

A Re-examination of Greenberg's Universals

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Introduction

It is a great puzzle that although we all instinctively 'know' what human language is, it is surprisingly difficult to nail down concrete, incontrovertible universals. Naively, one might assume that it would be easy to state such apparent truisms as 'all languages have nouns and verbs', but even this is more problematic than one might believe (cf. Croft 2003: 13–19, Tomasello 2003: 17–19). Nevertheless, if we hear people chatting in an unfamiliar foreign tongue on a train, although we cannot understand what they are saying, we sense they are using a human language like ours in a way that we do not with the whistles of dolphins, songs of birds or dances of bees. And the fact that, with sufficient exposure, any human child can learn any human language provides ample and repeated proof of the universals that must be present. It is indeed astonishing that human languages can appear outwardly so different in their sounds, grammar and vocabulary, yet any human child can learn any human language without instruction. Even as adults, although learning a new language is often laborious, it is not impossible, given sufficient exposure, practice and motivation.

Why, then, cannot linguistics identify a full spectrum of universals when informally we can easily recognise the commonality of language and learning lan-

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guage is child's play? As Greenberg, Osgood and Jenkins (1966 : xv) point out, linguists are obviously also aware of the 'similarities and identities' among languages, and this guides their analyses of new languages.

Many eminent linguists, including Greenberg, Hockett and Chomsky, have put forward universals. Greenberg wrote in the introduction to *Universals of Language* (1966 : xi) :

'In view of the present level of methodological sophistication of both synchronic and diachronic linguistics and the truly enormous mass of empirical data on languages of the world now at our disposal, the time appears ripe for generalizing efforts on a wide scale. Indeed, this is imperative for linguistics both to fulfil its own promise as a science and to make the contributions to the formulation of a general science of human behavior which its sister disciplines may legitimately expect.'

Unfortunately, one can with justification state that this promise remains unfulfilled almost half a century later, even after fifty years of very intensive linguistic research. Already in 1966, Greenberg could state (p. 75) :

'In a certain sense we would prefer to have as few universals as possible, not as many. That is, we would like to be able to deduce them from as small a number of general principles as possible. However, the establishment of a relatively large number of empirical generalizations must, on the whole, come first. For one thing, it would be embarrassing to deduce a particular universal from what seemed like a valid general principle, only to discover that the generalization was not empirically valid.'

Further, the loss of languages, probably since a peak in language numbers before Europeans set (their) foot on America, Australia and so on, means that the empirical search for universals is already compromised, and will be further so if UNESCO's prediction that half of human languages will disappear by the end of this century comes true.¹

So what about the state of universals research today? Close to half a century after Greenberg's *Universals*, in 2009, in a new volume on universals, Christiansen, Collins and Edelman write (2009 : 4) :

'... at the present time, there is no need to justify the claim that language universals exist. All linguists (formally or functionally oriented) would recognize the *search for* the universal aspects of language as one of the most important areas of research in their field. As opposed to the state of affairs at the time of the 1961 Dobbs Ferry Conference, there are many well-articulated *candidate universals* that in some cases have been debated extensively. However, as evidenced by the broad spectrum of perspectives represented in this volume, opinions differ – sometimes strongly – over the exact nature of language universals, their origin, and how best to study them.'

They add (2009 : 5) :

'The search for universals of languages has been, and still remains, one of

¹ With not only linguistic loss as a consequence : humanity would lose enormous cultural wealth and embedded knowledge, UNESCO *Atlas of the World's Languages in Danger*, www.unesco.org/culture/languages-atlas/, accessed 10 March 2012.

the central explanatory goals of the various disciplines involved in the study of language.’

In the introduction to a volume of studies entitled *Universals of Language Today*, published in 2010, Scalise, Magni and Bisetto (p. xv) state :

‘Typological investigations have been largely based on the implicit assumption of a number of universal grammatical categories, relations and constructions, which are derived from the Latin and English grammatical tradition, notions such as parts of speech, passive, subject, direct object, relative clause, etc. The increasing attention devoted to the structural diversity displayed by human languages, however, entails a constant reassessment of existing taxonomies. And also, linguistic variability again and again demonstrates that these basic notions are extremely difficult to define in both formal and cross-linguistically valid terms.’

