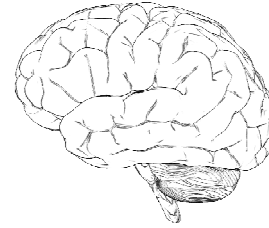


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Lecture 10a (11 Jun 2012)

Basic features of language



Key aspects of language





- Displacement 
- Arbitrariness 
- Productivity 
- Learnability 



Image: <http://www.bazaardesigns.com/4604-global-world-flags/>

2

Can non-humans learn language?

Nim Chimpsky 

Kanzi 

Can:

Learn words and meanings
Construct simple sentences

Limited evidence for:

Complex, generative sentences




Image: <http://newlearningonline.com/new-learning/chapter-6-the-nature-of-learning/kanzi-learns-language/>
<http://www.guardian.co.uk/commentisfree/2011/aug/27/project-nim-chimpsky>

3


Core components of language

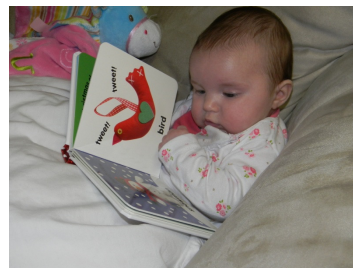
Phonology

Morphology

Semantics 

Syntax

Pragmatics 



4

Phonology and phonemes

/ba/ and /pa/

Cross-language variability

e.g., Bantu and click sounds

Phonological rules

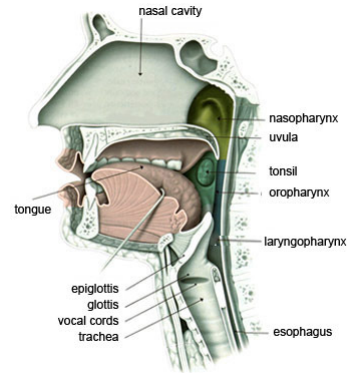


Image: http://thebrain.mcgill.ca/flash/capsules/outil_bleu21.html

5

Morphology and morphemes

Bound vs. free morphemes

“unbreakable”

“football”

“panthers”

Content vs. functional morphemes

“shoes,” “and,” “human”

Free the bound morphemes!

Image: http://www.zazzle.ca/free_the_bound_morphemes_bumper_sticker-128160673092773479

6

Semantics



Literal meaning

(Potential) sources of confusion

Effect of context



Image: <http://www.realestategolfodulce.com/Scotiabank>

7

Syntax



Syntactical rules

Noun, verb

Surface vs. deep structure



“Jim ate the burrito”

“The burrito was eaten by Jim”

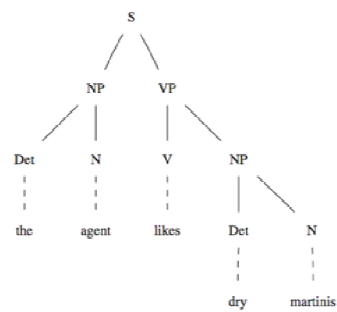


Image: <http://forums.xkcd.com/viewtopic.php?f=25&t=20840>

8

Pragmatics



Indirect speech

Metaphors 



Sarcasm

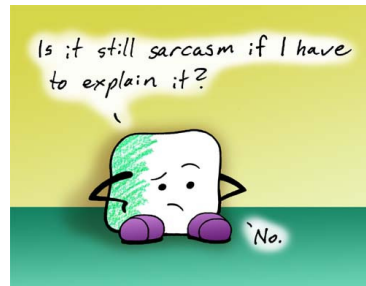



Image: <http://lisbethcalandrino.com/2011/03/30/well-were-not-busy-so-it-must-be-because-were-lazy/>

9

Language processing


Auditory (listening)

Parsing and filtering 
Linking sound to meaning



Visual (reading)

Sounding words out
'Grabbing' whole words
Linking percept to meaning

Garden path sentences 

"The prime number few"
"Fat people eat accumulates"



Image: <http://www.smartowl.com/2011/how-to-pass-car-inspection/>

10

How do we learn language?

