

then assume that such patterns had a common origin. They use mitochondrial DNA for tracing the histories of female populations and the Y chromosome for those of males. The volume indicates that molecular methods have a greater potential than historical linguistics for determining the patterns of human dispersal. But the approach has its own set of unresolved methodological issues, which are very usefully described by the contributors. The authors also recognize that the current number of samples is clearly too small for the conclusions they wish to draw.

The ideal approach is to use genetic distribution patterns in modern humans to test hypotheses regarding prehistoric dispersals derived from archaeology and linguistics. Taking this approach, several contributors have produced results that conflict with the hypotheses of Renfrew and Bellwood by suggesting that the predominant patterns of genetic diversity in both Europe and Polynesia arose long before the supposed spread of the first farming peoples. But pre-

cisely how current patterns of genetic diversity relate to several millennia of population history remains to be fully established.

Renfrew's concluding comments express the frustration that will be felt by many reading this volume: When we look at the wide geographical distribution of languages, there is something to be explained, and some general processes should be at work. But as soon as we examine one language family or one region, we are immersed in historical particulars. When considering the explanation for these, we find not only the absence of an interdisciplinary consensus but the lack of agreement among practitioners within a single field.

Although this volume neither validates nor falsifies the farming-language dispersal hypothesis, it unquestionably constitutes a key milestone in the creation of a new synthesis of human prehistory. As such, it is required reading for anyone concerned with understanding our present circumstances as well as our past.

## LANGUAGE

## Many Perspectives, No Consensus

Andrew Carstairs-McCarthy

Clemenceau said that war is too important to be left to the generals. Likewise, scientists in many fields believe that language is too important to be left to the linguists. Though a linguist myself, I think this view has some justification. For the last century and a half, most academic linguists have excluded from their discipline topics not susceptible to the sort of rigorous analysis pioneered in the

19th century in historical linguistics and extended in the 20th to the phonology, morphology, and syntax of contemporary languages. The origin of language, formerly a popular topic of scholarly speculation, was left out in the cold. But

coveries in animal communication, biological anthropology, and brain science began to make the evolution of language seem seriously researchable for the first time. Conferences, books, and university courses on the topic have multiplied. Even a few linguists have decided that it is time for them to get their hands dirty in this area.

*Language Evolution* is a brave attempt at a state-of-the-art survey of language origin research at the beginning of the millennium. The editors, Morten H. Christiansen and Simon Kirby, are Ph.D. graduates of Edinburgh University, where the links between linguistics and other cognitive disciplines are particularly strong. In the 17 chapters, 20 established contributors to the field address nearly all the current issues. Among the questions they consider are:

Is language an adaptation? Or did it arise as an exaptive by-product of other evolutionary developments?

Do animal communication systems or chimpanzees' capacity to use human sign language shed light on language evolution?

How relevant are other human characteristics such as habitual bipedalism or changes in the configuration of the skull or the vocal tract?

How does the capacity to use "symbols" (in some sense) relate to language?

Has evolution resulted in a brain "organ" dedicated to language? Or are all of the characteristics of language explicable

### Language Evolution

Morten H. Christiansen  
and Simon Kirby, Eds.

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Evolution of Language.

scholars outside linguistics were subject to no such self-denying ordinance. Thus, archeologists, psychologists, and others continued to hypothesize about the origin of language in ways that seemed naïve to those few linguists who took any notice. In the late 20th century, however, exciting dis-

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Image not available for online use.

## BROWSEINGS

**The New World's Old World.** Photographic Views of Ancient America. *May Castleberry, Ed.* University of New Mexico Press, Albuquerque, NM, 2003. 280 pp. \$47.50. ISBN 0-8263-2971-3.

Cameras have been pointed at prehistoric ruins in the Americas since the 1840s. Castleberry and her contributors survey the results, from the archaeological documentation taken by early expeditions—such as Claude Joseph Désiré Charnay's *Left Wing of the Nuns' Palace, Chichén Itzá, Mexico, 1860* (above)—to the personal interpretations created by contemporary artists. The volume includes 75 duotone prints, a series of site descriptions, and essays that discuss the photographers' approaches and achievements.

in terms of other mental mechanisms of wider scope?

What is the exact role in speech and language of the recently discovered *FOXP2* gene?

Was the primary function of language originally social (e.g., for grooming or bonding among individuals)? Or did it have more to do with foraging or tool use?

