

# Functions of Consciousness

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Liege, April 2009

Part One

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## *Warm-up*

2/35

- Please answer the following questions:
  - Do you think consciousness has a function?
  - If so, what is it (are they)?
  - If not, why not?
- Acknowledgement: Some material based on a tutorial designed by Juliane Wilcke (University of Canterbury, New Zealand).
- Most of it from Seth (2009). Functions of consciousness. Elsevier Encyclopedia of Consciousness., ed. W. Banks.

# Objectives

- This tutorial will not:
  - Reveal the one true function of consciousness
- This tutorial will:
  - Clarify issues surrounding ascribing a function(s) to consciousness
  - Distinguish between the questions (i) what consciousness does and (ii) why it evolved.
  - Critically examine some widely held ideas about the function of consciousness (e.g., rationality, volition)
  - Explore the state-of-thinking about alternative functions

# Outline

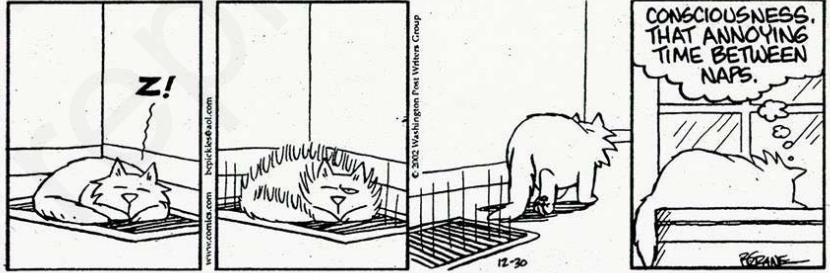
- **Part 1: Issues**
  - Consciousness
  - Does consciousness have a function?
  - Functional analysis
  - Consciousness revisited
- **Part 2: Functions**
  - Volition and rationality
  - The integration consensus
  - Beyond integration
- **Conclusions**

# 1. Consciousness

“Consciousness is everything we experience. Think of it as what abandons us every night when we fall into a dreamless sleep and returns the next morning when we wake up.”

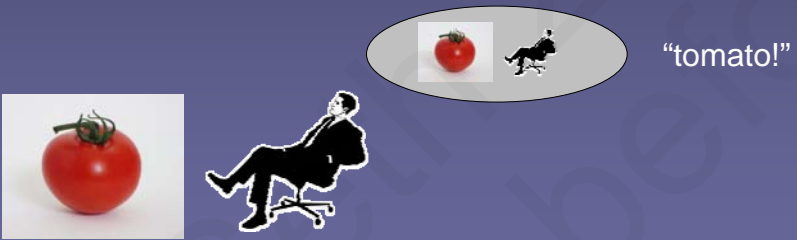
Tononi & Edelman (1998)

**Pickles** by Brian Crane



# Consciousness

- **Primary consciousness:** basic components of conscious scenes: colors, shapes, smells, sounds.
- **Higher-order consciousness:** consciousness of consciousness: thoughts, beliefs, etc.



2. *Does consciousness have a function?*

## Conscious inessentialism (CI)

“For any intelligent activity  $i$ , performed in cognitive domain  $d$ , even if we do  $i$  with conscious accompaniments,  $i$  can in principle be done without these conscious accompaniments.”

Owen Flanagan



- Constitutive vs. causal essentiality (Dretske)
- Zombies
  - CI implies zombies, but zombies do not imply CI.
  - Brainy zombies

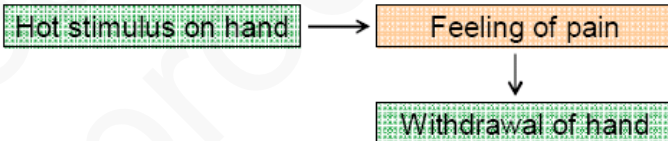
## Epiphenomenalism (EP)

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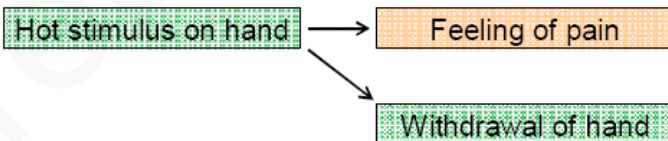
“An unwarrantable impertinence.”