Behaviorist account



Limitations:

- Explicit instruction
- Dynamic generation
- Types of errors (i.e. "runned")



Nativist theory (Noam Chomsky)

Language Acquisition Device (LAD)



Parsing (Jenny Saffron)

Statistical regularities in language

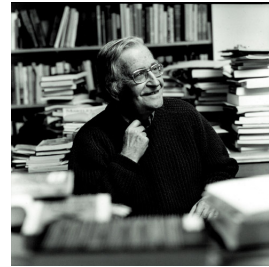


Image: <http://heebmagazine.com/weapons-of-mass-delusions-noam-chomsky-on-the-guilt-of-a-nation/11524>

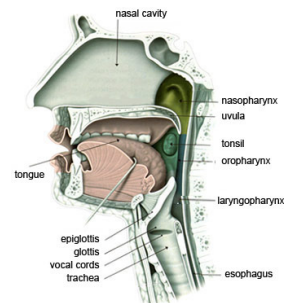
11

Interim section summary

Language contains key properties that only humans are capable of learning and demonstrating. Work with monkeys has not been able to replicate full human ability

Phonology, morphology, semantics, syntax and pragmatics constitute critical components of every language. Languages can primarily be distinguished by nuances in these primary features.

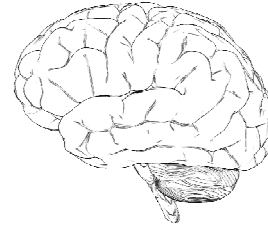
How is language supported in the brain? What happens when one or more of these structures is injured?



12

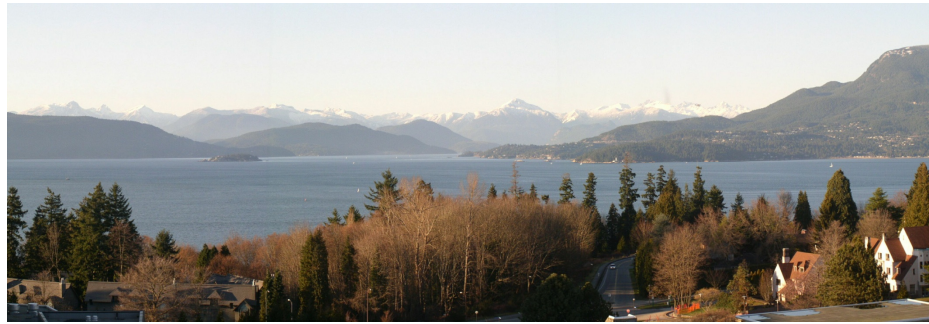
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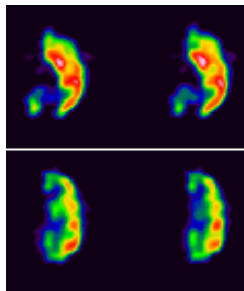
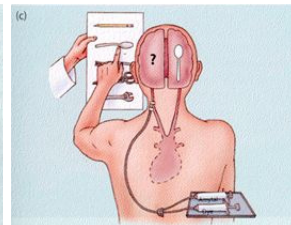
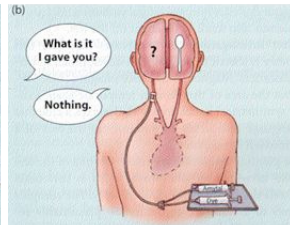
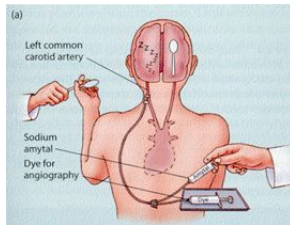


Lecture 10b (11 Jun 2012) Neuropsychology of language

Please note: this lecture contains graphic pictures of the brain



Wada test



14

Image: <http://neuromonitoring.wordpress.com/tag/wada-test/> and <http://www.cerebromente.org.br/n01/pet/pet.htm>

