Language lessons

Language is a fundamental human characteristic. Its origins and development can inform our understanding of human ecology and evolution, and evolutionary biology methods can be fruitfully applied to linguistics in turn.

Language is arguably the one phenomenon that remains in support of human exceptionalism. Despite manifold and complex systems of communication in other animals — waggle dances in bees, compositional syntax in birds, distinctive vocally phrased songs in whales — so far as we know, the genus *Homo* is the only one to exhibit the formalized, abstract mode of communication that we call language.

Until recently, one might have refined that further to state that *Homo sapiens* is the only species to exhibit the capacity for language. Although the archaeological record of written language goes back only about 5,000 years[1], the archaeological record for the symbolic capacity thought to underpin abstract language goes back much further and extends to other species. Recent rock art dating from the Iberian peninsula suggests that Neanderthals might have made abstract art[2], while the engraved Trinil shell from Java suggests that the capacity for abstract expression might extend back to *Homo erectus*[3]. Anatomically, it has been proposed that the biological adaptations that made *H. erectus* such an efficient biped (for example, upright posture, large lung capacity) might also have facilitated vocal communication[4]. Similarly, archaeologists have argued that the manual and mental dexterity necessary for increasingly complex tool manufacture may have evolved hand-in-hand, as it were, in the genus *Homo*[5].

As such, and for the moment at least, language and its anatomical and cognitive underpinnings remain a characteristically hominin feature. Because of this, the way the world's almost 7,000 extant languages have changed and developed over time is a key part of understanding human ecology and evolution. It comes as no surprise, then, that the study of language evolution and origins has sometimes been fraught: in 1866, the newly formed Linguistic Society of Paris famously banned all discussion of language origins as wild speculation[6]. Since that time, debate has come to focus on whether language develops and changes in a process analogous to biological evolution, and how close this parallel is[7]. However debated the analogy, there is consensus that many of the computational tools used to study biological evolution can usefully be applied in linguistics as well.

For example, in a paper in this month's issue, Bouckaert et al. use Bayesian phylogenetic methods to explore the expansion of Pama–Nyungan languages, the world's largest hunter-gatherer language family, across Australia. They find support for a rapid mid-Holocene expansion of the language family from an origin near the base of the Gulf of Carpentaria, with an average migration speed three to four times slower than that reported for the Indo-European language family across a similar geographical range[8], and slower than average along the coast and waterways. These findings contradict previous hypotheses that coupled the movement of genes and languages along such corridors but, when combined with regional archaeological evidence, support the idea of language spread and replacement occurring concurrently with that of technological and cultural innovation.

Language evolution can also inform models of past population replacement, as Posth et al. show in this issue. The earliest inhabitants of Remote Oceania, associated with Lapita material culture, which is in turn tightly tied to Austronesian-speaking peoples, had East Asian origins[9]. Combining ancient and contemporary genomic data from the South Pacific, Posth et al. find evidence for rapid, near total population replacement of these original inhabitants by individuals of Papuan ancestry beginning 2,500 years ago. But linguistic evidence adds another strand to their story: in spite of the evidence for population replacement, Austronesian languages continue to be spoken in the region today, with no evidence of a wholesale shift to Papuan languages. Instead, in Vanuatu, there is evidence of sporadic Papuan linguistic and cultural parallels that could be a result of contact, argue Posth et al. This language continuity, they state, suggests that the population replacement must have been an incremental and complex process, involving repeated migrations and intermarriage, rather than a one-off event.

Exploring the exchange and contact between different subsistence groups is currently a hot topic in human population genetics studies. Writing in this issue, Lopez et al. explore the demographic history of central African hunter-gatherers and farmers, finding a surprisingly low impact of hunter-gatherer population decline on their mutational load, as well as gene flow between the two populations. Linguistic exploration could help to uncover the nature of this. For example, contact between southern African hunter-gatherers and Bantu-speaking agriculturalists is invoked as an explanation for the limited incursion of click consonants into southern Bantu languages, such as Xhosa and isiZulu[10]. As ever, in such cases, it's important to remember that those groups that are stereotyped as speaking 'more ancient' languages, such as Kalahari foragers or Australian Aborigines, have a cultural and linguistic history as long and as complex as any other. Palaeontologists argue that there's no such thing as a living fossil, and this applies to linguistic evolution just as much as to biological evolution.

Considering the extent of the analogy between linguistic and biological evolution begs the question, is language adaptive? Lidström and Johnson point out in their Comment, also published in this issue, that jargon and unnecessarily technical vocabulary have permeated the language that many of us use on a daily basis, and ecology is no exception to this. Language evolution, like biological evolution, is not teleological, but one goal of scientists must be clear and effective communication. This is something that we prize at *Nature Ecology & Evolution*, and want to help all researchers achieve. ❐

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