

## Conceptual fallacies in neuroscience reconsidered

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*Abstract:*

The use of language forbids direct ascription of psychological faculties to parts of humans. Yet the strategy of *reductive ascription* remains available: Psychological faculties may be reduced to neuronal faculties which then can be ascribed to neuronal mechanisms. The charge of conceptual mistakes raised against neuroscientists is reconsidered. Where psychological and neuronal faculties can be linked by a step of functional reduction, ascription of psychological faculties to neuronal mechanisms is possible. Then the criticism is not valid.

**Key words:** Neuroscience, Psychological predicates, Conceptual fallacies, Functional reduction

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## What we can say

“Only of a human being and what resembles (behaves like) a living human being can one say: it has sensations; it sees; is blind; hears; is deaf; is conscious or unconscious.”

Ludwig Wittgenstein famously coined this dictum (see §281 in [16]). Based on it, numerous statements in the literature of neurobiology, which ascribe psychological predicates or faculties to something less than the human whole, were pinpointed as fallacious [1, 2, 7, 8]. Below, this charge is reconsidered.

Of the psychological predicates there are many more: To vote, to go for a walk, to remember, to love ones neighbour, to behave as expected, to joke, etc. According to Wittgenstein the author of a psychological predicate is always a whole human being, never a part. Note that psychology deals with wholes but also with parts, for it is concerned with mental phenomena and these are but parts of the human whole.

Then the reason for ascription <sup>2</sup> of faculties to the human whole is merely that the use of common language leaves no alternative. My brain cannot go for a walk all on its own because use of language does not support this concept. The language used expresses a roadmap of concepts, such as subject-object duality, past-present-future and part-whole distinctions. This road must be followed as we speak and think. Conceptual questions, such argue the distinguished asserters M.B. and P.H., antecede matters of truth and falsehood and are not amenable to scientific investigation [1: p.79].

Based on Wittgenstein's dictum, Bennett & Hacker warn us that a science which deals with parts of humans, like neuroscience, should not ascribe faculties owned by the psychophysical unity to its parts. This 'makes no sense' and leads to a confusion of the mereological part-whole duality, it is a conceptual mistake.

Accordingly, Bennett & Hacker formulated their *mereological principle* :

Psychological predicates apply only to human beings (or other animals) as wholes and cannot intelligently be applied to their parts, such as the brain.<sup>3</sup>

What is so special about those predicates? They ascribe faculties to the human whole and are accompanied by an experience of these faculties. Special, then, is the 1<sup>st</sup> person perspective of the experience, a per-

2 To ascribe means to hold causally responsible.

3 Slightly edited. The original reads “Psychological predicates which apply only to human beings (or other animals) as wholes cannot intelligently be applied to their parts, such as the brain.” [1]

spective so convincingly familiar to all of us! <sup>4</sup>

## Supervenience and reduction

A whole, here the whole of human unity, has a dependent existence, it exists in virtue of its parts, 'supervenes' over its parts.<sup>5</sup> Further, that the mental supervenes over the neuronal-physical is a defensible position [10: p.45]. Then both psychological and neuronal faculties result from neuronal mechanisms. These mechanisms are but parts of the human whole. Examples for neuronal faculties are convergence, divergence and correlation of signals, lateral inhibition, activation, adaptation etc. The neuronal faculties will be ascribed to their mechanisms. However, according to the mereological principle, psychological faculties are not ascribed to their neuronal mechanisms but to the human whole. Their neuronal mechanism, then, remains uninvestigated.

To resolve this difficulty I suggest to consider *reduction*. Here is the corresponding roadmap:

Psychological faculties related to psychological predicates are ascribed to the human whole (a1) and not instead to one of the parts, i.e. to neuronal mechanisms (a2).

Based on dictum (a2), the neuronal mechanism of a psychological faculty cannot be addressed, for without ascription to the neuronal mechanism this mechanism remains invisible, out of scope. This is an unhappy consequence of (a2), of which little notice was taken so far. Taken seriously, it means that a psychological faculty cannot be investigated with respect to its neuronal mechanisms. Yet, there is a way:

(b) Given supervenience of the mental over the neuronal-physical, psychological faculties are surely underpinned by corresponding neuronal faculties, to which they can possibly be *reduced*.

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- 4 The concept of 1<sup>st</sup> person (I experience) and 3<sup>rd</sup> person (he, she, it experiences) perspective, also known as 'epistemic dualism' [4, 5], is an elaboration of the subject-object duality. The perspectives are founded on linguistic usage petrified into a grammatical fact. Thus perspective dualism reflects the use of language and cannot be avoided like one would avoid a fallacy. For roots of perspective dualism and the mind-body problem, see René Descartes, Franz Brentano, Ludwig Bertalanffy and Thomas Nagel's 'dual aspect theory', as quoted in [11: p.3].
- 5 Supervenience: As introduced by Donald Davidson [3], S supervenes over R if S cannot change without a change of R. S is linked to R by identity, constitutive or causal relations [6: p.67]. Arguably the mental 'supervenes' over the neuronal, meaning that it exists 'in virtue of', is necessitated by the neuronal system. Also, being constitutive, a whole supervenes its parts (see the *mereological supervenience*, which is asymmetric [9: p.582], discussed in [12: p.17]). Thus whole and part are not independent, interacting subjects. This was aptly pointed out in the 'double subject fallacy' [14]. Note that human whole and the mind are not the same: the mental is part of the human whole.

