Mechanical rationality, decision making and emotions

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1. Rationality - Instrumental rationality and negative view of emotion
2. The possibility of mechanical rationality – a computational approach
3. Problems of classical computational approach and suggestions to solve them
4. Positive view of emotion in decision making and reasoning

Rationality

Categorical meaning: *rational / non-rational*

Behavior is evaluated on the basis of reasons - explanations in terms of ends, norms and values.

Aristoteles: Man is a rational animal.

Normative meaning: *rational / irrational*

Belief or behavior is (was) not appropriately justified with reasons, norms or values.

Reason / emotion

The traditional western view:

Emotions fix our ends and desires and have a motivating force.

Hume: “reason is a slave of the passions”

Reason – limited to finding the right means to attain the ends.

Instrumental rationality – reason as a kind of computation (Hobbes)

“Negative view of emotion” (Plato)

The possibility of mechanical rationality

Two methods of explanation

- the Aristotelian method of explanation in terms of final ends

- mechanical or mechanistic method of explanation in terms of the regular, deterministic behavior of matter and motion.

Galileo’s characterization of the mechanical world picture

- "this grand book the universe, which … cannot be understood unless one first comes to comprehend the language and to read the alphabet in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is humanly impossible to understand a single word of it."

Computationalism and rationality
A bit of history

Thomas Hobbes (1588 - 1679)

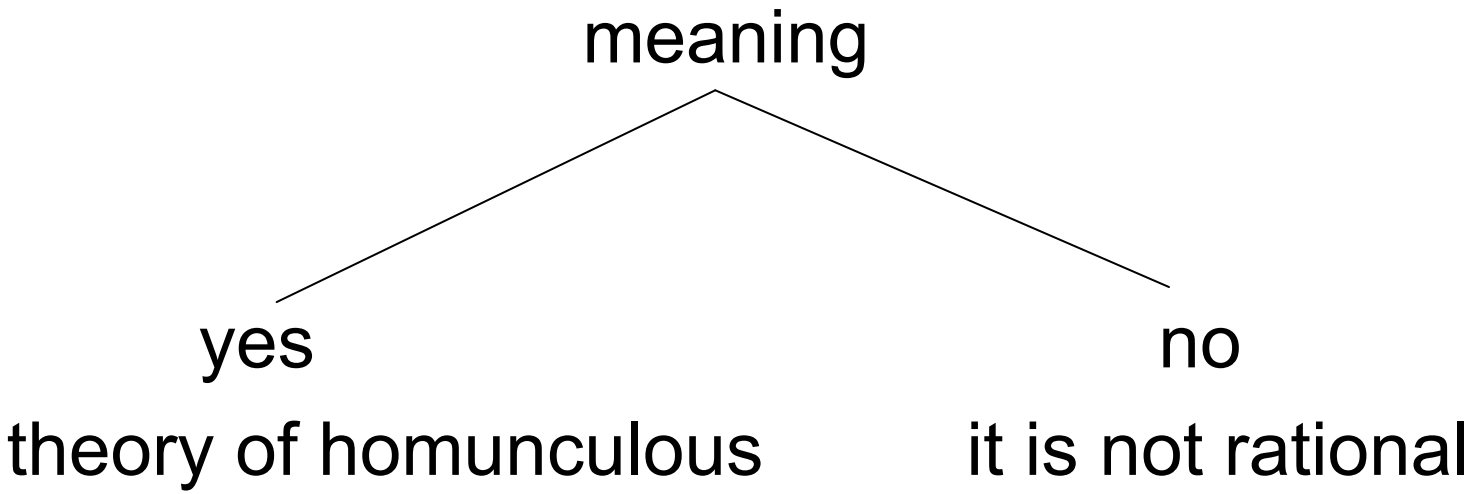
- "By RATIOCINATION, I mean *computation*
- ”When a man reasoneth, he does nothing else but conceive a sum total, from addition of parcels; or conceive a remainder, from subtraction of one sum from another.... These operations are not incident to numbers only, but to all manner of things that can be added together, and taken one out of another. For as arithmeticians teach to add and subtract in numbers; so the geometricians teach the same in lines, figures, - - angles, proportions, times, degrees of swiftness, force, power, and the like; the logicians teach the same in consequences of words; adding together two names to make an affirmation, and two affirmations to make a syllogism; and many syllogisms to make a demonstrations.” (Hobbes, *Leviathan*)

