

The Nature of Consciousness

Handout [11]

Patricia Churchland: *Can Neurobiology Teach Us Anything about Consciousness?*

JeeLoo Liu

§ General Outline

1. Neuroscience can reveal the physical mechanism subserving psychological functions.
2. The right strategy for understanding psychological capacities is essentially reductionist.
3. Adopting the reductionist strategy means trying to explain the macro levels (psychological properties) in terms of micro levels (neural network properties).

[Reductionism]

___ to discover macro-to-micro explanations

§ Paul Churchland on Reductionism

*[Intertheoretic Reduction]:

___ When a new and very powerful theory turns out to entail a set of propositions and principles that mirror perfectly the propositions of some older theory or conceptual framework, we can conclude that the old terms and the new terms refer to the very same thing, or express the very same properties.

(e.g. heat = high average molecular kinetic energy) The old theory is then said to be "reducible" to the new theory.

*The claim: from folk psychology to neuroscience

___ Terms for folk psychology have "intertheoretic identities" with terms in neurosciences (even if the present neuroscience has not yet developed to this stage).

___ Neuroscience will discover a "taxonomy" of neural states that stand in a one-to-one correspondence with the mental states of our common sense taxonomy.

*Different attitudes on intertheoretic reduction:

- I. The complete reduction is in principle possible (there is no contradiction in its being carried out between two fields--e.g. it may not be in principle possible to reduce astrology to astronomy).
- II. The complete reduction is in practice possible (we need an actual proof for this claim).
- III. The reduction is possible to the degree of useful approximations to the desired ideal account (e.g. Paul and Patricia Churchland).

- IV. The reduction is not possible even to the degree of useful approximation, but mental phenomena are still just the macro-level descriptions of the neural phenomena. ==> Nonreductive materialism (e.g. Fodor)
- V. The reduction is in principle impossible, because mental phenomena are fundamentally different from neural phenomena. (e.g. Searle, McGinn, Chalmers)

The question is whether it is reasonable to expect, and to work toward, a reduction of all psychological phenomena to neurobiological and neurocomputational phenomena.

*[Some Prototypical Cases of Intertheoretic Reduction]

[success]

1. astronomical motion ---> motions at the microscopic level
2. heat (temperature) --> mean molecular kinetic energy (**Body's ability to do work by virtue of its motion.**)
3. reduction of classical (valence) chemistry by atomic and sub-atomic (quantum) physics (**quantum physics has indeed managed to grasp the underlying elements of chemical reality.**)

[semi-success]

1. Newton's three laws of motion by Einstein's Special Theory of Relativity.

[failure]

1. the older phlogiston theory of combustion (How did wood turn into ashes, what happen to the rest of the wood?) by the oxygen theory of combustion (oxygen was being absorbed during combustion).

[It is worth emphasizing that this reduction involved identifying familiar phenomenal property of common objects with a highly unfamiliar microphysical property.]

§ P.S. Churchland's Attitude:

- 1. I do not mean that a reductionist research strategy implies that a purely bottom-up strategy should be adopted.**
- 2. I do not mean that there is something disreputable, unscientific or otherwise unsavory about high-level descriptions or capacities *per se*.**
- 3. It would be wisest to conduct research on many levels simultaneously, from the molecular, through to networks, systems, brain areas, and of course behavior. Hypotheses at various levels can co-evolve as they correct and inform one another.**
- 4. It is possible to have nontrivial revision and even replacement of existing high-level descriptions by 'neurobiologically harmonious' high-level categories.**

___ By 'neurobiologically harmonious' categories, I mean those that permit coherent, integrated explanations from the whole brain on down through neural systems, big networks, micronets, and neurons.

§ Main Assumptions on Methodology:

1. Awareness just *is* some pattern of activity in neurons.
2. Introspection is not infallible: There could be a difference between appearance and reality. (Searle is wrong!)
3. The working assumption is that if a person is aware of a stimulus, his brain will be different in some discoverable respect from the condition where he is awake and attentive but unaware of the stimulus. An auspicious strategy is to hunt down those differences.
4. To achieve this goal, we need to find psychological phenomena that
 - (a) have been reasonably well studied by experimental psychology,
 - (b) are circumscribed by lesion data from human patients as well as data from precise animal microlesions,
 - (c) are known to be related to brain regions where good neuroanatomy and neurophysiology has been done, and
 - (d) where we know quite a lot about connectivity to other brain regions.