

Prerequisites for a Theory of Diachronic Adaptation

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0. Introduction

Martin Haspelmath's programmatic article seeks to show that "observed adaptive patterns in language can be explained through diachronic evolutionary processes" and that "linguistic adaptation is in many ways analogous to biological adaptation". We understand that Haspelmath is not discussing the genetic evolution of the language faculty in the human species (another topic of current interest; see Hurford et al. 1998). Rather, he hopes to reconstitute evolutionary explanations in a non-biological context. Although the article raises a number of interesting issues which may well stimulate further thinking in this area, we will argue that it falls far short of demonstrating that adaptation is the major force behind language change. Secondly, we will argue that the proposed research program will still require a theory of universal grammar (UG) and of learning. Moreover, given that there already exist explanations of language change in terms of these concepts, there may be no need for further explanation in terms of adaptation.

A substantive program of diachronic adaptation must articulate precise analogs between language change and established evolutionary mechanisms in genetics. At a minimum it must provide analogs of the following three facets of evolutionary theory: 1) variation; 2) adaptation via reproductive fitness; and 3) heritability of traits. Once these goals have been met, actual evidence must be given showing that languages evolve using these mechanisms. Let us consider these points in turn.

1. Variation

We take for granted that variation in language use exists, and plays an important role in language change. This variation must have a source. In biology, the usual source is random genetic mutation. Though Haspelmath does not discuss the sources of variation in language, several are familiar from the literature.

One source of variation is borrowing through language contact. Of more interest to our current discussion is variation generated by language learners in the course of acquisition. This kind of variation comes about through what has traditionally been called analogy, or overgeneralization, or imperfect learning (Berko 1958, Kiparsky 1982). For example, language learners who know the present tense form of the verb *bring* and who are not familiar with the past tense form may spontaneously produce *brang* or *bringed*, by applying general rules of the grammar. We need a theory of acquisition to account for this source of variation.

Turning to a case discussed by Haspelmath, we know of no evidence pointing to the existence of the form *[kætz] 'cats' in the history or prehistory of English or any Germanic language. Thus, the choice of the actual form [kæts] is not an example of variation leading to selective adaptation. We suggest that there is a principle of UG operating here, preventing codas from having more than one phonologically distinctive voicing gesture. But this principle does not emerge directly from phonetic factors such as articulatory effort, because low-level phonetic processes in English produce such clusters word finally, though they are non-distinctive; e.g. [bi:jds] 'beads'. There is, then, no selective adaptation here, only conformity to a UG principle that ensures a formal simplicity in certain phonological structures.

2. Fitness

Once variants are in circulation, adaptation through selection requires a measure of fitness. In biology, fitness is reproductive fitness, though substitute measures (foraging rates, bone strength, etc.) are often employed, supplemented with arguments as to how the substitute fitness measures relate to reproductive fitness. Haspelmath offers no externally validated measures of fitness, but rather appeals to intuitive ideas about what is good (or easy) for the speaker or listener. Indeed, he sees "no need to go into the details of what exactly makes language structures 'good' for speakers and hearers." Weighing the various "cost factors" against the "benefits" is of course a difficult problem, but without concrete proposals, the theory remains too vague to be properly evaluated.

One might suppose, for example, that Berlin and Kay's hierarchy of colour terms would be an excellent candidate for this type of account, since we know the

physical and psychophysical bases of colour perception, and therefore we should be able to provide a well-grounded external motivation for the hierarchy. The problem is that the hierarchy red > green/yellow > blue does not directly follow either from properties of the retinal cones, which are tuned to approximately red, green, and blue, or from the two-dimensional colour space, which has a red-green and a yellow-blue dimension. It thus remains to be shown that the linguistic colour hierarchy has a functional motivation external to language. And if this case, which involves well understood language-external neural and physical mechanisms, eludes an adaptive functional explanation, what are the prospects for providing such an explanation in cases which are less well understood, and which have less obvious external correlates?

Many cases appear to simply resist explanation in terms of fitness. For example, Idsardi 1997 shows that much of the diachronic development of Hebrew has resulted in increased opacity in the surface patterns of the language (see also Ravid 1995, Bolozy 1978). It is hard to imagine how increasing opacity contributes to fitness of any kind, and yet diachronic developments commonly increase opacity. Principled and natural explanations of this phenomenon already exist in terms of generative phonology, as the addition of rules to the end of the grammar (Halle 1962) interacting with the simplicity metric (cf. Sober 1975 on generative phonology and Sober 1988 on evolutionary biology).

Looking further at Haspelmath's example of devoicing in coda, the historical record shows that Primitive Germanic had voiced codas that were devoiced in some dialects, such as Middle High German. In Yiddish, however, voiced codas were subsequently restored. Such oscillations have been observed in biology, but it is not at all clear what circumstances might have arisen, in some dialects but not others, to make devoicing adaptive at one point and maladaptive at the next stage. It remains to be shown that adaptation plays a role here. The Yiddish developments, for example, are understandable in terms of a theory of how learners acquire a grammar from available data. It can be shown that the loss of final schwas in Yiddish made the devoicing rule so opaque that learners were unable to acquire the rule (King 1976). A parallel case involving the loss of Middle English vowel-length alternations is discussed by Lahiri and Dresher (1999). Once again, the major source of explanation is the learning theory and UG, not diachronic adaptation.

3. Heritability

Inheriting traits from parents is not much of a topic in evolutionary biology because the answer is so simple – traits are inherited by sexual or asexual reproduction. For language this is another problem entirely. The next generation acquires its language by learning it from the evidence available in the

linguistic environment. This is obviously a much more complicated matter than sexual reproduction, as the child has many more "parents" in the speech community.

Since the advent of generative grammar, diachronic developments have been explained through the acquisition of grammars by successive generations of learners (Halle 1962). The evidence available to the child, along with the genetically endowed UG, interact to produce testable, empirically supported theories of diachronic development. Lacking a true analog to genetic heritability, the burden of explanation for sustained diachronic change again falls on transmission from one generation to the next by means of learning.

4. Conclusion

In summary, we have serious reservations about the viability of the program of diachronic adaptation as outlined by Haspelmath. To the extent that it can be developed into an explicit proposal, it appears that, rather than replacing generative models of diachronic change, it in fact must incorporate exactly these models. However, once explanations in terms of UG are taken into account, it is not clear that there is anything left for diachronic adaptation to accomplish.

Acknowledgements

We would like to thank members of the University of Toronto phonology reading group for valuable discussion of the issues involved, particularly Daniel Hall, Milan Rezac, and Keren Rice. Drescher would like to acknowledge the support of grant 410-96-0842 from the Social Sciences and Humanities Research Council of Canada. Idsardi's research was partially supported by a Fulbright Visiting Professorship to the University of Toronto.