William James

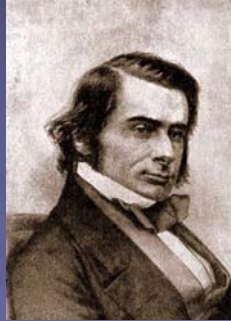
Common sense: (example from Flanagan, 1992)



Epiphenomenalism:



“The consciousness of brutes would appear to be related to the mechanism of their body simply as a collateral product of its working, and to completely without any power of modifying that working, as the steam-whistle which accompanies the work of a locomotive engine is without influence upon its machinery.”



Thomas Huxley

“Feeling is a mere collateral product of our nervous processes, unable to react upon them any more than a shadow reacts on the steps of the traveller whom it accompanies. Inert, uninfluential, a simple passenger in the voyage of life, it is allowed to remain on board, but not to touch the helm or handle the rigging.”



William James

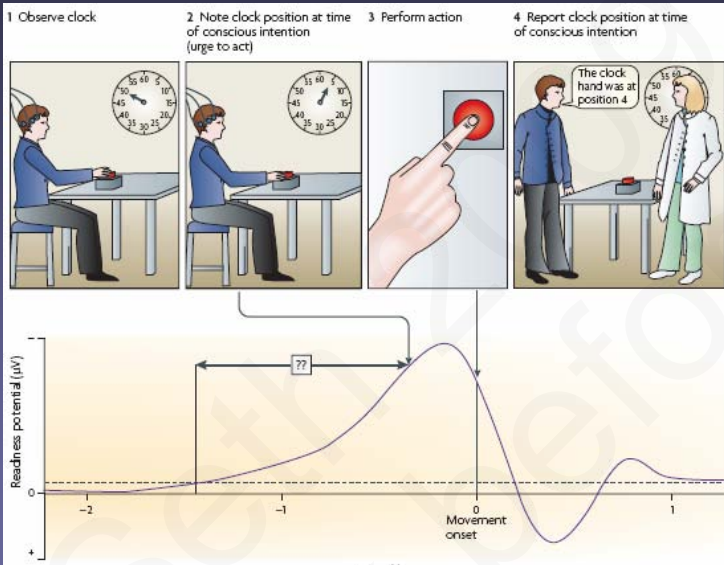
## *Epiphenomenalism (EP)*

- Consciousness exists but does not play any role in neural or cognitive operations.
- If CI is false, this does not imply that EP is false.
- If CI is true, this does not imply that EP is true.
- Metaphysical EP: consciousness is entirely without causal powers.
- Biological EP: causal effects of consciousness not involved in reproductive success.

## *Empirical evidence for CI and EP*

- Evidence for CI: behaviors for which consciousness has been assumed necessary can be carried out in its absence.
- Evidence for EP: causal link between consciousness and behavior is challenged.

# The Libet experiments



## Extensions to Libet

nature  
neuroscience

### Unconscious determinants of free decisions in the human brain

Chun Siong Soon<sup>1,2</sup>, Marcel Brass<sup>1,3</sup>, Hans-Jochen Heinze<sup>4</sup> & John-Dylan Haynes<sup>1,2</sup>

There has been a long controversy as to whether subjectively 'free' decisions are determined by brain activity ahead of time. We found that the outcome of a decision can be encoded in brain activity of prefrontal and parietal cortex up to 10 s before it enters awareness. This delay presumably reflects the operation of a network of high-level control areas that begin to prepare an upcoming decision long before it enters awareness.

