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Linguistics and Evolution: A Background Briefing for Non-Linguists

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Current mainstream theoretical linguistics is very little occupied with questions of evolution. This follows naturally from the history of the subject this century (see below), and is regrettable, but there are welcome signs of increasing attention to the evolution of the language faculty. In this briefing, for non-linguists, I will give sketches (so brief as to risk caricature) of some discernible strands in modern linguistic research, then outline some intellectual themes which have shaped the subject and tended to draw it away from evolutionary considerations, and finally list some current areas of agreement and contention on the evolution of language.

Discernible research communities in modern linguistics

'Horizontal' specialization

Reflecting a consensus that the basic architecture of language is 'doubly articulated', theoretical linguists tend strongly to specialize in one or other of the two 'ends' of language structure,

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either syntax-and-semantics or phonetics-and-phonology.

Within syntax-and-semantics, there is again specialization, giving rise to the existence of syntacticians who study grammatical structure with relatively little attention to an overall theory of meaning, and of semanticists who attend relatively little to the complexities of grammatical structure in languages. Within phonetics-and-phonology, there are also strong tendencies to specialize, giving rise to phonologists whose work on the organization of sound systems in the world's languages is only loosely rooted in the acoustic and articulatory substance of sound, studied by the phoneticians.

This stratified view of language structure is generally accepted as a valid and convenient carving of nature at her joints. But it results in the study of form (e.g. syntax, grammar) being often separated from the study of function (semantics, meaning) and from substance (phonetics, sound). This 'horizontal' fragmentation of (the study of) language is compounded by 'vertical' schisms between linguists, sketched below.

'Vertical' schisms

Inevitably, the sketches below are oversimplified. Many well-known workers (e.g. Jerry Fodor) defy such categorization. Only those research strands with some relevance to phylogeny and evolution are mentioned.

Generativists and/or formalists

This covers the large influential community working in diverse grammatical, formal semantic (logical), and phonological frameworks such as Government and Binding Theory (GB),

Head Phrase Structure Grammar (HPSG), Lexical Functional Grammar (LFG), Montague Grammar, Discourse Representation Theory (DRT), Relevance Theory, Situation Semantics, and Prosodic Phonology. The sociology of the subject is such that a researcher tends to work in just one of these frameworks. To some extent the various frameworks merely provide alternative convenient notations, but they are also to some extent genuine rivals for scientific truth.

Leaders of these research programmes may (or may not) claim that their theoretical constructs correlate with psychological (ultimately neurological) entities. But in reality, their normal activity orbits around the task of specifying the relationship between sentences and their meanings; sentences are taken to be abstract specifications of sequences of speech sounds, and meanings to be abstract specifications of sets of truth conditions.

When, occasionally, such formalists invoke psychological explanations, this is almost always on the level of ontogeny, presupposing an innate richly structured 'Language Acquisition Device'. Universal features of language are explained by this genetic program, which structures the mental representations internalized by children, whatever language they are exposed to, in narrowly predetermined ways. But what drives much formalist research is considerations of internal coherence and formal elegance, attempting to capture intricate connections between sound and meaning by parsimonious sets of principles. Questions of phylogeny are usually not addressed. The flavour of genera-

alist/formalist work is mathematical (algebraic, non-numerical); often it is concerned with the analysis in depth of a set of examples, crucial for the theory concerned, drawn from a single language. The valuable contribution of this style of research has been to demonstrate the extraordinary fine-grained asymmetrical complexity of language structure.

For some leading (and very different) examples of this broad genre, see Chomsky (1981) and Gazdar et al. (1985); Sperber and Wilson (1986) and Barwise and Perry (1983) would probably be counted by many as formalists, but might claim to fit in the next category, by virtue of some concern with communication.

Functionalists

There tend not to be schools of functionalists in the same sense as there are schools (see above) of formalists. A number of influential individuals are known for expounding the relationship between function and form in language, including M.A.K. Halliday, James Givón, Simon Dik, and Joan Bybee. Though their works are sometimes insightful and profound, many such scholars do not self-consciously identify with older philosophical traditions. In particular, the roots in philosophical logic of the formalists' work are not shared by many functionalist linguists, whose notions of 'function' and communication tend to arise (with the risk of circularity) from the study of language itself. To varying degrees, functionalists are antagonistic to the work of generativist/formalists, because of their lack of concern with function and communication. Functionalists tend to share the formalists'

view of the very fine-grained asymmetrical complexity of language structure, but prefer a more reductionist style of explanation.

Although functionalists may mention phylogeny and evolution somewhat more than generativist/formalists, their concern is typically with the influence of communication on language form in ontogeny and with the cultural transmission (and historic drift) of languages. Functionalists tend to explain language universals in terms of cultural evolution driven by pressures of communication (e.g. syntax from discourse, phonological contractions from articulation, etc.).

