1 Evolution and history

1.1 Overview

In this chapter, we shall outline exactly what we mean by 'evolutionary linguistics'. We consider some early theories and speculations about the origin of language, and make an important distinction between evolution and history. In discussing the evolution of language (or strictly, the evolution of the human capacity for language), we need to understand the terminology of evolutionary theory, and we therefore introduce the basics of the theory of natural selection. It is worth noting, however, that many linguists do use terms like 'evolution' and 'evolve' to refer to developments in historical rather than evolutionary time, adopting evolutionary metaphors to help us understand language change. Finally, we discuss the notion that humans might now be beyond the forces of evolution, but conclude that evolution is indeed continuing, though humans may be more capable of altering our environment than other species.

1.2 Evolutionary linguistics

Evolutionary linguistics has two interacting subjects of study, namely the issue of how, why and from what earlier systems the human capacity for language originated; and how, when and why it has subsequently developed, through descent with modification, to allow us to acquire and use the language systems we have now. The first aspect requires us to investigate where the systems we call language have come from: as Shakespeare puts it, 'Nothing will come of nothing' (*King Lear*, I:i), so it would be scientifically improper as well as completely unenlightening to invoke a mysterious blinding flash somewhere in the early history of our species before which we were silent and agrammatical beings, and after which we had fricatives, diphthongs and subordinate clauses. On the other hand, what we know of the processes of biological evolution indicates clearly that something very highly structured and apparently very specialised can indeed come from not very much: the eye, for example, has evolved independently a number of times in different lineages, beginning on each occasion from a much simpler source (Nilsson and Pelger 1994). Moreover, at least when we are dealing with simpler organisms and shorter generation intervals, this process of development of complexity can happen rather quickly: Nilsson and Pelger make a pessimistic best estimate of approximately 364,000 years for a light-sensitive patch to develop into a camera eye corresponding to roughly the structure of the modern human eye.

This means that there are likely to have been precursors to human language as we know it; and perhaps aspects of these might still be discernible either in the communication systems of our primate relatives (which are sometimes vocal, sometimes gestural, and sometimes both), or in other human behaviours which we have maintained since before we had language. However, the second part of our enterprise involves looking at how and why these pre-existing systems have developed into the capacity for language and the linguistic systems we have now. As we shall see, this does not mean we will be focusing on how languages today differ from one another: that is a matter for historical linguistics and typology. Evolutionary linguistics looks at possible sources for human language in other systems and its development up to the point when it achieved the level of structural complexity common to languages today.

This preamble may explain why we are not calling the enterprise in which we are engaged here the origin of language, or the evolution of language: each of these terms focuses on only one of the two key aspects of the whole process. It is also important that we include the term 'linguistics' in the title, because the 'of language' part is either misleading or at best ambiguous, stressing as it does the superficial and behavioural aspects of languages themselves. As we shall see, we are primarily concerned with the genetic developments which have shaped the physical and neurological structures responsible for predisposing us to acquire these rather highly variable behavioural patterns.

1.3 Early ideas about the origin of language

1.3.1 The first language

Early theories tended to focus only on one aspect of what we are calling evolutionary linguistics: they were much more concerned with the origin question than with any subsequent development. The very earliest discussions in this area, in fact, tended to make the assumption that human language must have originated in a system just like some of the languages known to us in historical time: the question was not how human language originated in some other system, but which human language came first. This model is familiar from the biblical account (in Genesis 11) of the Tower of Babel, which tells how God created a single language for humans. Those humans, in turn, used their language to develop a plan to build a tower high enough to reach heaven; whereupon God, increasingly concerned by this outbreak of cooperation, 'confounded' their languages, scattering different groups of people around the earth, and presumably creating the family-tree model of language families at a stroke.

