

Functions of Consciousness

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Part Two

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Outline

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- **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**

Revision

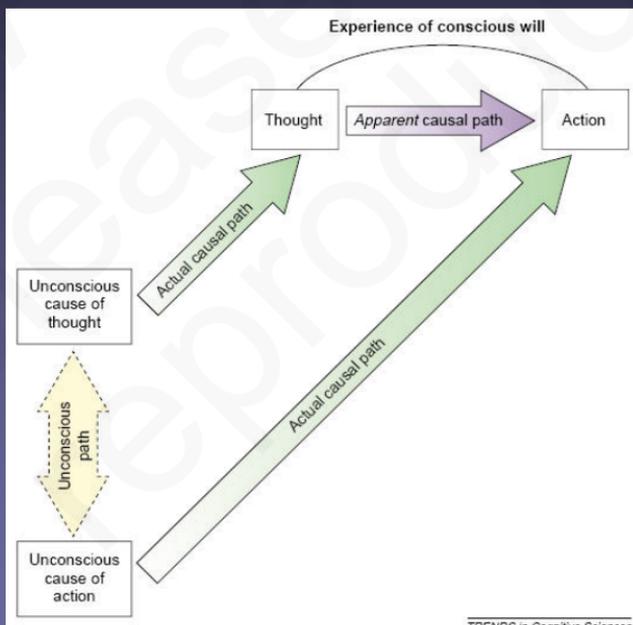
- Conscious inessentialism and epiphenomenalism.
- Teleo-functions vs. Cummins functions.
- HOT theory and consciousness: The function of consciousness is only the function of the HOT that makes a particular mental state a conscious mental state.

5. Volition and rationality

Volition

- The function of consciousness is to initiate and control voluntary action.
- James' "ideomotor theory"; getting out of bed on a chilly morning.
- But: both the actions and the intentions may be caused by a common set of unconscious precursors (remember Libet).
- So: The experience of volition is an experience like any other and does not have any additional causal power in virtue of being volitional.

Is free will an illusion?



Daniel Wegner

Apparent mental causation

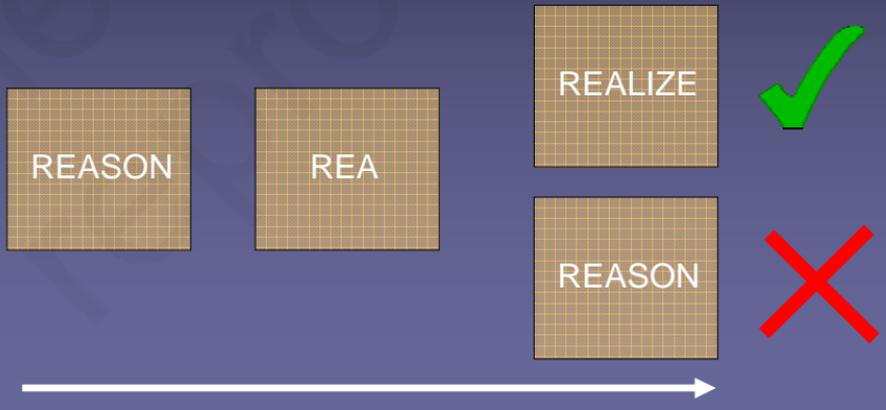
- We experience volition only when mental content is inferred, rightly or wrongly, to have produced the corresponding action.
- Such inferences are made when the following constraints are satisfied:
 - Primacy (content precedes the action)
 - Consistency (content corresponds to the action)
 - Exclusivity (no other plausible factor)
- Can voluntary actions occur in the absence of experiences of volition?
 - E.g., schizophrenia



Daniel Wegner

Experimental evidence re: volition

- Libet, Haggard, again.
- Blindsight subjects / biofeedback training
- Larry Jacoby's exclusion task:



Rational action

- From Descartes, Locke on, much emphasis on the benefits of conscious deliberation for effective decision making.
 - Block: (Access) consciousness is “poised for use for the rational control of action and speech”
 - Koch: consciousness provides an “executive summary” to parts of the brain involved in planning and deliberation
- But: Not all conscious thinking is rational, and not all rational behaviour is conscious.
- Nisbett & Wilson (1970s): peoples’ descriptions of their own reasoning processes are often inaccurate.