Language and the left hemisphere

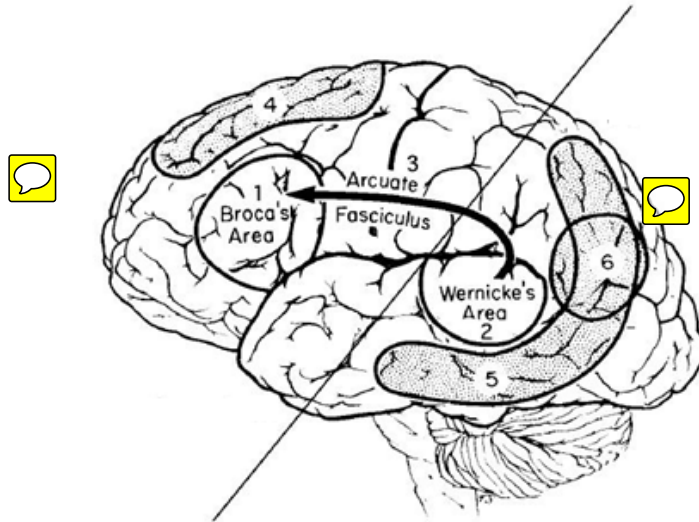
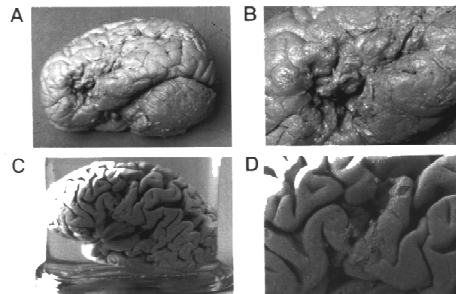
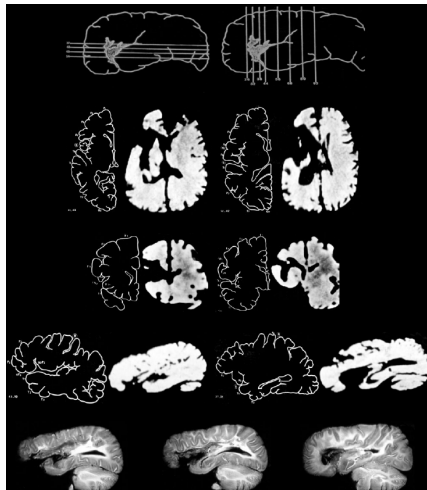


Image: Courtesy of M. D'Esposito

15

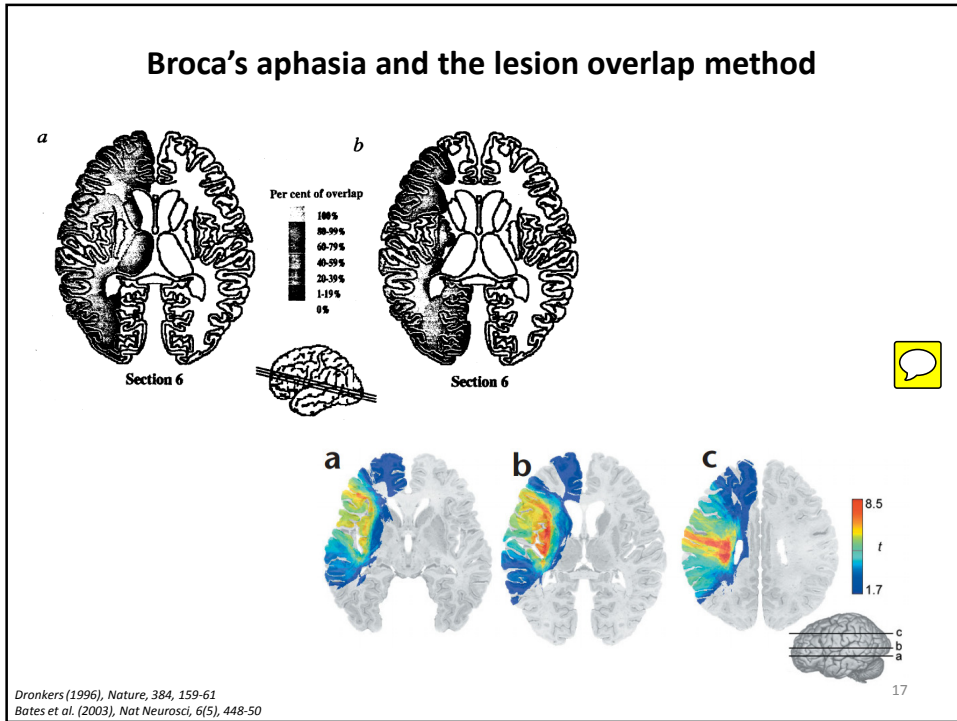
A selective impairment in speech fluency: Broca's aphasia



