Beyond naïve functionalism and audacious formalism: Convergent evolution in language structures

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1. Functionalism and convergent evolution

Since the 20th century, linguists have repeatedly proposed that **universal tendencies in language structures** can be understood by preferential selection from a pool of variants, as in biological evolution (e.g. Nettle 1999; Croft 2000; Blevins 2004; Ritt 2004; Steels & Szathmáry 2018).

But while linguists have often highlighted the role of variation and selection, they do not often talk about **adaptation** and **convergent evolution**.

evolutionary processes:

- creation of variants   (in biology: by gene mutation)

- replication   (in biology: reproduction)

- selective retention of variants   (in biology: by natural selection)

- adaptation

linguistic change:

- creation of variants: innovations by speakers

- replication: transmission to other speakers

- selective retention: diffusion/propagation of selected variants

- adaptation   (e.g. Haspelmath 1999)

convergent evolution in biology:

Tasmanian marsupial wolf (adapted to the same niche)

convergent evolution in linguistics:

Languages from different families often have similar features (or properties, or traits) because they were subject to similar selective pressures.

Chinese		**English**		**French**		**Hungarian**	
sān 三	**dì**-sān 第三	three	thir-**d**	trois	trois-**ième**	három	harm-**adik**
liù 六	**dì**-liù 第六	six	six-**th**	six	six-**ième**	hat	hat-**odik**

Portuguese	**German**	**Arabic**	**Yoruba**	
caminh-a	geh-t	ta-mšii	o rin	'walks'
caminh-**ar**-á	**wird** gehen	**sawfa** ta-mšii	yoo **ma** rin	'will walk'

2. Naïve functionalism and audacious formalism

One sometimes gets the impression that linguists are still engaged in a debate between naïve functionalism and audacious formalism.

Audacious formalism:

Many properties of grammars are innate:

> "If this theory of language learning is true [i.e. Principles and Parameters], it would help solve the mystery of how children's grammar explodes into adultlike complexity in so short a time. They are not acquiring dozens or hundreds of rules; they are just **setting a few mental switches**." (Pinker 1994: 112).

This is *audacious*, because there would have to be very a large number of innate elements (features, categories, parameters, constraints) that are innate – many hundreds or many thousands.

It is very unlikely that these could be genetically encoded, so this is an audacious hypothesis.

> (Compare this with the innateness theory of chimpanzee gestures: Byrne et al. (2017) claim that there is "a rich set of innate signals", i.e. only about 80)

Naïve functionalism:

Languages develop the properties they do because these fulfill speakers' needs.

> "One common conception about some types of language change in general, and grammaticalization in particular, is that the latter is a **result of the communicative needs or goals** of the speakers of a language." (Narrog & Heine 2021: 162)

This is *naïve*, because speakers always have the same grammatical needs, so there should be no reason to make changes.

Neither of these views reflects the insight of evolutionary thinking that

good design is possible without intention.

Audacious formalists do not even think about goodness of fit, and naïve functionalists often attribute the creation of good design to "speakers' needs".

3. The 19th century debate between "morphists" and "adaptationists"

• **Adaptationists** like Georges Cuvier were sometimes accused of having a **naïve trust in the goodness** of nature (almost like the natural theologists)

• The more modern (quasi-formalist) **"morphists"** (like Étienne Geoffroy Saint-Hilaire, Goethe, and Richard Owens) seemed to have **no good explanatory account for the basic forms** that they highlighted (e.g. Goethe's "Urpflanze")

(see Haspelmath 2018)