In the evolution of universals, we have two possible alternatives :²

² Chomsky has claimed (1975 : 59, cited in Jackendoff 2002 : 234) that ‘We know very little about what happens when 10^{10} neurons are crammed into something the size of a basketball, with further conditions imposed by the specific manner in which this system developed over time. It would be a serious error to suppose that all properties, or the interesting properties of the structures that evolved, can be “explained” by natural selection.’ For criticisms of this claim, ‘appealing to the simple increase in brain size plus the convergence of unknown physical principles’, see Jackendoff with references. In 2002, in Hauser, Chomsky and Fitch (p. 1572), discussing hypotheses of the evolution of the faculty of language, the authors write, with reference to Dawkins (1986), that ‘natural selection is the only known biological mechanism capable of generating such functional complexes’. They conclude (2002 : 1578) : ‘although we have said relatively little about the

1. Either a feature of language is universal, in which case
 - a. It must be inherited and develop in all human children, and
 - b. We must be able to account for its origin by evolution
2. Or a feature of language is non-universal, in which case
 - a. Overt features are learnt from exposure by a child from those around her
 - b. Features that are postulated theoretically but are not overt must be deduced or induced from exposure by each child individually, possibly aided by an innate ability or abilities of some kind, in which case we must be able to account for the origin of such ability by evolution

Further, universals of language can be either unique to language or cross-domain.

Given the shrinking number of languages and the bias towards English (and in Western Europe earlier Latin) and 'Standard Average European' in the study of language, we must beware of postulating prominent features in prominent languages as universals. Darwin did not put forward his theory of evolution based only on the flora and fauna of England. If in five hundred years' time the only languages spoken on Earth were English and Chinese, and if because of some man-made catastrophe we were unaware of the great variety of languages that existed before, we could list in error many 'universals' of human languages that in fact were merely features of English and Chinese. In this sim-

role of natural selection in shaping the design features of FLN [the faculty of language in the narrow sense], we suggest that by considering the possibility that FLN evolved for reasons other than language, the comparative door has been opened in a new and (we think) exciting way'.

ple example we can see the importance of research of the variety of the world's languages and the pitfalls of an overfocus on a few familiar languages, as well as the in-built bias of researching our native tongue and its potential to influence the way we think, not least about language.

We must also beware of postulating universals that are secondary rather than primary. For example, if again in five hundred years we were to look at human societies, we might be able to state that all humans travel in flying automobiles (or use an iPhone). This might indeed be universal, but it is not a primary characteristic of human beings – as a glance at history would show. The primary universal here is the human ability to use and make tools, using the human brain and hand, with the flying automobile a fantastic example of the ingenuity of many generations. Given that human language is acquired by children from those around them, we must be aware of the importance – and the tricky task – of teasing out those characteristics that are indeed universals from those that are the product of generations of workings of those universals and other factors.³ If a meteor struck the Earth tomorrow, destroying all traces of technology and leaving only a few surviving infants, we might (if we were not dead) be able to observe the fundamentals of human tool-making. In language,

³ I.e. biological evolution and cultural transmission, or *dual inheritance*. Cf. Kirby (2012 b : 480) : 'Where do the characteristic design features of human language come from? In particular, how do we come to have a language that allows us to express novel utterances and have them reliably be understood? One answer is that this highly adaptive trait is simply an innately encoded feature of our biological endowment, tuned by natural selection under pressure for successful communication ... In recent years, however, an alternative view has been set out that suggests language adapts not through a process of gradual biological evolution, but rather as a result of cultural evolution as it is transmitted in a population through repeated learning and use ... This process ... [is] known as *iterated learning*.'

a similar example might be an examination of the grammar of English, Russian, Arabic or Zulu. Before we jump to conclusions about human language based on these, we should also consider pidgins and the development of creoles. These might give us a more basic guide into what is universal about human language. *To some extent* this may also explain the large gap we see between ourselves and other species but which is not evident in the genome: the gulf may be the cumulation of generations of humans, with their ability to use symbols and combine them meaningfully.⁴

So, then, are we really only able to proclaim such truisms as ‘all languages have vowels’?⁵ Are universals staring us in the face but we cannot see them – i.e. we cannot see the universals for the languages – or are they ‘deeper’ and more abstract? Tomasello (2003: 13–14) sums up these two positions as follows:

‘Generative grammarians believe that the human species evolved a genetically based universal grammar common to all peoples and that the variability in modern languages is basically on the surface only. There are a number of accounts from this perspective ... But in all ... the basic idea is the same: that the fundamental grammatical categories and relations underly-

⁴ The human genome contains about 3 billion base pairs of DNA; 98.8% of the genome is shared by humans and chimpanzees, a difference of 1.2% (see Matsuzawa 2012). Relative to adult size, humans are born with the smallest brain of primates – growth takes place after birth (Neubauer and Hublin, in press, cited by Boeckx 2012a).

⁵ Although surely *true* of, and a constraint on, spoken languages, (a) to be a valid universal in the sense of the current paper we would need to prove that speakers have in their brains a (preschooling) category ‘vowel’ (rather than or in addition to say ‘phoneme’ or ‘distinctive feature’); (b) secondly, and significantly, sign languages do not have ‘vowels’.

ing all of the world's languages come from a biological adaptation (or set of adaptations) in the form of a universal grammar.

The alternative is the usage-based view, in which there is no need to posit a specific genetic adaptation for grammar because processes of grammaticalization ... can actually create grammatical structures out of concrete utterances ... Thus it is a historical fact that the specific items and constructions of a given language are not invented all at once, but rather they emerge, evolve, and accumulate modifications over historical time ...'

For examples of the latter process in pronouns, see Howe (1996). However, does this alternative mean that Human Language has no universal 'grammar' of any kind?

This paper, then, is the first in a series of very preliminary working papers on universals of human language. The first examines universals put forward by Joseph Greenberg in his 1966 publication 'Some Universals of Grammar with Particular Reference to the Order of Meaningful Elements'. A second paper will look at the subsequent four-volume publication of findings from the Stanford Project on Language Universals directed by Greenberg and Charles A. Ferguson. Further papers will examine universals or 'design features' suggested by Charles F. Hockett (in the same volume as Greenberg 1966 but meriting a separate analysis here because of their focus) and those put forward as 'Universal Grammar' by Noam Chomsky, also examined separately.

An additional paper will look at the linguistic use of sound, which is not universal but is the default medium of transmission of human language. This will include phonemic data from the UPSID (University of California, Los Angeles, Phonological Segment Inventory Database) survey. I will also look at two

online resources on language universals: *The World Atlas of Language Structures* (WALS), a joint project of the Max Planck Institute for Evolutionary Anthropology and the Max Planck Digital Library, and *The Universals Archive*.⁶ I will then examine sign language to see what common universals of human language we can put forward and, perhaps, reject.

A final paper will review three more recent collections of studies on universals, including discussion by for example Croft, Bybee, Jackendoff and Pinker.

Based on these papers, I will attempt to draw some conclusions about what we can say about all human languages and thus about Human Language.

Absolute universals and implicational universals

Two types of universals often distinguished are absolute universals and implicational universals. Most of the universals put forward in Greenberg's study are implicational, in the form 'If x , then y '. In this paper, however, I am interested in absolute universals, i.e. what can we say about *all* human languages *without exception*. This does not mean that implicational universals are unimportant: on the contrary, they can reveal a lot about common ways language is structured and organised by human beings – as shown for instance by Greenberg's Universal 1.

⁶ Available online at <http://typo.uni-konstanz.de/archive/>. 'Within the typology programme of the Deutsche Forschungsgemeinschaft, 1996–2001, the remit of the project "Sprachbaupläne" was to collect and document linguistic universals that have been suggested in the relevant literature, in particular those of an implicational kind ("If a language has property [unit, category, rule, construction, pattern, ...] X, then it will also have Y"). The main result of this project is The Universals Archive, since 2002 maintained with the support of the Fachbereich Sprachwissenschaft of the Universität Konstanz.'

