

introduction to neuroscience: **brain as a machine**

the brain

what do we know?

what don't we know?

what can we learn experimentally?

cartesian dualism

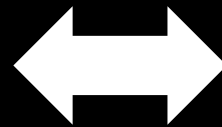
body: simple

vision

hearing

touch

...



mind: complex

feelings

thinking

personality

...

cartesian dualism

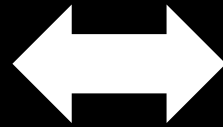
body: simple

vision

hearing

touch

...



mind: complex

feelings

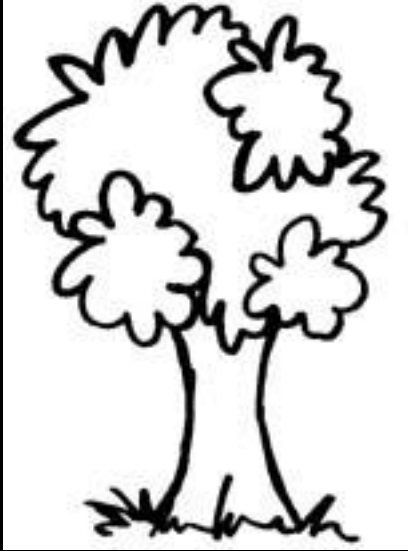
thinking

personality

...

how do they interact?

