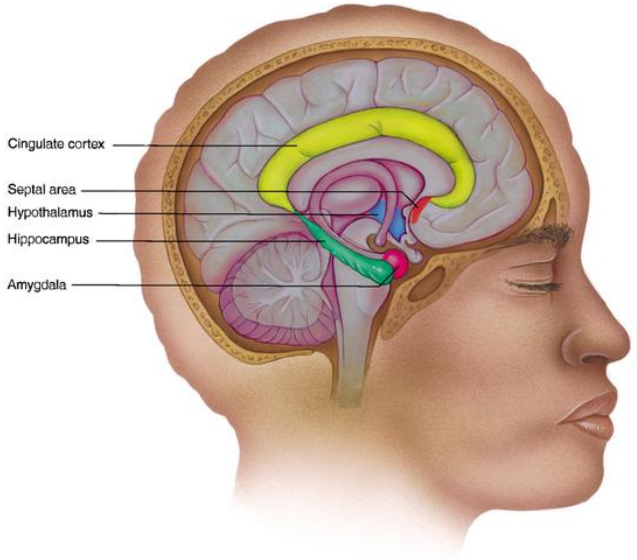
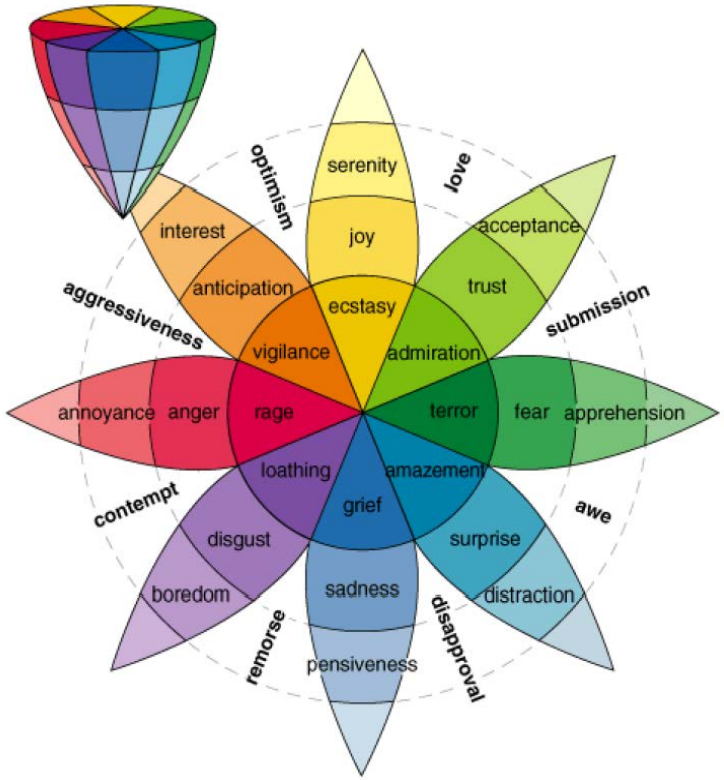
EL CERVELL EMOTIU AL TIMÓ





Cicle: "***Passejant pel nostre Cervell***"

Casa de Cultura de Girona

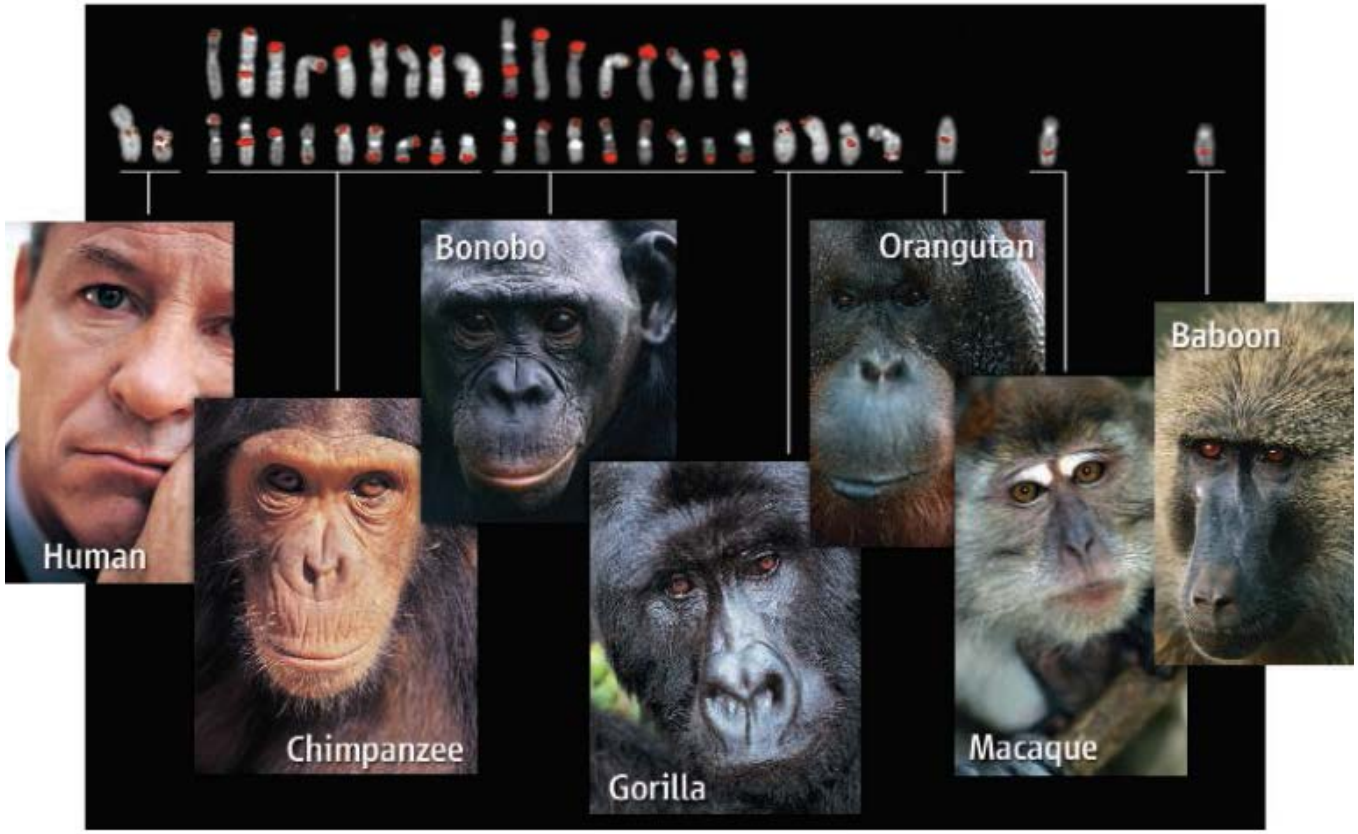
Universitat de Girona

Càtedra Lluís Santaló

Octubre 2013

Adolf Tobeña
Departament de Psiquiatria i Medicina Legal
Facultat de Medicina. Campus de Bellaterra.
Universitat Autònoma de Barcelona

Close kinships: chromosome spots for speciation



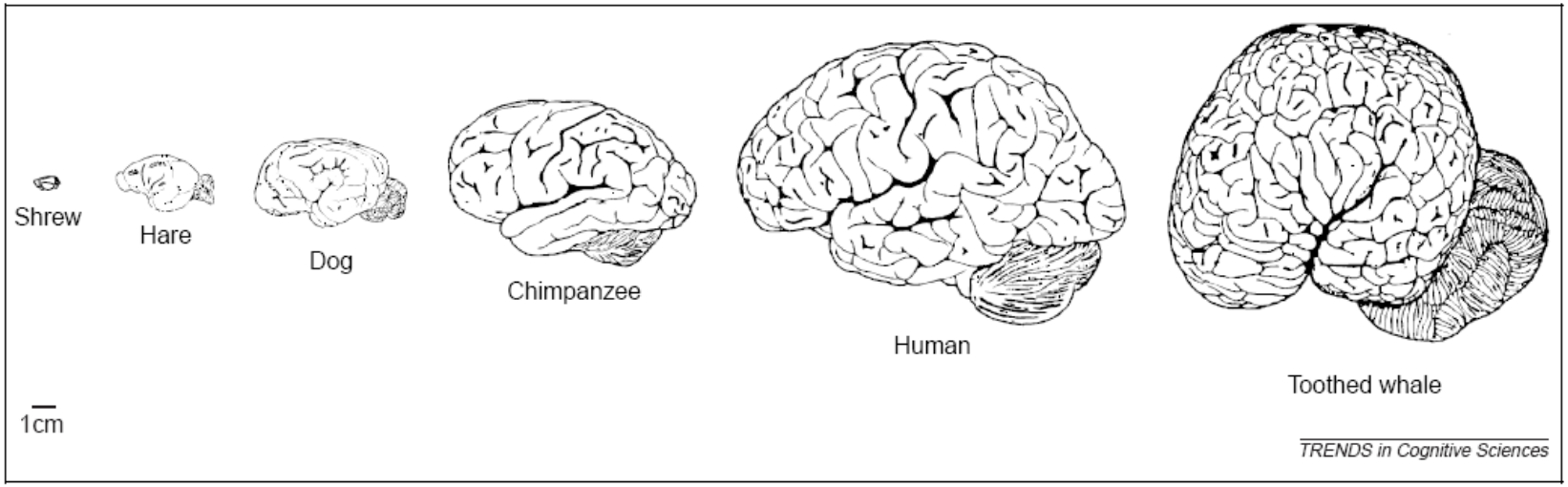


Figure 1. A series of mammalian brains. Humans do not have the largest brain in absolute terms and are exceeded in size by many cetaceans (whales, dolphins, porpoises) and the elephants. They also do not have the most convoluted cortex. With a few exceptions, convolution of the cortex increases in proportion to cortical size.