The morphists obseved that independently of their functions, morphological shapes of animals were often quite similar. **How could this be explained?**
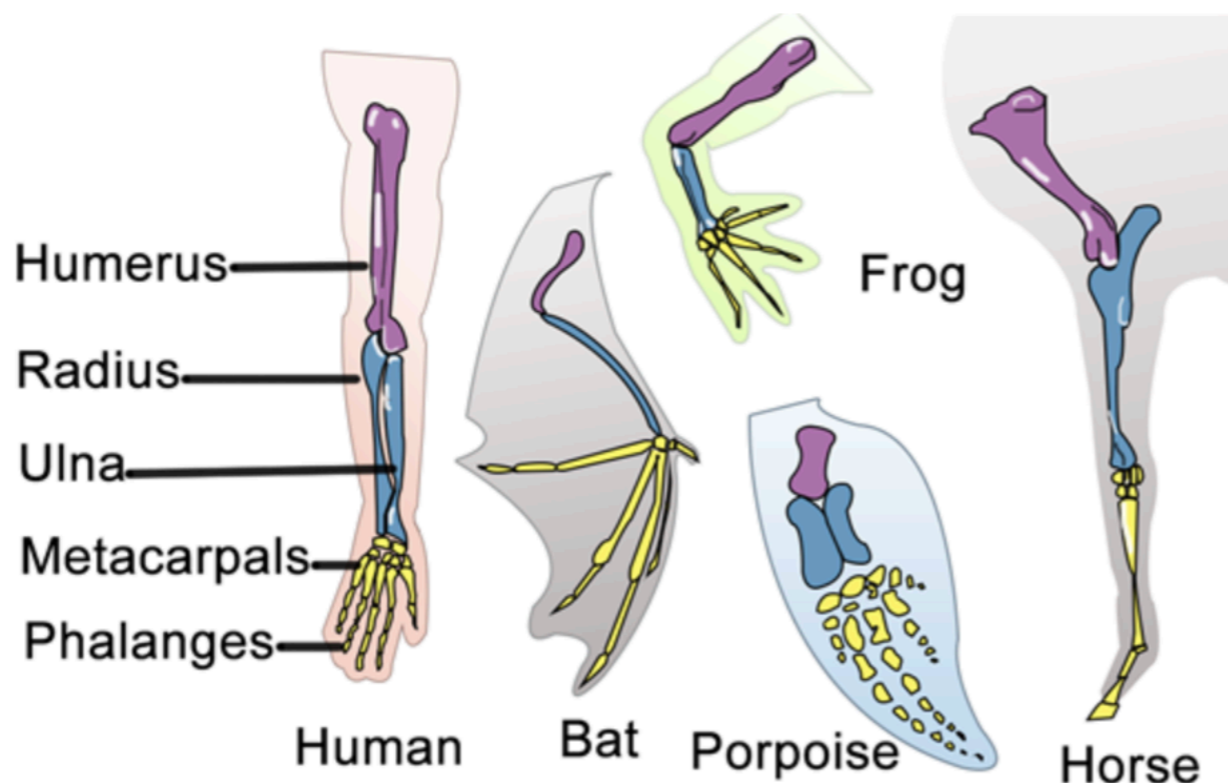
adaptationism
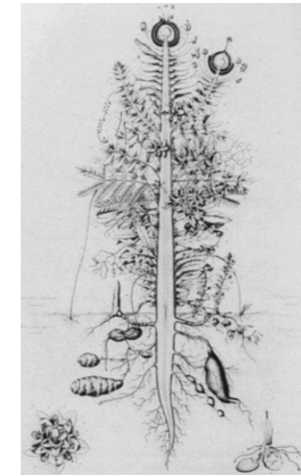
natural theologians

William Paley

Cuvier

Georges Cuvier

morphism

Goethe ("Urpflanze")

Geoffroy St. Hilaire

Étienne Geoffroy Saint-Hilaire

adaptationism

natural theologians

Cuvier

George

morphism

Goethe ("Urpflanze")

Geoffroy St. Hilaire

"*While Cuvier founded the "**functionalist**" school of organismal biology, with his insistence on animals as functionally integrated wholes, Geoffroy continued the more "**formalist**" tradition of biology that had started with Buffon and was being continued by Goethe, Lamarck, and others. In his 1818 book* Philosophie anatomique, *Geoffroy asked the question: "Can the organization of vertebrated animals be referred to one uniform type?" The answer for Geoffroy was yes: he saw all vertebrates as modifications of* **a single archetype**, *a single form. Vestigial organs and embryonic transformations might serve no functional purpose, but they indicated the common derivation of an animal from its archetype.*"

adaptationism | **morphism**

natural theologians | Goethe ("Urpflanze")

Cuvier | Geoffroy St. Hilaire

Georges Cuvier | Étienne Geoffroy Saint-Hilaire

1830

Cuvier–Geoffroy debate

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The **Cuvier–Geoffroy debate** of 1830 was a scientific debate between the two French naturalists Georges Cuvier and Étienne Geoffroy Saint-Hilaire.[1][2][3] For around two months the debate occurred in front of the French Academy of Sciences. The debate centered primarily on animal structure; Cuvier asserted that animal structure was determined by an organism's functional needs while Geoffroy suggested an alternative theory that all animal structures were modified forms of one unified plan. In

adaptationism	**morphism**
natural theologians	Goethe ("Urpflanze")
Cuvier	Geoffroy St. Hilaire

Georges Cuvier

Étienne Geoffroy Saint-Hilaire

emphasis on functional explanation	**emphasis on pure form**
(convergent evolution)	("basic plan of nature")
(cf. functionalism in linguistics)	(cf. formalism in linguistics)

4. Resolving the big debate

Resolving the contradictions in biology

Darwin: – Adaptation is explained by natural selection.
             – "Pure forms" (homologies) are explained by the tree of life
               (**descent**).

Resolving the contradictions in linguistics?

– "Pure forms" are explained by the social divergence of languages (words and
  constructions are arbitrary conventions).

– Homologies at word level are explained by **descent** (family trees of individual
  families)

– Typological parallels are **analogies** that can be explained by **convergent evolution**
  and **adaptation** (self-organization, selection of efficient systems)

5. Conclusion

Adaptation is an important principle in the development of languages.

As in biology, this can be used to explain linguistic analogies (= typological similarities).

In the history of linguistics and biology, one can see parallels, but also differences:

  – Homology was understood quite late in biology (only after 1859) (**phylogenetic trees**)

  – Analogy was understood quite late in linguistics (only after about 1979) (**evolutionary adaptation**)

It seems that in linguistics, too, convergent evolution has the potential to become the leading theory of language structures.

As in biology, we cannot normally identify the causes of the innovations, and we see similar patterns emerge **from rather different sources**, but when the outcomes are similar across languages, they are likely to be due to **the same functional forces**.