cartesian dualism **soul?**

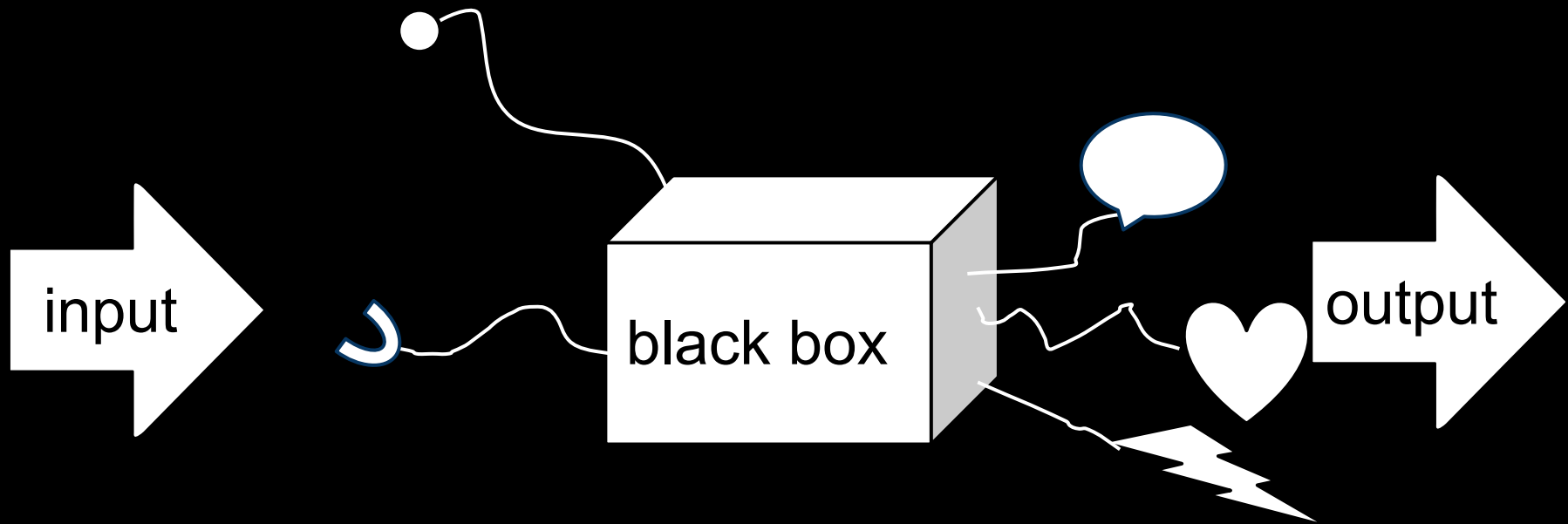


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functionalism



3 simple steps to consciousness

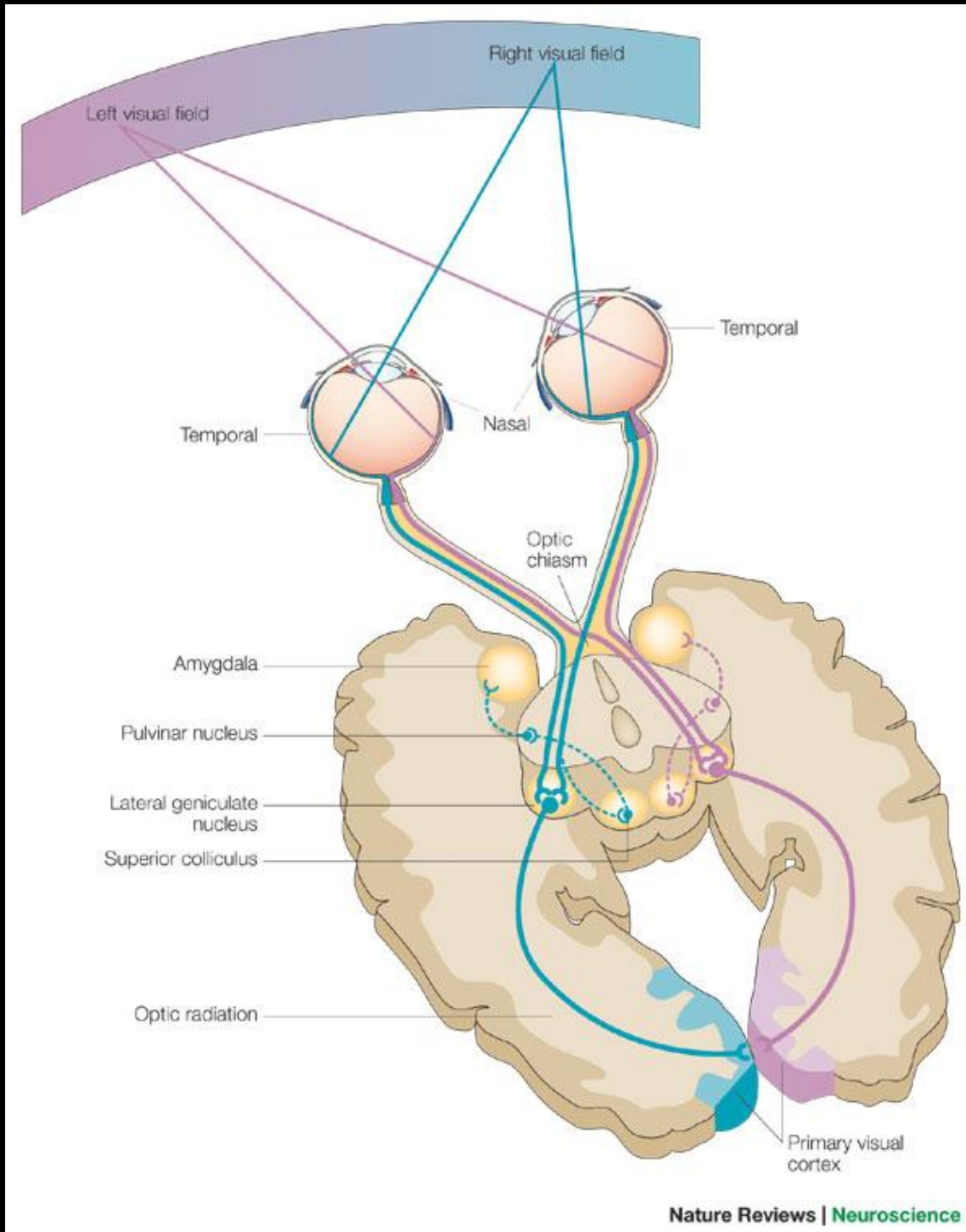
1 early vision