The paradox of mechanical reasoning

"either the manipulator pays attention to what the symbols and rules *mean* or it doesn't. If it does pay attention to the meanings, then it can't be entirely mechanical – because meanings (whatever exactly they are) don't exert physical forces. On the other hand, if the manipulator does not pay attention to the meanings, then the manipulations can't be instances of reasoning – because what's reasonable or not depends crucially on what the symbols mean". (Haugeland, 1985, p. 39)

The paradox of mechanical reasoning

"if the process or the system is mechanical, then it can't reason; if it reason, it can't be mechanical." (Haugeland, 1985, p. 39)



How is rationality mechanically possible?

Descartes scientific argument for dualism from *Discourse on method*

"it is not conceivable that such a machine should produce different arrangements of words so as to give an appropriately meaningful answer to whatever is said in its presence, as even the dullest of man can do …"

- Turing test!

A belief/desire psychology and propositional attitudes

The states (entities, events,…) are

1. Semantically evaluable
2. Have causal powers
3. The implicite generalisations of commonsense belief/desire psychology are largly true of them.
   (Fodor, 1987, p. 10)

- a commonsense belief/desire explanation: the similarity between trains of thought and arguments (e.g. Sherlock Holmes)

- states are both semantically and causally connected - causal connections respect the semantic ones

- what sort of mechanism could support this

The representational/computational theory of mind

- Computers show us how to connect semantic properties of a symbol with its causal properties *via its syntax* and thus offer an explanation of how there could be nonarbitrary content relations among causally related thoughts.

- Sentences in LOT interact in a way that mirrors the logical interactions of the contents. A token sentence of LOT is a concrete object that can have causes and effects and therefore can play a causal role.

Classical symbolic models

1. its representations have combinatorial syntax and semantics (LOT)

2. the principles by which representations are transformed are defined over structural properties of representations

(Fodor and Pylyshyn, 1988, p. 12-13)

In principle/ in practice solution to the problem of mechanical rationality

The frame problem

The problem of common-sense reasoning:

- How to deal with the changing world?
- How to determine the relevant consequences of an event?

Classical cognitive science approaches

- Design new non-monotonic logic
- the representational approacht
  representing knowledge in a usable way, i.e. how to *correctly* represent the world in a computationally efficient way
- the inferential approach
  more psychologically oriented and addresses the frame problem as an issue of dealing with change and allows for non-deductive reasoning methods

- The main criticism:
  a questionable primacy of declarative knowledge

- Dreyfus suggests that procedural knowledge (knowledge how) is a more fundamental knowledge underlying common-sense reasoning abilities and that the frame problem arises because classical cognitive science and AI have neglected the procedural kind of knowledge that underlies our skills.

Connectionism/neural networks and dynamical system theory as rival candidates

- different knowledge representation - distributed representations
- pattern recognition and generalization
- The problem of systematicity

Further philosophical worries

- Are purposive and mechanical explanation compatible? (Malcolm, Goldman, Kim)

- The problem of mental causation for physicalists (supervenience + the causal closure of the physical domain)

The positive view of emotion in decision making and reasoning

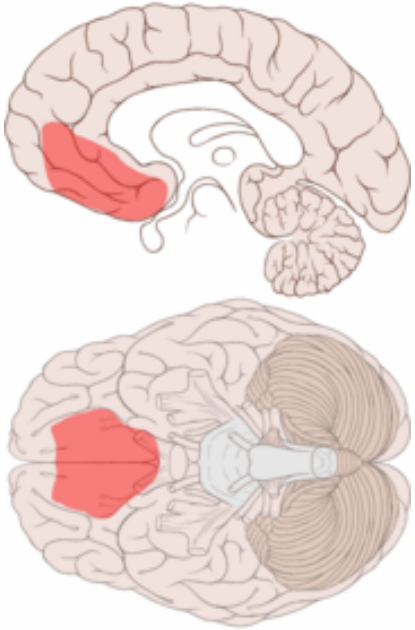
- Problems closer to the everyday situations include uncertainty and risk
- Emotions delimit the range of outcomes to be considered

