

Returning language to culture by way of biology

Invited commentary on Evans, N. & Levinson, S.C. (2009). The myth of language universals: Language diversity and its importance for cognitive science. *Behavioral and Brain Sciences* 32, 429–492 [commentary on pp. 460-461].

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Abstract

Conflation of our unique human endowment for language with innate, so called universal, grammar has banished language from its biological home. The facts reviewed by Evans and Levinson fit the biology of cultural transmission. My commentary highlights our dedicated learning capacity for vocal production learning as the form of our language endowment compatible with those facts.

The synoptic sketch of language diversity presented by Evans and Levinson suggests that the scope and depth of this diversity itself is a pivotal fact of language. The sheer variety in patterns of usage by which different languages map between linguistic form and meaning points to cultural transmission as the biological model of choice for human language. Handed down the generations in a family setting, languages not only provide a good match to the details of human population structure world-wide (Cavalli-Sforza 1997), but each one of them, linguistic isolates included, is in a state of perpetual change. Grammars (as the rest of language) undergo constant transformations in historical time, exhibiting shared modes of change driven by language *use*, modes that may in fact harbor the true laws of language (Bybee 2006; Greenberg 1969; Lehmann 1995).

Add the fact that any human being, placed in any one of these language communities at birth, will acquire full competence in the local language, and the cultural model equates to two null hypotheses: every extant and past mapping between linguistic form and meaning is learnable under the circumstances in which humans typically encounter them, and we come into the world equipped with the capacity to acquire, and eventually to transmit, such mappings across generations by cultural learning. The impression that language requires constraints on its *forms* (such as its grammar) other than those imposed by the logic of cultural transmission itself stems from a half-century old strategic confound introduced into linguistics by Noam Chomsky (1959).

One argument Chomsky opposed to behaviorist claims regarding language acquisition was a formal one: the sophisticated Suppes-Estes formalization of behaviorist learning theory lacks the power to acquire a grammar of human caliber (Chomsky 1975, in Piattelli-Palmarini 1980, p. 111). Though the logical possibility remained that behaviorist learning theory is inadequate *as learning theory*, Chomsky took the unlearnability of human grammar by its means to support the proposition that grammar is innate. Through his persistent efforts, the fact that humans have a

unique biological endowment for language has come to be identified with a presumptive *innate grammar* to which learning contributes but "minor modifications that give one language or another, depending on experience" (Chomsky, in Harnad 1976), as if this were the only way to have an endowment for language.

There is neither need nor justification for biologically oriented work on human language to continue to accommodate this strategic confound. Cultural transmission delivers the restricted search space needed to enable language learning, not by constraining the form language takes on an innate basis, but by ensuring that the form in which language is presented to the learner is learnable (Zuidema 2003). The target of the new generation's learning process is itself the outcome of a learning process (previous generation). Gold's 1967 theorem – cited as recently as 2002 by Hauser, Chomsky & Fitch – accordingly cannot decide between learned and innate grammar (Zuidema 2003; see also Clark, 2001; Horning 1969; Johnson 2004; Lappin & Shieber 2007). Moreover, across generations of learning agents cultural transmission has the power to transform a state of arbitrary strings randomly paired with meanings into a shared and efficient grammar without intervention of natural selection or differential reinforcement of outcomes (Kirby 2002). This apparent magic results from competition among strings for access to subsequent generations via the "learner bottleneck," a central aspect of the "poverty of the stimulus" argument. In this competition more efficient and general forms tend to outlast others over generations.

What remains is to complete the cultural model with a way to sustain the chain of transmission of initial nonsense (unsemanticized, ungrammaticalized strings) over the many generations required for convergence on a shared grammar. The ideal prior state for this can be found among the cultural traditions of complex learned song of many songbirds and a few mammals. Some of these are not confined to cultural variations on an innate pattern, the "species-specific song" recently invoked by Fitch (2008), but are emancipated from innate constraint on the form song takes (calls and songs of 76 species of birds from two continents have been identified in the repertoire of the marsh warbler: Dowsett-Lemaire 1979; Baylis 1982). Under circumstances explored in Merker & Okanoya (2007), a prelinguistic human adaptation for emancipated song would provide the mechanism to sustain string transmission for however long convergence might take, because it would be driven by the need to impress by elaborate vocal display rather than to communicate meaning.

But "*Something* about the faculty of language must be unique in order to explain the differences between humans and other animals" (Fitch, Hauser & Chomsky 2005). Indeed, a condition met by the very adaptation needed for song learning to be possible, as first proposed by Darwin (1871). It is a dedicated learning capacity missing in all other primates – our ape relatives included – but essential for every word and sentence we know how to pronounce, namely the capacity to learn to reproduce, by voice, patterns of sound originally received by ear, technically known as vocal production learning (Janik & Slater 1997). We share this capacity with some of

the singers and all mimics among the birds, and with a few mammals, yet we alone, of all species, have evolved vocal learning in the setting of a primate brain.

Supported by a conformal motive (Merker 2005) and *de novo* evolution of a direct projection from primary motor cortex to the respiratory and phonatory motor nuclei of the lower brain stem (Okanoya & Merker 2007; Brown et al. 2008), vocal learning turns the cerebral territories centered on Wernicke's and Broca's areas from their non-language uses in other primates to the service of human language by recruiting them to the generative production and intergenerational transmission of culturally learned vocal lore. To it we owe not only our developmental trajectory for language learning, infant babbling included, but our propensity for imitation and ritual culture more generally (Merker 2005), along with a robust selection pressure for encephalization (Merker & Okanoya 2007; Merker in press). As repeatedly urged by students of birdsong (Marler 1970; Nottebohm 1975; Doupe & Kuhl 1999), this distinctive capacity of ours for vocal learning holds the biological key to the singularity of human language. Through it, and unconstrained by innate so called universal grammar, the historical filter of cultural transmission – which passes only the possible – continually adapts the actual forms of languages to multiple interacting constraints such as use, utility, learnability and neural resources (Christiansen & Chater 2008), as well as cultural norms (Everett 2005), with diversity in train.

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