

A commentary on **Evans** and **Levinson** *The Myth of Language Universals: diversity and its importance for cognitive science*

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Unveiling phonological universals: A linguist who asks “why” is (inter alia) an experimental psychologist

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Abstract

Evans and Levinson are right to hold theories of language accountable for language diversity, but typological data alone cannot determine the structure of mental phonological grammars.

Grammatical universals are nonetheless testable by formal and experimental methods, and the growing research in experimental phonology demonstrates the viability of a comparative experimental evaluation of the UG hypothesis.

There is little doubt that the twin challenges of language universals and language diversity are critical for understanding the architecture of the language faculty, its domain-specificity and evolutionary origins. Despite their crucial import, these questions remain unaddressed in most existing psycholinguistic research. Evans and Levinson (2009, E&L) should be commended for reminding the cognitive science community of its outstanding intellectual debt in this area. Nonetheless, E&L's own conclusion—that the hypothesis of universal grammar is false—does not follow from the evidence they present. Here, I specifically consider E&L's analysis of phonological universals—the role of syntactic and semantic universals falls beyond the scope of this commentary.

In its bare minimum, the hypothesis of universal grammar (UG) states that the brains of all speakers represent a shared set of grammatical constraints. Although this hypothesis is often associated with the claims that UG constraints are innate, domain- and species-specific, these additional claims are not logically linked to the basic hypothesis of grammatical universals. E&L appear to reject all four claims on the grounds that language typology exhibits no absolute, exceptionless regularities. Typological universals, however, are distinct from grammatical universals, and the link between them is complex. Grammatical universals—the object of cognitive inquiry—are mental representations (I-language), whereas typological universals are statistical generalizations concerning external linguistic outputs (E-language). Such outputs are shaped by multiple factors, of which putative grammatical universals are only one force—the restrictions on perception, motor control, conceptual structure and memory, coupled with cultural and social factors are equally strong determinants.

Consider, for example, the typological prevalence of CV syllables (discussed by E&L). One theory of UG, Optimality Theory (Prince & Smolensky, 1993/2004), attributes this fact to a universal, but violable, well-formedness constraint that requires all syllables to begin with an onset. Such a constraint, however, does not guarantee that CV syllables are most frequent typologically (typological frequency is also determined by extra-grammatical factors) nor does it preclude the existence of onsetless syllables (e.g., V—such syllables can be protected by other constraints enforcing faithfulness to grammatical inputs). Instead, the Onset constraint predicts that no grammatical process will actively transform syllables with an onset to onsetless ones (de Lacy, 2008). Whether the case of Arrernte (cited by E&L)—counters this prediction is debatable (Berry, 1998; Smith, 2005), but typological frequency alone clearly cannot decide this matter.

Although this conclusion calls for a more careful interpretation of the typological diversity, it does not render the UG hypothesis unfalsifiable: Optimality Theory asserts that universal well-formedness constraints are active in the grammars of all speakers, irrespective of whether the relevant structures are present or absent in their linguistic experience. This strong hypothesis has sparked a productive research program that uses experimental tools to test the role of grammatical language universals—an enterprise that has unfortunately gone unnoticed by E&L. The available findings suggest that speakers are sensitive to putatively UG restrictions unattested in their language while ignoring other regularities that are equally motivated on statistical and phonetic grounds (Becker, Ketrez, & Nevins, 2008; Davidson, 2006; Hayes, Zuraw, Siptar, & Londe, 2008; Moreton, 2008; Wilson, 2006).

Consider, for example, the restrictions on onset clusters (e.g., *bl* in *blocks*). It is well known onsets such as *bl* are typologically more frequent than *lb*, and languages that tolerate syllables like *lba* tend to allow *bla*. This fact is attributed to sonority—a scalar property that correlates with the intensity of consonants: least sonorous (softest) on the scale are stops (e.g., *b,d*), followed by nasals (e.g., *n*) and liquids (e.g., *l*). Accordingly, *bla* rises in sonority whereas *lba* manifests a sonority fall. The typological preference for onsets like *bl* is captured by a scalar UG constraint that favors onsets with large sonority distances (e.g., *bl* > *bn* > *bd* > *lb*, where > indicates preference, Clements, 1990; Smolensky, 2006).

Although sonority restrictions are widely documented, the typological evidence reflects only implicational tendencies, and many languages manifest outright reversals (e.g., Russian allows sonority falls, e.g., *lb*). Such observations might lead E&L to conclude that sonority restrictions are not grammatical universals, but rather artifacts of modality-specific acoustic and articulatory preferences. However, sonority-based restrictions have been documented in sign languages (Corina, 1990; Sandler & Lillo-Martin, 2006), and recent experimental work suggests that they are active in the brains of individual speakers even when the relevant structures are absent in their language. English speakers, for example, favor syllables that rise in sonority (e.g., *bnif*) compared to sonority plateaus (e.g., *bdif*), which, in turn, are preferred to sonority falls (e.g., *lbif*), and this preference shapes the perception of these syllables (Berent, Steriade, Lennertz, & Vaknin, 2007; Berent, 2008): The worst-formed onsets of falling sonority (e.g., *lbif*) are more likely to be misperceived (as *lebif*) compared to sonority plateaus (e.g., *bdif*), which in turn, are misperceived relative to sonority rises (e.g., *bnif*). The misperception of ill-formed onsets is not due to an inability to extract their surface form from the acoustic input (e.g., it obtains with

printed materials, Berent, Lennertz, Smolensky, & Vaknin, in press) nor is it explained by the statistical properties of English—similar results have been reported among speakers of Korean—a language that arguably lacks onset clusters altogether (Berent, Lennertz, Jun, Moreno, & Smolensky, 2008). Instead, these systematic misperceptions imply broad grammatical knowledge that triggers the active recoding of ill-formed structures. The convergence of sonority preferences across phonological systems, both spoken and signed (Sandler, 1993), is consistent with a domain-specific phonological mechanism.