2 higher vision

3 higher cognitive functions

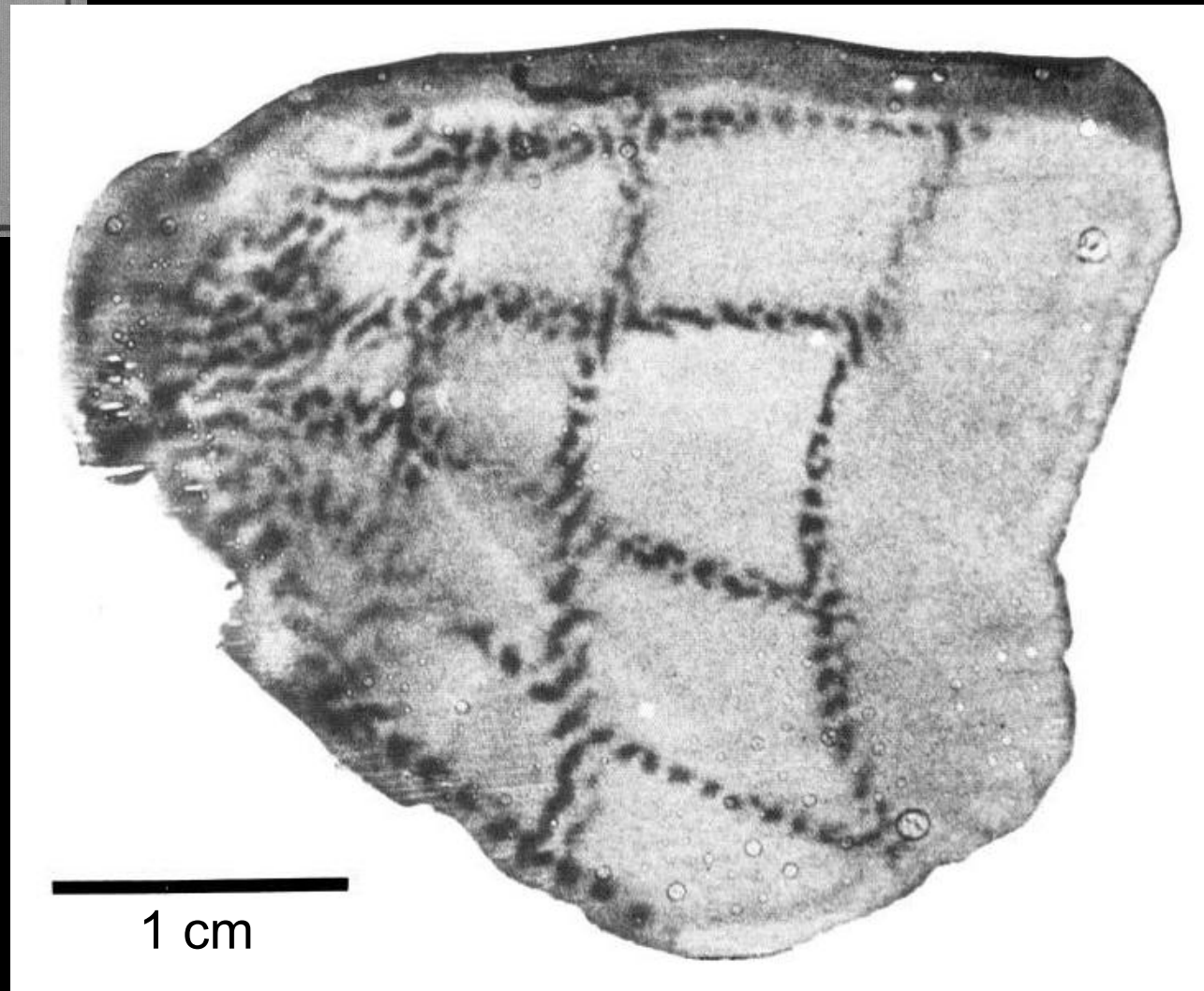
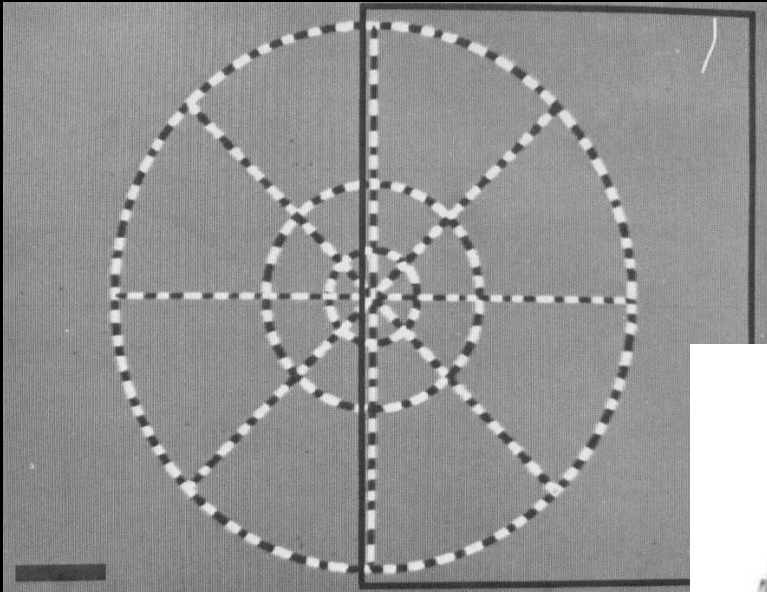
step1

visual system



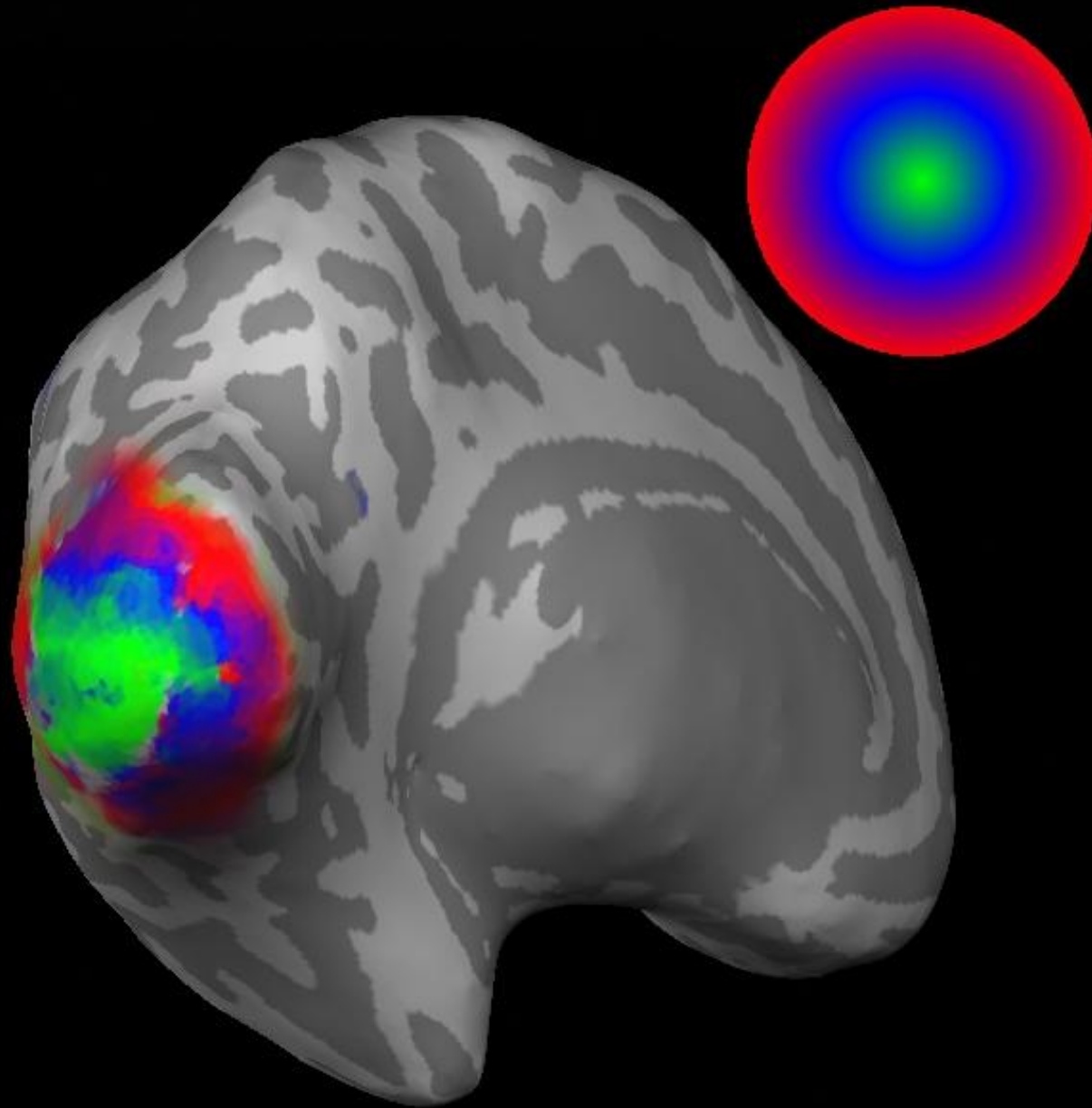
Hannula et al., *Nat. Rev. Neurosci.* (2005)