What the Bible does not tell us is which language was the first; the implication seems to be that this initial system no longer exists. However, there are various records of attempts to identify the first human language through rudimentary (and typically inhumane) 'experiments'. Pharaoh Psamtik, or Psametticus I (663–610 BC), for instance, left two small children to be brought up by a shepherd, who was permitted to feed them but not talk to them, and who was to report to the Pharaoh on what language they had learned. Unsurprisingly, they were not particularly verbose; but in due course, after about two years, the shepherd reported to the Pharaoh that they had approached him with hands outstretched, saying *becos*, which on investigation turned out to be the Phrygian word for 'bread', both a reasonable request and an apparent demonstration that Phrygian (an Indo-European language of Asia Minor which died out around the sixth century AD) was the world's first language. A similar approach was adopted by King James IV of Scotland (1473–1513), who sent babies to be raised on the rather inhospitable island of Inchkeith in the Firth of Forth, with the added sophistication of preventing cheating by employing a nursemaid who could not speak. Robert Lindesay of Pitscottie, a contemporary commentator, comments laconically that 'Sum sayis they spak goode hebrew bot as to my self I knew it not bot be the authoris reherse' (Mackay 1899: 237).

However, neither Phrygian nor Hebrew is a realistic candidate for the role of first human language. This is no reflection on these particular languages, but on the simple fact that the role of 'first human language' is not open to be filled, certainly not with any developed, structurally complex system such as either of these. Nominating any language of the type we know now is simply invalid: in doing so, we would be confusing Language with languages, and evolution with history.

1.3.2 Early theories of origin

Before going on to develop this distinction between evolution and history, we should look at some further early theories which do seek a source for human language beyond languages we know now. Jespersen (1922: Ch. XXI) provides an outline of a number of these, referring to them all rather disparagingly as having 'been advanced by followers of the speculative or a priori method', by which

> those who have written about our subject have conjured up in their imagination a primitive era, and then asked themselves: How would it be possible for men or manlike beings, hitherto unfurnished with speech, to acquire speech as a means of communication of thought? (1922: 413)

These early theories tend also to rejoice in rather expressive, cartoon shorthand names: the three we shall consider briefly here are the bow-wow, pooh-pooh, and yo-he-ho theories.

All these early ideas rest on the key – and reasonable – assumption that a sound or sequence of sounds originally uttered for some non-linguistic purpose might in time come to have linguistic meaning. First, the bow-wow theory is based on onomatopoeia: if cats meow, or birds tweet, early humans (or rather, pre-human hominids; see further Chapter 4) may well have used relatively close imitations of those sounds to refer to the creatures making them. Second and similarly, the pooh-pooh theory suggests that language has developed from instinctive, emotional cries, like the *ouch*es and *ow*s and *ooh*s and *aah*s of pain or pleasure or anger. Third, the yo-he-ho theory notes that strenuous physical activity can lead to repeated and sometimes rhythmic exhalation of breath, often accompanied by grunts and groans of various kinds; again, elementary words for actions might develop from the sounds typically encountered along with the actions, so that 'the first words would accordingly mean something like "heave" or "haul"' (Jespersen 1922: 415–16).

However, the main and intrinsic limitation of all these early theories lies precisely in their restriction to and preoccupation with the first words of human language, when words in many ways are the very least of our worries as evolutionary linguists. It is true, but not particularly illuminating, that some early words might derive from imitation of sounds heard in the natural environment of early hominids; or that cooperative grunts might turn into a few early verbs; or that noises triggered by pain, for example, might change into language-specific signals: Jespersen (1922: 415) notes that 'in pain, a German and a Seelander will exclaim *au*, a Jutlander *aus*, a Frenchman *ahi* and an Englishman *oh*, or perhaps *ow*'. But there are many more objects, let alone concepts, which have no characteristic noises of their own for us to imitate, than those that do; many activities are not strenuous and would not be expected to provoke cooperative noises which might in time come to stand for the event; and it is questionable whether Jespersen's *au*, *ahi* and *ow* are words at all, or something else, a difficulty he notes himself in recognising that such interjections frequently contain sounds, like voiceless vowels or clicks, not found in the normal segmental phonological inventory of the language in question. These theories might tell us a plausible story about the origin of a few early words, but they cast no light on the subsequent development of whole lexicons, full as these are of totally conventionalised, arbitrary and unmotivated associations of sound and meaning, or of the more mysterious but arguably far more central development of order and structure above the level of the word.