Greenberg's 45 universals

The first point to note is that Greenberg's universals are 'universals of grammar with particular reference to the order of meaningful elements'. Secondly, the conclusions are tentative, being based on a limited sample of languages.⁷

In the list of Greenberg's universals below, I have marked qualifications that disqualify a universal as absolute in italics; universals that are absolute I have marked in bold. In some cases a universal contains more than one qualification; in such cases I have generally highlighted the most significant. As illustration, in Universal 1, the qualification 'almost always' disqualifies this as an absolute universal. Further in Universal 1, although the dominant order might be SO, as Greenberg also points out (1966: 76) 'the vast majority of languages have several variant orders'. A further complication is a universal linguistic category of 'subject' and 'object'.⁸

Universal 1

'In declarative sentences with nominal subject and object, the dominant order is *almost always* one in which the subject precedes the object.'

⁷ For many of the statements in Greenberg's paper, 'a sample of the following 30 languages' was used (1966: 74–75), listed here geographically: Basque, Serbian, Welsh, Norwegian, Modern Greek, Italian, Finnish (European); Yoruba, Nubian, Swahili, Fulani, Masai, Songhai, Berber (African); Turkish, Hebrew, Burushaski, Hindi, Kannada, Japanese, Thai, Burmese, Malay (Asian); Maori, Loritja (Oceanian); Maya Zapotec, Quechua, Chibcha, Guarani (American Indian [sic]).

⁸ Cf. Croft (2003: 13): 'One cannot make generalizations about subjects across languages without some confidence that one has correctly identified the category of subject in each language and compared subjects across languages. This is in fact a fundamental issue in all linguistic theory. Nevertheless, this problem has commanded remarkably little attention relative to its importance for linguistic theorizing.'

Universal 2

'In *languages with prepositions*, the genitive *almost always* follows the governing noun, while in *languages with postpositions* it *almost always* precedes.'

Universal 3

'*Languages with* dominant VSO order are always prepositional.'

Universal 4

'With overwhelmingly greater than chance frequency, *languages with* normal SOV order are postpositional.'

Universal 5

'If a language has dominant SOV order and the genitive follows the governing noun, then the adjective likewise follows the noun.'

Universal 6

'All *languages with* dominant VSO order have SVO as an alternative or as the only alternative basic order.'

Universal 7

'If in a *language with* dominant SOV order there is no alternative basic order, or only OSV as the alternative, then all adverbial modifiers of the verb likewise precede the verb. (This is the 'rigid' subtype of III.)'

Universal 8

‘When a yes-no question is differentiated from the corresponding assertion by an intonational pattern, the distinctive intonational features of each of these patterns are reckoned from the end of the sentence rather than from the beginning.’

Universal 9

‘With well more than chance frequency, when question particles or affixes are specified in position by reference to the sentence as a whole, if initial, such elements are found in prepositional languages, and, if final, in postpositional.’

Universal 10

‘Question particles or affixes, when specified in position by reference to a particular word in the sentence, *almost always* follow that word. Such particles *do not occur in languages with* dominant order VSO.’

Universal 11

‘Inversion of statement order so that verb precedes subject *occurs only in languages where* the question word or phrase is normally initial. This same inversion occurs in yes-no questions only if it also occurs in interrogative word questions.’

Universal 12

‘If a language has dominant order VSO in declarative sentences, it always puts interrogative words or phrases first in interrogative word questions ;

if it has dominant order SOV in declarative sentences, there is never such an invariant rule.

Universal 13

'If the nominal object always precedes the verb, then verb forms subordinate to the main verb also precede it.'

Universal 14

'In conditional statements, the conditional clause precedes the conclusion *as the normal order* **in all languages.**'

Universal 15

'In expressions of volition and purpose, a subordinate verbal form always follows the main verb as the normal order *except in those languages* in which the nominal object always precedes the verb.'

Universal 16

'*In languages with dominant order VSO*, an inflected auxiliary always precedes the main verb. *In languages with dominant order SOV*, an inflected auxiliary always follows the main verb.'

Universal 17

'With overwhelmingly more than chance frequency, *languages with dominant order VSO* have the adjective after the noun.'

Universal 18

'When the descriptive adjective precedes the noun, the demonstrative and the numeral, with overwhelmingly more than chance frequency, do likewise.'

Universal 19

'When the general rule is that the descriptive adjective follows, there may be a minority of adjectives which usually precede, but when the general rule is that descriptive adjectives precede, there are no exceptions.'