Psycholinguists and neurolinguists

Psycholinguists are identified by the research style of psychology, with rigorously planned and controlled experimentation, interpreted by statistics, as the ideal. The 'neuro-' end of the psycho-/neuro- spectrum is more concerned with actual brain structures, the 'psycho-' end with more abstractly (or 'functionally') specified constructs, still subject to experimental investigation. Psycholinguists work on language performance processes (production and perception), and make basic assumptions about the gross architecture of language systems derived from a consensus of formalists and functionalists (above). Much of their work seeks to test by experiment or observation the psychological validity of constructs postulated by the formalists. Examples of such constructs investigated by psycholinguists include: the constituency structure of sentences; the distinction between major and minor parts of speech; processes deriving words from other words (e.g.

divinity from *divine*); semantic inference rules. In addition, psycholinguists pose questions left unasked by formalists, such as the nature of the search procedures involved in planning and executing an utterance, or interpreting speech. Psycholinguists study both normal and abnormal adults and children.

Psycholinguists are typically little concerned with phylogeny and evolution, which is too speculative in flavour for their experimental style of research. Across the spectrum individual psycholinguists relate tactically and somewhat eclectically to research on language structure. Constitutionally many are inclined to prefer functionalist reductionism as a style of explanation, but others are attracted to the challenge of testing the innateness of the complex structures postulated by the formalists. Researchers who fit fairly well into this category include Eve Clark, Harry Whitaker, Elinor Rosch, Anne Cutler, Lila Gleitman, Elizabeth Bates, and Michael Maratsos.

Learnability theorists

A small band of mathematically oriented researchers, following a seminal article by Gold (1967), have developed the field of Learnability Theory. This poses such questions as: Is there a possible algorithm for learning any language of a given formally specified class on the basis of data of a given kind? Given particular classes of languages, and particular assumptions about input data, what are the minimal structural principles that must be built into algorithms for learning these languages from these datasets? Obviously this work draws heavily on generativist/formalist work, but represents

a move toward placing claims about the Language Acquisition Device on a firmer logical footing. Wexler and Culicover (1980) is a representative work in this area. Phylogenetic and neurobiological speculation is scarcely indulged in by learnability theorists.

Typologists and genealogists

Following a tradition set by Joseph Greenberg and continued by Jack Hawkins, Bernard Comrie, Matthew Dyer, Bill Croft, and others, typologically oriented linguists examine large numbers of languages with a view to establishing descriptive generalizations holding of as many of the world's 5000-odd languages as possible. These generalizations may be absolute universals (extremely elusive) or statistically highly significant tendencies across languages. The concentration on breadth puts typologists in methodological conflict with generativist/formalists, who typically concentrate on in-depth analyses of isolated phenomena in single (or small groups of) languages. Sociologically, typologists tend to congregate more with functionalists than with generativist/formalists. Typologists probably pay less attention to questions of phylogeny and evolution than functionalists.

Greenberg is also responsible for leading work on the genealogical groupings of the world's languages. His large-scale genealogical classification of the languages of Africa is generally accepted, but his similar more recent attempt at a broad classification of the languages of North and South America is controversial. Greenberg's colleague, Merritt Ruhlen, has produced a speculative world genea-

logy of languages. This attracts the attention of human origins researchers in other fields (genetics, paleontology), but is often ignored or dismissed by linguists, whose concerns fall into the categories sketched above. (It is a mark of the conceptual confusion in this field that classification schemes such as Greenberg's are known among linguists as 'genetic'; I have preferred to use 'genealogical' to prevent confusion of cultural and phylogenetic evolution.)

Evolution and formative themes of modern linguistics

Beginning students in Linguistics are taught certain basic theoretical dichotomies, with implications for the study of the evolution of language. They include the following:

Synchrony versus diachrony

Synchronic descriptions describe the state of a language at one point in time; diachronic descriptions describe historical developments from one such state to another.

Form versus substance

The same formal relationships can hold between entities realized in completely different physical substance. Thus a chess game can be conducted with pieces of wood, marks on paper, spoken words only (for geniuses), or images on a computer screen, but the formal relations between the entities (known as 'knights', 'pawns' etc. are essentially the same. In language, the same words, phrases and sentences may be realized in speech or in writing,

and grammatical relations such as 'subject-of' and 'agreement' remain the same.

Form versus function

Objects may be described in terms of their shape or their use. A spade is about a metre long, with a rectangular metal blade, sharp at one end, and a wooden handle. That the handle is 'for grasping', and the blade 'for thrusting into the ground' is another matter; a spade could also be used to prop open a door, as a weapon, or an artwork. Similarly, an English yes/no interrogative sentence begins with an auxiliary verb followed by the subject and the rest of the verb phrase, in that order. That such interrogative sentences are typically used for asking questions is another matter; they can also be used to make statements, issue requests, warnings, greetings, congratulations, and so on.