retinotopy



Tootell et al., *J. Neurosci.* (1988)

retinotopy



from E. Vul

mind reading

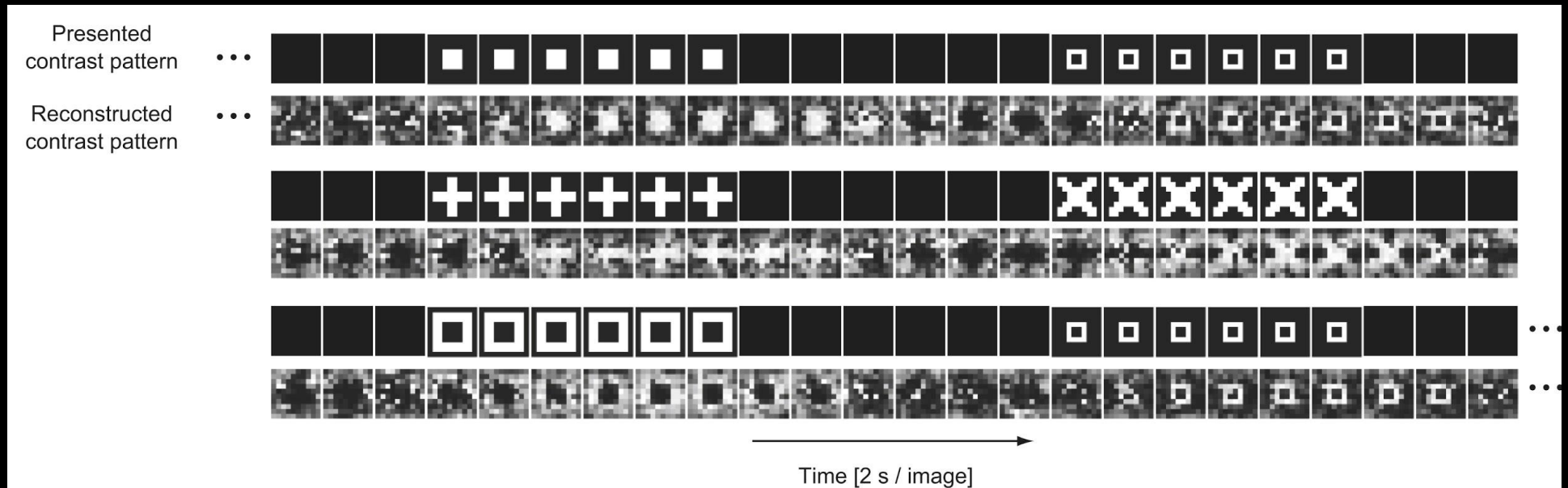
Mean of
reconstructed
contrast pattern



Presented
contrast pattern

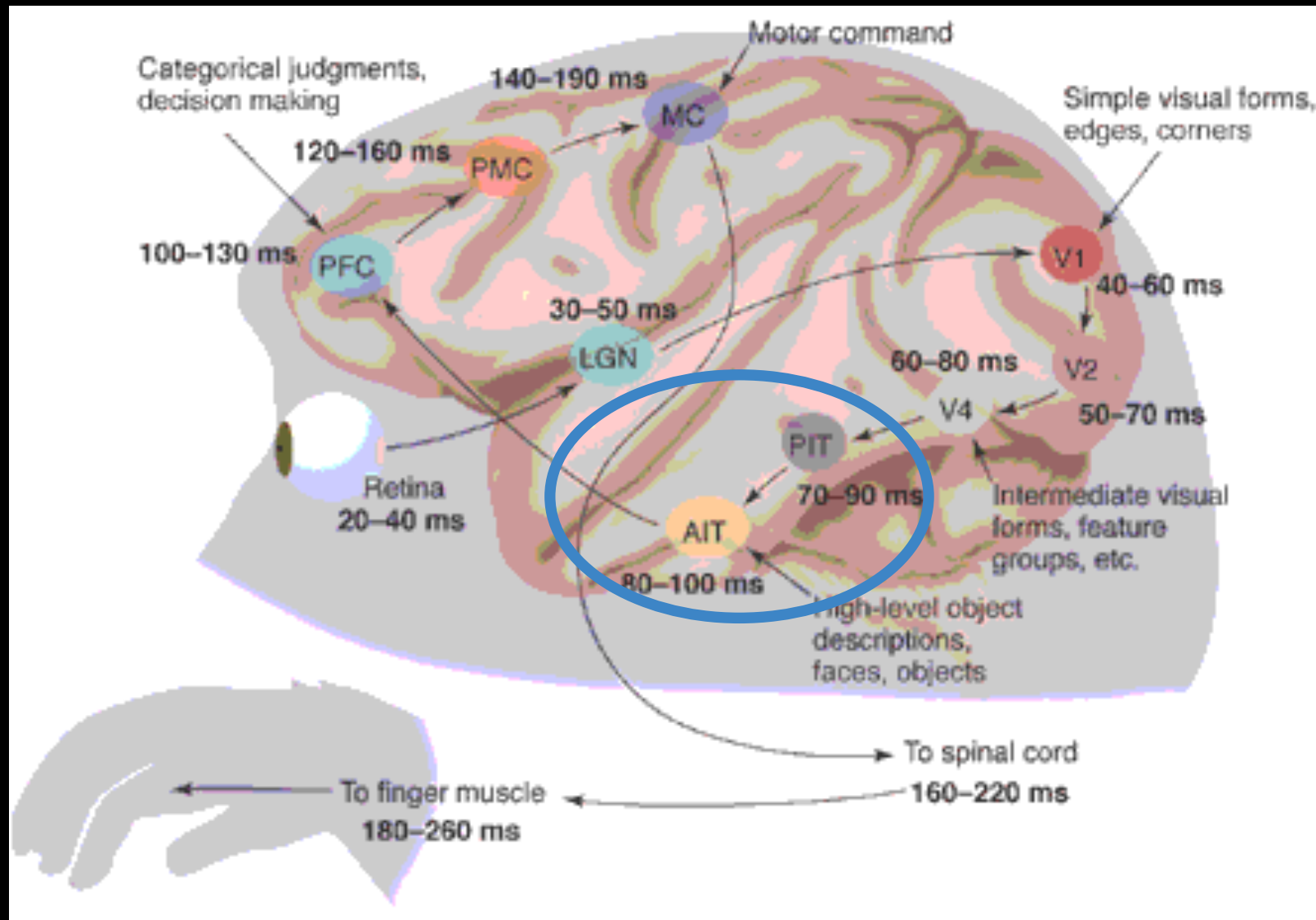


mind reading



step2

visual system



modularity

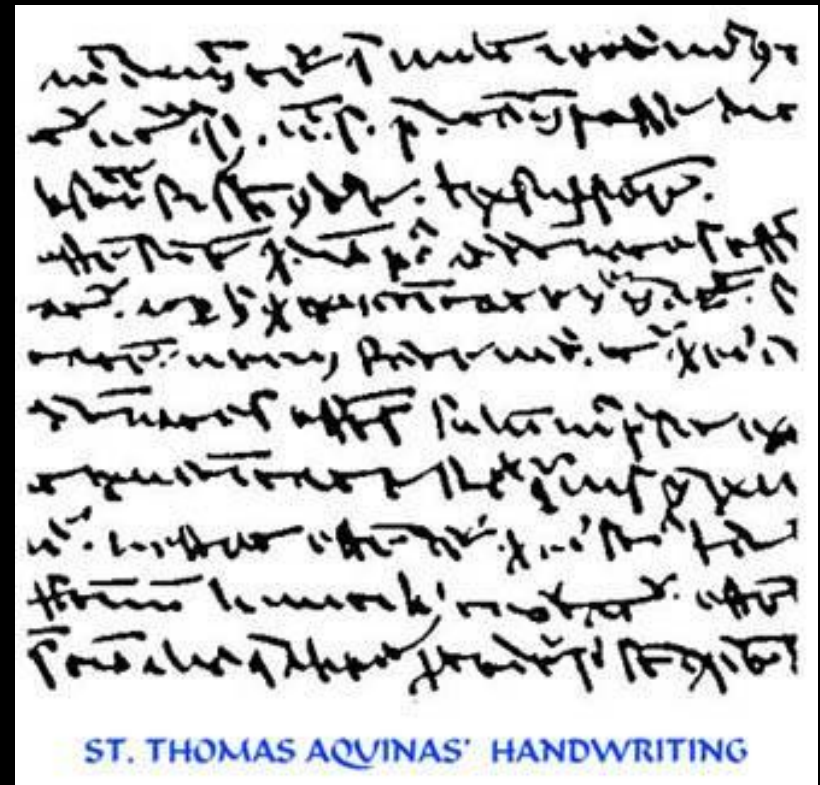
**information processing:
distributed or specialized?**

prosopagnosia

cannot recognize faces
can recognize objects,
places, letters



mod. from B. Balas



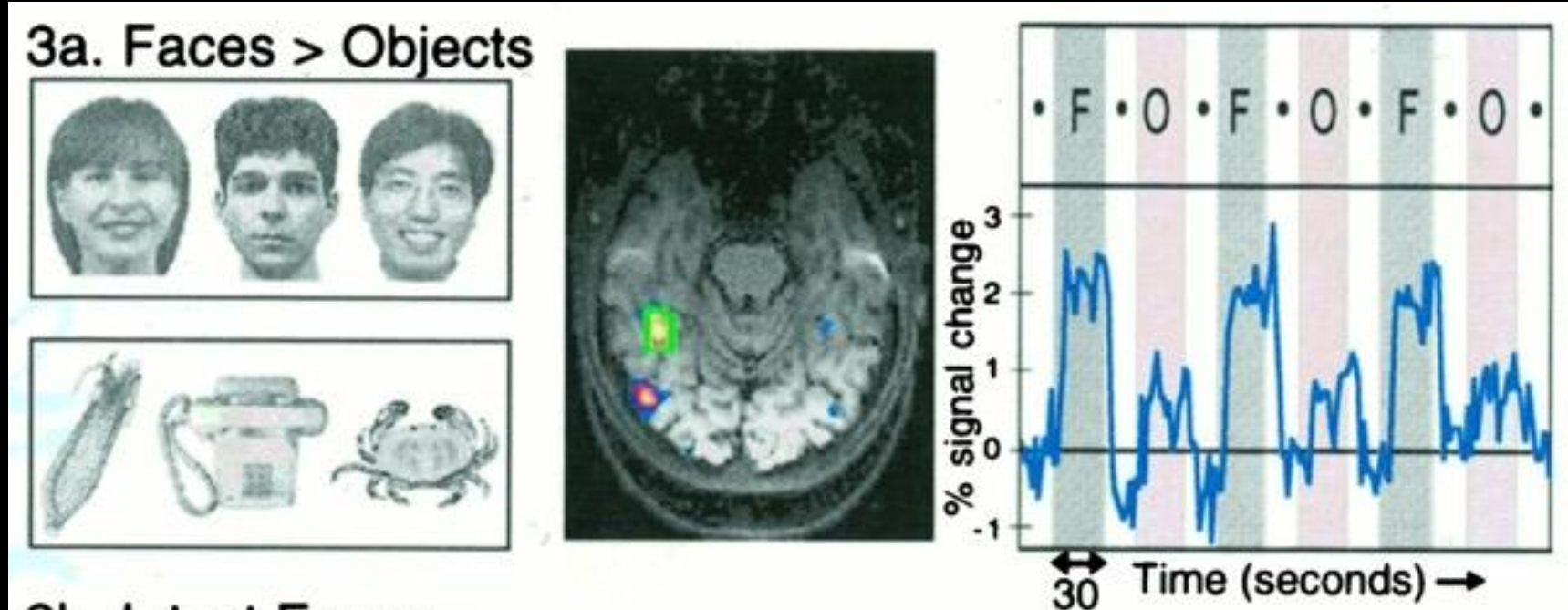
from M. Ogilvie

fMRI



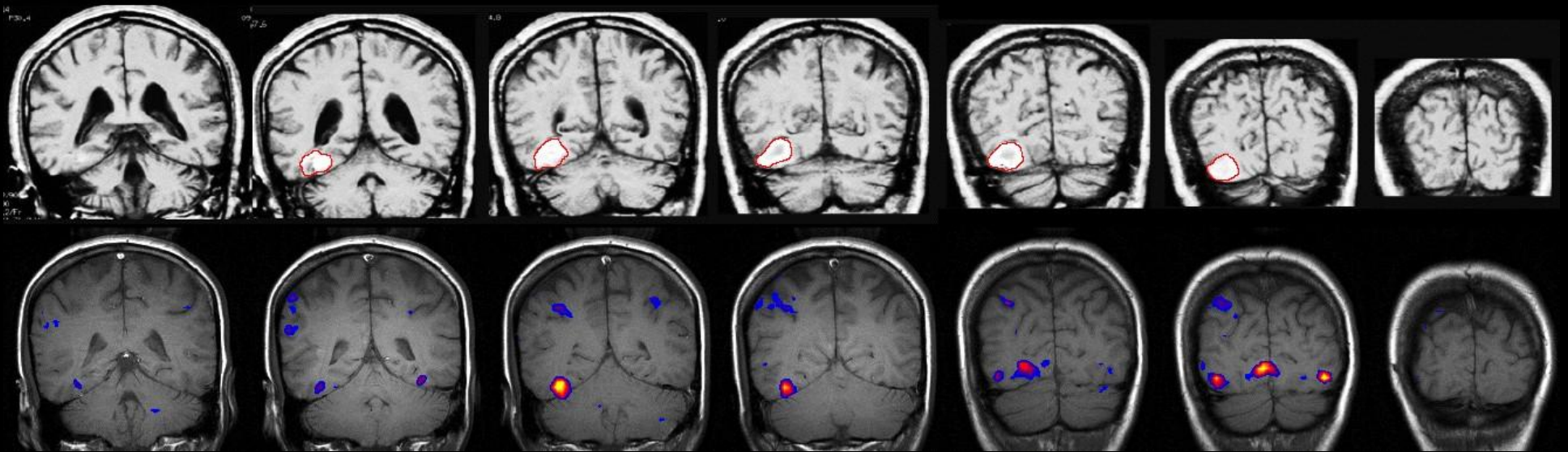
Image Editor @ Flickr

face module?