  "in the process of rational deliberation itself, [emotions] render salient only a tiny proportion of the avalable alternatives and of conceivably relevant facts". (R. de Sousa, 1994)

- Logical reasoning alone does not suffice for real world decision making

Insights from neurology and neuroscience

- Example of Phineas P. Gage and other patients with lesions in ventromedial prefrontal cortex



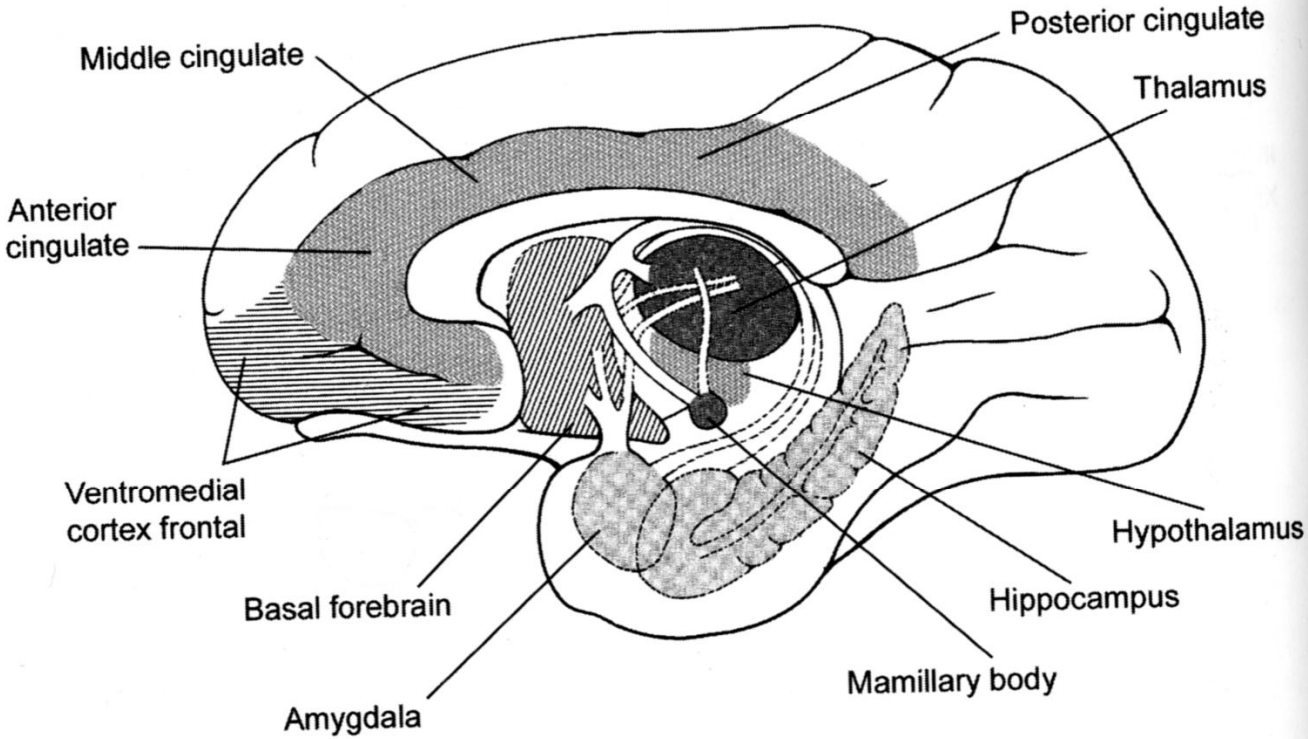


Figure 3.17 A schematic diagram of the limbic structures.