Universal 20

'When any or all of the items (demonstrative, numeral, and descriptive adjective) precede the noun, they are always found in that order. If they follow, the order is either the same or its exact opposite.'

Universal 21

'If some or all adverbs follow the adjective they modify, then the language is one in which the qualifying adjective follows the noun and the verb precedes its nominal object as the dominant order.'

Universal 22

'If in comparisons of superiority the only order, or one of the alternative orders, is standard-marker-adjective, then the language is postpositional. With overwhelmingly more than chance frequency if the only order is adjective-marker-standard, the language is prepositional.'

Here where Greenberg discusses comparison, for example in English 'X is larger than Y', we have a good illustration of what we frequently come up against when we look for grammatical universals. There are perhaps good grounds for assuming that comparison is a likely semantic universal in human language(s), and an ancient one – i.e. that all languages have some way of communicating that X (or U) is bigger, smaller, faster, slower, tastier, or more dangerous than Y (or I). But in spite of this, as even English can show, we can find no universal language construction, i.e. no 'grammatical' universal. Greenberg states that a minority of the world's languages have an inflected form as English (e.g. *slow-er*); however, 'more frequently a separate word modifies the adjective', as also in English (e.g. *more* dangerous). And although he does compare three elements across his language sample, namely adjective, marker and standard (*larg(er) than Y*), to produce Universal 22, he must exclude some languages as they use a verb (with a general meaning 'to surpass'), as particularly common in Africa: 'X is large, surpasses Y'. Further, Loritja, an Australian language in his sample, also falls outside this pattern, as it uses a construction 'X is large, Y is small'.

To summarise, while we have a likely semantic universal, we cannot find a universal linguistic construction – even Greenberg's limited sample of thirty or so languages throws several spanners in the works. And we would hardly be justified in positing a 'deeper' universal *grammatical* construction to account for 'surface' manifestations that vary so greatly. One could make a similar argument for questions – i.e. a way of asking for some information or some thing from another human (which also has an extragrammatical form, an intonation pattern, in very many languages) – or for negation – or for the encoding of time in language – or for reporting what another person said, to name but a

few. This is a common result of crosslinguistic comparison (cf. again Croft 2003 : 13–19, Tomasello 2003 : 17–19), and one must of course ask *why?*

Universal 23

‘If in apposition the proper noun usually precedes the common noun, then *the language is one* in which the governing noun precedes its dependent genitive. With much better than chance frequency, *if the common noun usually precedes the proper noun*, the dependent genitive precedes its governing noun.’

Universal 24

‘If the relative expression precedes the noun either as the only construction or as an alternate construction, *either the language is postpositional, or the adjective precedes the noun or both.*’

Universal 25

‘If the pronominal object follows the verb, so does the nominal object.’

Universal 26

‘If a language has discontinuous affixes, it always has either prefixing or suffixing or both.’

Universal 27

‘If a language is exclusively suffixing, it is postpositional ; if it is exclusively prefixing, it is prepositional.’

Universal 28

'If both the derivation and inflection *follow* the root, or they both *precede* the root, the derivation is always between the root and the inflection.'

Universal 29

'If a language has *inflection*, it always has derivation.'

Universal 30

'If the verb has categories of person-number or if it has categories of gender, it always has tense-mode categories.'

Universal 31

'If either the subject or object noun agrees with the verb in gender, then the adjective always agrees with the noun in gender.'

Universal 32

'Whenever the verb agrees with a nominal subject or nominal object in gender, it also agrees in number.'

Universal 33

'When number agreement between the noun and verb is suspended and the rule is based on order, the case is always one in which the verb precedes and the verb is in the singular.'

Universal 34

'No language has a trial number unless it has a dual. No language has a

dual *unless it has* a plural.’

Universal 35

‘There is no language in which the plural does not have some non-zero allomorphs, whereas *there are languages in which* the singular is expressed only by zero. The dual and the trial are almost never expressed only by zero.’

Universal 36

‘*If a language has* the category of gender, it always has the category of number.’

Universal 37

‘A language never has more *gender categories* in nonsingular numbers than in the singular.’

Universal 38

‘*Where there is a case system*, the only case which ever has only zero allomorphs is the one which includes among its meanings that of the subject of the intransitive verb.’