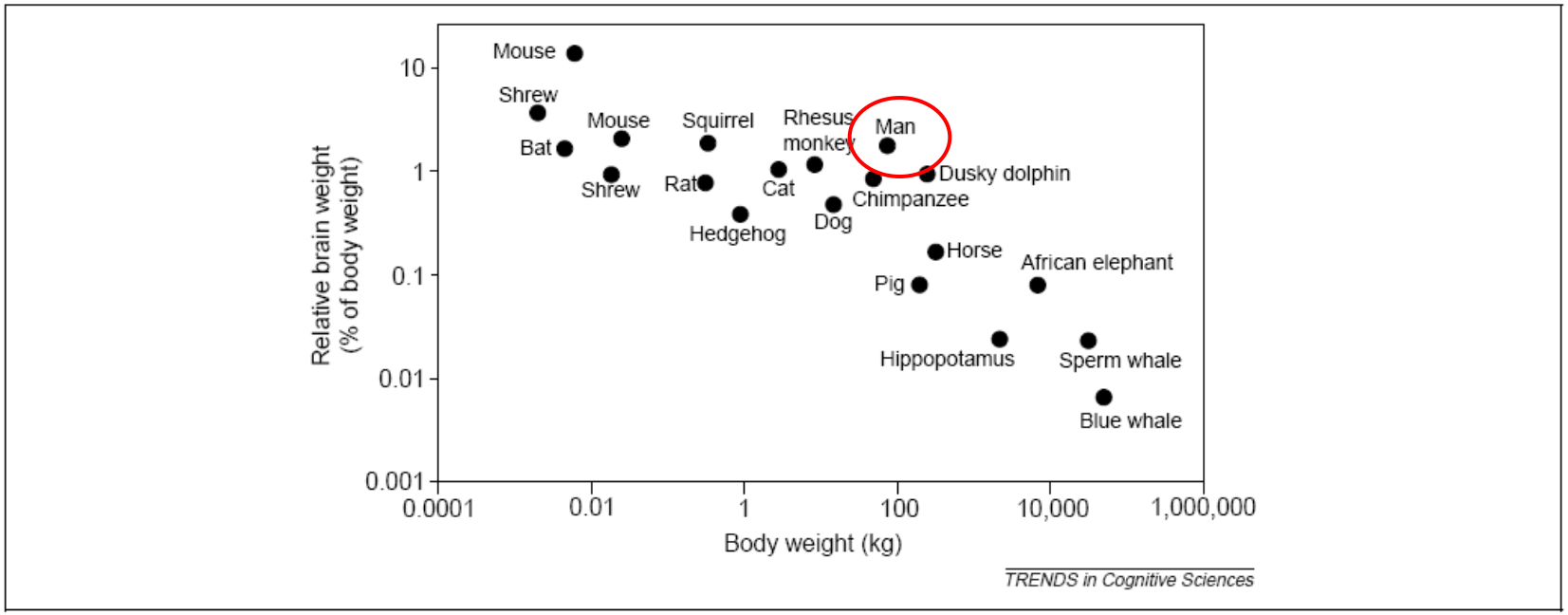
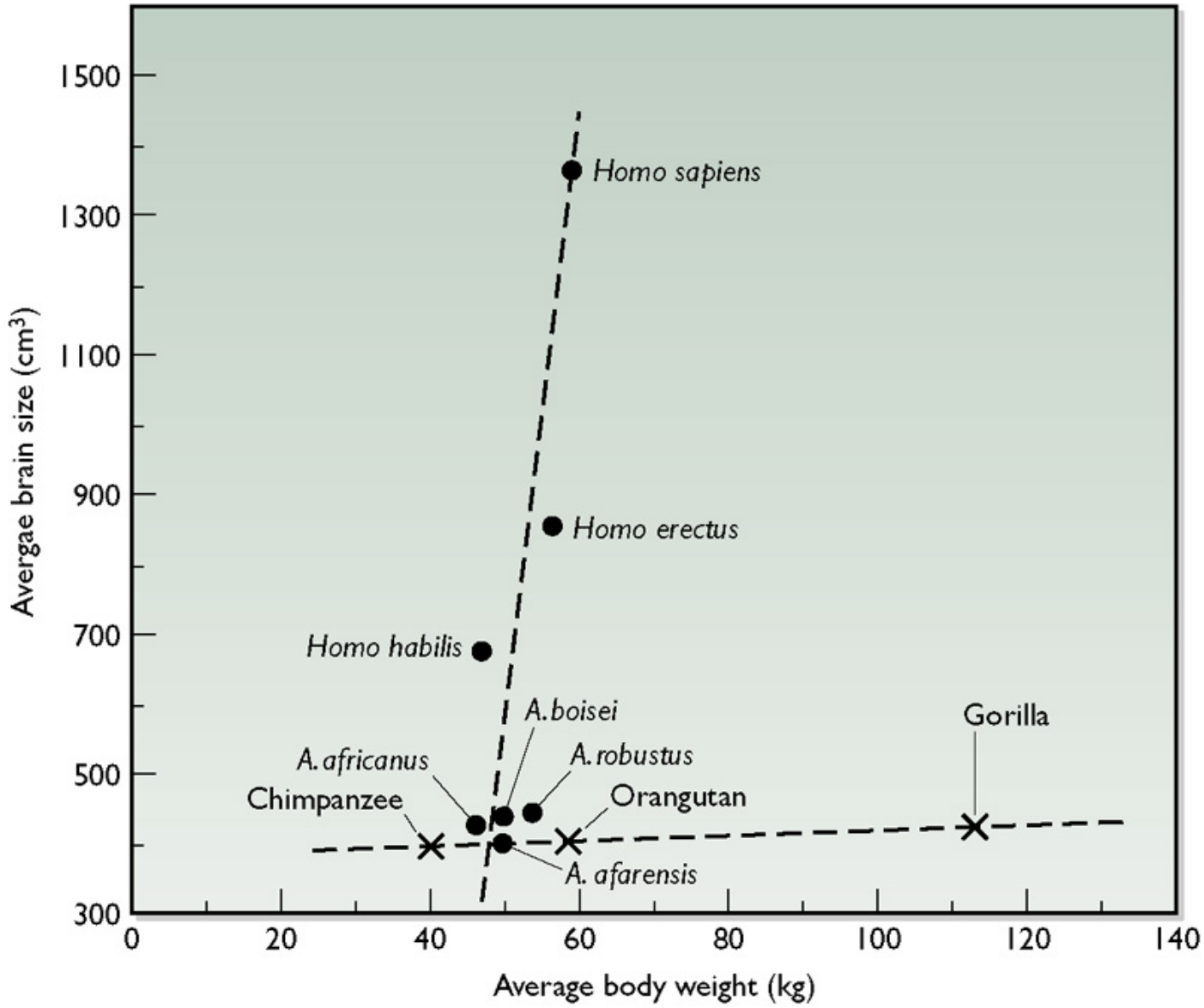
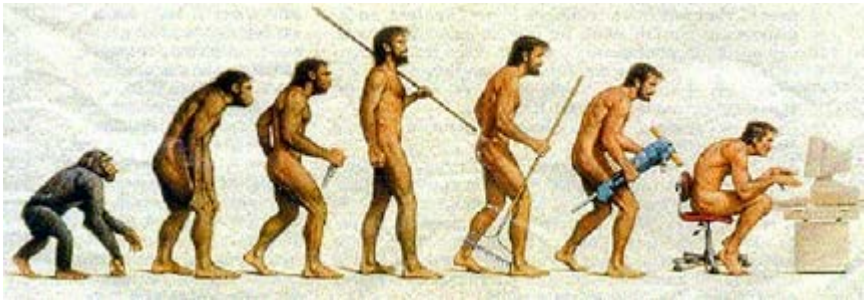
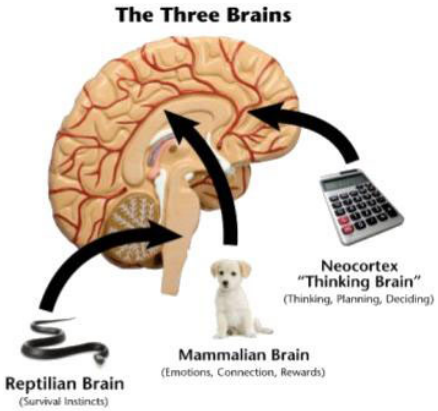


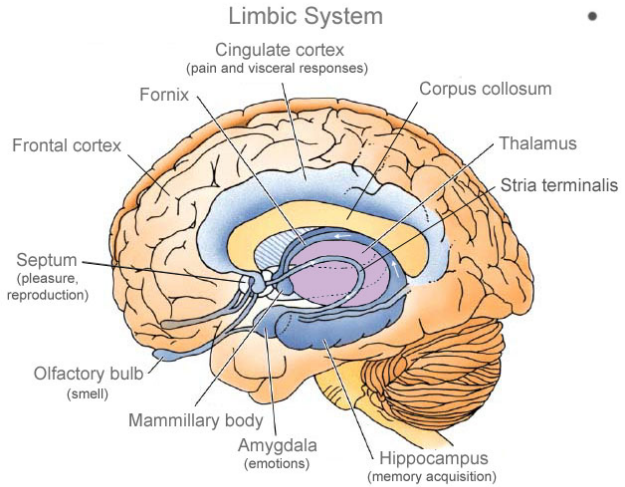
Figure 3. Mammalian brain size as a percentage of body size. Brain weight is given as a percentage of body weight for the same 20 mammalian species as in Figure 2, again plotted in log–log coordinates. As can be seen, small mammals such as mice and shrews have much larger brains in relative terms (10% or more of body weight) than cetaceans (less than 0.01%). Humans, with a brain representing 2% of body weight, have a much higher relative brain size than would be expected (around 0.3%). Modified from [74].

Brain volume vs. Body weight: encephalization departure









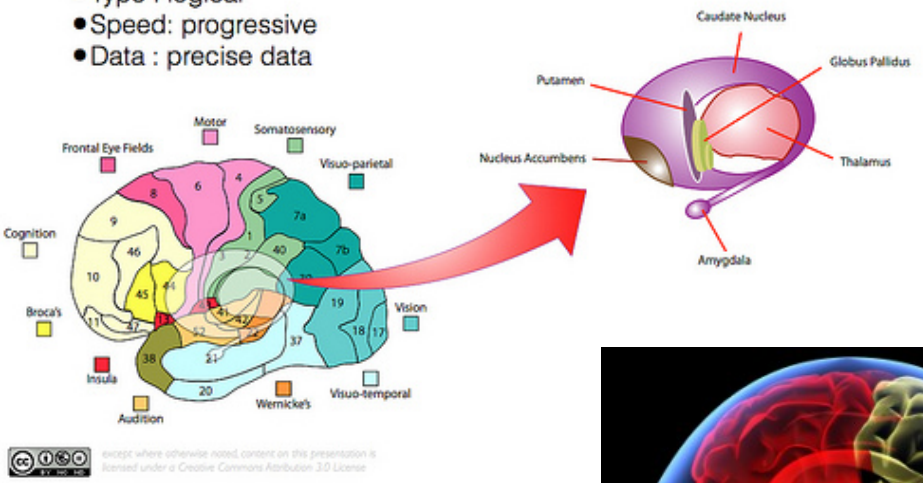
Basal ganglia removed

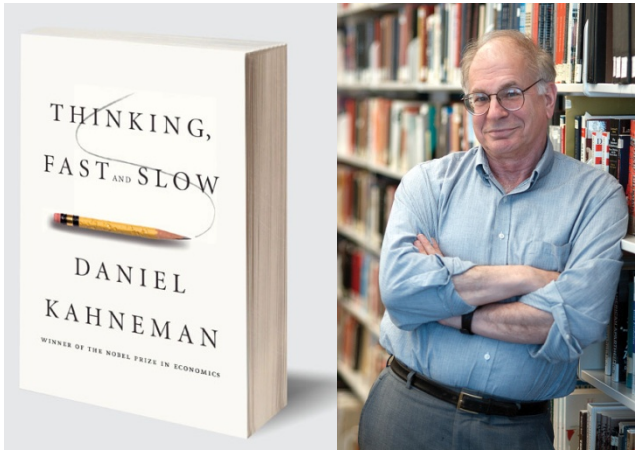
"Logical" Brain

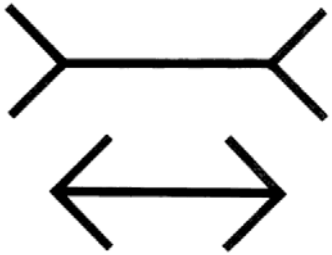
- Type : logical
- Speed: progressive
- Data : precise data