prosopagnosia

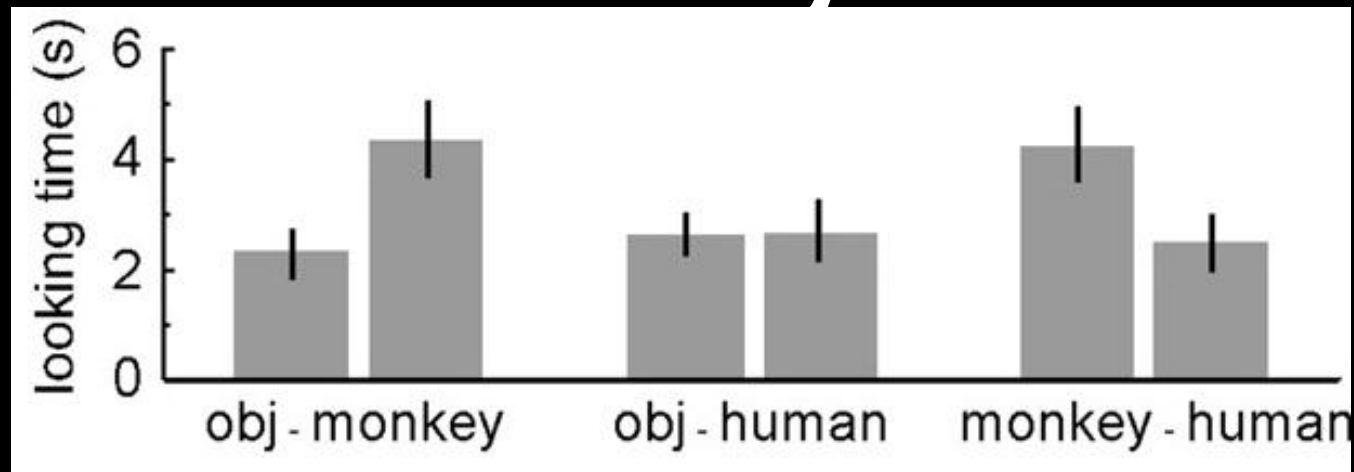
prosopagnosic patient



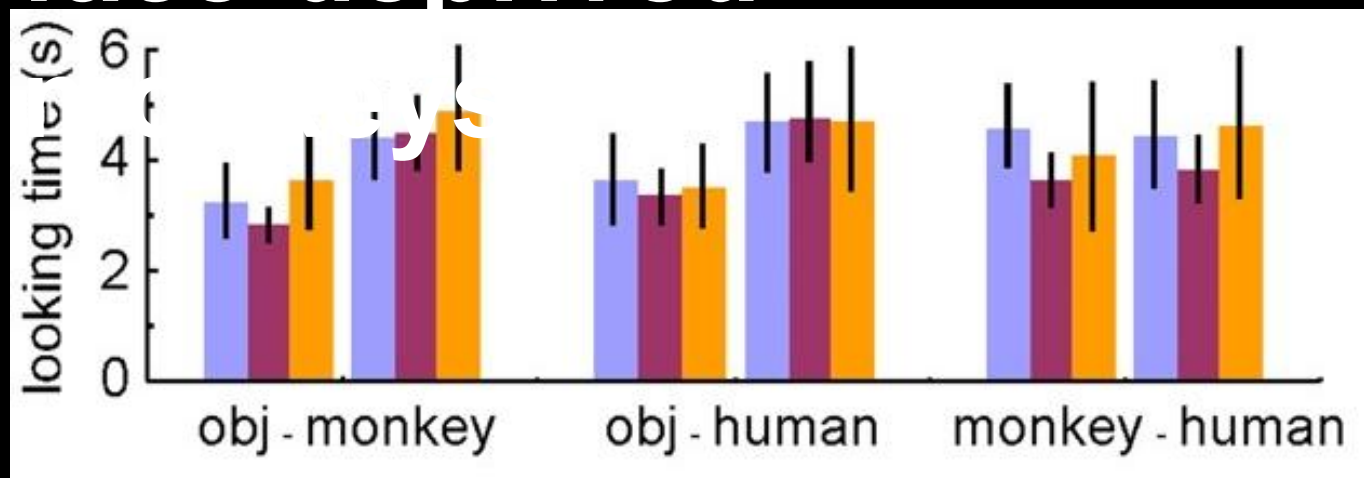
nancy kanwisher

face processing innate?