Nonetheless, the present results cannot determine whether phonology preferences, are, in fact universal, or innate. Markedness (i.e., well-formedness) hierarchies, such as sonority, could vary in detail due to both predictable grammatical processes (e.g., conflation, de Lacy, 2006) and variation in fine-grained phonetic properties that could inform their inference (Hayes & Steriade, 2004). Whether phonological markedness hierarchies are experience-independent or learned is unknown, and there is vanishingly little information on their domain- and species-specificity. Far from being untestable, however, these questions call for a comparative cross-linguistic research program that combines typological, formal and experimental methods. The emerging field of experimental phonology demonstrates the viability of this approach in evaluating the UG hypothesis.

References

- Becker, M., Ketrez, N., & Nevins, A. (2008). The surfeit of the stimulus: Analytic biases filter lexical statistics in Turkish devoicing neutralization. *Manuscript submitted for publication*.
- Berent, I., Steriade, D., Lennertz, T., & Vaknin, V. (2007). What we know about what we have never heard: Evidence from perceptual illusions. *Cognition*, *104*, 591-630.
- Berent, I. (2008). Are phonological representations of printed and spoken language isomorphic? Evidence from the restrictions on unattested onsets. *Journal of Experimental Psychology: Human Perception & Performance*, *34*, 1288-1304.
- Berent, I., Lennertz, T., Jun, J., Moreno, M. A., & Smolensky, P. (2008). Language universals in human brains. *Proceedings of the National Academy of Sciences*, *105*, 5321-5325.
- Berent, I., Lennertz, T., Smolensky, P., & Vaknin, V. (in press). Listeners' knowledge of phonological universals: Evidence from nasal clusters. *Phonology*
- Berry, L. (1998). *Alignment and adjacency in Optimality Theory: Evidence from Walpiri and Arrernte*. University of Sidney, Sidney.
- Clements, G. N. (1990). The role of the sonority cycle in core syllabification. In J. Kingston & M. Beckman (Eds.), *Papers in laboratory phonology I: Between the grammar and physics of speech* (pp. 282-333). Cambridge: Cambridge University Press.
- Corina, D. P. (1990). Reassessing the role of sonority in syllable structure: Evidence from visual gestural language. In M. Ziolkowski, M. Noske & K. Deaton (Eds.), *CLS* (Vol. 2, pp. 33-43).
- Davidson, L. (2006). Phonotactics and articulatory coordination interact in phonology: Evidence from nonnative production. *Cognitive Science*, *30*, 837-862.
- de Lacy, P. (2006). *Markedness: reduction and preservation in phonology*. Cambridge, New York: Cambridge University Press.
- de Lacy, P. (2008). Phonological evidence. In S. Parker (Ed.), *Phonological argumentation: Essays on evidence and motivation*: Equinox Publications.
- Evans, N., & Levinson, S. (2009). The Myth of Language Universals: Language diversity and its importance for cognitive science. *Behav Brain Sci*.
- Hayes, B., & Steriade, D. (2004). A review of perceptual cues and cue robustness. In B. Hayes, R. M. Kirchner & D. Steriade (Eds.), *Phonetically based phonology* (pp. 1-33). Cambridge: Cambridge University Press.
- Hayes, B., Zuraw, K., Siptar, P., & Londe, Z. (2008). Natural and unnatural constraints in Hungarian vowel harmony. *Manuscript submitted for publication*.
- Moreton, E. (2008). Analytic bias and phonological typology. *Phonology*, 83-127.
- Prince, A., & Smolensky, P. (1993/2004). *Optimality theory: Constraint interaction in generative grammar*. Malden, MA: Blackwell Pub.
- Sandler, W. (1993). A sonority cycle in American Sign language. *Phonology*, *10*, 242-279.
- Sandler, W., & Lillo-Martin, D. C. (2006). *Sign language and linguistic universals*. Cambridge: Cambridge University Press.
- Smith, J. L. (2005). *Phonological Augmentation in Prominent Positions*: Routledge.
- Smolensky, P. (2006). Optimality in phonology II: Markedness, feature domains, and local constraint conjunction. In P. Smolensky & G. Legendre (Eds.), *The harmonic mind: From neural computation to Optimality-theoretic grammar* (Vol. Vol. 2. Linguistic and Philosophical Implications, pp. 27-160). Cambridge, MA: MIT Press.

Wilson, C. (2006). Learning Phonology with Substantive Bias: An Experimental and Computational Study of Velar Palatalization. *Cognitive Science*, 30, 945-982.