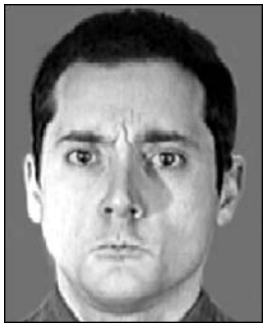
"Emotional" Brain

- Type : emotional
- Speed : immediate
- Data : summary data







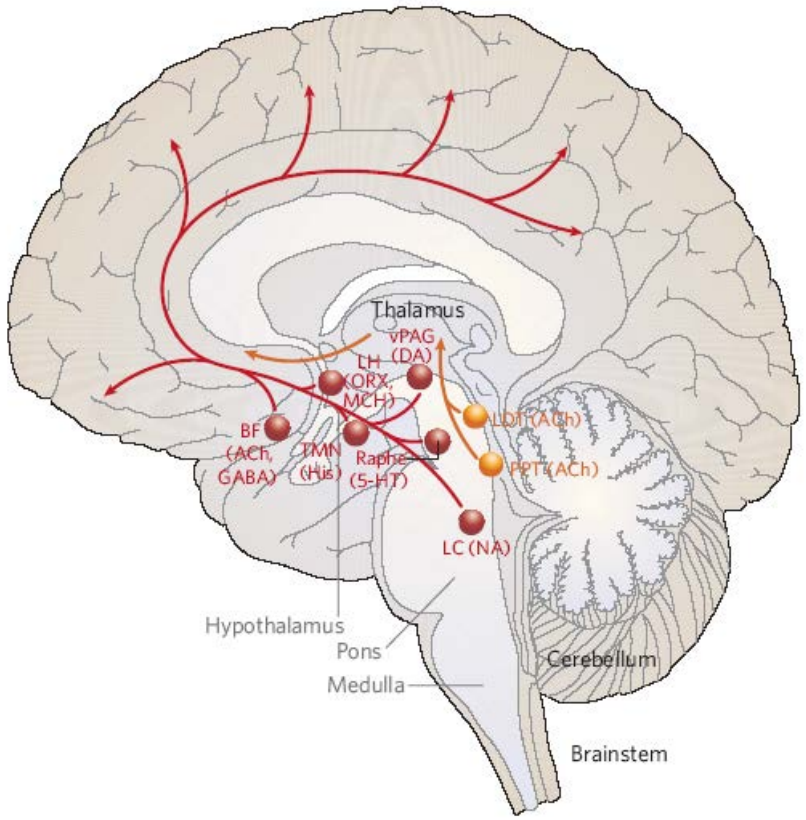


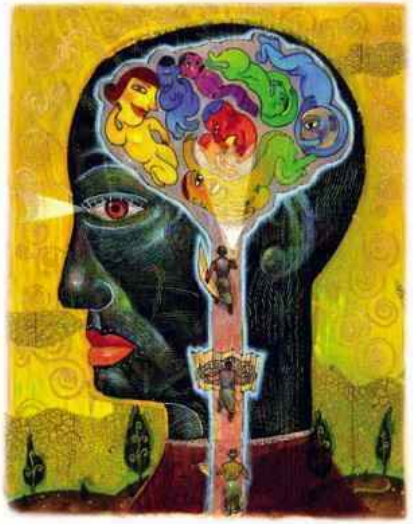
17 x 24 = 12.609

123

? 528

Neurohormonal subsystems contributing to brain's vigilance/alertness/mood





Insight

Consciousness

Agency

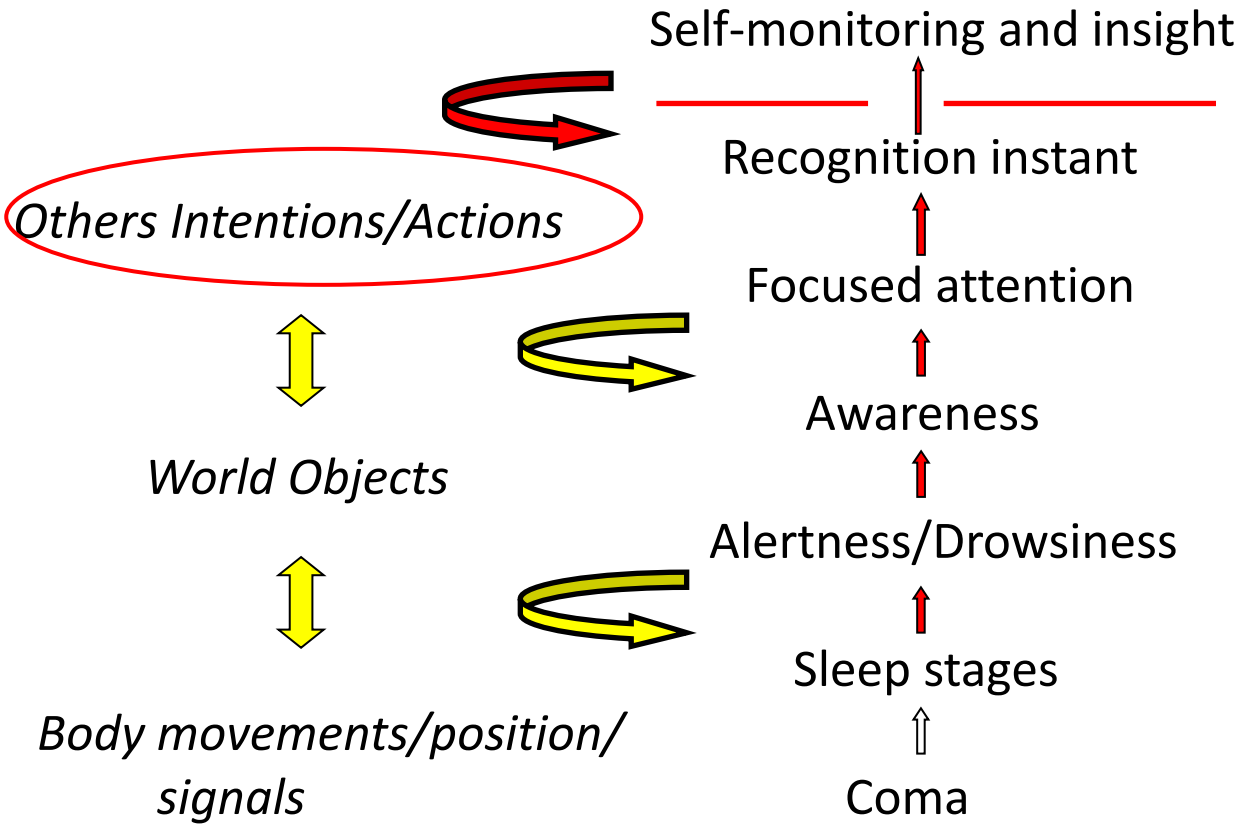
Awakening

Vigilance

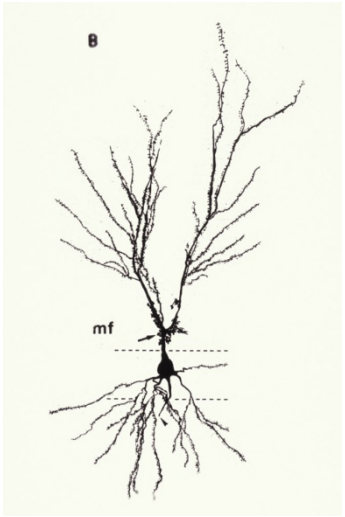
Sleep

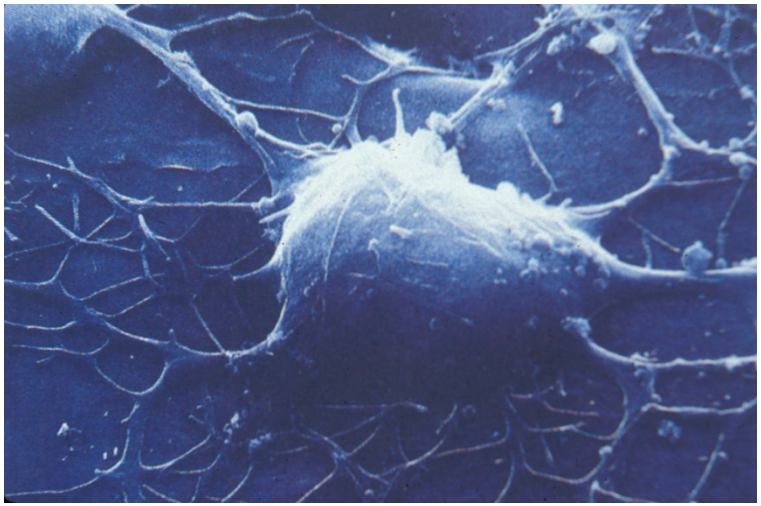
Brainstem and midbrain arousal systems

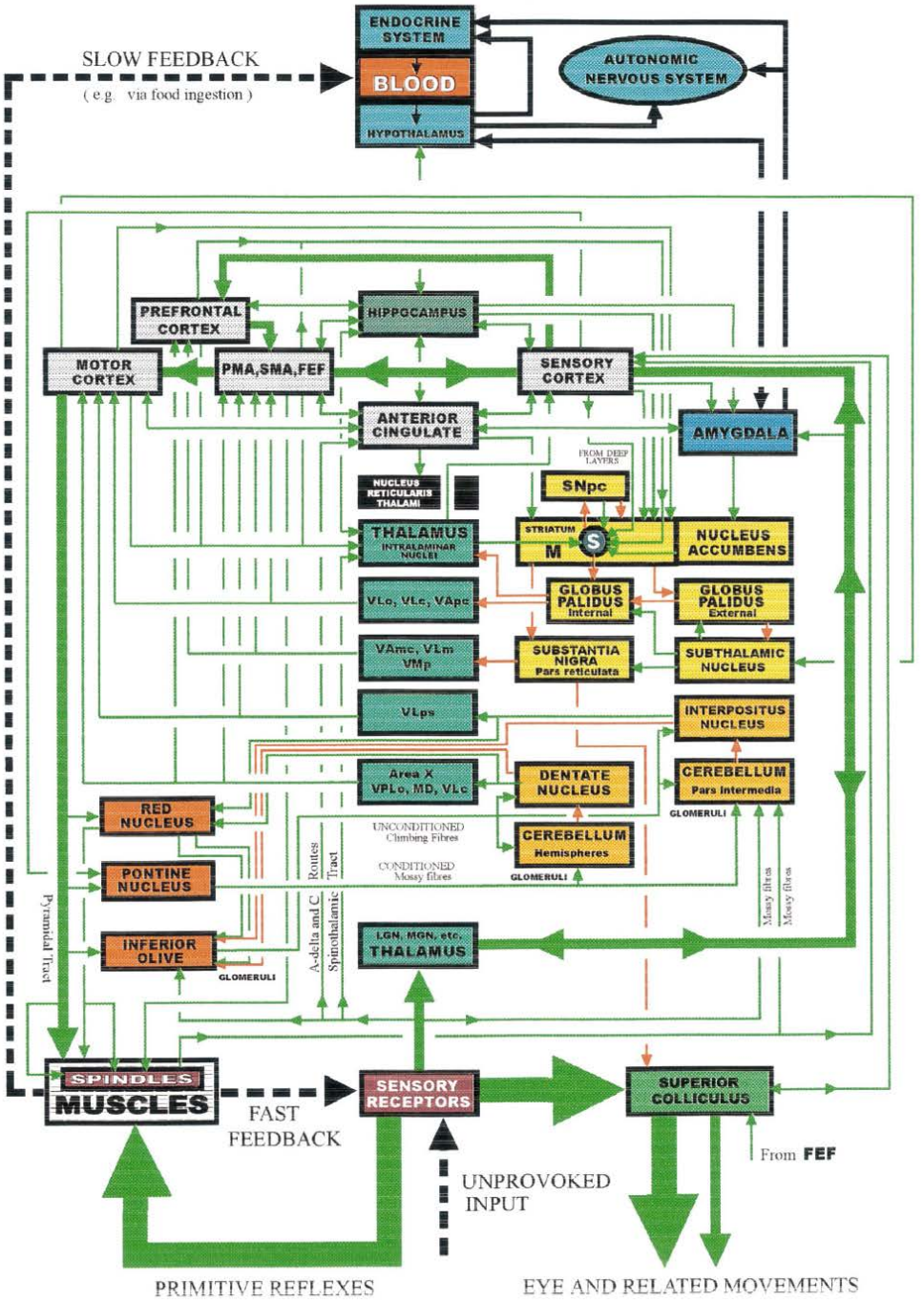
Self-consciousness interacting with Others´ consciousness: The Social Brain