Recent evidence re: rationality

- Choice blindness (Johansson et al.)
- Unconscious deciding (Dijksterhuis et al.)
- Neuropsychological evidence showing that an excess of rationality can be maladaptive.
- Damasio/Cabanac: Consciousness integrates emotion in order to bias rational deciding, reducing the space of possible options and the time and effort required to decide among them.

Interim summary

- Consciousness should not be excluded from functional roles in volition and rationality.
- But, it is not the experience of volition that causes the voluntary action.
- And, consciousness is neither necessary nor sufficient for rational action.

6. The integration consensus

The “integration consensus”

- Consciousness serves to integrate otherwise independent neural and cognitive processes.
- This integration enables flexible, context-dependent behavior.
- James: The distribution of consciousness is “exactly such as we might expect in an organ added for the sake of steering a nervous system grown too complex to regulate itself.”

Global workspace (GW) theory

- Bernard Baars (1988 onwards).
- The GW: “a central resource enabling the distribution of signals among numerous otherwise informationally encapsulated and functionally independent specialized processors.”
- Mental content becomes conscious mental content when it gains access to the GW.
- Combines parallelism with seriality.
- In novel situations GW broadcast can mediate the production of novel responses.



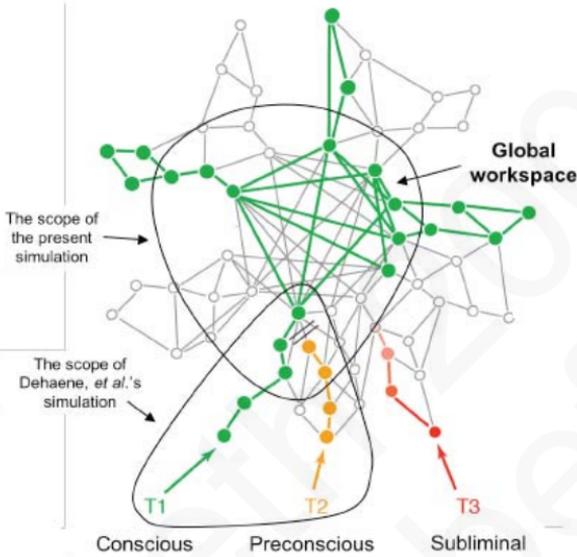
Bernard Baars

Global workspace (GW) theory

Parallel
Special



Global



e model:
t seq.

Neuronal GW: Stanislas Dehaene et al.

Criticisms

- GW theory may be vulnerable to both EP and CI, e.g. as shown by Stan Franklin's 'IDA' system which uses a GW model to solve a naval logistical problem.
- Integration for flexibility is arguably a very basic function of nervous system activity, substantially present even in invertebrates.

Flexibility and skill acquisition

- Flexible control is needed especially during the acquisition of new skills.
- Automatic behavior seems 'less conscious' than behavior during learning, and brain activity is also less widespread for learned behavior.
- Cleeremans: Radical plasticity thesis
- Lamme: recurrent sweep of neural activity generates consciousness and is also a primary mechanisms for synaptic plasticity.

Boundaries of integration

- Ezequiel Morsella (2005): "it remains unclear which kinds of information are distributed in this global, conscious manner and which kinds are distributed in a different, perhaps unconscious, manner".
- Supramodular interaction theory (Morsella): Conscious integration involves the skeleto-motor system.
- Bjorn Merker: effects of self-motion contaminate sensory information about the world and need to be compensated for. Consciousness provides a stable arena for action.