Jespersen's own contribution is to reject the 'speculative method', and instead to consider evidence from child language, 'primitive' languages, and the histories of languages. He has rather little to say about the first of these, only making the point that any insight from language acquisition should really come from the very earliest, babbling stage, since it is erroneous to attempt to develop a theory of language origins based on what children are doing while learning a language that already exists. His observations on 'the languages of contemporary savages' (1922: 417) are clearly best left on one side as a product of the thinking of the time; they are difficult to reconcile even with Jespersen's own earlier and more enlightened statement that 'no race of mankind is without a language which in everything essential is identical in character with our own' (1922: 412–13). For the most part, the features he highlights here are simply reflections of typological differences and consequently, as we shall see below, products of historical rather than evolutionary processes and time.

Finally, however, Jespersen suggests that we might productively consider evidence from earlier stages of present-day languages and from linguistic reconstruction, and 'attempt from that starting-point step by step to trace the backward path. Perhaps in this way we may reach the very first beginnings of speech' (1922: 418). We shall test this method of backwards extrapolation in Chapter 3 and find it wanting, but for the moment can note that Jespersen nonetheless comes to some interesting conclusions on the basis of his retracings of change. On the basis that language change typically involves simplification of pronunciation, 'We may perhaps draw the conclusion that primitive languages in general were rich in all kinds of difficult sounds' (1922: 419); the same kind of argument is taken to suggest that early language had long words which have subsequently become progressively shorter. Grammatically, Jespersen suggests that the historical trend towards analysis, with the development of small and separable units, may have its roots in an extreme form of synthesis, where units with the shape of single words and no discernible internal structure may have expressed the meaning of whole sentences. Since tone and pitch-accent often disappear in documented histories, we might assign tone to the first language(s), which Jespersen also envisages as highly musical in its intonation, on the grounds that intonation is strongly linked with emotion, and that (much more dubiously) 'it is a consequence of advancing civilization that passion, or at least, the expression of passion, is moderated, and we must therefore conclude that the speech of uncivilized and primitive men was more passionately agitated than ours, more like music or song' (1922: 420).

This link with song is perhaps one of the most striking elements of Jespersen's own suggestions about early language. Conceptually at least, his ideas have some connection with the pooh-pooh theory, since he argues explicitly against the suggestion that language developed primarily to allow us to express and communicate our thoughts: 'Thoughts were not the first things to press forward and crave for expression; emotions and instincts were more primitive and far more powerful' (1922: 433). From here, however, Jespersen departs on more of a flight of fancy, developing his theme in a claim that (1922: 433–4):

> the genesis of language is not to be sought in the prosaic, but in the poetic side of life; the source of speech is not gloomy seriousness, but merry play and youthful hilarity … In primitive speech I hear the laughing cries of exultation when lads and lasses vied with one another to attract the attention of the other sex, when everybody sang his merriest and danced his bravest to lure a pair of eyes to throw admiring glances in his direction.

This Camelot-like preoccupation with love and spontaneous outbreaks of song as a key to the early development of language has attracted its share of derision:

Aitchison (1996: 9) quotes Diamond (1959), who observes acidly that 'As for courtship, if we are to judge by the habits of the bulk of mankind, it has always been a singularly silent occupation'. Jespersen himself seems aware of such reactions, and in a rather hurt footnote suggests that critics should not get too preoccupied with his 'remarks on primitive love-songs, etc.', which some have sought to demolish 'by simply representing it as a romantic dream of a primitive golden age in which men had no occupation but courting and singing' (1922: 434). Jespersen claims that the real utility of his view is the suggestion that we should not simply speculate on language origins, but use tendencies of linguistic change to provide evidence. As we shall see in Chapters 3, 8 and 9 below, this methodology is seriously problematic; but some of the suggestions Jespersen makes about the importance of prosody in the development of language from pre-language will resurface again later, while his hypothesis that the earliest language is likely to have contained long, unanalysable utterances which were subsequently divided to produce smaller, individually meaningful units, is strikingly similar to some aspects of Alison Wray's (2000, 2002a) account of the evolutionary linguistic importance of formulaic language (though without, in this case, the singing).

1.4 Evolution and history

1.4.1 Schleicher's distinction

All the languages we know about today, whether they are still spoken now or attested in written records, are at approximately the same level of structural complexity: we shall essentially take this for granted, as any linguist would, but what we mean by it is that complexity, roughly speaking, evens out across the grammar, so that a language with a highly complex morphology might have a rather more simple syntax, for example. For one recent and extensively documented example, consider Everett (2005), on Pirahã, a language spoken in a number of villages along the Maici River in Brazil (see also Nevins, Pesetsky and Rodrigues 2009, Everett 2009). Everett argues, controversially, that Pirahã lacks a whole range of features which are often considered to be vital to, or even definitional of, human language: these include number words and numerals; colour terms; and embedding of one syntactic structure in another, giving rise, for instance, to subordinate clauses. Pirahã likewise has one of the smallest segmental phoneme inventories recorded, and a remarkably small pronoun system (which is moreover likely to have been borrowed in its entirety). Nonetheless, Everett emphasises that 'No one should draw the conclusion from this paper that the Pirahã language is in any way "primitive". It has the most complex verbal morphology I am aware of and a strikingly complex prosodic system' (2005: 62, note 1). Everett argues that there is radical reduction in some aspects of the structure of Pirahã as compared with many or even perhaps all other human languages; but equally, some areas of the grammar are highly complex. As Everett also notes, in comparing languages we are not concerned with particular vocabulary items, or coverage of particular semantic fields: not having words for vaccines or satellite television does not make one language less structurally complex than others, just as not having the things these words refer to does not make a human group less highly evolved, reflecting instead simply the nature of its society.

In fact, we should not say that properties of individual human societies, or of individual human languages, have evolved at all: behavioural differences of this kind have arisen in historical rather than evolutionary time, and through historical rather than evolutionary processes. This distinction between evolution and history has certainly been made in linguistics before now, though not always in the way we envisage here. Invoking evolution, though not necessarily with its Darwinian biological meaning, was quite popular in late nineteenth-century linguistics, and August Schleicher in particular used biological terminology plentifully in his development of the family-tree mode of representation for language affiliations. 'Philosophically, however, Schleicher was a nineteenth-century German Romantic progressivist, influenced more by Hegel than by Darwin' (McMahon 1994: 319); and although he knew Darwin's work, his concept of evolution was an earlier, pre-Darwinian interpretation couched in an overall model of progress and decay. Schleicher saw the evolution of language as an essential aspect of the evolution of our species, but regarded evolution as a progressive expansion of earlier simple forms into later complex ones. Evolution in this sense is a period of novelty and progress, culminating in the considerable morphological complexity of inflecting languages like Latin, Greek and Sanskrit. However, as soon as any languages reached this peak of perfection, evolution stopped and history began. History, in Schleicherian terms, is bad news: if evolution is progress and the development of complexity, history involves a return to simplicity via a lengthy period of decay and loss, with no prospect of creating anything new.

This rather bleak view of history is not one we are going to follow here; nor will we be adopting these negative attitudes to change, which tends in any case to follow cycles from more complex to less and back again rather than the linear and directed (and downhill) developments envisaged by Schleicher. However, although we do not accept Schleicher's definitions of evolution and history, we do need some distinction between the two.