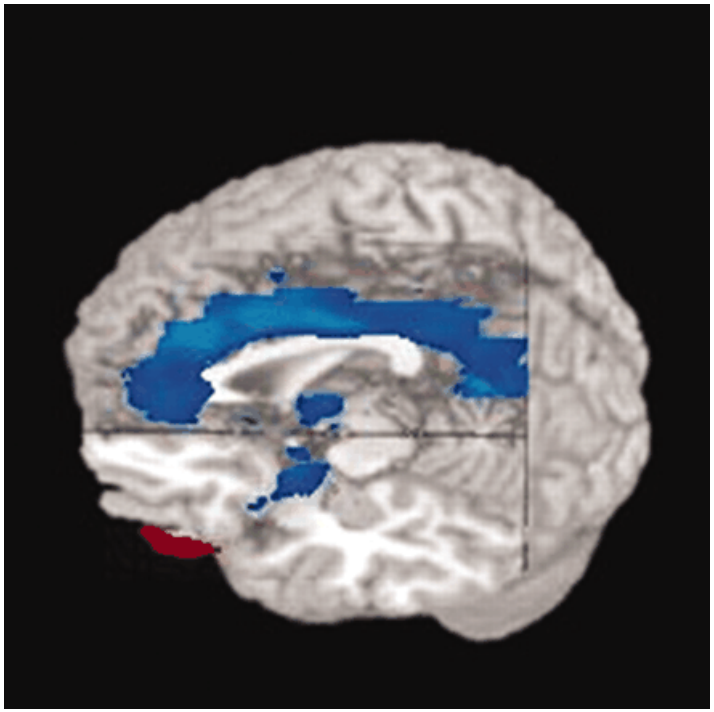


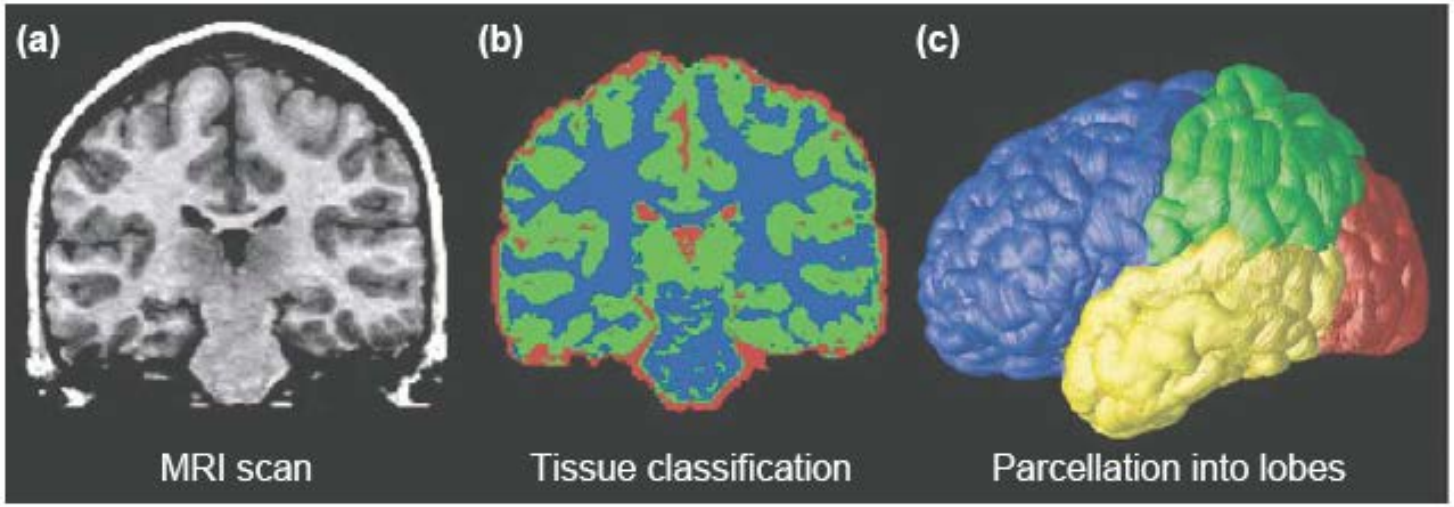
A biophisics/engineer brainmap



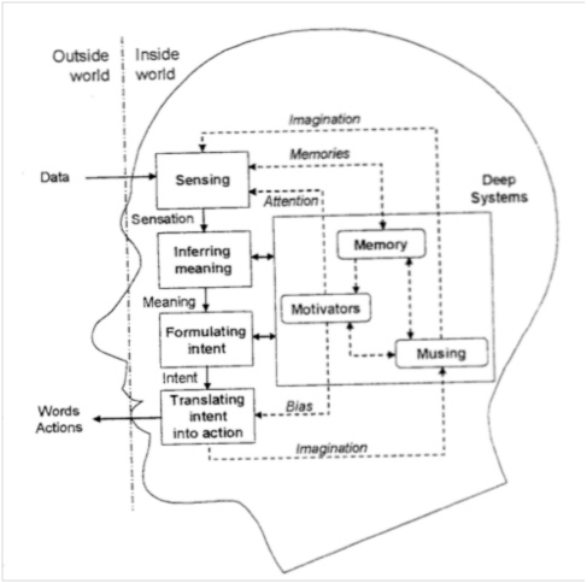


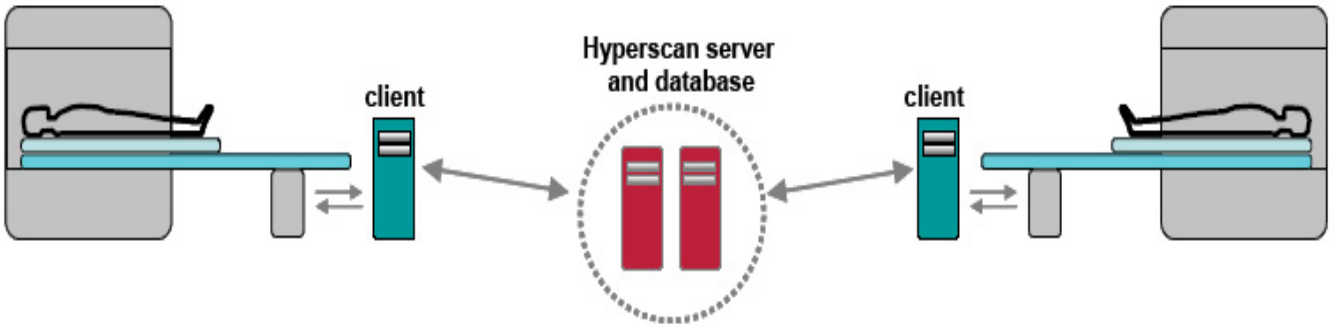





(a)
(b)
(c)
MRI scan
Tissue classification
Parcellation into lobes

Neuroeconomics at fMRI machines: entering emotions within decision making processes



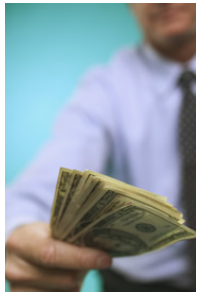


Hyperlinked scan acquisition at distances

The Neural Basis of Economic Decision-Making in the Ultimatum Game

Alan G. Sanfey, James K. Rilling,Jessica A. Aronson, Leigh E. Nystrom and Jonathan D. Cohen

***Science*, 300, 5626, 1755-1758 , 13 June 2003**



- The nascent field of ***neuroeconomics*** seeks to ground economic decisionmaking in the biological substrate of the brain. We used functional magnetic resonance imaging of **Ultimatum Game** players to investigate neural substrates of cognitive and emotional processes involved in economic decision-making. **In this game, two players split a sum of money;one player proposes a division and the other can accept or reject this. We scanned players as they responded to fair and unfair proposals.** Unfair offers elicited activity in brain areas related to both emotion (anterior insula) and cognition (dorsolateral prefrontal cortex). Further, significantly heightened activity in anterior insula for rejected unfair offers suggests an important role for emotions in decision-making.

