

The background features a collage of scientific and humanistic imagery. On the left is a detailed anatomical drawing of a frog's internal organs. In the center is a portrait of a man with glasses, likely a historical figure in science or philosophy. To the right is a chemical structure of a pyrimidine nucleobase, specifically 5-methyluracil (thymine), with labels for NH₂, H₂C, and OH groups. Further right is a complex, multi-layered biological structure, possibly a virus or a cell. The word "Biohumanities" is written in a cursive font at the top. A large, faint "X" is overlaid on the background.

Against Normality and proper function

Paul E. Griffiths

The functional analysis of mind

- Philosophers of psychology have argued that the dominant method of the psychological sciences is ‘functional analysis’
- Complex causal capacities (functions) are analysed into causal capacities of sub-systems
- This functional decomposition hierarchy is to be mapped onto – and thus explained by – a structural decomposition hierarchy of parts and wholes
- As we heard yesterday, this perspective can be extended to many other areas of life science

Millikan on functional analysis

- Ruth Millikan, Karen Neander and others suggest that the functions to be analysed must, of necessity, be adaptive functions
- Functions, in other words, only make sense in the light of evolution
- This view endorsed in Rosenberg (2006)



Two senses of function

- Selected function - e.g. a sequence of nucleotides GAU has the selected function of coding for aspartic acid if one reason that sequence evolved by natural selection was because it had the effect of inserting that amino acid into some polypeptide in ancestral organisms
- Causal function - e.g. a sequence of nucleotides GAU has the causal function of coding for aspartic acid if that sequence has the effect of inserting that amino acid into some polypeptide in the organism in which it occurs
- These correspond to the conventional neo-Darwinian notions of being an *adaptation* (selected function) and being *adaptive* (having a causal function which increases fitness)

Neander on structural analysis

“The relevant notions [*of function and structure*] are both ‘normative’ in the sense that they are both notions of the normal, in the teleological as opposed to the statistical sense of the term, if we assume an etiological account of each of them, Abnormality inclusive categories involve a notion of structure and function that is, to recall the title of Amundson and Lauder’s paper, with, not without, a purpose.” (Neander 2002, 414)

Millikan on biological idealisation

- “A chunk of matter, depending on what are considered its allowable inputs, may exemplify many different Cummins systems at once...What counts as a Cummins function is relative to choice of an ideal type to be explained. ... Living chunks of matter do not come, just as such, with instructions about what are allowable conditions of operation and what is to count as allowable input. Similarly, they do not come with instructions telling [*what is*] damage, breakdowns or wear-downs. Nor do they come with instructions about which processes...are to count as occurring within and which are irrelevant or accidental to the system.” (Millikan 2002, 121)
- A purely descriptive, rather than normative, biology has no principled way to determine what counts as the system in need of analysis, or what counts as its biological functioning

Millikan on biological idealisation

- Millikan demands a ‘principled and useful way to delimit Cummins systems’ (2002, 121):
 - identifying boundary conditions for their operation
 - distinguishing variation from pathology
 - delimiting the boundaries of a single system, so that we can subject the correct aspects of nature to causal analysis.
- She suggests that it is the fact that a certain causal capacity is Normal, that is, is the result of natural selection, which solves this problem
- But it *cannot* be true that we need to know what is Normal in order to conduct a causal analysis of an organism’s biological functioning...

Millikan's paradox

- Ascriptions of selected function are generated by (hypothetical) causal analysis of the capacities of ancestral organisms to survive and reproduce in ancestral environments (Griffiths 1993)
- Hence, if we cannot identify which capacities of ancestral organisms to subject to causal analysis without knowing what the parts of those organism were selected for in their ancestors, then we face a vicious regress
- Therefore, a purely causal analysis of the adaptive role played by parts of ancestral organisms must be possible without knowing what those parts were adaptations for
- Furthermore, ancestral organisms cannot be easier to causally analyze than living organisms on which we can actually experiment (Stotz and Griffiths 2002)

Can we do without an evolutionary perspective?