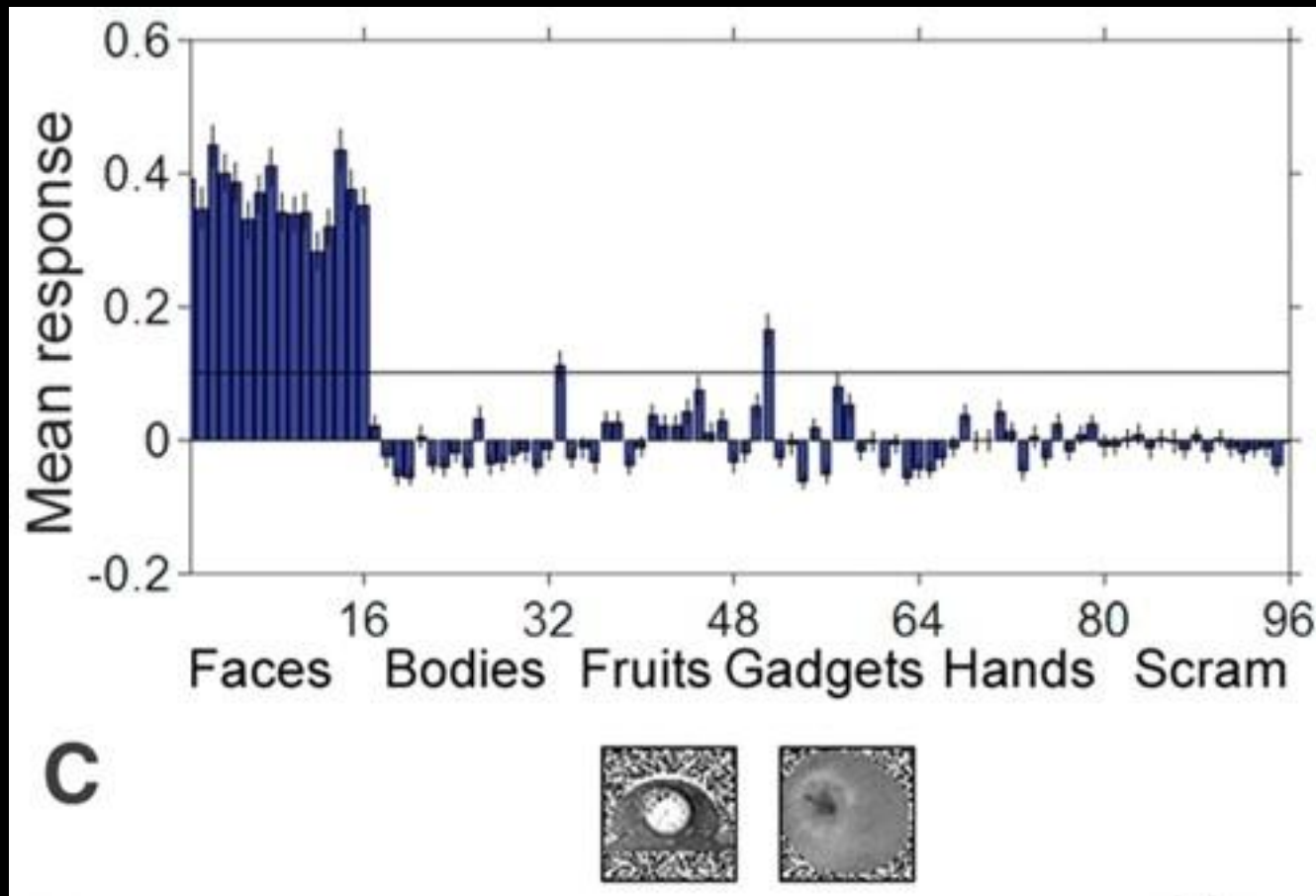
normal monkeys



face-deprived

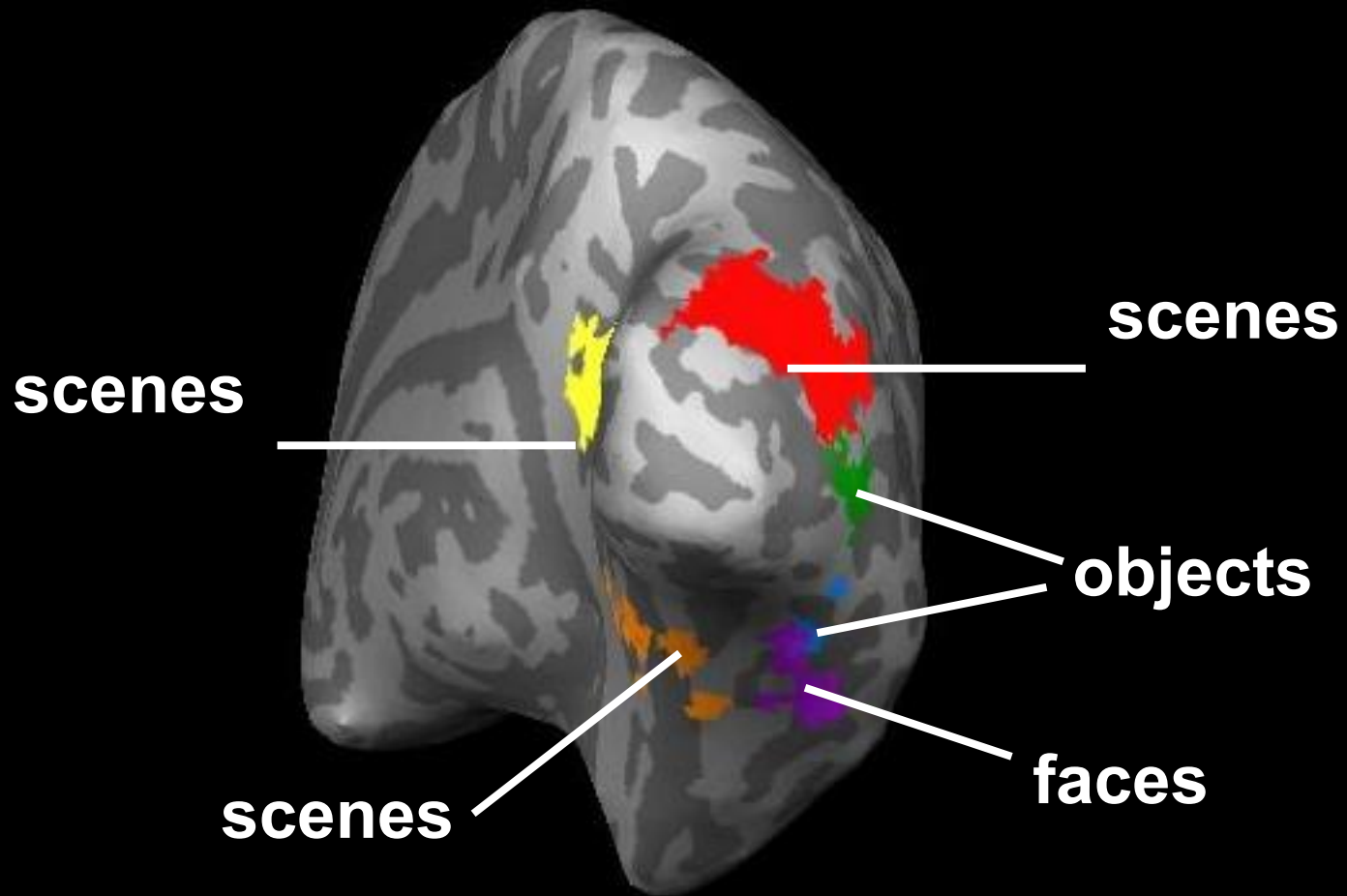


face module



97% face-selective cells

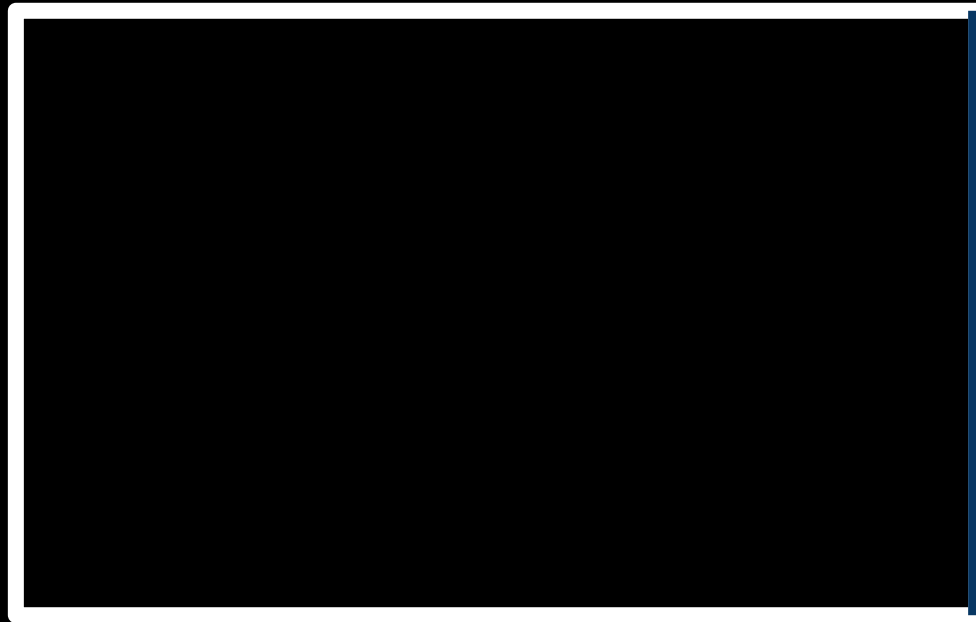
category-selective regions



geometry module



geometry module



geometry module

0%	58%
42	0%

adults

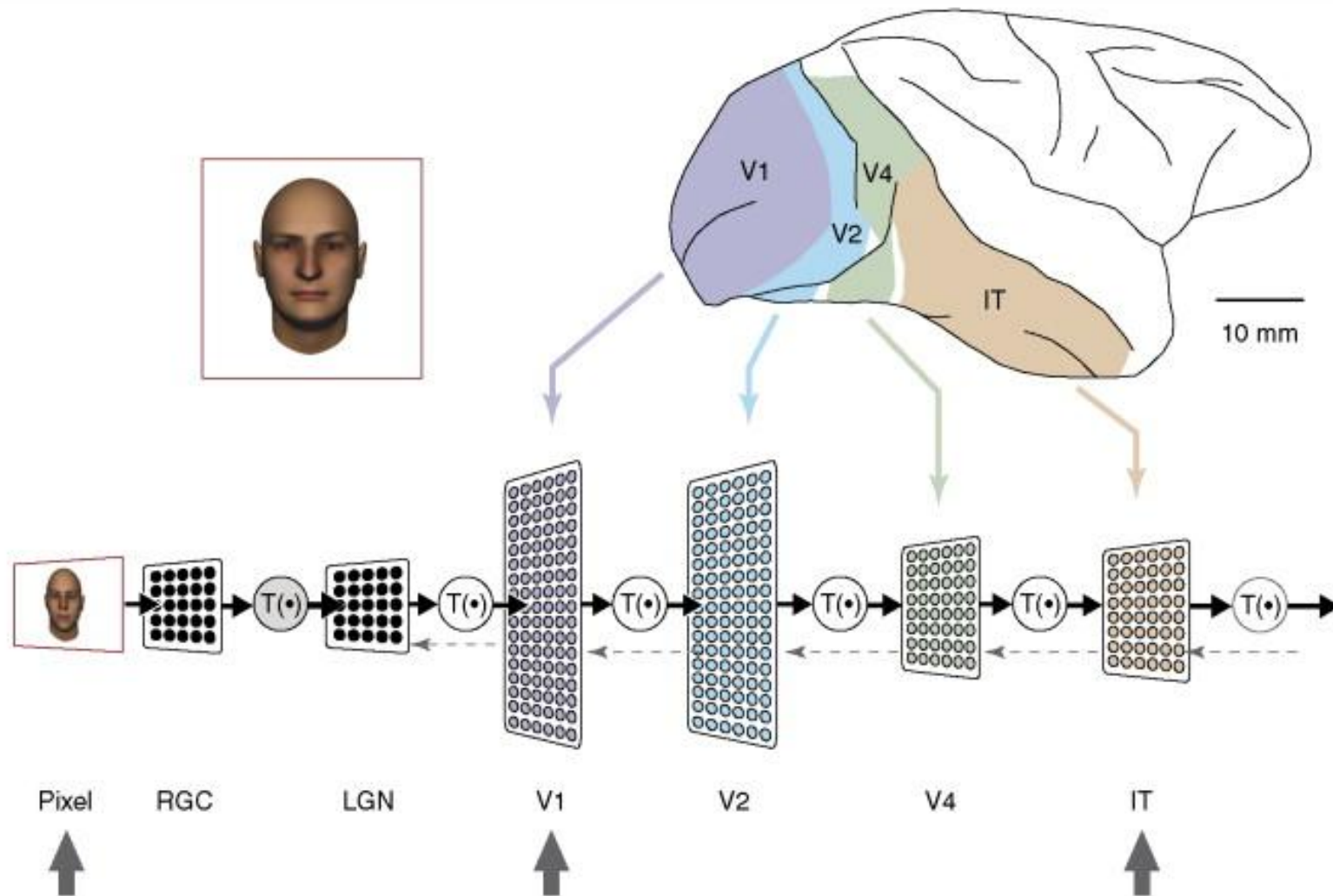
