Subjective Experience and Objective Brains

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Questions and Requests:

- **Questions:**
  - If you had to choose one theory / discovery from the history of brain research that had great influence - which one would you choose?
  - What would you consider as a major breakthrough in brain research today?
  - What is the right direction for research? Why?
  - Is there a "right direction"?

- **The arrow and the target**

- **Request:**
  - “It will be better if each of you will present the radical point of view of his side”
Starting with the “Radical”:

- A radical word:
If you had to choose one theory / discovery from the history of brain research that had great influence - which one would you choose?

- That depends on what we consider as the brain research
- Is the ultimate goal of brain research “Understanding the brain and mind as a computing machine” (i.e. “Neural Computation”)?
- -- In my opinion, NO!
- Why? Because the brain is, of course, a wonderful computing machine, but that’s not its salient, or most important feature
- The salient feature of the brain is that -- is the organ of the mind (המוח هو איבר הנפש!).
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- Minds, like brains, are part of nature -- a very poorly understood part of nature
- Brain research, especially its future, should reflect this fact. Therefore, in my opinion:
  - The goal: understanding the brain as a computing machine
  - The goal: understanding the brain as the organ of the mind
  - But: if the goal of brain research is to understand how the brain gives rise to the mind, then we are immediately confronted by the mind-brain problem
  - The problem: how subjective experience is related to objective brains
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- The mind-brain problem is about 2500 years old
- Until the 19th century it was the exclusive domain of philosophers, because it has been impossible to investigate the role of the brain as the organ of the mind directly
- Since then, in my opinion, great advances have been made on the road to understanding the brain as the organ of the mind
- Many gifted individuals have contributed great discoveries and great theories about the nature of the brain, the nature of the mind, and their interrelationship
Discoveries and theories by Paul Broca, Charles Darwin, John Hulings Jackson, Santiago Ramon y Cajal, Sigmund Freud, Charles Sherrington, Alexander Romanovich Luria, Wilder Penfield, Konard Lorenz, Roger Sperry, Arvid Carlsson and Eric Kandel, among many others, have advanced our understanding of how the brain gives rise to the mind.

The “how” has been, and still is, under intense debate.
Understanding the brain as the organ of the mind: How hard is the problem?

- David Chalmers
  - Mathematician, Rhodes Scholar, PhD w Douglas Hofstadter; Director, Center for Consciousness Studies, University of Arizona

- The Conscious Mind (1996):
  - The easy problem: *What* are the neural processes that are associated with consciousness? (correlation, NCC)
  - The hard problem: *How* do neural processes make us conscious? (causality)

- Is there a hard problem?
  - The example of life and the mechanisms of life
The explanatory gap: “How does the brain produce qualitative subjectivity? How does it get us over the hump from the objective third-person character of neuron firings to the subjective first-person feelings we have when we are conscious?” (Searle, 2011)
What would you consider as a major breakthrough in brain research today? What is the right direction for research? Why? Is there a "right direction"?

The right direction, in my opinion, is the direction that will best help us understand ASAP how the brain gives rise to the mind (NCC’s).

Mind ≠ Consciousness [i.e., the unconscious is part of the mind], but we will ignore this for now.

I do not know whether the hard problem of consciousness really exists once the easy problem is solved; I suspect that it does, but am not sure.

Either way, I believe that whether we like it or not, we are stuck investigating the easy problem of consciousness, with the hope that this will one day help us understand the hard problem of consciousness – or discover that it has melted away.
The easy problem: What are the neural processes that are associated with consciousness? (correlation, NCC’s)

- Not so easy
- Many neuroscientists who see the brain as “a computing machine” also believe that consciousness is generated by (or emerges from) the joint activity of billions of interconnected neurons in the cerebral neocortex

However, I believe that this might not be the best way to study how the brain gives rise to the mind. Here is why:

Consciousness is characterized by three distinct features:
- Subjectivity (qualia, sensory)
- Intentionality (will, motor)
- Unity

Can we explain subjectivity (“I feel”) and intentionality (“I want”)?

Subjectivity and intentionality, in their basic forms, are probably subneocortical
Subjectivity, and therefore consciousness, is inherently emotional

- Subjectivity = Conscious awareness?
- Conscious awareness is not a unitary phenomenon
- Damasio -- Somatic Marker Hypothesis
  - (Core Cs $\rightarrow$ Extended Cs)
- Panksepp -- Affective Neuroscience
  - (Affective Cs $\rightarrow$ Cognitive Cs)
- Affective consciousness may be the most basic form of consciousness
- Consider pain and anesthesia… (why?)
Emotions are (primarily) subneocortical

- In order to truly pass the Turing Test (=be conscious), computers will have to develop **feelings**
- This may happen sooner than we think
- Understanding how the brain generates primal emotional feelings may be the most solvable problem in consciousness studies
- It can be readily studied in animals
- In all mammals studied to date, including humans, electrical stimulation induces much stronger feelings with much less electrical current in the lower regions of the brain (e.g., PAG<amygdala<neocortex)
- Decorticated animals (and humans) are outwardly much more emotional than animals / humans with intact brains
Strong emotional expression (and feelings?) in an anencephalic child
PAG

- PAG is the lowest region of the neuroaxis for which we have abundant evidence for emotional subjective experiences.
PAG underlying core (affective) consciousness – the evidence:

- (1) Lowest ESB energy to obtain emotional feelings and actions
- (2) Smallest brain damage compromising consciousness
- (3) Most massive convergence site of brain systems
Affective Neuroscience

- If we want to understand “I feel”, we should study the PAG
- If we want to understand feelings, we should study limbic structures and functions (amygdalae, cingulate gyrus, insular cortex, basal ganglia)
- If we want to understand “I want”, we should study dopamine (Panksepp’s SEEKING system)…
- All psychiatric disorders (schizophrenia, depression, anxiety, ADHD, etc.) are associated with disturbances in the brain’s core emotional systems
- Hagai?
Final thoughts: Animals, humans and feelings