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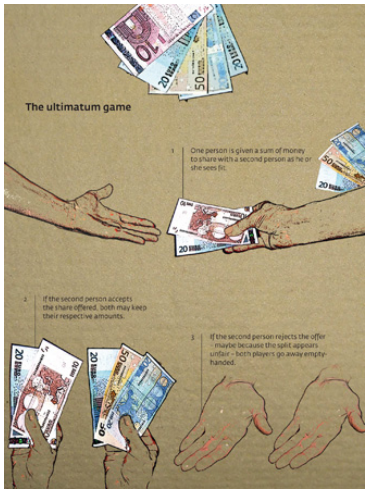

PROCEDURE

19 Ss. (volunteer students) received offers from 10 unknown fellows through a screen while they were fMRI scanned

10 US dollars to divide at each offer

30 scan-trials per person and round, while receiving

- 10 ultimatum offers from proponents (face photographs)
- 10 ultimatum offers from a computer
- 10 control tasks (TR speed threshold for a small reward)

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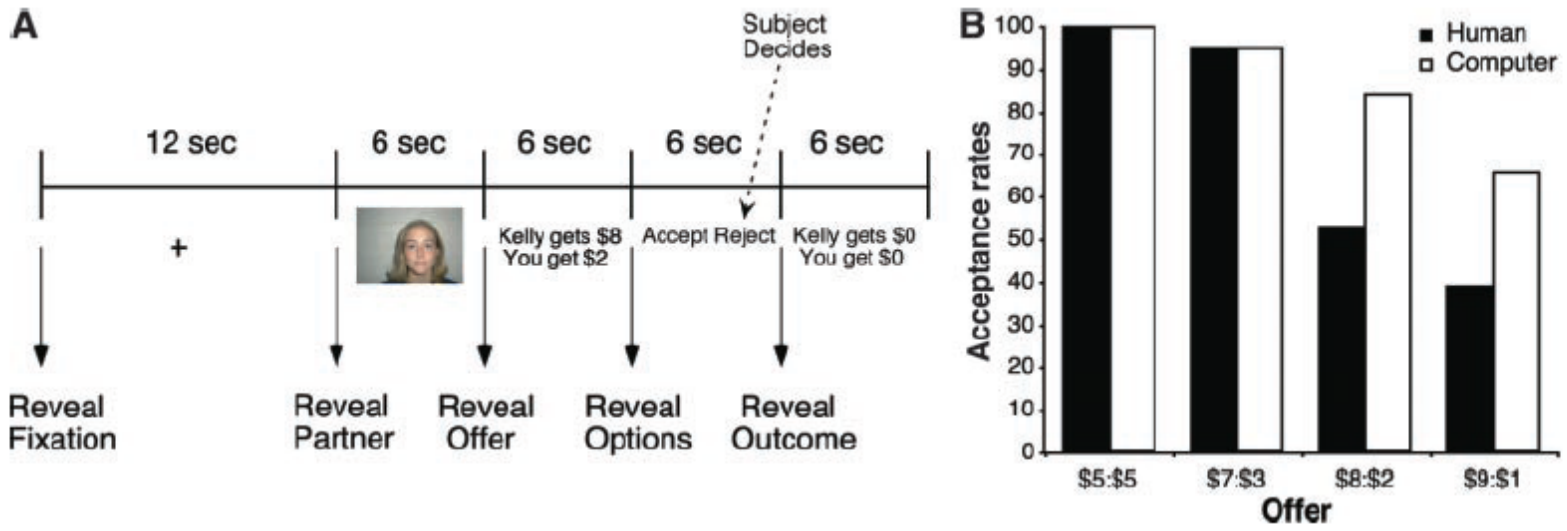

Timeline of a single round of the Ultimatum Game. Each round lasted 36 sec. Subjects received 20 Offers in total.

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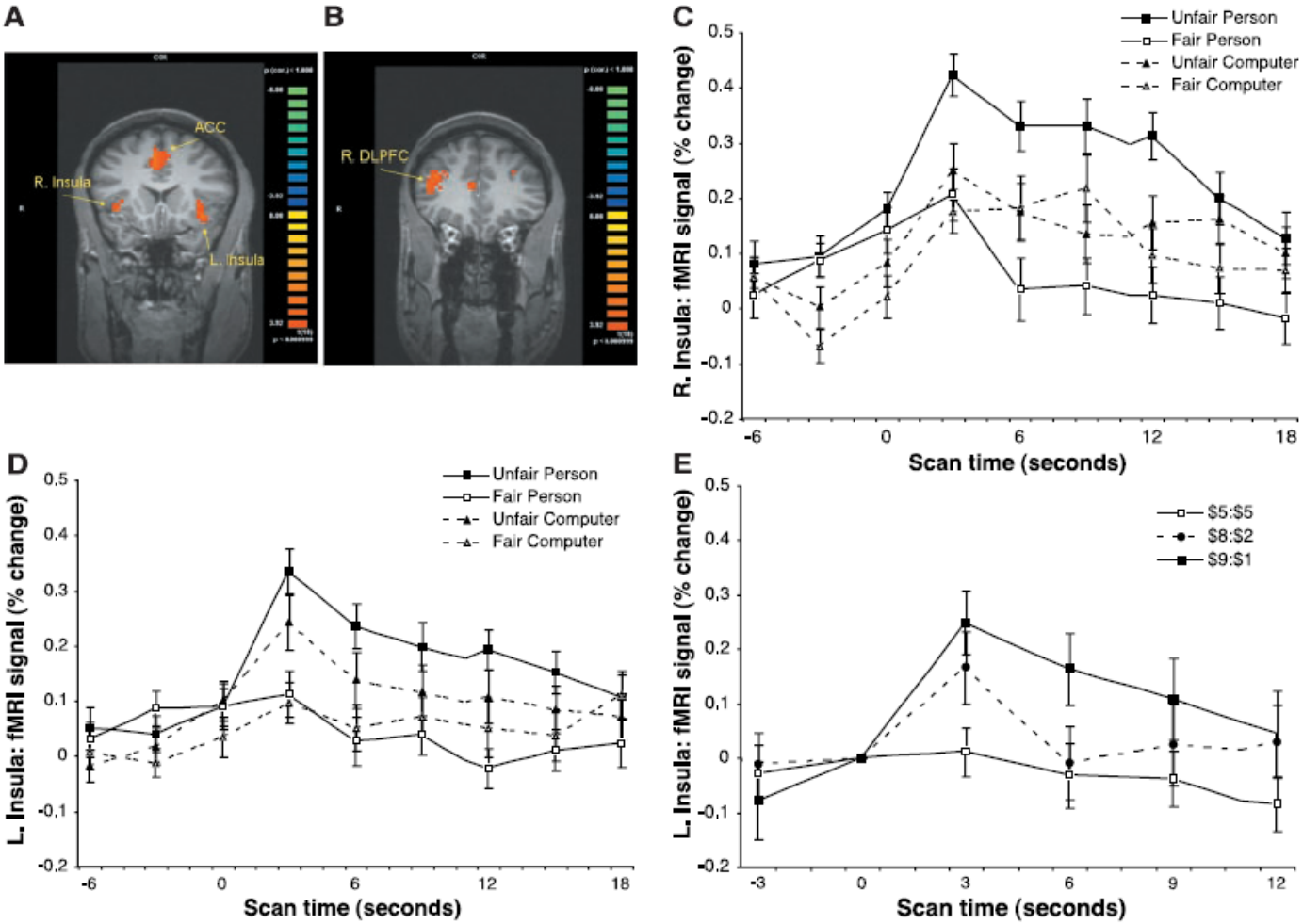

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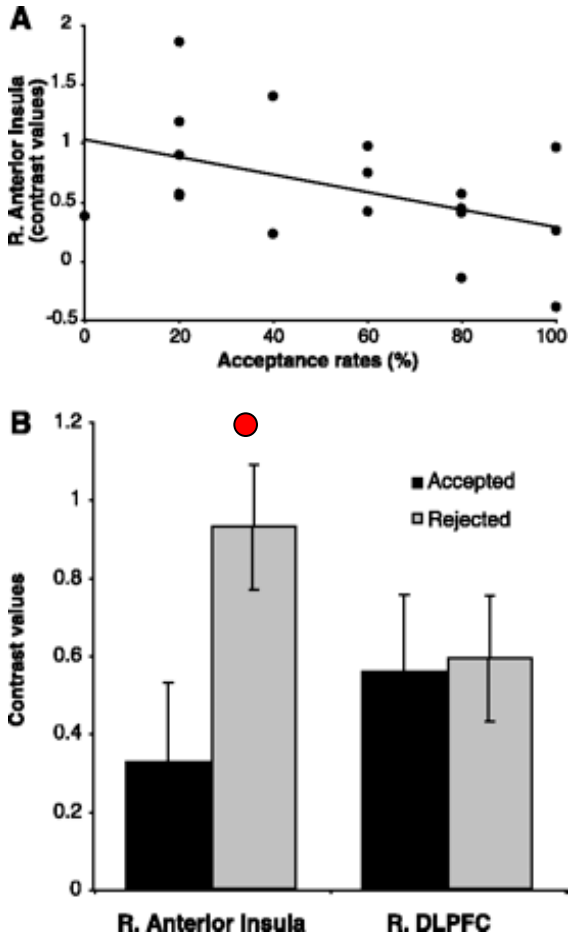
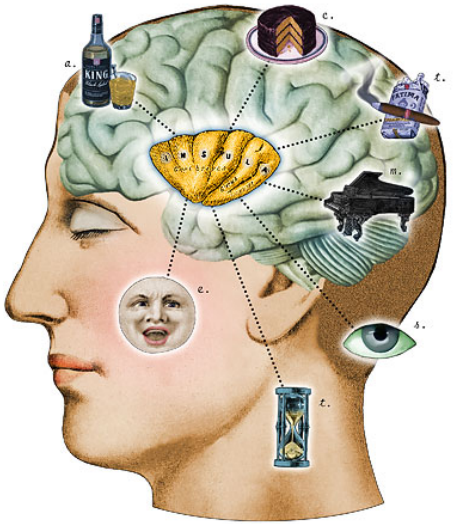
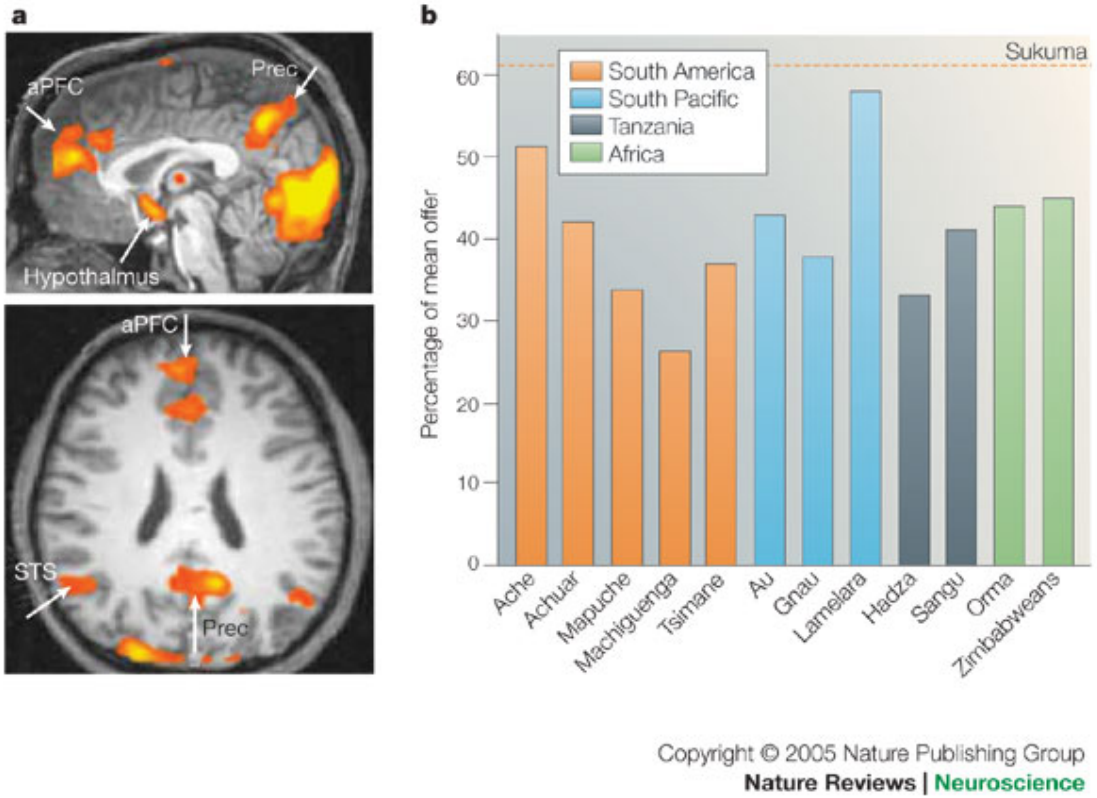