Langue versus parole, or competence versus performance

The abstract system of rules constituting a language is different from the actual behaviour of people using it. In some sense, the system (langue or competence) is present even when no speakers are actually using it.

Digital versus analogue, or qualitative versus quantitative

In general, linguists operate on the assumption that linguistic categories (e.g. phonemes, parts of speech, grammatical relations, semantic classes) are sharp-edged, not fuzzy. No calculus of continuity, and no statistics, are used in analyzing language structures. Attempts to define 'squishy'

frameworks have been marginal within linguistics.

Developed versus 'primitive' languages

This is mentioned as a false dichotomy. Linguists have steadfastly refused to articulate any notion of 'primitive language'. It is maintained that, though languages differ somewhat in the subtlety with which they permit discussion of various domains (e.g. kinship, numbers, time), they all exhibit rich structuring to roughly the same degree, and are all equally effective for the needs of their speakers. This judgement remains impressionistic and dogmatic, though it may be correct.

As it happens, Linguistics in the 20th Century has largely committed itself to the first members of these dichotomies, i.e. to synchrony, to form as opposed to substance, to langue or competence, to non-quantitative analysis and to the principle that there are no primitive languages. Naturally, there are workers who investigate the other sides, but the traditional core of theoretical linguistics is the synchronic, qualitative analysis of the form of similarly developed language systems. This development is not convivial to evolutionary theorizing, which necessarily involves diachronic change, the substance of organisms, the functions of their parts, their behaviour, quantitative analysis (e.g. of fitness, selection pressure) and the assumption that organisms may vary significantly in complexity and effectiveness. This may explain why a lack of interest in evolutionary matters is so deep-rooted among linguists.

Chomsky's work, though undoubtedly revolutionary, clearly carries on solidly in the synchronic/formal/systemic/qualitative/egalitarian tradition. On the other hand, he is responsible for propagating three further emphases in the subject, which make an approach to phylogeny and evolution more feasible. These are:

Universal grammar versus grammars of particular languages

Before Chomsky, the idea of universal grammar was considered largely spurious, because the grammars of individual languages are so patently different. Chomsky envisaged the grammars of particular languages as (scientific) theories of those languages, and universal grammar as an overarching metatheory. Universal grammar is not the grammar of any particular language, but provides a notation and a set of principles characterizing the grammars of languages; it is a 'theory of theories'. This kind of distinction had been appreciated before Chomsky, but his work sharpened awareness of it, and careful workers now more often made the distinction between languages (e.g. French, Swahili, Quechua), and Language, (i.e. the essence of language, or the language faculty). When talking about the evolution of language, it is vital to be clear which of these one has in mind.

Psychological/biological realism versus vague platonism

From his earliest published work, Chomsky emphasized the psychological (later biological) nature of language structure. Saussure's *langue* was ambivalently labelled both social and psychological and was attributed

to whole language communities – how individuals had access to this abstract system was unclear. At the level of individual languages, Chomsky replaced *langue* with *competence*, which he located firmly in the heads of individual speakers; a speaker's competence is his/her tacit knowledge of the rules of his/her language, a cognitive map which is consulted in some way during the actual production and perception of utterances. At the level of general linguistic theory, Chomsky located universal grammar in the head of the newborn child. Universal grammar, for Chomsky, is the inborn apparatus allowing a child to acquire a tacit knowledge of all the structural complexities characteristic of a human language. Chomsky's espousal of psychological/biological realism, though an advance, is at the cost of social considerations; Chomsky denies that social factors such as communication have any significant shaping effect on the form of language, either in ontogeny or in phylogeny.

Explanation versus taxonomy and description

Chomsky has made linguists much more aware of the goal of explaining why languages take the complex shape they do, rather than just describing and classifying languages. His own preferred style of explanation is to attribute language universals to an innate Language Acquisition Device. But the demand for explanation, once born, is insatiable, and the call naturally arises for an explanation of the innate Language Acquisition Device itself. Chomsky himself resists attempts to explain it in terms of adaptation and natural selection.

Current issues in the evolution of language

In all the diversity outlined above, one can glimpse the outline of some common assumptions and questions. I list some prominent points of agreement and contention below.

Agreed

Humans are unique as a biological species in their capacity to acquire language. For an individual to know a language is to possess a system mentally represented in its brain. Such systems have a rich and complex architecture. Humans (alone) are innately equipped with something which makes the acquisition of such systems possible.

'The evolution of language' is perniciously ambiguous. It is most usefully disambiguated into:

The history of particular languages. For example, modern French, Catalan, Rumanian, etc. are descended from a variety of Latin, which in its turn, with sister languages Ancient Greek, Sanskrit, Proto-Germanic, proto-Slavic, proto-Indic, etc. (the 'proto-' languages are historical hypotheses), is descended from an even more remote parent language, Proto-Indo-European. The continuity along these lines of descent is provided by cultural transmission alone, bearing no necessary relation with biological heredity. Historical proto-languages can to varying degrees be reconstructed from their descendants, but the maximum time depth to which linguists would agree that such reconstructions are feasible is between 5000 and 10,000 years.