(c) The neuronal faculties, thus identified, are then ascribed to their neuronal mechanisms.

Then, provided the psychological faculties can be reduced to neuronal faculties, which according to Jaegwon Kim should (with the exception of qualia, see below) be possible by *functional reduction* [10: p.164], the psychological faculties can be ascribed to the neuronal mechanisms of the neuronal faculties! This is ascription of psychological faculties to a part of the whole, with (b, c) contradicting (a2).

It appears that, yes, psychological faculties are to be ascribed to the human whole, the use of common language leaves no alternative. Further, yes, they cannot *instead* be ascribed to a neuronal part of the whole, for already the use of language forbids this. Further, due to different idioms, psychological faculties and any description of neuronal faculties in their idiom will seem unrelated. Yet the psychological faculties may be *reduced* to neuronal faculties which then can be ascribed to neuronal mechanisms. Thereby psychological faculties can, by reduction, be ascribed to neuronal mechanisms (as well as to the human whole). This may be called *reductive ascription*.

The proceedings are best illustrated with an example:

Let “to go for a walk” be our psychological predicate. It refers to an activity of a whole human, who owns the psychological faculty of going for a walk while her conscious Self-agent has the *experience* of a walk. Ascription is to the human whole because the use of language leaves no other choice. (Another view holds that the faculty is neuronal but adopted by an prerogative agent, the conscious Self, who, further, claims to be the whole [15].)

At the same time the macro-behaviour 'going for a walk' is underpinned by neuronal activity arising from neuronal faculties. The activity will involve several modules of the brain which generate the neuronal pattern which supports the walk. The neuronal activity may be described in the biophysical idiom of the 3<sup>rd</sup> person perspective in terms of action potentials and synaptic events. It reveals mechanistic detail to scientists. However, given the different idioms, the connection between psychological faculty and corresponding neuronal faculties remains obscure.

### **Functional reduction**

At this point reduction comes in. 'Explanatory reduction' is the highway of scientific explanation, for where we cannot reduce, we cannot understand. It means that an explanandum on a supervenient system-level is explained in terms of activity and its laws on a lower, subvenient level, the reduction base.

Specifically for the mind-neuron relation Jaegwon Kim proposed a general strategy of *reduction by functional role* [10: p.164]. The strategy relies on an identity of functional causal roles at the two system levels. In my words:

(1) A mental macro-property 'going for a walk' is selected which has a functional causal role because only if certain conditions are met (weather good, walker not tired etc.) will the complex phenomenon of 'going for a walk' result.

(2) By experimentation, several neuronal processes are identified as realizers of (1), characterized by spike rates, convergence, correlation etc. These micro-properties jointly correlate with (1) and explain (1). Together they support the same causal role as (1).

(3) Then the properties (1) and (2) are taken to be identical, they differ only in the idiom in which they are described.

If behaviours of the same causal role (i.e. corresponding behaviours in the same functional context) result on mental and neuronal level, then reduction was successful, a psychological faculty was explained by the neuronal mechanisms causing the corresponding neuronal faculties. Kim is confident, except for qualia all mental properties are expected to be reducible by functional role [10: p.166].

For Kim, qualia are an exception because they have no task, role or function, thus cannot be functionally reduced.<sup>6</sup> Here my view differs. Introspection shows that qualia raised by taste, smell, vision etc. are strikingly different, suggesting a role as sensory discriminators. Erasing all qualia in a thought experiment might have severe physiological consequences, we would then be unable to mentally distinguish sensory channels. Thus qualia may have a role as mental identifiers of sensory channels. The matter is explained more fully in [13].

I suggest that qualia have a role as mental identifiers of sensory channels. Having a role, they are in principle functionally reducible. Note that the single assumption, i.e. that the neuronal realizes the mental, suffices to conclude that M supervenes its realizer N, thus M is reducible to N.

It is expected that *correlation* and *bottom-up manipulability* hold, i.e. interruption of the neuronal processes will interrupt the mental experience. Of course, when applied to a particular psychological faculty, much neuro-mechanistic experimentation and recursive *bottom-up* modelling will be required to work out the reduction to the neuronal world in detail [11: p.58].

A speaker of common language is guided by an unconscious roadmap

<sup>6</sup> Kim's view that mental qualia are without task, role or function, therefore cannot be reduced, appears to contradict his acceptance of M supervening N. For then N is the reduction base, thus M reducible, even though not necessarily by function.

of concepts. Thus she is not able to ascribe psychological faculties to anything but the human whole. A scientist, however, may realize this dependence and devise an alternative. She may use functional reduction to translate from a psychological or common language description to a neuronal description. This will allow reductive ascription of psychological faculties to neuronal mechanisms. Following this road, new uses of language may be established, emphasizing the advance rather than the tradition of our concepts.

I suggest to recast the mereological principle as follows:

Psychological faculties and predicates may be ascribed to human beings as wholes. Due to use of language they may not instead be ascribed to parts, such as the brain. But an ascription to a part (to a neuronal mechanism) is possible, if *functional reduction* of psychological to neuronal faculties is successful.

## Conclusion

The charge of conceptual mistakes raised against neuroscientists should be reconsidered. Where psychological and neuronal faculties can be linked by a step of functional reduction, ascription of psychological faculties to neuronal mechanisms is possible. Then the criticism is not valid.

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