- “Functional biology without evolution is incomplete in the sense that it ignores many important questions about life, but not in the sense that no aspect of life can be understood without invoking evolution” (Arno Wouters 2005, 55)
- He distinguishes:
 - ‘Biological role’ – ‘the manner in which that item/activity contributes to the activity of a complex system’ (my ‘causal function’)
 - ‘Biological advantage’ – ‘the way in which that trait influences the life chances of an organism as compared to other traits that might replace it’ (2005a, 41-2)
- Wouters argues that biologists study role not advantage. The specifically *biological* role that is causally analysed is ‘viability’ – the ability to stay alive
- Theorists of self-organisation have identified the privileged causal capacity as autopoiesis, or self-reproducibility (e.g. Schlosser 1998)
- Weber (2004) has endorsed a similar position, drawing on McLaughlin (2000)

We cannot do without an evolutionary perspective

- Wouter's account runs head on into Millikan's original objection – there are just too many causal capacities, most of which are not part of the biological functioning of the organism
- Capacities we would not identify without an evolutionary perspective: mechanisms controlling variance in offspring number, fever?
- In order to avoid confounding 'biological role' with 'causal role' we need to identify biological role with Wouter's 'biological advantage'
- This is overlooked by Wouters because a great deal of experimental biology is still documenting basic mechanisms and is simply not yet sensitive to the details of the causal capacity they will one day explain
- Much of proximal biology focuses on a form of 'how possibly explanation' – how is a certain causal capacity physically possible (e.g. ox-phos)

Tinbergen's Four Questions

1. Causation
 2. Survival value
 3. Ontogeny
 4. Evolution
- Questions of causation ask about the mechanisms by which organisms do what they do, and questions of ontogeny ask how those mechanisms are built ('causal biology')
 - Questions of survival value ask: "whether any effect of the observed process contributes to survival if so how survival is promoted and whether it is promoted better by the observed process than by slightly different processes." (1963, 418)
 - Questions of evolution have "two major aims: the elucidation of the course evolution must be assumed to have taken, and the unraveling of its dynamics." (1963, 428) The course of evolution is revealed by inferring phylogenies and homologies. The dynamics of evolution are revealed by the study of 1) population genetics and 2) survival value (1963, 428), which correspond to Sober's (1984) evolutionary 'consequence laws' and 'source laws'.

Evading Millikan's paradox

- A biologically meaningful causal analysis must be carried out from an 'evolutionary perspective'. But this can mean focusing on the capacities singled out by Q2, rather than Q4
- This was how Tinbergen singled out the capacities that constitute biological functioning – those capacities that could have an influence on the dynamics of selection processes
- This approach is simultaneously 'evolutionary' (it is guided in by our best current models of selection), and 'methodologically creationist':
- “To those who argue that the only function of studies of survival value is to strengthen the theory of natural selection I should like to say: even if the present-day animals were created the way they are now, the fact that they manage to survive would pose the problem of *how they do this.*”
(Tinbergen 1963, 423 my emphasis)

Idealisation – some ideas

- Much proximal biology studies causal roles that are agreed on all hands (e.g. between Darwinists and creationists)
- This partly because so much work is still aimed only at identifying basic mechanisms
 - explanations of how certain causal capacities are *physically possible* can abstract away from the details of any particular case.
 - There is often a presumption that if you can get the effect using a modified living system, you must be getting the actual mechanism because it is surprising that anything can have this effect
- When subtle cases require a ‘tie-breaker’, it is the ecological perspective that should play the role, because it embodies our current understanding of ‘biological functioning’ (of ‘living’?)
- ‘viability’, ‘self-reproduction’ are merely sub-capacities of the ecological role of the organism (‘occupying its niche’?)



<http://www.uq.edu.au/biohumanities>