0%	96%
4%	0%

10%	39%
39	12

kids

9%	29%
50	12

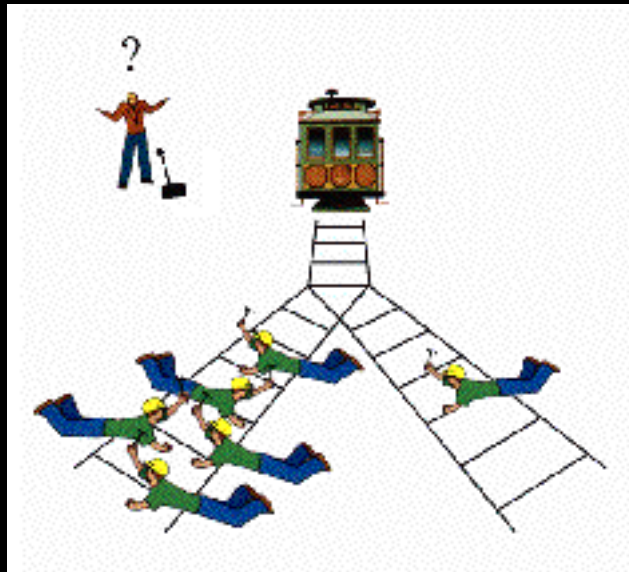
visual system



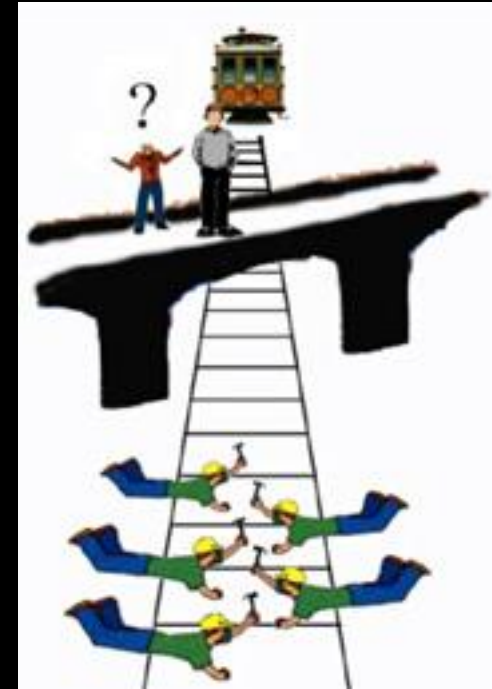
TRENDS in Cognitive Sciences

step3

moral cognition



trolley problem

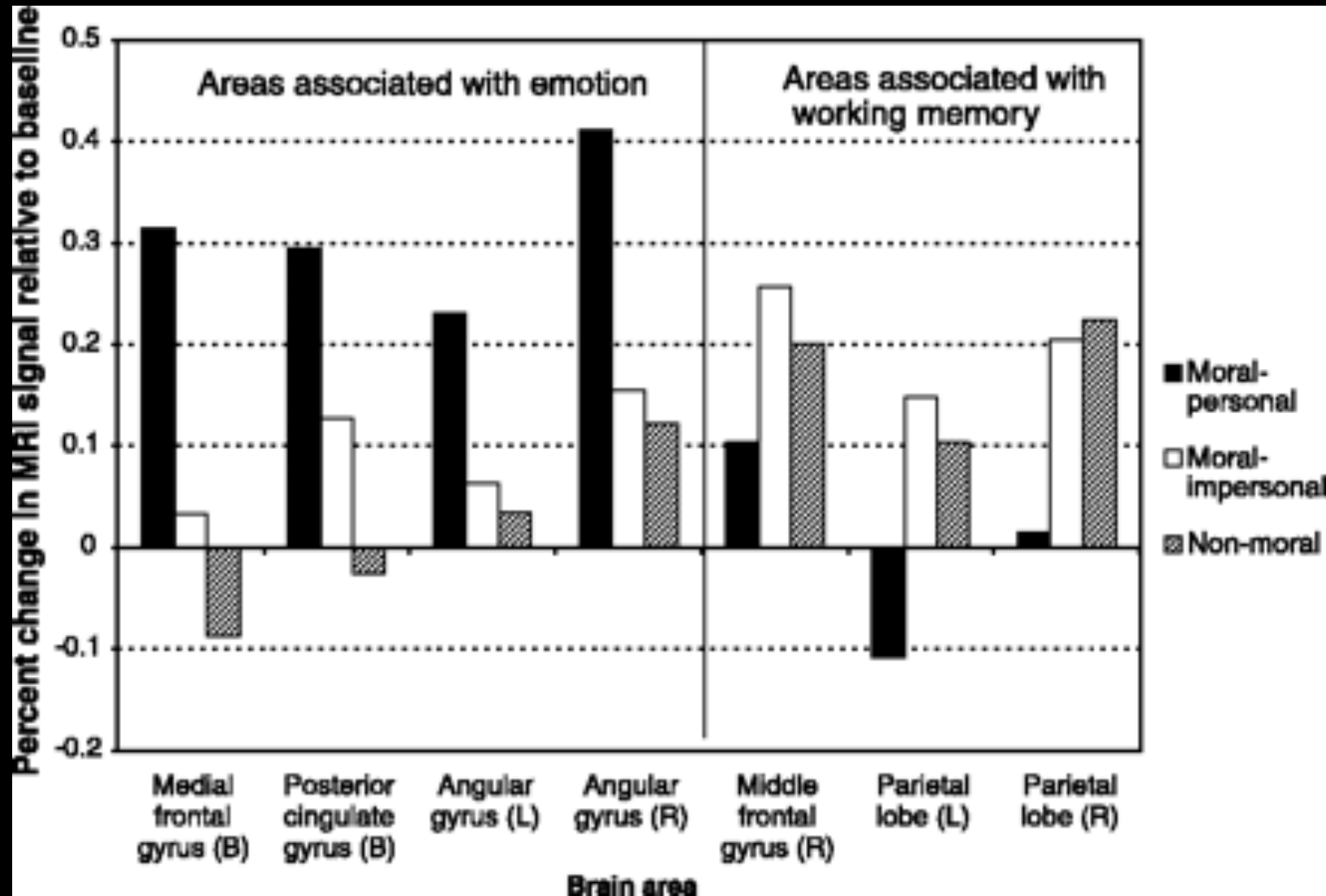


footbridge problem

where does your
morality originate from?