1.4.2 Evolution by natural selection

Perhaps the easiest way to conceptualise the difference between evolution and history is precisely to consider the timescales involved. A well-worn but still highly pertinent expression of this comes from Maynard Smith (1993: 327):

> About 400 million years ago the first aquatic vertebrates evolved; at least two million years ago man's ancestors first chipped stones to make simple tools. Less than ten thousand years ago, in the neolithic revolution, animals and plants were first domesticated. If a film, greatly speeded up, were to be made

> of vertebrate evolution, to run for a total of two hours, tool-making man would appear only in the last minute. If another two-hour film were made of the history of tool-making man, the domestication of animals and plants would be shown only during the last half minute, and the period between the invention of the steam engine and the discovery of atomic energy would be only one second. These figures show how rapid are historical changes when compared to evolutionary ones.

When we talk about evolution, we mean a slow, incremental process across many generations, which we shall explore in more detail in Chapter 7, but which essentially consists of three interrelated stages. First, there is mutation. Accept for the moment that humans, just like all other living organisms, are composed of individual cells, which work together to make larger organs. Each cell contains a nucleus, and each nucleus in turn contains genetic material, or DNA. Strings of adjacent elements of DNA (which are conventionally written as sequences of four distinct units, A, C, G and T) make up genes. Each gene contains the coded information to construct a protein, which in turn may have a particular function, either alone or as part of a group. If any element of such a sequence is changed, we have mutation: thus, a sequence of AACGTTCGC may become AAC**A**TTCGC during the process of reproduction, so that the parent organism has the former sequence, and its offspring the latter. Processes of mutation may be physically conditioned by environmental mutagens such as ultraviolet light, but are much more commonly random 'errors' occurring during replication, which create differences between earlier and later versions of 'the same' DNA sequence. This is why evolution is often described as persistence with modification: the sequence as a whole is maintained, and the structure or behaviour for which it codes is also highly likely to be inherited by the next generation with only minor modification, since the sequence is virtually intact. This assumes that the genetic sequence has some kind of structural or behavioural significance in the first place; but that does not appear to be true for absolutely every 'letter' in the genetic sequence. In many cases, sequences which do code for the construction of a particular protein are interspersed along a stretch of DNA with sequences which do not appear to code for anything at all; hence the frequent reference to 'junk DNA', which either has no surface or phenotypic meaning, or none we have discovered yet. In fact, the Human Genome Project (Human Genome *Nature* issue 2001) has established that only approximately 1.5 per cent of the 3,200,000,000 (that's three thousand two hundred million) bases (those are the As, Cs, Gs and Ts) in the human sequence actually do code for proteins.

Regardless of any physical or behavioural relevance, however, any mutation will cause a small but measurable change at the genetic level to take place. However, although mutation necessarily comes first, it is only an enabling step in the evolutionary story that follows. Without mutation, there could be no evolution; but there may be mutation which stops without developing any evolutionary meaning, if, for instance, the effects of the new, mutated sequence are so disastrous that the organism in which the mutation arises just drops dead. On the other hand, if the organism survives, then we have a situation of variation, such that individuals with the old and new sequences co-exist in the population. What happens next will depend on what effect that new variant has, if any. Crucially, if its effect is positive, then organisms with it are likely, all other things being equal, to prosper, and to have more viable offspring than those with the old-fashioned variant. Consequently, in subsequent generations the proportion of the population with the new variant will increase until it is the norm. Moreover, any other mutations affecting the same trait will tend to be increasingly favoured, so that a simple and small change from the previous norm can become exaggerated over evolutionary time into an extreme or a completely novel structure or behaviour. This would be the usual evolutionary account for the development of long necks in giraffes, or humps in camels, for example, since long necks are beneficial in terms of reaching high foliage, and humps are superb fat-retention (and therefore indirectly water-retention) devices in deserts.

