

BOX 1.1 Opinion: Linguistic evidence for human origins

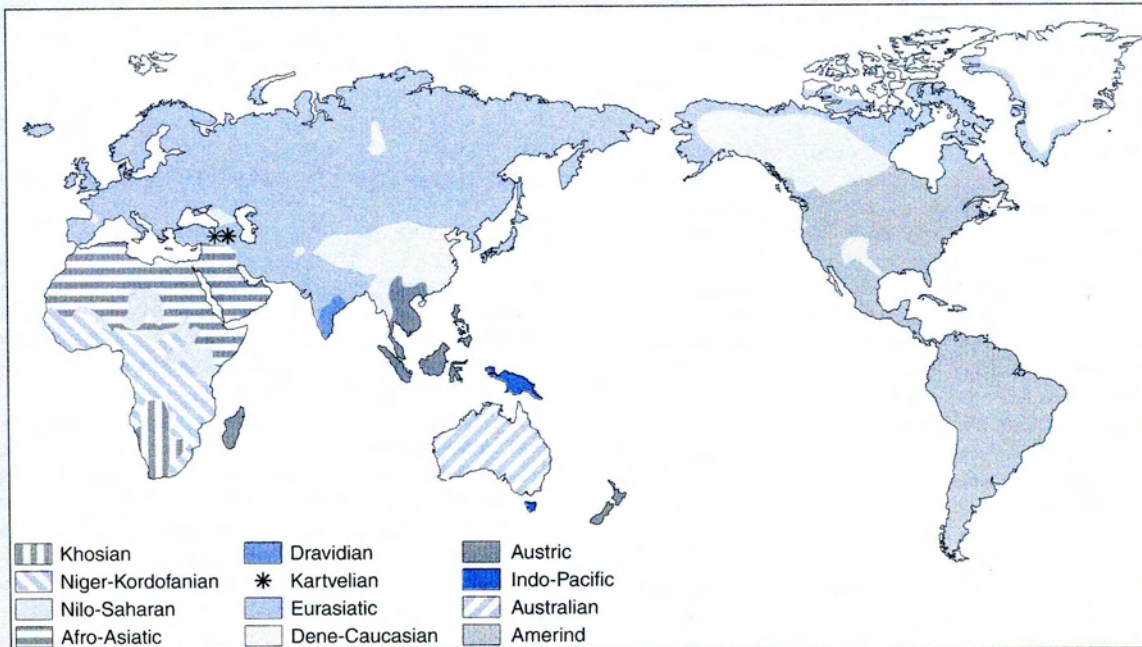
It has been known for more than two centuries that the comparison of extant or historically-attested languages can lead to the identification of extinct languages that existed before the invention of writing – that is, in prehistoric times. In 1786 an English jurist serving in India, Sir William Jones, noted that similarities in the words of Latin, Greek, and Sanskrit were so striking that they could only have arisen ‘from some common source, which perhaps no longer exists.’ What struck Jones was that both the roots and endings in verbs in these languages were almost identical: Sanskrit bhár-anti ‘they carry,’ Greek phér-onti ‘they carry,’ Latin fér-unt ‘they carry,’ and he recognized that it would be absurd to suppose that such similarities had arisen by chance. Jones thus identified a language family that later came to be known as Indo-European, and which includes most of the languages of Europe (except for Basque, Hungarian, Finnish, and Estonian) as well as languages ranging as far east as northern India (Kurdish, Farsi, Pashto, Hindi, Bengali). But even more importantly Jones offered an evolutionary explanation for linguistic diversity and he did so some 73 years before Darwin’s evolutionary explanation via natural selection for biological diversity.

What is surprising is that two centuries after Jones’ fundamental discovery, most historical linguists still maintain that Indo-European represents the limit of comparative linguistics. According to this widely held view language

change is so rapid and unrelenting that after around 6000 years – conveniently the supposed age of Indo-European – all trace of genetic affinity is lost so that even if Indo-European did once have some relatives, there simply could be no trace of this relationship still surviving today. What is even more surprising, however, is that this view was known to be incorrect a century ago. At the beginning of the twentieth century Holger Pedersen, Alfredo Trombetti, and others pointed out numerous traits shared by Indo-European and other language families, among the most prominent of which were an M/T ‘I/you’ pronominal pattern and a dual/plural opposition expressed by K/T suffixes.