from J. Greene

moral cognition



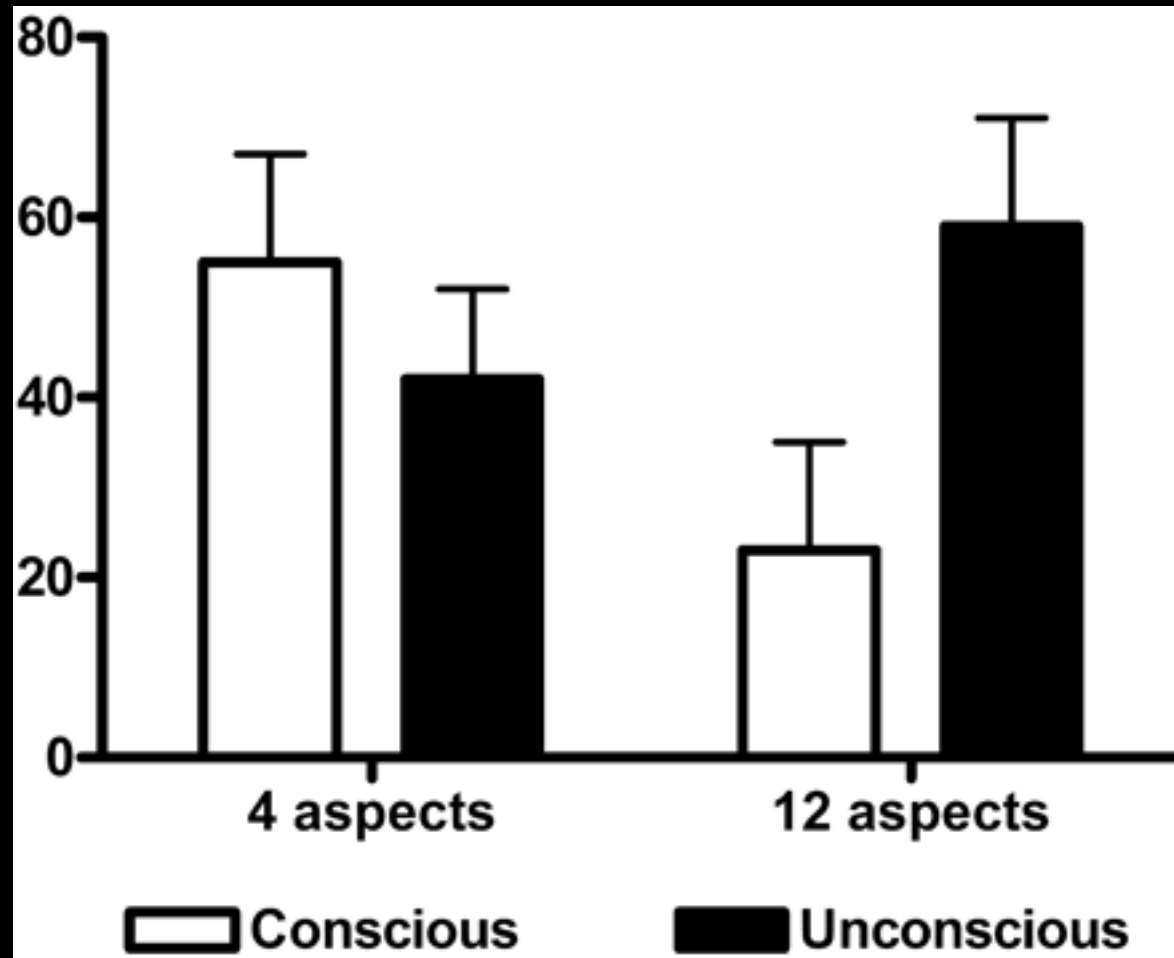
Greene et al., Science (2001)

**con
scious
ness**

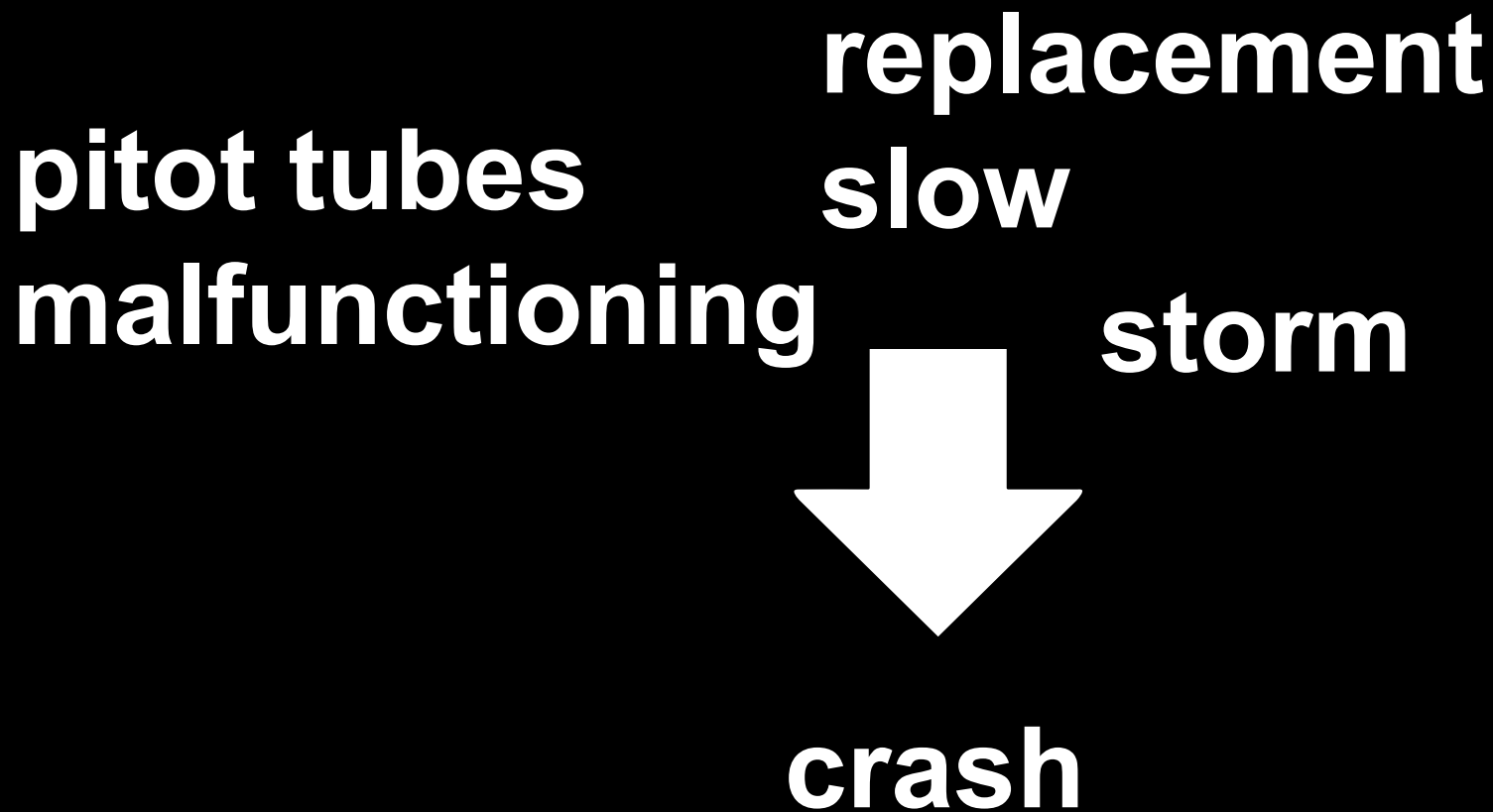
simple to complex

**is there anything special about
consciousness?**

conscious decisions



simple to complex **air france 447**



simple to complex

**is there anything special about
consciousness?**

**maybe it is a result of
interactions of simple
components**

thank you