Left anterior insula

16

Dronkers, Plaisant, Iba-Zizen & Canabis (2007), Brain, 130, 1432-41




Broca's aphasia: symptoms

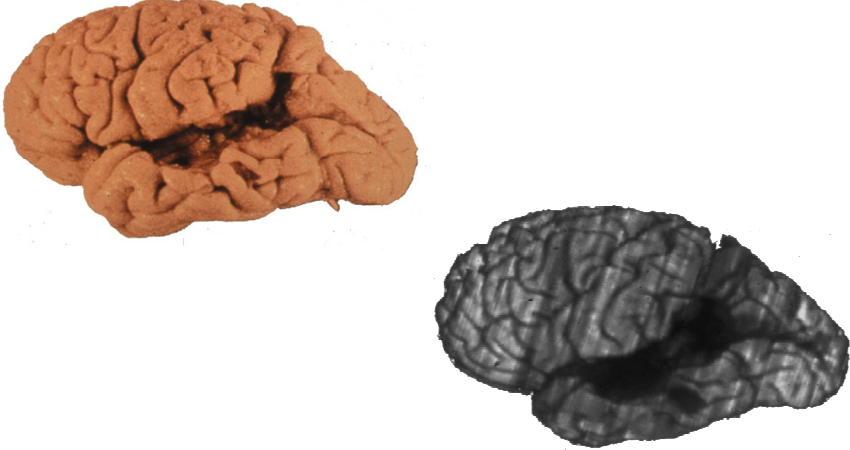
Non-fluent output
Effortful and slow
Agrammatism
Impaired prosody

