Beyond the argument from design

Article · March 2006
DOI: 10.1142/9789812774262_0084

2 authors, including:

Willem Zuidema
University of Amsterdam
64 PUBLICATIONS **727** CITATIONS

BEYOND THE ARGUMENT FROM DESIGN

WILLEM ZUIDEMA

Institute for Logic, Language and Computation, University of Amsterdam,
Plantage Muidergracht 24, 1018 HG, Amsterdam, the Netherlands
jzuidema@science.uva.nl

TIMOTHY O'DONNELL

Primate Cognitive Neuroscience Laboratory, Harvard University,
33 Kirkland Street, Cambridge MA 02138, U.S.A.
timo@wjh.harvard.edu

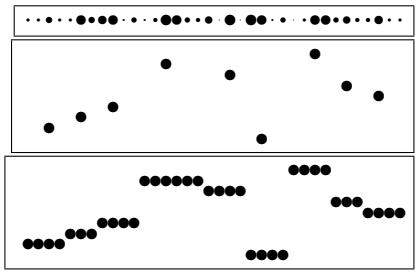
Many studies of the evolutionary origins of human language capabilities rely on what is sometimes called the "Argument from Design". Such studies attempt to establish that a given feature of that capacity is (i) too complex to have arisen by chance, and (ii) appears to be specifically designed for processing natural languages. It is argued that the theory of natural selection is the only scientific theory that can explain the appearance of complex, adaptive design, and, hence, that the conclusion that the feature evolved as an adaptation for language is unavoidable.

We will not, at this point, address the many disagreements about the linguistic data used in such studies, or questions about whether or not given processing abilities are specific for language, or about whether or not objective measures for complexity exist. Rather, we analyze the validity of reasoning with the argument from design when studying culturally transmitted systems such as natural language or music. We show that in these systems such reasoning is unsound, because there exists an alternative scientific explanation for the appearance of design that can be termed "cultural evolution".

As a simple example, consider the evidence reviewed in Pinker and Jackendoff (2005) showing that other primates, including chimpanzees, have difficulties distinguishing human phonemes and/or make phoneme boundaries differently from humans. Pinker & Jackendoff conclude that human speech perception is special, and must therefore, they imply, be adapted for language in the biological sense. However, it is easy to show – as we do in figure 1 using a variant of the model from Zuidema and Westermann (2003) – that if a language is transmitted and negotiated culturally, and allowed to change based on success and failure in recognition, any arbitrary features of the perceptual system will be reflected in the configuration of

signals. This suggests an alternative explanation for the fact that *humans* are much better than other species at recognizing *human* phonemes: human languages have evolved so as to exploit the accidental peaks in human auditory perception.

In our talk, we will look in detail at two other proposed adaptations, concerning compositional semantics and phrasal syntax, and summarize results from simulations studied by ourselves and others (e.g. Kirby, 1994). In all cases, we find that human languages can evolve to match idiosyncratic features of human language processing, giving humans the appearance of being designed for language without them having adapted in the biological sense. Hence, every time we observe the appearance of design for language, we need to ask: did it result from cultural or from biological adaptation? One important route for distinguishing between the two hypotheses is via falsification of the biological adaptation hypothesis by showing similar biases in animals. A second route, supporting the latter hypothesis, is via an optimality- (or game-) theoretic analysis showing that languages adapted to human biases are superior to languages adapted to non-human biases. We will present examples of both types of evidence, and conclude that language evolution research can and should move beyond the argument from design.



Legend: The top frame (auditory perception) shows for each of 36 possible signals, the randomly chosen probabilities of correct recognition. The middle frame (production) shows for each of 9 possible meanings (vertical axis), which signal (horizontal axis) is used to express it. The bottom frame (interpretation) shows for each of 36 possible signals (horizontal), which of 9 possible meanings (vertical) is chosen as its interpretation.

Figure 1. Through cultural evolution, languages emerge that reflect arbitrary features of the auditory perception. Shown are results from a simulation (a variant of the model described in detail in Zuidema & Westermann, 2003) where individuals, with given perceptual characteristics (top frame) learn their language (middle and bottom frame) from each other. The result of the simulation gives the appearance of design: the characteristics of perception are such that the signals used to express each possible meaning (middle frame) are all among the most reliably recognised signals (top frame). However, there has only been cultural adaptation: the language evolved to exploit the peaks in auditory perception.

References

Kirby, S. (1994). Adaptive explanations for language universals. *Sprachtypologie und Universalienforshung*, *47*, 186-210.

Pinker, S., & Jackendoff, R. (2005). The faculty of language: What's special about it. *Cognition*, *95*(2), 201-236.

Zuidema, W., & Westermann, G. (2003). Evolution of an optimal lexicon under constraints from embodiment. *Artificial Life*, *9*(4), 387-402.