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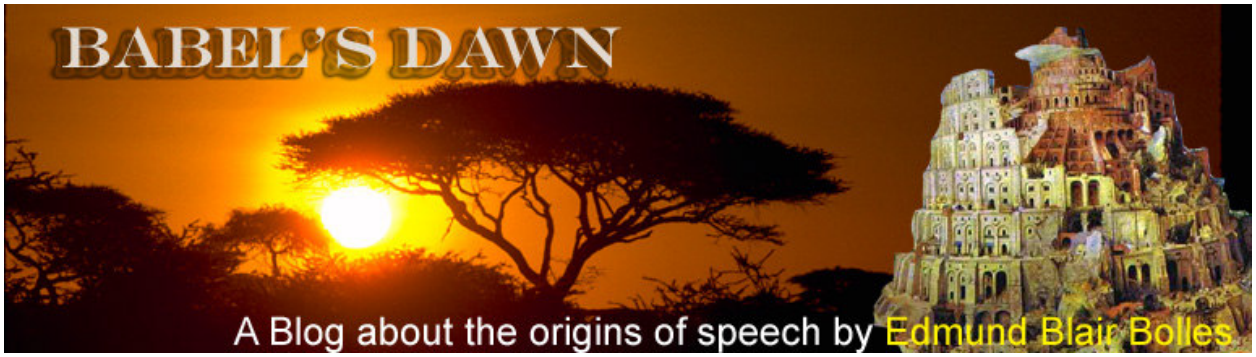


**Post of: November 22, 2009**

# Bilogy Is Much But Not All

**Organismal biology** is the study of organisms, how they are identified, structured, and function. Is that a broad enough definition to include language?.

This blog is often hard on the imperialism of generative grammarians who take only their own field's work into account when trying to explain language origins, so naturally I expected to nod my head all the way through an essay in the latest issue of *Trends in Cognitive Science* complaining that biology's "great strides of understanding… causes of behavior… are generally ignored in the debate

regarding linguistic knowledge, especially in the realm of syntax." But in the end I was of two minds. The opinion piece, "Language: the perspective from organismal biology," by Daniel Margoliash and Howard C. Nusbaum (abstract here) makes some excellent points, but the authors seem not to realize that many fields besides organismal biology have "great strides of understanding" to contribute to the study of language origins. (Organismal biology, by the way, is what used to be called biology, the study of living organisms. These days, with cell biology, molecular biology, etc., old-time biology has a fancy new name.)

The central investigative technique used in the essay is comparative. It notes a difficulty with the method:

> The apparent uniqueness of certain functional attributes of human language, such as generativity, could indicate that there is little to be gained by comparisons with other species and a broader biological perspective.

But the paper goes on:

> Arguments about the uniqueness of language tend to be of the form that identifies 'the' single attribute that is unique to humans, supporting the perspective of a special human endowment. However, language evolved to fit multiple traits of the human brain, not the other way around. There is a long list of 'unique' traits that were said to define language but fell by the wayside as they were demonstrated in other primates, other mammals and in birds. A vast biological knowledge indicates that specialization involves adaptation of a host of traits, not one.

It is a worthwhile, subtle argument that I expect to keep in mind for some time to come. In ordinary philosophizing, people say X is unique because it has unique properties $u_1$, $u_2$, etc, but in biology it is often observed that a unique adaptation rests on the union of known traits $k_1$, $k_2$, $k_3$ etc. The authors are not denying that language is unique, but they do deny that the uniqueness can be traced to a unique trait, like recursion. Instead, known traits produce something new. It's like the recipe for a baked Alaska; the parts are familiar, the result is without precedent. So the authors' method looks at the various traits that support language.

This blog has done that sort of comparison as well. The paper talks about zebra finches and so has *Babel's Dawn* (see, e.g.: Birds Also Use FOXP2) . But the authors take their conclusions a bit farther:

> The re-development of wild-type songs from isolate songs by tutoring shares much with the observations of creolization. Regardless of the way the results of this study are interpreted, there is one conclusion that is inescapable: the regularization of the structural patterning of communicative signals across generations is not unique to humans. Species-specific elements of UG can be viewed from the perspective of a pattern broadly present in evolutionary history, and specifically this also places additional pressure on the claim for the uniqueness of UG in the primate lineage.