Comprehension intact
Complex syntax may be problematic

Image: Courtesy of M. D'Esposito

Wernicke's aphasia






19


Image: Courtesy of M. D'Esposito

Wernicke's aphasia: symptoms



Fluent (but nonsensical) output
Prosody intact

Poor comprehension




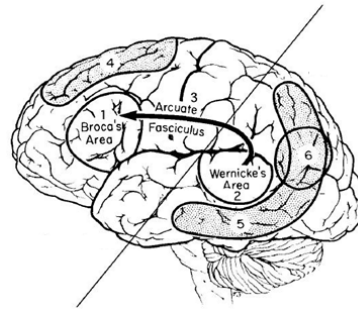
20

Image: http://www.ling.upenn.edu/courses/Fall_2001/ling001/neurology.html

Paraphasias

Semantic paraphasias 

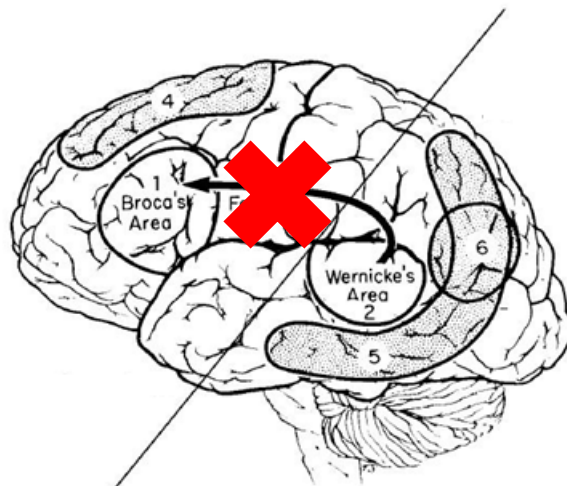
Phonemic paraphasias 



21

Image: Courtesy of M. D'Esposito

Conduction aphasia



22

Image: Courtesy of M. D'Esposito

Global aphasia

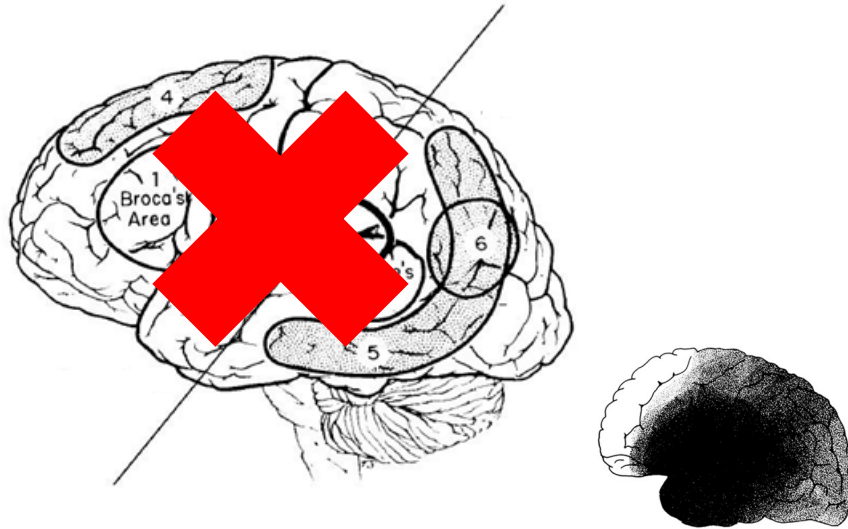


Image: Courtesy of M. D'Esposito and <http://brainmind.com/LeftHemisphere.html>

23

Agraphia

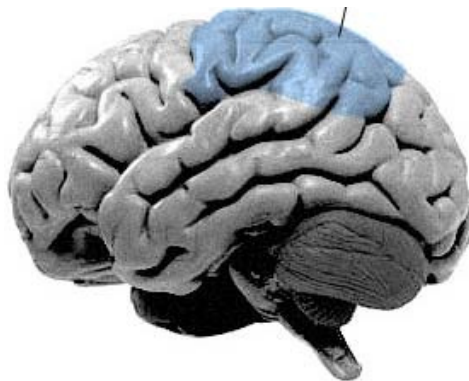


Image: <http://scientopia.org/blogs/scicurious/2010/12/08/magnets-brain-disruption-and-math/>

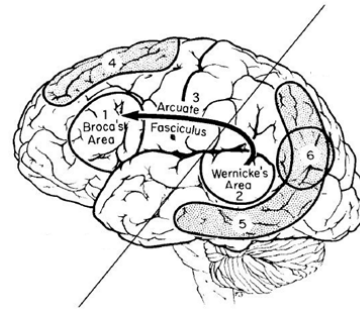
24

But what about the right hemisphere?

Discourse processing



Sarcasm and pragmatics



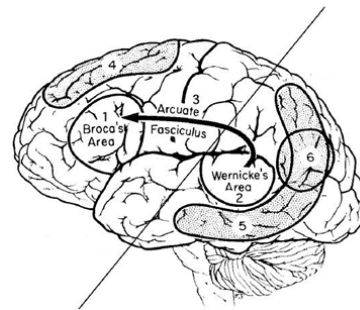
25

Image: Courtesy of M. D'Esposito

Interim lecture summary

Left frontal systems appear to support language production while left temporal systems appear to support language comprehension

