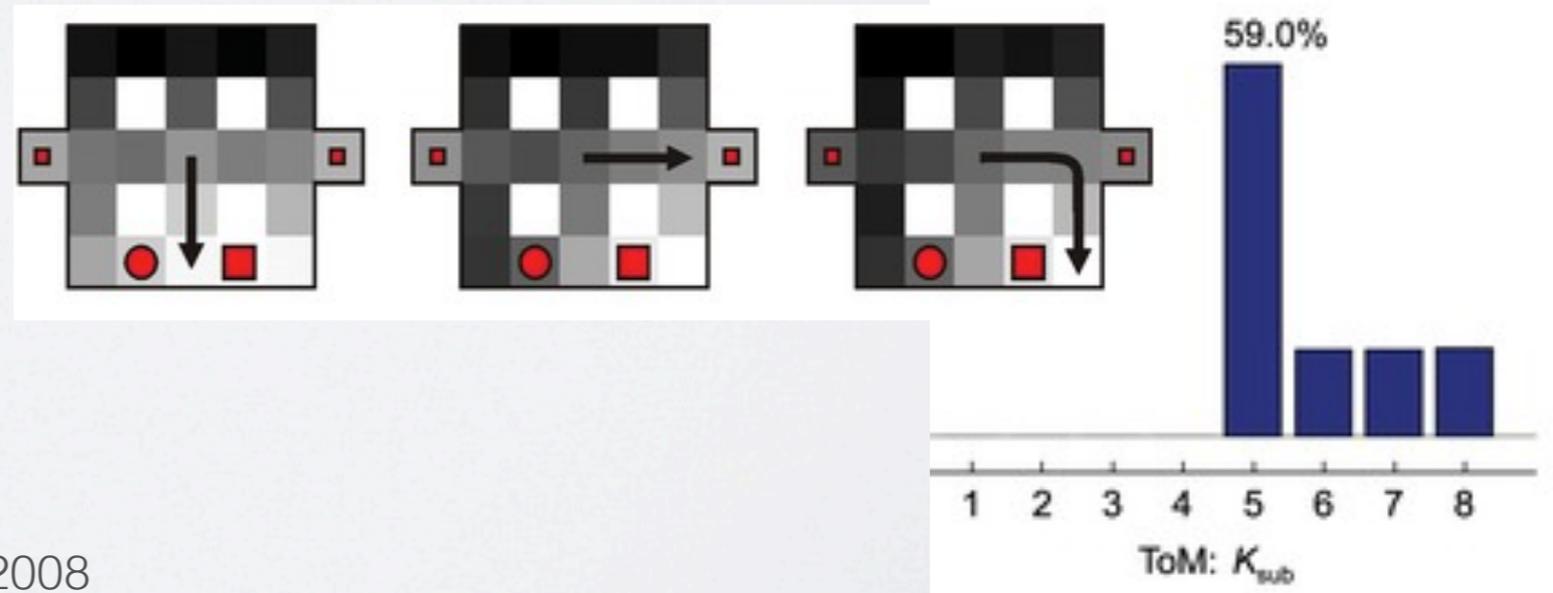
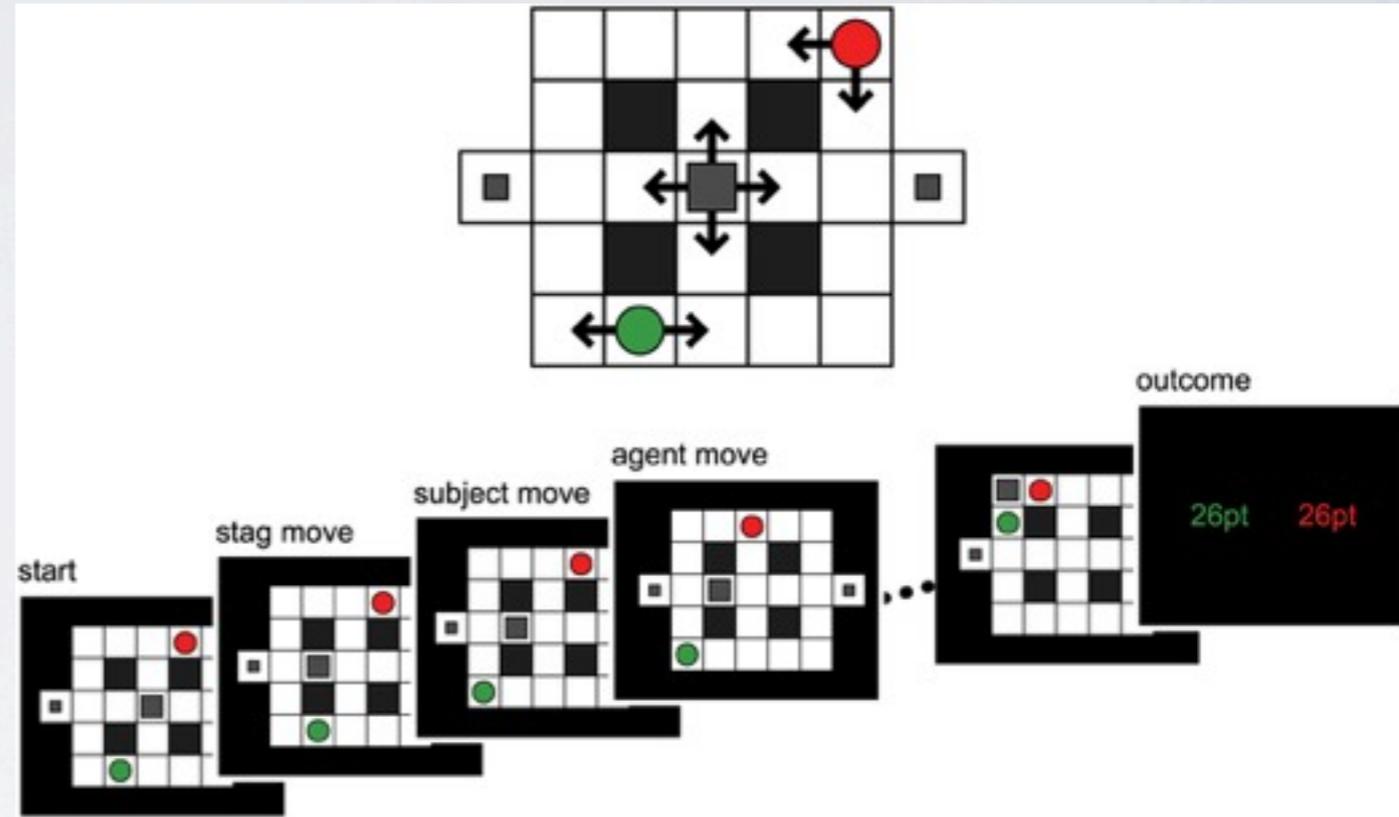
Diagnosing social intelligence?

Version 3: Model 'economic' games

e.g. Incidental effects



Strategic cooperation/defection



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?

