Probabilistic decision support systems

(UNCERTAINTY)

Online lectures

Antal Péter

antal@mit.bme.hu

Thinking Fast and Slow

- Daniel Kahneman:
  - Thinking Fast and Slow, Deep Learning, and AI
  - Artificial Intelligence Podcast
  - https://www.youtube.com/watch?v=UwwBG-MbniY

Unconscious (initiative) vs conscious (will)

Abstract: Voluntary acts are preceded by electrophysiological "readiness potentials" (RPs). With spontaneous acts involving no preplanning, the main negative RP shift begins at about -550 ms. Such RP's were used to indicate the minimum onset times for the cerebral activity that precedes a fully endogenous voluntary act. The time of conscious intention to act was obtained from the subject's recall of the spatial clock position of a revolving spot at the time of his initial awareness of intending or wanting to move (W). W occurred at about -200 ms. Control experiments, in which a skin stimulus was timed (S), helped evaluate each subject's error in reporting the clock times for awareness of any perceived event.

For spontaneous voluntary acts, RP onset preceded the uncorrected Ws by about 350 ms and the Ws corrected for S by about 400 ms. The direction of this difference was consistent and significant throughout, regardless of which of several measures of RP onset or W were used. It was concluded that cerebral initiation of a spontaneous voluntary act begins unconsciously. However, it was found that the final decision to act could still be consciously controlled during the 150 ms or so remaining after the specific conscious intention appears. Subjects can in fact "veto" motor performance during a 100-200-ms period before a prearranged time to act.

The role of conscious will would be not to initiate a specific voluntary act but rather to select and control volitional outcome. It is proposed that conscious will can function in a permissive fashion, either to permit or to prevent the motor implementation of the intention to act that arises unconsciously. Alternatively, there may be the need for a conscious activation or triggering, without which the final motor output would not follow the unconscious cerebral initiating and preparatory processes.

5. Free will and individual responsibility

This is not the place to debate the issue of free will versus determinism in connection with an apparently endogenous voluntary action that one experiences subjectively as freely willed and self-controllable (see Eccles 1980; Hook 1960; Nagel 1979; Popper & Eccles 1977). However, it is important to emphasize that the present experimental findings and analysis do not exclude the potential for "philosophically real" individual responsibility and free will. Although the volitional process may be initiated by unconscious cerebral activities, conscious control of the actual motor performance of voluntary acts definitely remains possible. The findings should therefore be taken not as being antagonistic to free will but rather as affecting the view of how free will might operate. Processes associated with individual responsibility and free will would "operate" not to initiate a voluntary act but to select and control volitional outcomes. (Voluntary action and responsibility operating behaviorally within a deterministic view would, of course, be subject to analogous restrictions.)

Some may view responsibility and free will as operative only when voluntary acts follow slower conscious deliberation of alternative choices of action. But, as already noted above, any volitional choice does not become a voluntary action until the person moves. In the present study, the subjects reported that the same conscious urge or decision to move that they experienced just before each voluntary act was present and that it was similar whether or not any additional experience of general preplanning had already been going on. Indeed, the reported times for awareness of wanting to move were essentially the same for fully spontaneous acts and those with some preplanning (Libet, Gleason, Wright & Pearl 1983). One might therefore speculate that the actual motor execution even of a deliberately preselected voluntary act may well involve processes similar to those for the spontaneously voluntary acts studied by us. The urge or intention actually to perform the voluntary act would then still be initiated unconsciously, regardless of the preceding kinds of deliberative processes.