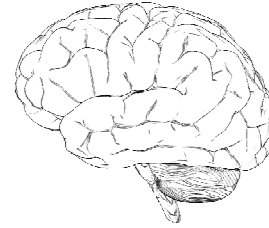
Damage to each respective region results in somewhat predictable impairments in the ability to speak or comprehend, respectively



26

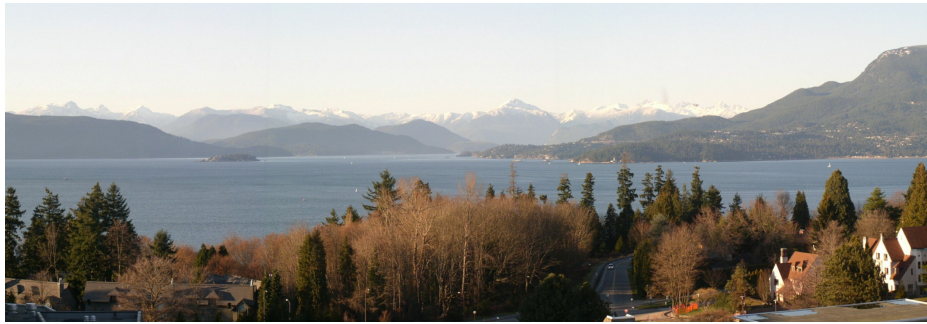
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Lecture 10c (11 Jun 2012)

Thinking about thinking



Decision-making

Do we always make rational decisions?

Rational choice theory 

Expected value

$P(\text{occurrence}) \times \text{Value}$

20% of winning \$500 — OR —

90% of winning \$100?

Caveats to this principle?



Picture: <http://kinescopehd.blogspot.ca/2011/04/americas-gets-zonked-for-first-time.html>

28

Making good decisions

We need FULL information

Often difficult/time-consuming
Not all factors are created equal

Using an algorithm

Is there an easier way?

Is every decision equally deserving of our time and resources?



29

Picture: <http://blog.startupprofessionals.com/2012/02/7-ways-and-why-to-treat-your-career.html>

Heuristics



Availability heuristic

'K' words

Plane crashes

Smoking and Jeanne Calment

Representative heuristic

Regression to the mean

Gambler's fallacy

70 Engineers and 30 lawyers...



30

Picture: http://www.olympic-casino.com/index.php?id=125209&b=1&c_tpl=1093

Some factors influencing the decisions we make

Framing effects

Deadly disease and treatment

Sunk-cost fallacy

Watching a lousy movie

Building a new factory

Certain relationships



Picture: <http://actionflickchick.com/superaction/thankskilling-just-add-alcohol/>

31

An approach to problem-solving



Means-end analysis

1. Goal
2. Current state
3. Differences
4. Reduce part 3!

Ill-defined problems



Picture: <http://www.clipartillustration.com/38003/interesting-abstract-free-graphic-teamwork-puzzle-concept/>

32

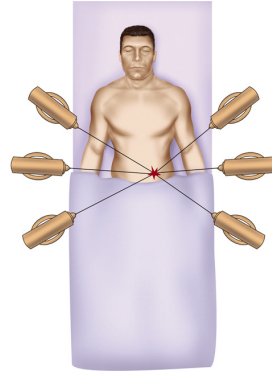
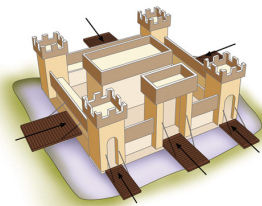
Being strategic

Method with means-end

Can one situation apply to another?

Analogical reasoning

Insight



Picture: Schacter's Psychology (2nd ed)

33

Basic forms of reasoning



Deductive reasoning

General → specific

All apples are fruit

All fruit grows on trees

All apples grow on trees

Inductive reasoning

Specific → general

An apartment complex

The police



Picture: http://en.wikipedia.org/wiki/File:Police_officer.jpg

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Thinking and the link to social psychology

Altruism

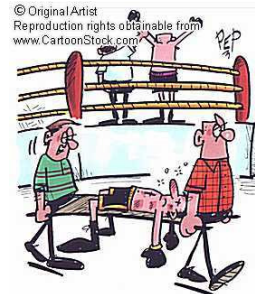
Likelihood of helping isn't random...