The origins of the language faculty. It is generally assumed that homo sapiens emerged about 100,000 years ago and had the same biological endowment as modern humans, and was thus at least capable of possessing a fully-fledged modern language. The continuity in the descent of homo sapiens is provided by biological transmission, subject to the vagaries of mutation and natural selection.

I am only concerned with the evolution of language in this latter sense.

In contention

Many contentious issues cross-cut each other. I list some here, and state my own (often very tentative) working position on each.

Are human language systems special? Or can they be reduced to other human capacities and/or systems of knowledge? This is the question of whether an innate acquisition device specific to the language faculty exists, or whether some general problem-solving intelligence is sufficient to account for human language and a range of other achievements.

I take the position that at least some basic aspects of the innate human language faculty are specific to language, and cannot be usefully reduced to other capacities, or have no obvious parallels in other faculties.

Is the language faculty monolithic? That is, can it be attributed, as sometimes seems to be hinted, to a single genetic mutation? Was there a saltation from homo-without-language to homo-with-language? The great gulf between our linguistic abilities and those of our nearest relatives would seem to indicate this. But the complex-

ity of language structure (like the complexity of the eye) argues against it. Many known genetic effects on language (if not all – I speak from ignorance), are polygenic.

I assume that there is a plurality of features, or subcapacities, which in combination comprise the human language faculty. Some of these capacities (e.g. mastery of symbolic behaviour, vocabulary learning) are shared by other species, and can be thought of as preadaptations for language, though still requiring some evolutionary explanation. The really crucial and interesting issue is whether the human capacity for syntax (which no other species seems to have) can be explained by a single genetic development. I plan to explore the view that the capacity for syntax can be decomposed into several components, including a disposition to form specific syntactic categories (prominently nouns versus verbs), and recursion.

Did structured human language emerge as a means of externalizing structured mental representations? Or did the structure arise first in communicative interactions and then become internalized?

If communication is the faithful recreation in the mind of an addressee of a message originally present in the mind of a sender, logically both minds must be already capable of representing this message. In that sense, communication can never forge ahead of representation. A mind qualitatively incapable of representing a message of a particular sort cannot be involved in the (successful) communication of such a message. On the other hand, there may be an important quantitative aspect in which the externalization of

insecurely grasped messages facilitates their internal representation or retention. We often talk to ourselves to clarify a thought. I believe that speaking to oneself would not have arisen among creatures that did not already speak to each other. In this way, habitual communicative interaction could have made possible the representation of successively more quantitatively complex messages (in terms of sentence length, number of arguments for verbs, degree of clause embedding, etc.).

To what degree are human language systems adapted to human social needs? This interacts with the previous question. I take it as self-evident that communication is advantageous, both to individuals and to groups (presupposing altruism). Selective pressure towards a capacity for enhanced communication is entirely plausible.

How is the history of languages related to the emergence and dispersion of homo sapiens? Greenberg, Cavalli-Storza and others have provoked controversy by claiming significant homomorphism between tree diagrams representing the relatedness of human languages and tree diagrams representing the genetic relatedness of human population groups. The invited implication is that, give or take a few mass conversions by war and suchlike, the dispersion of languages across the planet simply followed the dispersion of population groups. As groups migrated and became isolated, they changed and specialized somewhat genetically, and their languages changed too. Greenberg and Cavalli-Storza are thus offering to fill the gap between the maximal agreed time-depth for historical reconstruct-

tion of proto-languages (to 5000–10,000 years ago) and the assumed emergence of homo sapiens (100,000 years ago).

The jury will be out for a long time on this question, pending further evidence and argumentation. I would only point out that the belief that homo sapiens of 100,000 years ago had the same biological endowment as we have does not force the view that the history of our languages goes back that far (whether it can be reconstructed or not). Invention must be taken into account. Conceivably, an original language-less population dispersed, and, because of the common genetic capacity to acquire language (usually given a model), language was reinvented on separate occasions by different descendant groups. The striking technological advances noted in the upper paleolithic, of about 40,000 to 45,000 years ago, have been attributed to the emergence of language. On current views, this would have to mean not the emergence of the biological language capacity, which we assume has been present since 100,000 years ago, but the invention of (more developed) language at the more recent date. Given also my assumptions about the non-monolithic nature of language and the possibility of gradual quantitative advances in language complexity (see above), the instances of invention need not be individually very spectacular. Languages (as cultural artefacts) could have been augmented gradually by series of inventions, all within the range of possibilities defined by the biological platform established 100,000 years ago.