The concept of conscious veto or blockade of the motor performance of specific intentions to act is in general accord with certain religious and humanistic views of ethical behavior and individual responsibility. "Self-control" of the acting out of one's intentions is commonly advocated; in the present terms this would operate by conscious selection or control of whether the unconsciously initiated final volitional process will be implemented in action. Many ethical strictures, such as most of the Ten Commandments, are injunctions not to act in certain ways. On the other hand, if the final intention to act arises unconsciously, the mere appearance of an intention could not consciously be prevented, even though its consummation in a motor act could be controlled consciously. It would not be surprising, therefore, if religious and philosophical systems were to create insurmountable moral and psychological difficulties when they castigate individuals for simply having a mental intention or impulse to do something unacceptable, even when this is not acted out (e.g., Kaufinann 1961).

Libet, B., 1985. Unconscious cerebral initiative and the role of conscious will in voluntary action. *Behavioral and brain sciences*, *8*(4), pp.529-539.

A framework for consciousness

Here we summarize our present approach to the problem of consciousness. After an introduction outlining our general strategy, we describe what is meant by the term 'framework' and set it out under ten headings. This framework offers a coherent scheme for explaining the neural correlates of (visual) consciousness in terms of competing cellular assemblies. Most of the ideas we favor have been suggested before, but their combination is original. We also outline some general experimental approaches to the problem and, finally, acknowledge some relevant aspects of the brain that have been left out of the proposed framework.

Fig. 1. The snapshot hypothesis proposes that the conscious perception of motion is not represented by the change of firing rate of the relevant neurons, but by the (near) constant firing of certain neurons that represent the motion. The figure is an analogy. It shows how a static picture can suggest motion.

Crick, F. and Koch, C., 2003. A framework for consciousness. *Nature neuroscience*, *6*(2), p.119.

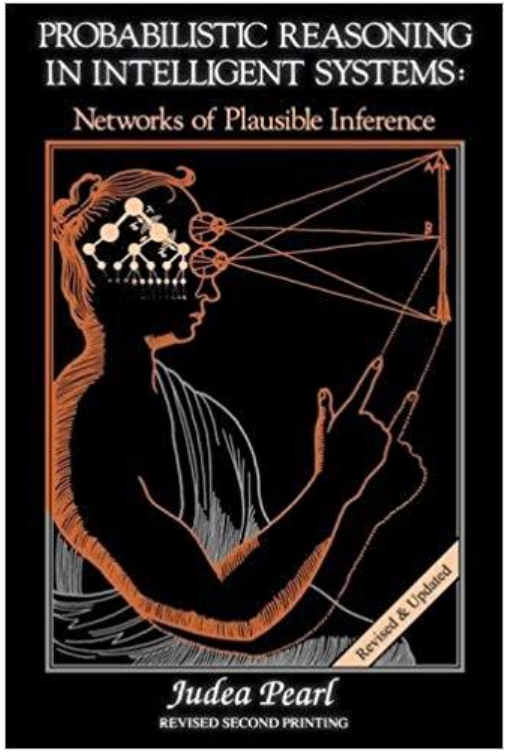
"The art of statistics"

- Professor David Spiegelhalter:
  - Communicating risk and uncertainty
  - https://www.youtube.com/watch?v=JhfMkmzaNdU
- Why you should love statistics
  - Alan Smith
  - https://www.youtube.com/watch?v=ogeGJS0GEF4
  -

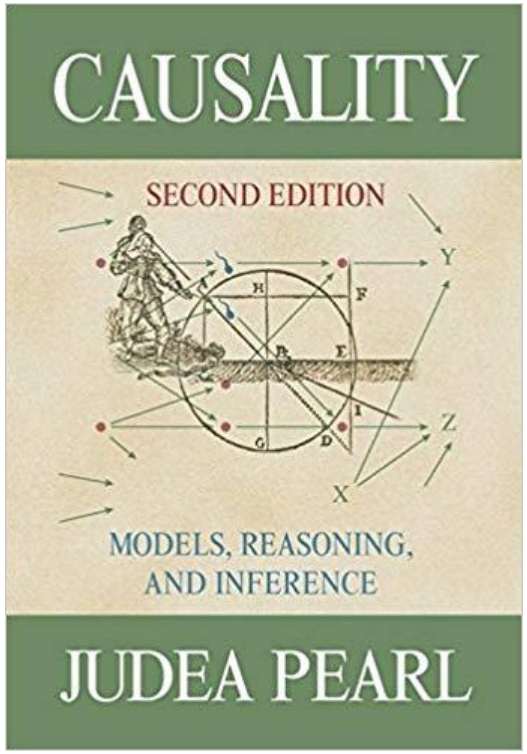
Bayesian or Frequentist?