The moral basis of human cognition

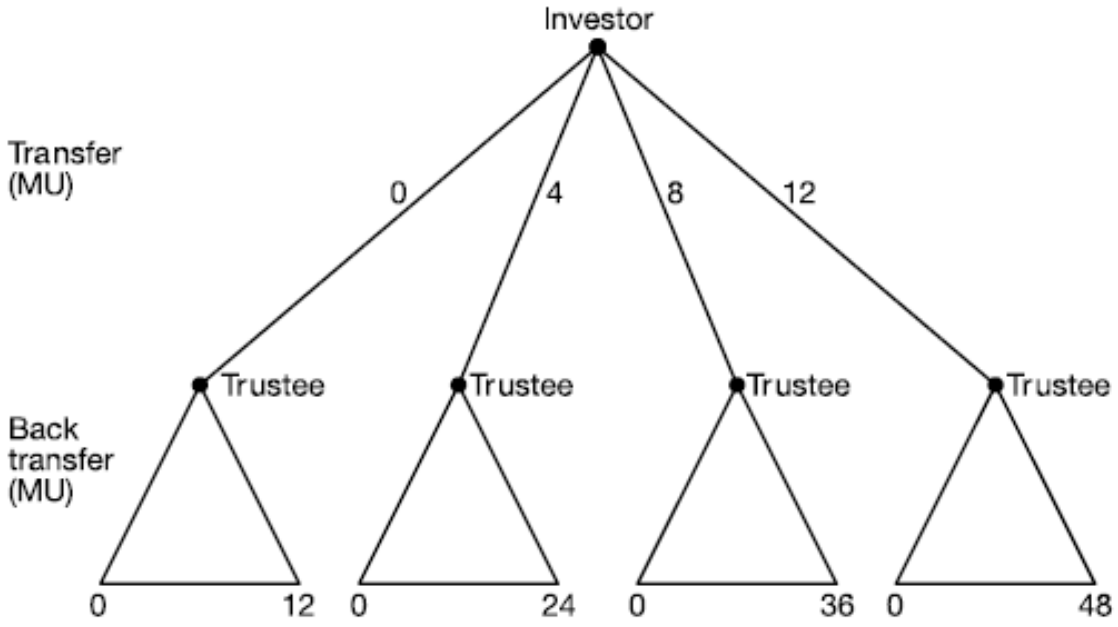
J Moll, R Zahn, R de Oliveira Souza, F Krueger and J Grafman (2005), ***Nature Reviews Neuroscience***, 10, 799-809.



a. Additional activated areas during "*Ultimatum game*" interactions.

b. Cultural differences at "*Ultimatum*" *offers*.

THE TRUST GAME



-12 Monetary Units to be invested on the trustee (4 choices).

-The market triplicates the inversion

-The trustees also start with 12 Monetary Units

- They can freely return a quantity to the investor (between 0-48 UM)

Tipically only one trial with every partner (unknown), several trials for each subject, earning a fixed amount (i.e. 80 Swiss Francs) plus the gains on the game.

Gains Investor = Init.Assign. – Investment + Return

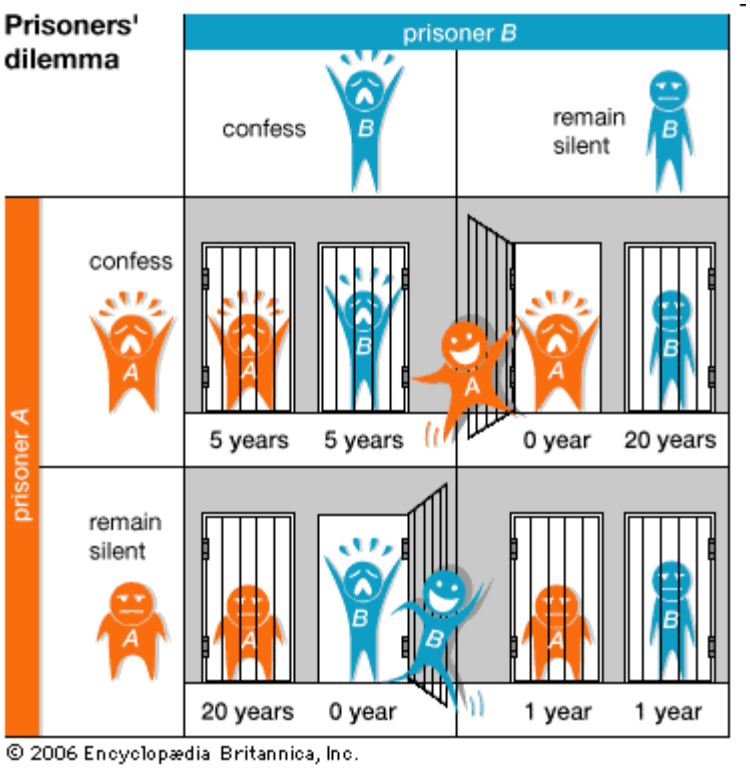
Gains Trustee = Init Assign. + Investment - Return

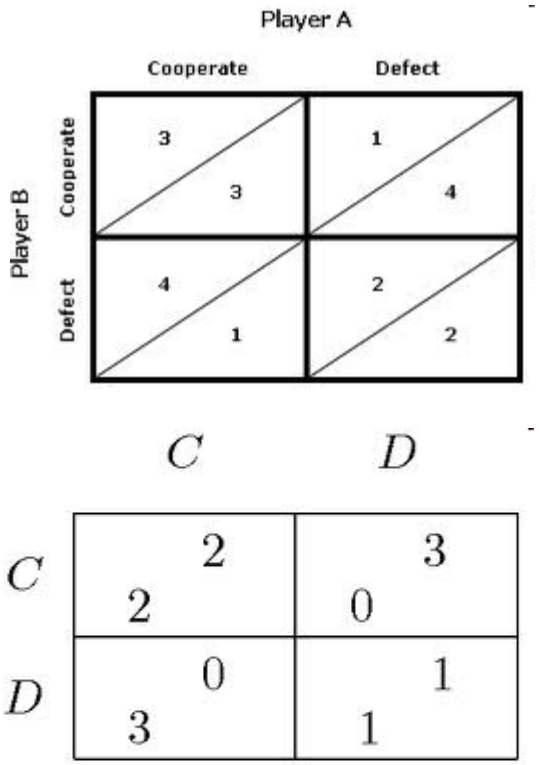
SWEET RETRIBUTION/REVENGE

Dominique J.-F. de Quervain, Urs Fischbacher, Valerie Treyer, Melanie Schellhammer, Ulrich Schnyder, Alfred Buck, Ernst Fehr *Science*, Vol 305, Issue 5688, 1254-1258 , 27 August 2004

Dorsal striatum (caudate) activation as the site of gratifying retribution

PRISONER'S DILEMMA GAMES: ONE-SHOT VS. ITERATED





From defection to cooperation….

Another procedure to study the desire of revenge: measuring feelings of empathy for pain

Empathic neural responses are modulated by the perceived fairness of others

Singer T, Seymour B, O'Doherty JP, Stephan KE, Dolan RJ and Frith ChD

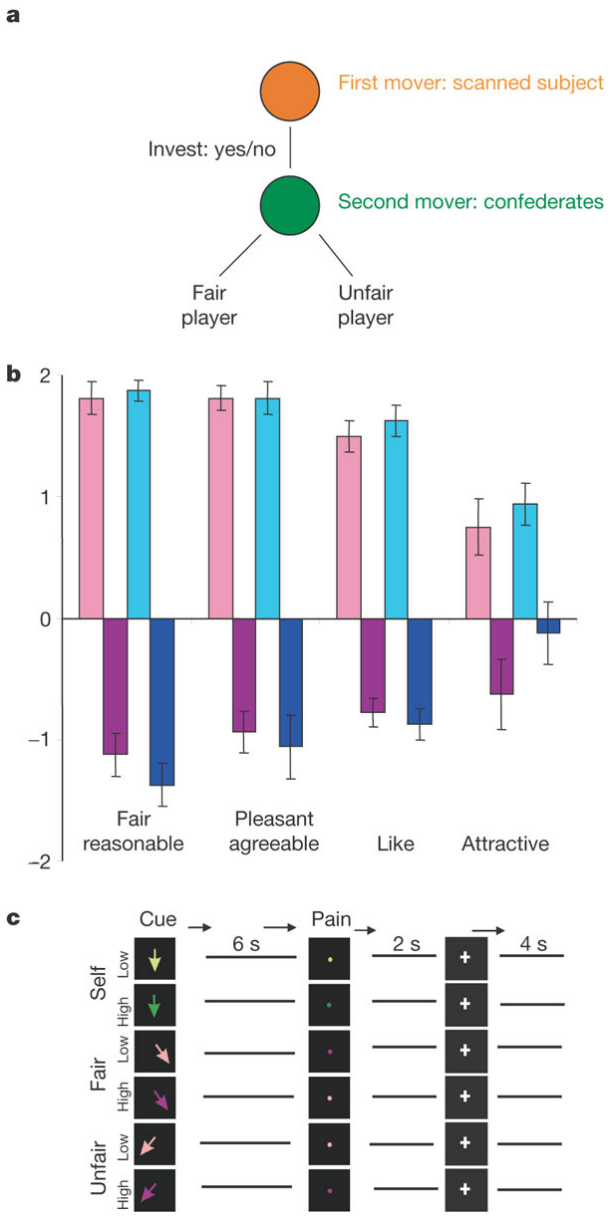
Nature, 439, 466-469, 2006, 26 Jan.

Iterated Prisoner's Dilemma Game

Points per cash, 10 at the start, tripled by the market at every move.

- Fair returns: 10,9,10,10,8,10,10...