A schematic diagram of the limbic structures
(Chuchland, P.S., 2002: 104)

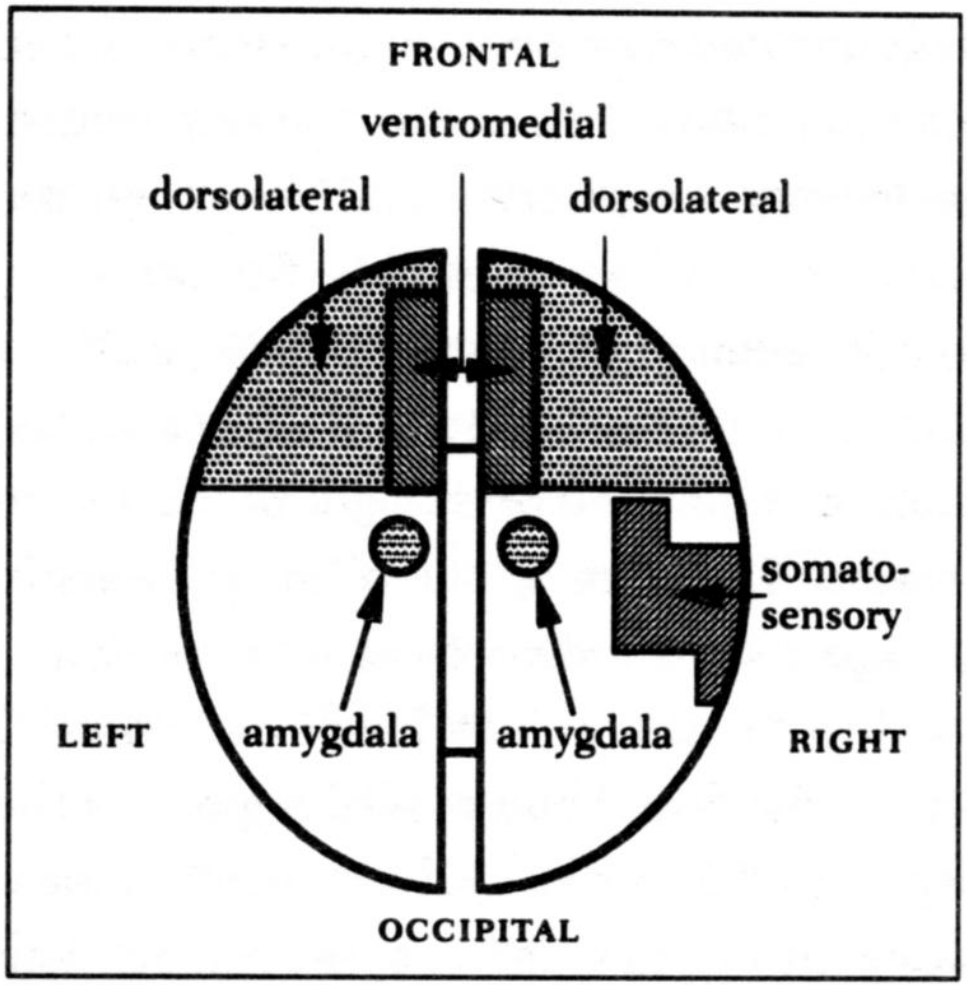


Figure 4-4. A diagram representing the set of regions whose damage compromises both aspects of reasoning and processing of emotion.