Cooperation

Prisoner's dilemma

Ultimatum game

Trolley dilemma







"Your too altruistic for your own good, pal - always standing up for other people's rights."

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Picture: <http://www.cartoonstock.com/directory/a/altruism.asp>

Prisoner's dilemma outcomes

		Henry	
		Not Guilty	Guilty
Dave	Not Guilty	 2 Years	 5 Years 1 Yr.
	Guilty	 5 Years 1 Yr.	 3 Years

37

Picture: <http://www.crossroadstimes.com/economics/is-the-global-economic-crisis-an-example-of-the-prisoners-dilemma.htm>

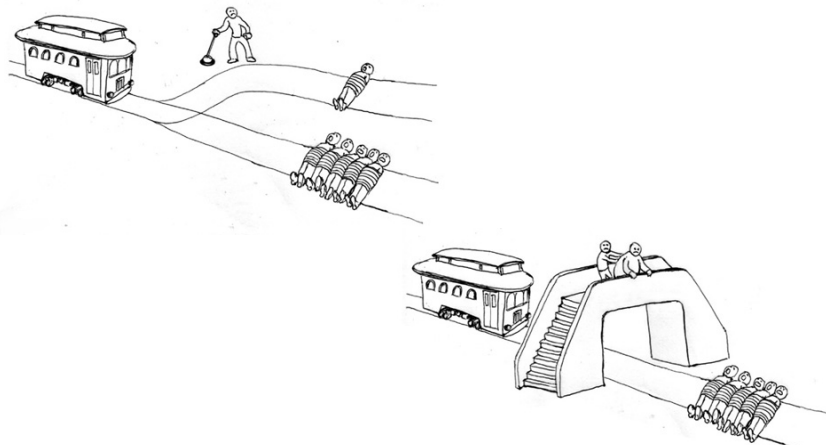
Ultimatum game



Picture: http://community.telustalksbusiness.com/blogs/talk_business/2011/05/23/the-top-10-ways-to-spend-100000-part-1

38

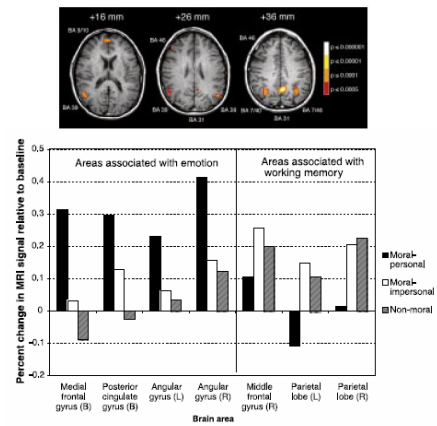
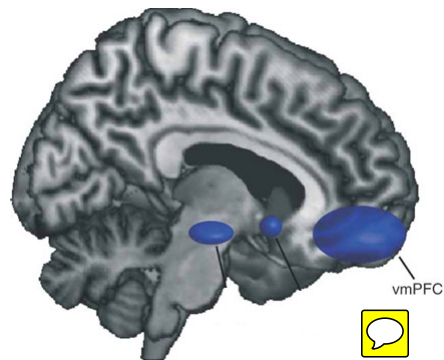
The trolley problem



Picture: <http://yesbutstill.wordpress.com/2010/07/28/moral-dilemmas-a-rant-about-the-trolley-problem/>

39

The neural correlates of morality?



"Hot" vs. "Cool" cognition

Greene et al (2001), *Science*, 293, 2105-8

40

Section summary

Decision-making in humans is far from perfect. There are numerous reasons why we may end up making a less than ideal decision.

Emotion plays a powerful role in many of the decisions we make. To be clear, this isn't necessarily a bad thing but it can get us into trouble at times.



Next class: Final Examination (BRING A PENCIL for the scantron)

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