- Unfair returns; 8,7,6,3,0,,3,0,4,3…



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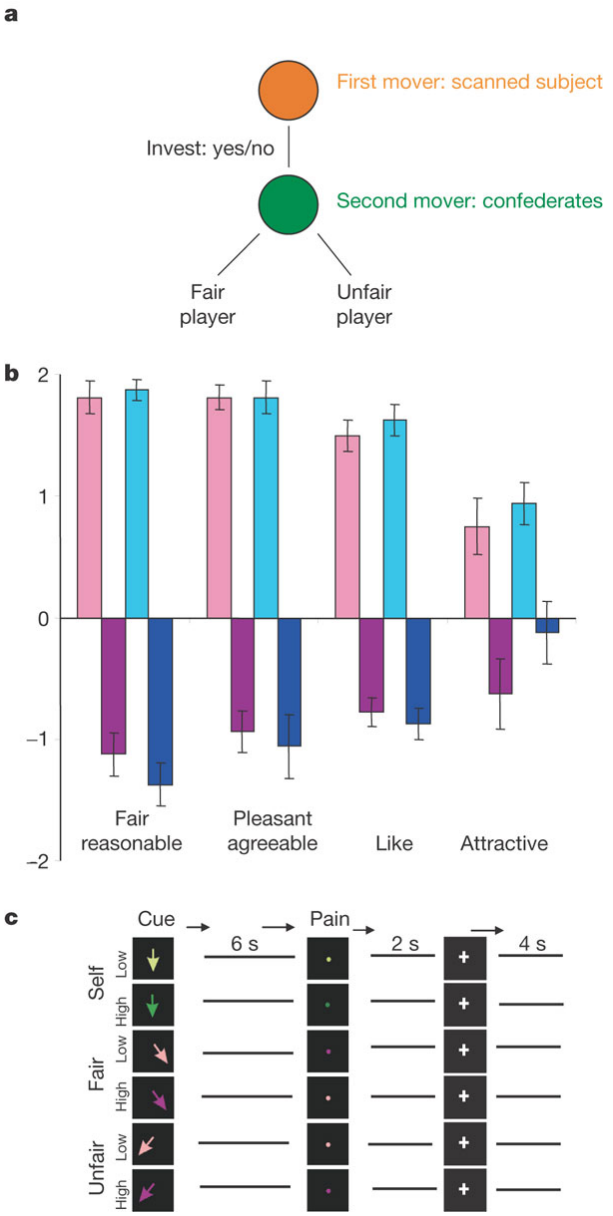
16 men (26,5 years), and 16 women (24,6 years) playing with 4 confederates (professional actors), seated beside the subjects during fMRI pain sessions

Pink/purple: women; Cyan/Blue:men.

(Behavioural evaluation at postscans session)

Experimental sequence during painfMRI sessions:

- Light color cue: low electric stimulus
- Strong color cue: strong electric stimulus



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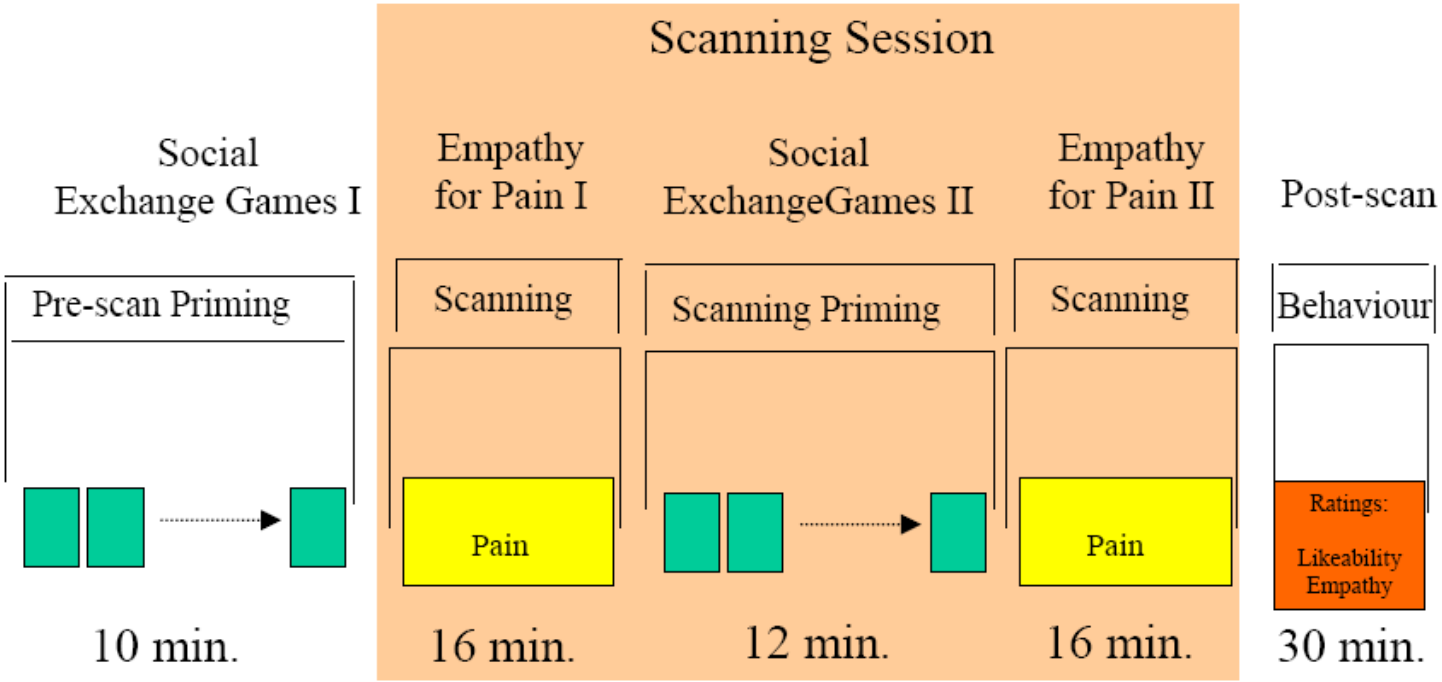

Like/Dislike inducing

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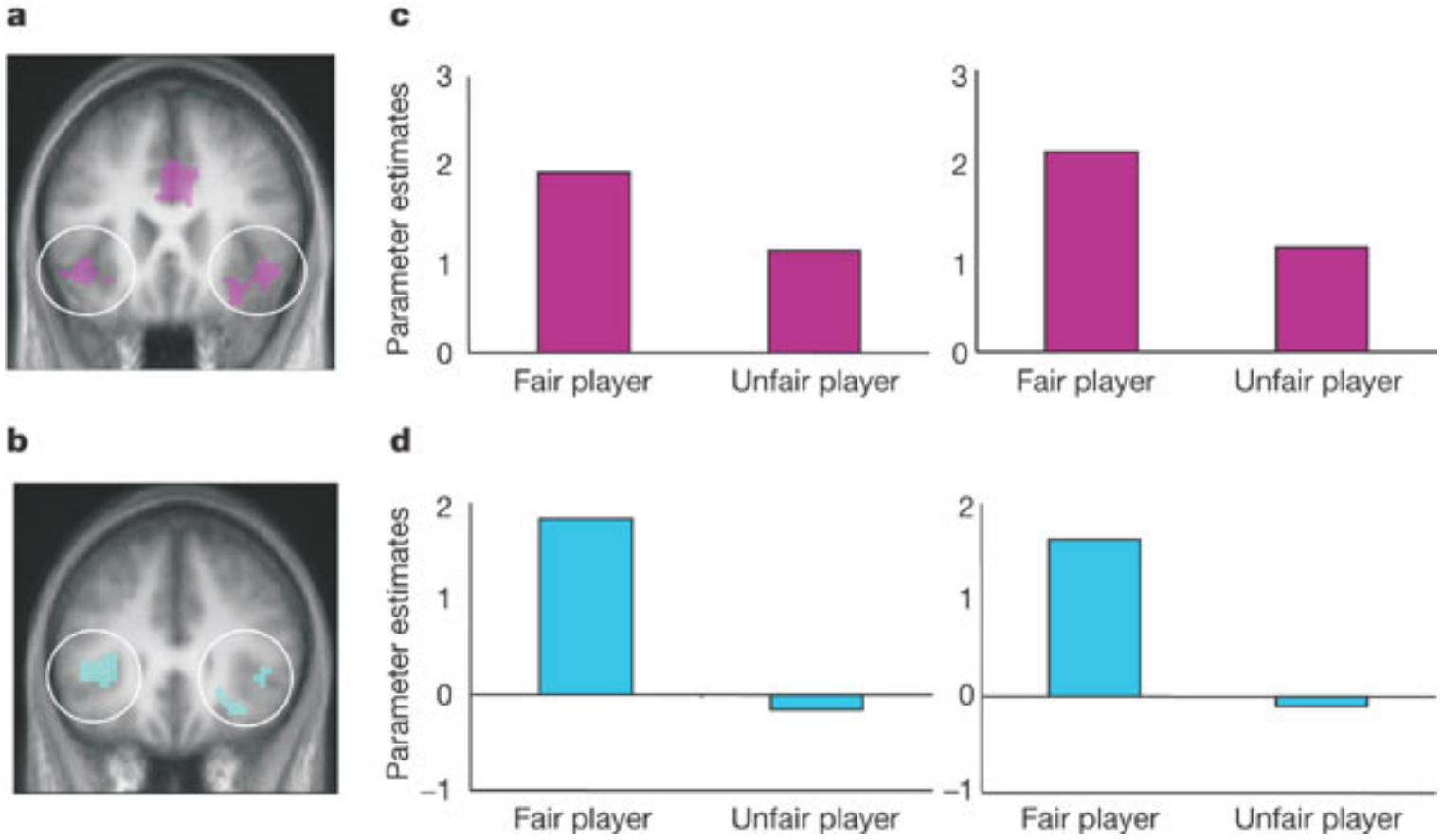

Frontoinsular cortex activations: Left and Right for women (purple) and men (blue)

Empathic neural responses are modulated by the perceived fairness of others

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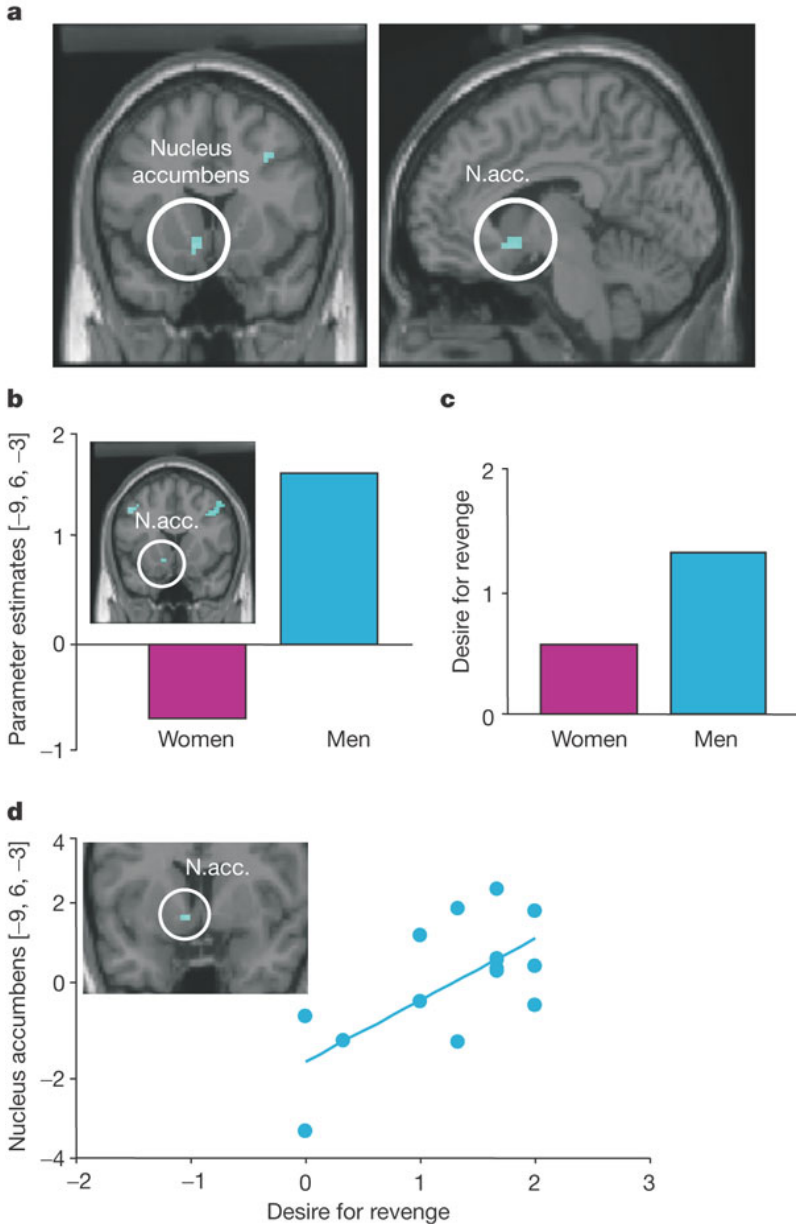
a: Accumbens activation in men on pain applied to unfair vs fair confederates

b: Gender differences at left accumbens activation on the same contrast

c: Gender difference on the desire of revenge scale (From -2 to +2)

d: Correlation between accumbens activation and desire of revenge (**r=68**), in men. No correlation in women.