- Michael Jordan:
  - Bayesian or Frequentist, Which Are You?
  - http://videolectures.net/mlss09uk_jordan_bfway/

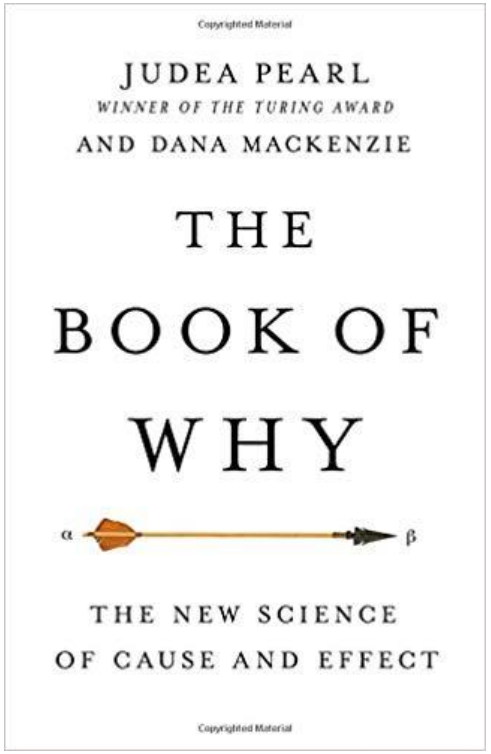
Causality



1988



2000



2018

Sequential decisions: bandits

Csaba Szepesvári

- DLRLSS 2019 – Bandits
  - https://www.youtube.com/watch?v=eJ3wZ14RRBQ
- Theory of RL – (Impossible mission)
  - https://www.youtube.com/watch?v=dHJxvSkTJHU

- Dr. Susan Murphy: "Wearable Tech in Healthcare"
  - https://www.youtube.com/watch?v=0FdN8gLHGNQ
  - http://people.seas.harvard.edu/~samurphy/seminars.html

Beyond utilities

- L.A. Paul
  - Transformative Experiences and Our Future Selves
  - https://www.preposterousuniverse.com/podcast/2020/02/24/85-l-a-paul-on-transformative-experiences-and-our-future-selves/

AGI resources: podcasts

- Lex Friedman: MIT 6.S099: Artificial General Intelligence
  - https://agi.mit.edu/
- Sean Carroll's Mindscape Podcast
  - http://www.preposterousuniverse.com/podcast/
- Sam Harris: Making sense
  - https://samharris.org/podcast/

AGI resources: courses

- MIT 6.S099: Artificial General Intelligence
  - https://agi.mit.edu/
- CS 294-149: Safety and Control for Artificial General Intelligence (Fall 2018)
  - https://inst.eecs.berkeley.edu/~cs294-149/fa18/
- **BME VIMIAV22 AGI/ "Mesterséges általános intelligencia"**
  - **http://www.mit.bme.hu/oktatas/targyak/vimiav22**

Science of happiness and well-being

Laurie Santos

- Science of happiness/well-being course https://www.coursera.org/learn/the-science-of-well-being
- TED
  - https://www.youtube.com/watch?v=DUd8XA-5HEk
- ASPEN
  - https://www.youtube.com/watch?v=ZizdB0TgAVM
- Making sense
  - https://www.youtube.com/watch?v=p1UxKD8C_GA

Happy Planet Index

https://en.wikipedia.org/wiki/Happy_Planet_Index