Discrimination and complexity



Every conscious scene is
differentiated

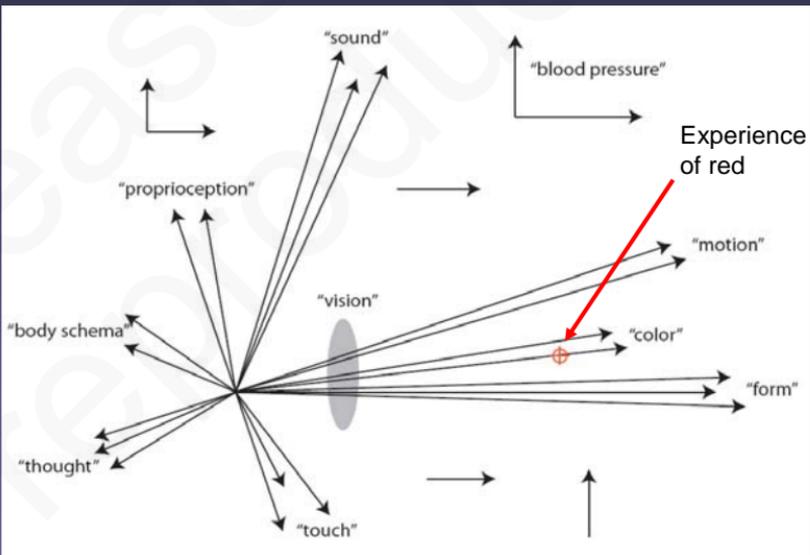
Every conscious scene is
integrated

Tononi (2004) *BMC Neurosci.*

Tononi & Edelman (1998), *Science*

Edelman & Tononi (2000), *A Universe of Consciousness*

Discrimination and complexity



Edelman & Tononi (2000), *A Universe of Consciousness*

Discrimination and complexity

- Every conscious scene is enormously informative. (Unconscious scenes would be substantially less informative.)
- Occurrence of any conscious scene simultaneously rules out the occurrence of a vast number of alternative conscious scenes.
- Each differentiated conscious scene can be linked to a different behavioral response.
- Function of consciousness is adaptive and flexible discrimination.

Interim summary

- Integration consensus: Consciousness functions to bring together diverse signals in the service of enhanced behavioral flexibility and discriminatory capacity.
- Can such integrative functions be implemented by nonconscious devices?
- Dynamic core hypothesis / information integration theory make some claims that conscious integration has to be conscious.

7. *Beyond integration*

Error correction

- Increasingly pervasive view (e.g., Friston): most general of all brain functions is prediction.
- A near-car-crash suddenly brings new elements into our conscious experience, possibly due to breakdown in prediction error.
- John Gray: The 'comparator hypothesis'.
- Plausibility of this hypothesis may be challenged by pervasiveness of prediction.
- Noe and O'Regan: contents of consciousness are determined by what we expect to see.

Social interaction

- Nicholas Humphrey (1987): “What consciousness does is to provide human beings with an extraordinarily effective tool for doing natural psychology. Each person can look into his own mind, observe and analyze his own past and present mental states, and on that basis make inspired guesses about the minds of others.”
- Associates with HOC (‘self-reflexive insight’).
- May deny consciousness to non-social creatures, and maybe even to autistic people, infants.

Social interaction

- Nicholas Humphrey (2008), on the function of consciousness: “I may shock you by what may seem the naivety of my conclusion (I’ve shocked myself): I think the plain and simple fact is that consciousness – on various levels – makes life more worth living. ”
- May not be as naïve as all that:
 - Close link with motivation
 - Close link with what it means to be ‘alive’
- Connects back to emotions, feelings, etc. (e.g., Damasio)

Dreaming

- Much of our lifetime conscious content occurs when we are not behaving!
- But dreaming of course need not be causally impotent.
- Dream content is often disturbing, threatening, and associated with anxiety (even in people in good mental health).
- Antti Revonsuo: dreaming as a biological defense mechanism for simulating threat perception.

Virtual reality

- General idea: consciousness presents a 'virtual world' in which actions and their consequences can be simulated.
- Germund Hesslow, Antti Revonsuo, to some extent Thomas Metzinger, and others.
- Simulation of possible agent-environment interactions is often taken as a hallmark of cognition rather than consciousness *per se*.

7. Conclusions

Conclusions

- Seth (2008): “There is abundant and increasing evidence that consciousness is functional. This evidence pertains both to the functional utility of being a conscious organism, and to having particular conscious content.”
- Rosenthal (2007): “The consciousness of thoughts, desires, and volitions adds little if any benefit for rational thinking, intentional action, executive function, or complex reasoning.”