When Your Gain Is My Pain and Your Pain Is My Gain: Neural Correlates of Envy and Schadenfreude

Takahashi H et al (2009), ***Science***, 323, 937-940

- Envy of other's succeses activates pain circuits

- Shadenfreude (delight at other's misfortunes) activates reward circuits

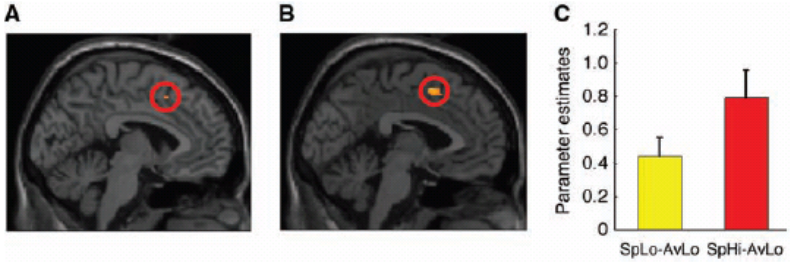


Fig. 1. Brain activation in dACC was modulated by relevance of comparison domain. Brain activations in response to (**A**) the SpLo minus AvLo condition and (**B**) the SpHi minus AvLo condition. (**C**) Mean for parameter estimates at the peak of dACC activation for SpHi-AvLo contrast (red) was greater than that for SpLo-AvLo contrast (yellow) ($t = 2.56$, $P = 0.02$). Error bars represent SE.

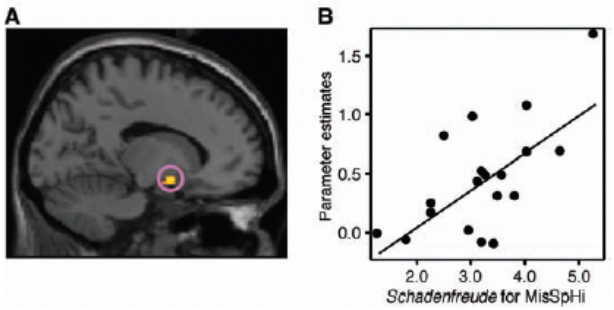


Fig. 2. Correlation between self-rating of schadenfreude and ventral striatum activation across participants. (**A**) Image showing correlation between mean rating of schadenfreude for MisSpHi and the ventral striatum in MisSpHi-MisAvLo contrast across participants. (**B**) Plots and regression line of correlation ($r = 0.65$, $P = 0.002$) between schadenfreude and parameter estimates of the ventral striatum activation for MisSpHi-MisAvLo contrast at a peak voxel (–14, 2, –12).

Comparison domains	Male student A (SpHi)	Female student B (SpLo)	Female student C (AvLo)	Misfortunes
academic achievement	high in science course	high in literature course	mediocre in literature course	He (She) was falsely accused of cheating in an exam.
club activities	ace pitcher of the baseball team	ace attacker of the volleyball team	benchwarmer of the volleyball team	The sports club activity was suspended due to a scandal.
popularity	popular among female students	popular among male students	not popular among male students	Ugly rumor about him (her) was spread.
girlfriend/boyfriend	beautiful and intelligent	handsome and intelligent	not handsome nor intelligent	His girlfriend (her boyfriend) had an affair with another man (woman).
job interview	good interview	good interview	bad interview	The company decided not to take the results of the interview into consideration.
work place	a multinational IT company	a local bank	small enterprise	The company is in financial difficulties.
salary	high	high	low	The bonus turned out to be very small.
cars	high-class European car	high-tech Japanese car	small secondhand car	The car had many troubles.
house	luxurious condominium downtown	a house with garden in countryside	an old apartment in the suburbs	Graffiti was written on the wall.
collection	watches	Japanese art and pottery	music CDs	A piece was stolen from the collection.
weekend	overseas travel	domestic travel	walking in the park	The plan for the weekend was cancelled because of a typhoon.
dinner	fancy French restaurant	ranking Japanese restaurant	instant food at home	He (She) got food poisoning from the dinner.
opportunities	many	many	few	He (She) has never met an attractive woman (man).

Supplementary Figures

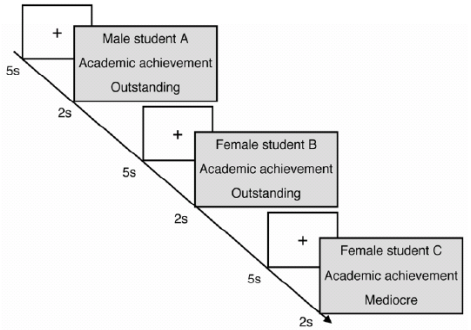
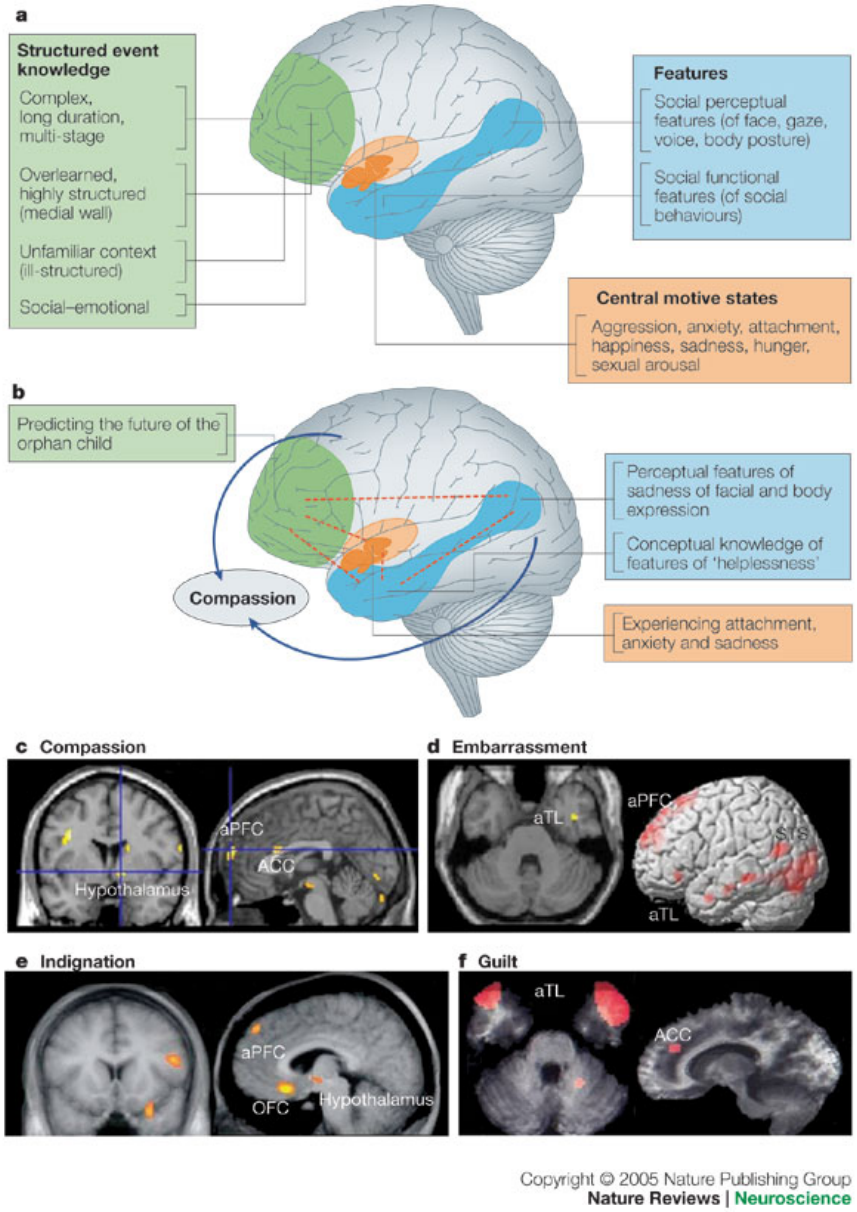


Figure S1: Schematic depiction of stimuli and task design of fMRI study 1 (envy experiment). First, a fixation crosshair was presented for 5s, followed by the experimental stimuli (SpHi, SpLo and AvLo) that were displayed for 2s. The top line in each stimuli-containing rectangle indicates a target person, the middle line indicates the domain of comparison, and the bottom line indicates the level of possession.



The moral basis of human cognition

J Moll, R Zahn, R de Oliveira Souza, F Krueger and J Grafman (2005), *Nature Reviews Neuroscience*, 799-809, 6 October.

Examples of the Event-Feature-Emotion Framework, by Moll et al. (2005), on Brain Morality.

Good Lamps Are the Best Police: Darkness Increases Dishonesty and Self-Interested Behavior

Zhong ChB, Bohns BK and Gino F (2010) ***Psychological Science***,

doi:10.1177/0956797609360754

Darkness can conceal identity and encourage moral transgressions; it may also induce a psychological feeling of *illusory anonymity* that disinhibits dishonest and self-interested behavior regardless of actual anonymity. Three experiments provided empirical evidence supporting this prediction. In Experiment 1, participants in a room with slightly dimmed lighting cheated more and thus earned more undeserved money than those in a well-lit room. In Experiment 2, participants wearing sunglasses behaved more selfishly than those wearing clear glasses. Finally, in Experiment 3, an illusory sense of anonymity mediated the relationship between darkness and self-interested behaviors. Across all three experiments, darkness had no bearing on actual anonymity, yet it still increased morally questionable behaviors. We suggest that the experience of darkness, even when subtle, may induce a sense of anonymity that is not proportionate to actual anonymity in a given situation.

- Exp. 2. ***Dictator game***, one-shot against the experimenter, 6$=initial amount to share (3$=fair split). N=51 students (31 female, 19 male, 21,36 years age, 5$ fix payment plus the opportunity to earn 6$ at the game).

Offers wearing Sunglasses M= 1,81 SD=1,3

Offers without Sunglasses M= 2,71* SD=1,83 t=2,02; P=0.049

*Not different from fair split.

- Exp. 3. Similar results with another 83 students (39 female, 44 male, 20,7 years).

Relationship perceived anonimity-amount offered = - 0,67