To what extent has sexual selection influenced language?

Was language originally (mainly) gestural rather than vocal?

Did the cultural explosion of the Upper Paleolithic, about 40,000 years ago, correspond to some new phase in linguistic evolution?

How much insight can be gleaned from computer simulations and mathematical models involving virtual communities of interacting "speakers"?

Contradictory answers to all of these questions can be found in the volume. But do not let that put you off. This may well

be, as the editors put it, "the hardest problem in science." Nonetheless, with so many diverse specialists now talking to one another, a good start has been made.

I said that the contributors address nearly all the current issues. I would like to have seen more prominence given to recent work by Herbert Terrace (*I*). Consider the distinction between "declarative" or "propositional" knowledge (knowing that... e.g., that Earth is round) and "procedural" knowledge (knowing how... e.g., how to get food or how to play the piano). Many characteristics that used to be considered restricted to humans (such as tool use, warfare, and deliberate deception) have now been found in other species, but it is still widely thought that declarative knowledge is uniquely human. If so, then it would seem likely that this is because only humans have language, by means of which propositions can be entertained or expressed. However, Terrace's research with macaques (humble monkeys, not apes) casts doubt on the claim that only humans have declarative knowledge. To obtain a food reward, macaques can quickly learn to punch a sequence of five or more symbols on a keyboard—and do it consistently right, even when the keyboard configuration is randomly shuffled. Thus, the macaques learn not just a sequence of manual movements (analogous to learning a passage on the piano) but an abstract sequence of symbols, whose application involves different motor commands on each occasion. What's more, macaques apply this knowledge so rapidly that a human observer must watch slow-motion videotapes in order to see what is happening. (How quick would you be at using an ATM if the numbers appeared in a different configuration every time?) Thus declarative knowledge does not seem to be limited to creatures that can utter declarative sentences.

What would I leave out in order to make way for Terrace? A currently fashionable topic is mirror neurons, discussed by Michael Arbib. Manual actions in monkeys are accompanied by neural activity in the homolog of Broca's area (in the human brain). Arbib reports on a discovery that in a monkey watching another monkey perform a manual action, the corresponding neurons are activated in its own homolog of Broca's area. He suggests that this echoic neural activation could lead to manual imitation, which could lead to gestural communication, which could lead to language (with which, in humans, Broca's area is associated). But in no extant nonhuman primates do individuals spontaneously mimic the gestures of others to any great extent, so a crucial stage in Arbib's scenario is speculative. Besides, although imitation is important in how humans learn language, it

plays little part in how we use it. In a conversation, we do not repeat what our interlocutor has just said. This point is made by Michael Corballis, who, ironically, defends a gestural-origin scenario for language and is favorably disposed to Arbib's work. Yet what he says about imitation weakens a crucial aspect of Arbib's case.

The evolutionary origins of language should intrigue anyone interested in the relationship of humans to other species. For them, *Language Evolution* will provide a useful starting point. But the volume is not a summary of mainstream views, because no such mainstream exists.

## References

1. H. S. Terrace, in *The Transition to Language*, A. Wray, Ed. (Oxford Univ. Press, Oxford, 2002), pp. 64–90.

## ARCHAEOLOGY

## As Our World Warmed

Lawrence Guy Straus

At the close of the last Ice Age (around 10,000 B.C.), dramatic events worldwide set the stage for the transformation, early in the present interglacial, of most of humanity from foragers to farmers. The ice melted, sea levels rose, and floras and faunas were rearranged as they began to assume

their modern compositions and zonal distributions. For the first time during a climatic transition of this nature and magnitude, the hominins (*I*) dealing with global change were anatomically modern people (*Homo sapiens sapiens*) who were living in Siberia, the Americas, and on all continents save Antarctica, sometimes at fairly high densities. Only 10,000 years earlier, humans had survived the cold and

aridity crisis of the Last Glacial Maximum through a combination of strategic retreat, technological inventiveness, subsistence intensification, social flexibility, and ideological sophistication. Now, they were poised for their biggest make-over since a creature variously known as *Homo ergaster* or *H. erectus* first crossed into Sinai from Suez, sometime around 1.5 million years ago. For better or worse (only time will tell), between 8000 and 3000 B.C. humans around the globe went

**After the Ice**  
A Global  
Human History,  
20,000-5000 BC  
by Steven Mithen

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