Damasio, 1994: p. 71

Damasio's theory of emotion and feelings

- The hypothesis of somatic markers

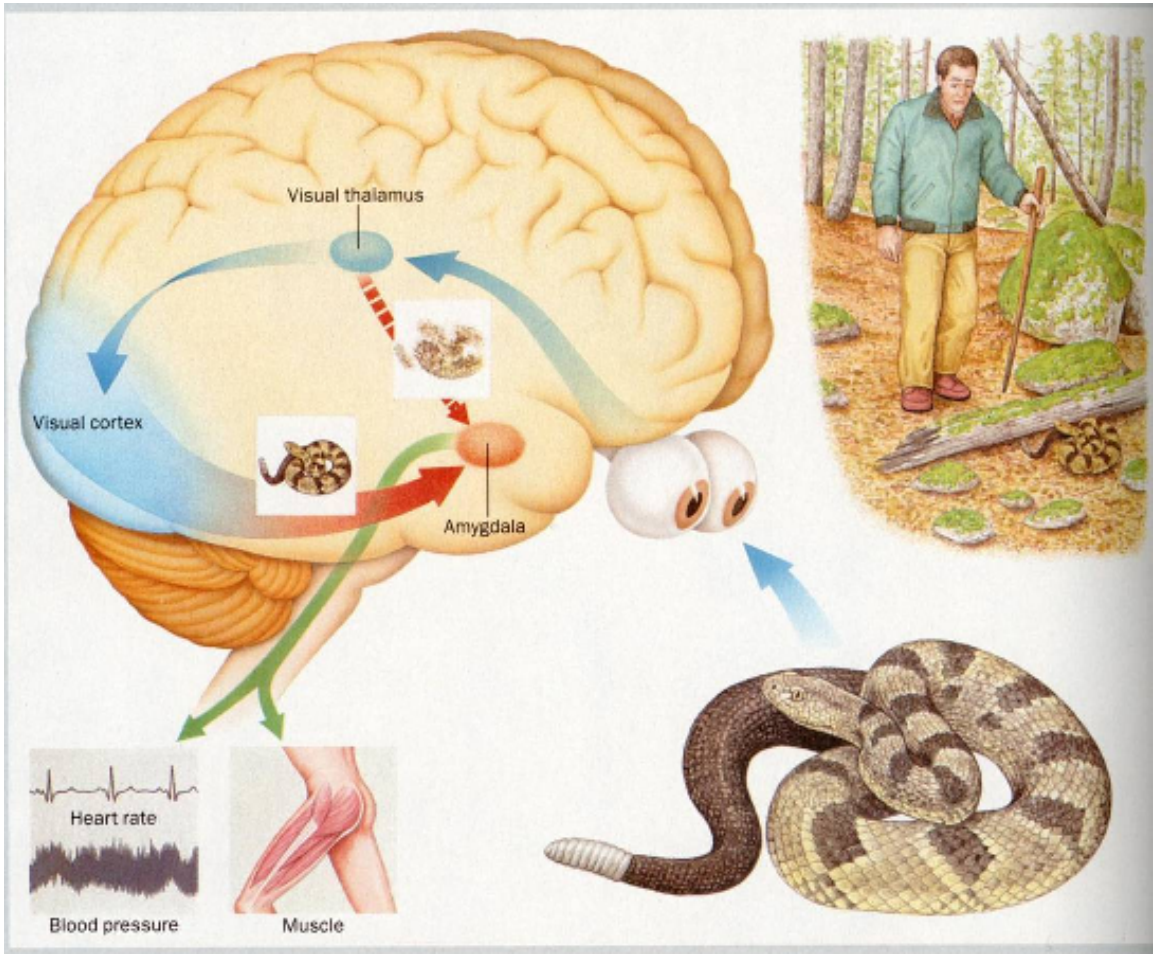
  a mechanism by which emotional processes can guide (or bias) behavior, particularly decision-making

- *Descartes's Error: Emotion, Reason, and the Human Brain* (1994), *The Feeling of What Happens* (1999), *Looking for Spinoza: Joy, Sorrow, and the Feeling Brain* (2003)

- When thinking about the possible consequences of the decision, gut feelings may be triggered by particular images associated with certain consequences – feelings operate as a kind of alarms - receting options that may lead to negative outcomes and thus reduce alternatives.

- Example of Damasio's patient's difficulties in arranging his next appointment

Two ways of processing – fear (J. Le Doux)



The search hypothesis of emotion

- “Emotions prevent us to getting lost in endles explorations of potentialy infinite search spaces by providing us with both the right kind of test and the right kind of search strategy for each kind of problem we must solve.” (Evans, 2002, p. 508)

The positive view of emotion

- Emotions play a positive role in aiding reason to make good decisions – instrumenetal reason is not independent of emotion.

?

Iowa Gambling test

(Bachera et al. 1994)