Here we see the strength and limits of the comparative approach. It suggests a new way of looking at something, but instead of providing new data it settles for an analogy. Personally, I love analogies because they offer a way of getting a finger grip on something that otherwise we couldn't

begin to explore. Zebra finches provide a handy tool for thinking about the issue of learning to make sounds that are more environmentally based than genetically based. Without such a comparison, we would not know how to begin thinking about that problem, but unless a comparison is between identical things the analogy must break down at some point. If you spot the breaking point, you can learn of a difference, in this case what distinguishes human vocalization from the zebra-finch. The danger of analogous thinking comes from trying to push the analogy beyond the breaking point, of mistaking analogy for identity.

The authors of the paper suggest they are talking about something identical, namely "communicative signals." But to my ears that phrase works like a pun, linking two distinct contexts in one phrase. In ethology and information theory in general, communicative signals serve to control; in language, communicative signals serve to direct attention. Language students get into trouble whenever they lump animal, machine, and human communications into a single pile. They miss what is distinctive about each.

In this case, the authors have claimed identity based on communicative signals and then gone on to claim a further identity between bird and human "structural patterning." Do languages even have structural patterning? From the beginning Chomsky has argued that you cannot learn syntax by learning patterns. That was the point that got Skinner into so much trouble. This error is where the pun-thinking that linked the two systems of vocalizing begins to rub. As far as we know, zebra-finch signals functions entirely on the surface, but language has an invisible meaning that cannot be determined merely by studying the surface. Chomsky says much of that meaning comes from the syntax; this blog says it comes from directed attention—no matter, pretty much everyone who studies language agrees that besides the surface words/phrases/sentences of language, there is a meaning separate from that surface. The statement linking the redevelopment of wild-type songs in zebra finches with creolization in languages ignores the role of meaning and misses what is unique about creolization. I've got my own quarrels with the notion of a universal grammar (UG), but overstretched analogy and pun identities do not really put "additional pressure on the claim for the uniqueness of UG in the primate lineage."

The quoted passage reflects a too ready dismissal of the need to really look at language and grasp what is peculiar about it. I am very open to the suggestion that language arises from traits we can find elsewhere in the biological world, but that doesn't mean the result isn't unique. In particular, I dislike the kind of imperialism that says, *oh this field is really just a part of what I'm more interested in*. So I balk when the authors write

> We hold that psychology is a subject of organismal biology,
> and the study of language a subset of psychology.

Why didn't they add, *and of course organismal biology is a subset of physics and chemistry*? I can think of many reasons for treating biology as its own field. It rests on a great theory, evolution through natural selection, that has no place in physics. The study of parts of an organism (e.g., cells, tissue, organs) includes the notion of function which has no place in physics. And even biology's most important molecule, DNA, requires something beyond the matter and energy that physicists and chemists study—information. Biologists often have to take physics and chemistry into account, but they do so from their own perspective and their interest in evolution, function, and information.

By "holding" that linguistics is a subset of a subset of biology, the authors deny that there is anything in the study of language that has no place biology. This blog has often insisted that biology has to be taken into account when thinking about language in general and its origins in particular, so it's fun to flip the stick around and tell biologists not to forget that language has meaning, syntax and creativity that have no place in biology, but are fundamental to anybody studying language.

Links:
Daniel Margoliash: http://neurobiology.bsd.uchicago.edu/faculty/margoliash.htm
Howard C. Nusbaum: http://www.psychologytoday.com/blog/bloggers/howard-c-nusbaum-phd
Language paper abstract: http://www.ncbi.nlm.nih.gov/pubmed/19892586?dopt=Abstract
Baked Alaska: http://allrecipes.com/recipe/baked-alaska-2/detail.aspx
Birds Also Used FOXP2: http://ebbolles.typepad.com/babels_dawn/2008/01/birds-also-use.html
Noam Chomsky: http://www.chomsky.info/
B.F. Skinner: http://www.bfskinner.org/BFSkinner/Home.html