This larger family, of which Indo-European was just one branch, was initially called Nostratic by Pedersen. After a period of quiescence in the first half of the twentieth century, work on Nostratic was revived in Moscow during the 1960s by Vladislav Illich-Svitych and Aron Dolgopolsky. A family similar to Nostratic has recently been proposed by Joseph Greenberg, who calls the family Eurasiatic (see *Figure*). The Eurasiatic family includes, in addition to Indo-European, the Uralic (Hungarian, Finnish), Altaic (Turkic, Mongolian, Tungus), Korean, Japanese, Ainu, Gilyak, Chukchi-Kamchatkan, and Eskimo-Aleut families.

In addition to Eurasiatic, other large families were discovered in the second half of the twentieth century, primarily by Greenberg, whose taxonomic work forms the basis of our



The World’s language families (after Greenberg).

knowledge of the relationships among the languages of Africa, New Guinea, and the Americas. The *Figure* shows the distribution of the 12 families into which Greenberg classified all of the world's roughly 6000 languages. Each of these families is defined by a specific set of traits. Whereas Eurasiatic is characterized by the M/T 'I/you' pronominal pattern, the Amerind family is characterized by N/M, and other families have pronominal patterns different from either of these.

Perhaps the most surprising finding of all is that even among these dozen families, most of which are quite ancient, there are still roots that are widely shared and which imply a recent common origin for all extant languages. Substantial evidence for monogenesis was already given by Trombetti a century ago, and recently John Bengtson and I have enlarged and refined Trombetti's evidence based on much better resources now available (Ruhlen, 1991, 1994). Examples of roots whose distribution ranges from Africa to the Americas are TIK 'finger, 1'; PAL '2'; AKWA 'water'; KAPA 'cover(ing), skin, bark'; and PUT 'vulva.'

While this emerging linguistic picture is still considered anathema to most mainstream historical linguists, one cannot

fail to see that it fits well with the archaeological and genetic evidence for human origins, according to which a behaviorally modern group of humans left Africa around 50 KYA and in a short time populated the entire world, replacing all of the earlier inhabitants, such as the Neanderthals. Traces of this rapid expansion out of Africa – and then throughout the world – can be seen in the archaeological record, in the genes of modern humans, and in modern languages. Furthermore, not only is the linguistic evidence consonant with the archaeological and genetic evidence, but several scholars, including Richard Klein and Jared Diamond, have proposed that it was in fact the emergence of fully-modern language around 50 KYA that was directly responsible for this expansion out of Africa and the subsequent disappearance of all earlier humans or human-like species. It would appear that human language – and its correlate human culture – was a tool with which earlier humans, such as Neanderthals, could not successfully compete.

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time-scales [typically up to 100 KYA (thousand years ago)]. **Geological records** in rocks provide information on older climates as far back as 3800 MYA. We will see that climate has varied greatly over the last few million years, and has had a major influence on human populations.

- ▶ In principle, the **genetic record** of life on Earth contained in the genomes of living species could provide evidence on evolutionary processes and relationships all the way back to the last universal common ancestor of all extant species. To find out about this lucky individual we have to compare and contrast the most distantly related branches on the tree of life. Comparisons among much more closely related individuals, perhaps from the same species, should provide evidence on much more recent evolutionary processes. Our ability to read this genetic record is a relatively recent development, although our confidence that information on our past exists within our heritable material is somewhat older. Genetic evidence comes from two main sources:
 - ▶ the genomes of living individuals that must have been passed down from ancestors;
 - ▶ ancient DNA from well-preserved organic remains, which may or may not have been passed down to living descendants.

1.1.2 All records are selective

It is important to bear in mind that none of these records represents an unbiased picture of the past. We do not have a time machine and therefore must rely upon evidence that has survived to the present. This process of survival is selective. In the archaeological record we find many stone tools but few wooden ones: arrowheads but not shafts. In the paleontological record we find plenty of skeletal fossils, but soft tissues leave traces only very rarely. In the historical record we may not encounter those texts that displeased contemporaneous or subsequent heads of state, either because they were destroyed, or not written in the first place. Similarly, in the genetic record, survival is quite literally selective. Natural selection and other processes have shaped, and continue to shape, our genome in different ways. Even ancient DNA evidence, although not influenced by subsequent natural selection, is biased: for technical reasons it can tell us far more about the genetic diversity of our female ancestors than it can about our male forebears. Since the survival of ancient DNA is influenced by physical and chemical conditions, samples will be more plentiful from some regions of the world than from others.

1.1.3 The palimpsest metaphor

In times past, when writing materials were in short supply a scribe would often reuse a manuscript rather than obtain a new parchment. The manuscript would be turned through