Nonetheless, there are trade-offs to take into account, too, since long necks and humps have their cumbersome aspects and might restrict movement or flexibility in other ways; we would not expect to find a lot of giraffe-type creatures in situations where foliage is low-growing, or humpy beasts among rivers and lakes. Furthermore, all this takes a very long time indeed: necks may become progressively longer, but the increase has to be gradual and incremental, especially bearing in mind that the original mutation will typically have had only a small effect, and that subsequent development of the trait in question will have to wait for further relevant mutations to arise. There is, after all, no point in developing such an enviably long neck in the womb that you can't be born successfully at all, or growing the same long neck in infancy without the associated development of a vascular system capable of pumping blood to the brain at the end of it. Evolution illustrates a constant compromise between developing a more extreme form of some trait, and overshooting, which is frequently fatal. Moreover, adapting too radically for a specific environment leaves a species unable to venture anywhere else, while environmental changes of even a fairly restricted type will leave it seriously vulnerable. Prudence, it seems, is the order of the day in evolutionary terms; and the whole process will typically happen gradually.

This, in short, is the Darwinian (or more accurately, neo-Darwinian; see Chapter 7 below for a much fuller development) account of evolution by natural selection. True, some mutations have such an immediately and catastrophically deleterious effect that organisms carrying them cannot survive: understandably, these do not spread, though they may survive at relatively low levels in populations because the mutation responsible recurs from time to time in different families. In the case of some inherited human diseases, the picture can also be more complex: severe forms of osteogenesis imperfecta (brittle-bone disease) are found in all human populations as a result of just such recurrent mutation, while recessive diseases may be maintained in part because the genetic defects responsible also increase resistance to other diseases. For example, a specific mutation leads to sickle cell anaemia when it is inherited from both parents; but when present in a single copy (as in those parents themselves), has only very mild anaemic effects and simultaneously protects against malaria. However, for the most part, mutations will be either neutral, and drift along unremarked in populations until someone develops an analogue of the Human Genome Project to sequence them; or they will be positive – in a particular environment.

Natural selection is often profoundly misunderstood and misrepresented as suggesting that particular changes and the resulting physical traits are naturally and globally superior and would spread and become the norm in populations wherever they arose. But this is not the case: what is selected depends completely on the environment where a species finds itself, and more specifically on the fit between what its genes force or allow it to do in behavioural terms, and what resources the environment offers for exploitation. This also addresses the confusion often encountered between the description of mutation as a random process, and the apparently directed nature of evolution. While mutation creates a pool of variants, it is natural selection that acts on these variants, picking out those which represent positive developments in, or adaptations for, a particular environment. Mutation is therefore initially at least a development within the individual genome; but natural selection, and the consequent spread of particular highly adapted variants, is active within and between populations.

1.4.3 Genes, structures and behaviour

Although we tend to talk about the evolution of particular behavioural or physical traits, like long necks or humps or flying or burying nuts under trees in autumn and digging them up again in winter, there is in fact a risk of fundamental confusion here which we must seek to avoid at all costs if we are to keep evolution and history separate. There is a three-way distinction we must make and maintain between *genes*, *structures*, and *systems* or *behaviour*.

Mutation takes place at the level of genes. Over long expanses of time, measured in terms of many generations, these mutations may spread through species and become the norm; as this happens, it will tend to have structural consequences, creating physical differences between parents and offspring which will become progressively more marked insofar as their results are still environmentally beneficial and do not become unwieldy. These physical or neurological structures in turn will permit, or condition, or predispose individuals within the species to particular behavioural patterns. But neither the behaviour nor the physical traits evolve in themselves; they are underpinned by the processes of evolution, but those processes operate at the genetic level. Behaviour and structures are phenotypic and represent the results of an interaction between genes and environment; mutation and selection take place in the genotype.

However, things are just a little more complicated than this. Sometimes our genetic systems and the physical structures to which these give rise allow a certain amount of flexibility at the behavioural level. Long necks mean food can be taken from higher trees; but relatively few species (giant pandas and koalas