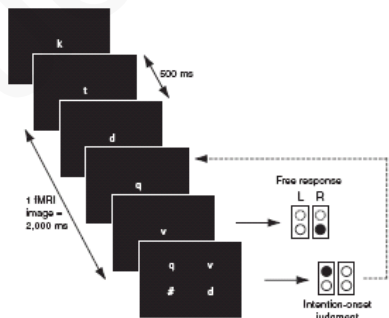


Figure 1 Measuring the onset time of conscious motor intentions. Subjects viewed a letter stream that was updated every 500 ms (shown here only for a few frames). At some point they spontaneously made the decision to press either the left or right button using their corresponding index finger (free response). Subsequently, they were presented with a response-mapping screen that instructed subjects as to which second button to press to report the time at which they consciously made the motor decision (Supplementary Methods).



## Interpreting Libet

- Libet: “If the brain can initiate a voluntary act before the appearance of a conscious intention ... is there any role for conscious function?”
- Issues:
  - Task specificity
  - Free won't rather than free will?
  - Influence of task instructions
  - Why surprising, anyway?
- Recent study on “free won't” by Brass & Haggard (J. Neurosci., 27, 9141-9145, 2007)

## Interpreting Libet

- Flanagan: “Libet’s results, far from offering solace to the suspicious epiphenomenalist, are precisely the sort of results one would expect if one believes that conscious processes are subserved by nonconscious processes, and that conscious processes play variable but significant causal roles at various points in different cognitive domains.”
- Plenty other evidence similar to Libet (e.g., in decision making).
- Recent review: Haggard, P. (2008) Human volition: towards a neuroscience of will. *Nature Neuroscience* 9: 934-946

## *Interim summary*

- Although both CI and EP are likely to be false it is difficult to establish their falsity.
- Even if CI and/or EP turn out to be true, deep questions remain, e.g.:
  - Why is consciousness associated with neural activity?
  - Why do conscious contents reflect functional roles?

## *3. Functional analysis*

## *What is a biological function?*

- Function type 1: Why did X evolve?
  - Proper function, teleo-function, etc.
- Function type 2: What does X do?
  - “Cummins function”

## *Evolutionary (teleo) functions*

- The function of X is the effect that X has which explains why it is there.
- Challenges (in general):
  - part/whole relations
  - present vs. past functions (e.g., reading)
  - non-pervasiveness of selection (e.g., colour of blood, chin structure)
  - “just so stories” (Gould and Lewontin)
- All the more difficult in the case of consciousness!

## *Evolutionary (teleo) functions*

- Required evidence (according to Robert Brandon; how to turn 'how-possibly' into 'how-actually'):
  - Evidence that selection has occurred (e.g., fossil evidence)
  - Ecological explanation of relative adaptedness
  - Evidence for heritability
  - Information about population structure
  - Phylogenetic information about trait polarity
- Polger and Flanagan: “The task of giving an adaptive explanation for consciousness inherits those difficulties intrinsic to adaptationist explanation, and complicates them with all the philosophical and scientific problems attendant to consciousness”

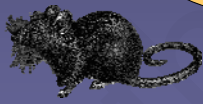
## *Animal consciousness*

- Thinking about the evolution of consciousness raises the question of animal consciousness:

# Animal consciousness



“tomato!”



“ \_\_\_\_\_ ”

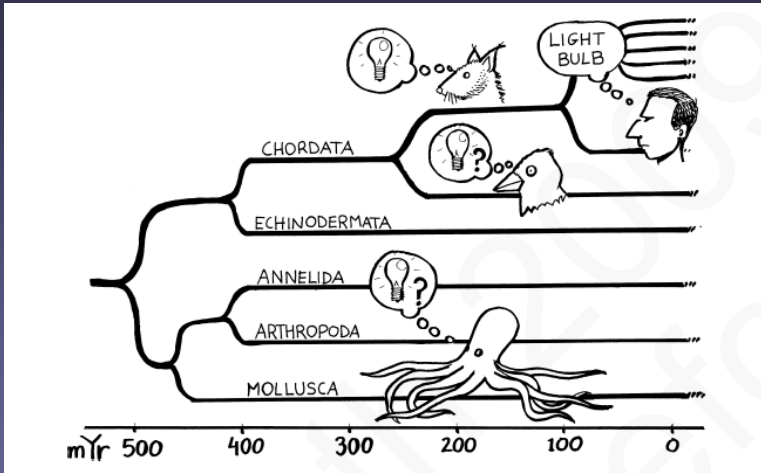
Seth, Baars, & Edelman D.B. (2005). *Consc. Cogn.*

