

# Adaptationism, Schmadaptationism

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## What is adaptationism?

- The view that natural selection is so powerful and unconstrained that “the direct production of adaptation through its operation [is regarded as] the primary cause of nearly all organic form, function, and behavior” (Gould and Lewontin 76).
- The view that “natural selection has been the only important cause of most of the phenotypic traits found in most species” (Sober 72).

## Gould and Lewontin: “The Spandrels of San Marco and the Panglossian Paradigm”

The practice of adaptationism:

- In principle, evolutionary biologists generally admit of alternatives to adaptation, but in practice, “faced with an organism, [they] tend to break it into parts and tell adaptive stories as if trade-offs among competing, well-designed parts were the only constraint upon perfection for each trait” (78).
- Adaptationism is so designed as to be deeply resistant to contrary evidence (79). How so?
  - “The rejection of one adaptive story usually leads to its replacement by another” (79). So if one adaptive argument fails, the adaptationist will try another or assume a weaker version of the first (78). If no adaptive argument can be made, the adaptationist will attribute the problem to ignorance of the organism and its environment (78).
  - “The criteria for acceptance of a story are so loose that many pass without proper confirmation” (79). “Often, evolutionists use *consistency* with natural selection as the sole criteria and consider their work done with then concoct a plausible story” (79).
  - Adaptationists will frame the inquiry so as to “emphasize immediate utility and exclude other attributes of form” (78).
- So as it is practiced, adaptationism at least borders on unfalsifiability.

Forms of evolutionary change without adaptation:

- No adaptation and no selection at all (82-3). Example: Genetic drift as a “kind of random genetic sampling error.”
- No adaptation and no selection on the part at issue (83). “The form of the part is a correlated consequence of selection directed elsewhere.” Example: Offspring eating mother from the inside as a “by-product of selection for rapid cycling of generations.”
- The decoupling of selection and adaptation (83-4).
  - Selection without adaptation. Example: A mutation greatly increases fecundity, but offspring die off due to insufficient resources.
  - Adaptation without selection. Example: Adaptations due to phenotypic flexibility, culture, or learning.
- Adaptation and selection but no selective basis for differences among adaptation (84-5). Example: When a population of organisms develops multiple good solutions to the same environmental challenge, none can be said to be more adaptive than the others.
- Adaptation and selection, but the adaptation is a secondary utilization of parts present for reasons of architecture, development, or history (85). Present utility often says little about reason for

origin. Adaptation may be “a secondary epiphenomenon representing fruitful use of available parts, not the cause of the entire system” (76). Example: Even if blushing is sexually selected, that won’t explain why blood is red.

### **Gould and Vrba: “Exaptation—A Missing Term in the Science of Form”**

A taxonomy of evolutionary fitness:

- Adaptation: Any feature that promotes fitness and was built by selection for its current role. (55)
- Function: The operation of an adaptation. (55)
- Exaptation: A feature evolved for other uses or none at all later co-opted for its current role. (55)
- Effect: The operation of a useful character not built by natural selection for its current role. (55)
- Aptation: The state of being fit.
- Pre-aptation: Exaptation from aptation considered before the fact. (64)

Exaptations originating in earlier aptive traits are widely recognized, whereas exaptations which result from non-aptive traits are underplayed (65). But demonstration of modern use does not specify the path of origin (60). Thus we need a concept of exaptation in addition to pre-aptation. Two types of exaptation:

- Exaptation from aptation. Examples: Feathers originally adapted for insulation are co-opted for flight. Bone originally adapted for storage of phosphate is co-opted for support.
- Exaptation from non-aptation. Examples: The sexual mimicry of hyenas is likely not due to the needs of the meeting ceremony. Instead, the sexual mimicry is a likely side-effect of the high androgen levels which generate in the dominance of females over males which is then co-opted for the meeting ceremony. Repetitive DNA is a non-aptive feature which may be co-opted later. (Then it would be an exaptation. For further theorizing as to why the genes replicate themselves at all, see Gould’s *Hen’s Teeth and Horse’s Toes*, pg 166-76.)

This taxonomy only makes sense if we reject adaptationism, for it presumes that at least some traits are not shaped by mechanisms other than natural selection.

### **Sober: “Six Saying about Adaptationism”**

1. Natural selection is the only natural process that can produce adaptive complexity (74).  
Sober: “What, then, is all the shouting about if both sides agree that natural selection is important, indeed indispensable, as an explanatory principle?”
2. Adaptationism is incompatible with the existence of traits that initially evolve for one adaptive reason but then evolve to take over a new adaptive function (75).  
Sober: Adaptationism doesn’t deny opportunistic switching, although individual adaptationists may often mistake current utility for reason for evolution.
3. Adaptationism is incompatible with the existence and importance of constraints that limit the power of natural selection (76).  
Such constraints do not concern “whether the fittest of the available phenotypes will evolve, but what the available phenotypes in fact are.” Adaptationism itself does not deny the existence of such constraints, merely that they are “important and pervasive.”
4. Adaptationism is untestable; it involves the uncritical formulation of Just So Stories (80).  
“Some adaptationist explanations are *difficult* to test” but “it is a double exaggeration to say that *all* adaptationist explanations are *impossible* to test.” More generally, “the claim that there exists an adaptive explanation of a specific trait is hard to prove wrong; such existence claims are harder to refute than specific concrete proposals.”

5. Populations of organisms are always finite, always experience mutation, and frequently experience migration and assortative mating. Optimality models fail to represent these non-selective factors and therefore are false.  
“The debate about adaptationism does not concern the *existence* of such factors, but their *importance*.”
6. Adaptationist thinking is an indispensable research tool. The only way to find out whether an organism is imperfectly adapted is to describe what it would be like if it were perfectly adapted (83).  
“Optimality models are important even if they turn out to be false” because we need to discover “whether the fittest available trait has evolved.” This requires “some grasp of what the fittest trait actually was.”