# Animal consciousness

D.B. Edelman et al. / *Consciousness and Cognition* 14 (2005) 169–187



# Animal consciousness



Edelman, D.B., Baars, & Seth (2005). *Consc. Cogn.*

... but this is really a different story altogether...

## Cummins functions

- Idea: to isolate salient causal effects from among a multiplicity of effects a given biological feature may have.
- How: by considering the role played by X in how some larger system (containing X) exhibits a more complex capacity or behavior.
- Example: Hearts have the function of pumping blood because this helps explains the capacity of the body to achieve oxygen circulation.

# Functionalism

- “Mental states are second-order properties constituted by their causal relations to one another and to sensory inputs and motor outputs”.
  - Controversial (too liberal, arbitrary?)
  - Accepting functionalism does not negate CI or EP (causal relations need not be explanatorily salient).
  - No need to subscribe to functionalism to ask about functions.

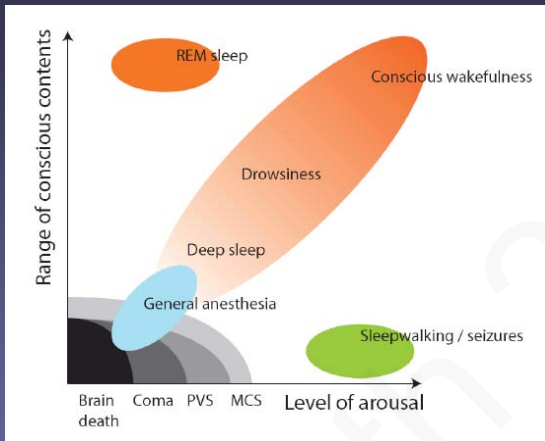


Jerry Fodor

## Interim summary

- Teleo-functions may be granted to the larger capacity, but do not necessarily transfer.
- Both Cummins-functions and teleo-functions pick out functions from mere effects in virtue of explanatory salience.
- Proposing a Cummins function does not exclude existence of a teleo-function.
- But can one ask about the evolution of consciousness without identifying a Cummins-function?

## Conscious level vs. conscious content



Adapted from Steven Laureys

- Other distinctions exist: e.g., “transitive” vs. “creature” vs. “state” consciousness (Rosenthal).

## Conscious content

- Many types of mental content can be either conscious or unconscious:
  - Explicit/implicit beliefs
  - Blindsight
  - Intentions
  - Linguistic thoughts?
- Useful to distinguish the function that mental content has in virtue of being conscious from the function that content would have even when unconscious (Rosenthal).
- May not always be possible to do so (e.g., blindsight, inner speech, etc.).



# Primary vs higher-order consciousness



“tomato!”

- Higher-order consciousness is needed for verbal report, but may not be needed for the existence of primary conscious content.
- i.e., important distinction between epistemology and ontology w.r.t. consciousness.

# Higher-order thought (HOT) theory

- A mental state is a conscious mental state in virtue of the existence of a higher-order thought (HOT), distinct from that state, to the effect that one is in that state.
- HOTs themselves need not be conscious (i.e., HOT ≠ HOC).
- According to HOT, mental content has the same causal effect whether conscious or not. The function of consciousness pertains to the function of the HOT.
- Function therefore likely to be minimal.



David Rosenthal

## *Interim summary*

- There is a difference between an organism's being conscious, and the conscious contents such an organism has. One set of functions cannot be inferred from the other.
- Where possible, differentiate the function of mental content from the function in virtue of its being conscious
- Consciousness is not a unitary phenomenon.