Universal 39

‘*Where morphemes of both number and case are present and both follow or both precede the noun base*, the expression of number almost always comes between the noun base and the expression of case.’

Universal 40

'When the adjective follows the noun, the adjective expresses all the inflectional categories of the noun. In such cases the noun may lack overt expression of one or all of these categories.'

Universal 41

'If in a language the verb follows both the nominal subject and nominal object as the dominant order, the language almost always has a case system.'

Universal 42

'All languages have pronominal categories involving at least three persons and two numbers.'

This universal put forward by Greenberg is disputed by Mühlhäusler and Harré (1990 : 62–64).

Universal 43

'If a language has gender categories in the noun, it has gender categories in the pronoun.'

Universal 44

'If a language has gender distinctions in the first person, it always has gender distinctions in the second or third person, or in both.'

Universal 45

'If there are any gender distinctions in the plural of the pronoun, there are

some gender distinctions in the singular also.’

Further universals cited by Greenberg, Osgood and Jenkins

In the same volume, Greenberg, Osgood and Jenkins (1966) mention a number of other universals. These include the following phonological, semantic and (in Greenberg et al.’s view) diachronic universals :⁹

‘All languages have phonemes’

‘All languages have some metaphorically transferred meanings’

‘All languages change’

While this is indeed a fundamental characteristic of human language, it is a secondary universal. The fact that all languages change is not due to a universal of language per se, but to its nature, how it is acquired and used.

Conclusions

Greenberg’s study of ‘universals of grammar with particular reference to the order of meaningful elements’ lists few if any absolute universals. This does not mean such universals do not exist ; however, Greenberg was unable to present any clear-cut examples based on his preliminary sample of thirty or so languages.

This is a highly interesting, indeed astounding, finding. Even more so given that the very small sample – roughly 30 from 7000 or omitting over 99.5%

⁹ I have selected only those I judged relevant to the discussion here. For example, I have not included ‘all languages have vowels’, for the reasons mentioned above. A second ‘universal hypothesis’ not included here is that ‘the rate of replacement of fundamental vocabulary is constant over time’.

of human languages¹⁰ – should make it easier to find commonalities. One could argue that Greenberg's negative result is far more revealing than the one or two possible absolute universals that are listed here and the forty-odd tendencies or statistical 'universals'. The fact that Greenberg was unable to cite any or almost no absolute grammatical universals is highly significant.

We must therefore ask why we seem unable to reel off a list of clear grammatical universals in human language (s)? And how, to appropriate a famous remark, if there were no universals, could children learn the grammar of a language they had never heard before? Of course, an equally astonishing fact – and one that we take for granted – is that there are no lexical universals, either, in the sense that human languages do not share any vocabulary. There are no universal words *at all* : without some form of contact and borrowing or co-descent, human languages do not have a single word in common and are mutually unintelligible.¹¹ Further, just as grammar, the vocabularies of human languages do not neatly translate word for word – Japanese 'ao' is not simply English 'blue', 'kirei' is not simply 'beautiful', English 'you' is not simply Japanese 'anata', 'be' is not simply 'iru' and so on.

And if we look at phonology, we also find very significant variation across the world's languages, with a couple of languages with only 11 phonemes ('segments') and another with 141 (see Crystal 2010 : 88 and 173 with references).

A question we will examine in a later paper, touched on above, is whether this means that universals are at a 'deeper', less superficial level of some kind, of the type put forward by Chomsky, or are we, and Greenberg, missing obvi-

¹⁰ See e.g. www.ethnologue.com and of course also omitting the multiplicity of dialects.

¹¹ By co-descent I mean recent relative to the likely age of modern human language and origin in Africa.

ous universals that are present? And if the ‘Out of Africa’ explanation is assumed, what principles could explain why language changed to such an extent as to become mutually unintelligible?

Greenberg focuses on the ordering of ‘meaningful elements’ and the tendency of languages (or speakers of those languages) to order these in similar ways. As there appear to be no or very few obvious grammatical universals, at least regarding the order of meaningful elements in Greenberg’s sample, we might hypothesise that the particular constructions of (individual) human languages derive more from general cognitive and functional principles rather than uniquely linguistic ones.

In the current paper, however, rather than focus on the particular ordering, I will examine one obvious universal of human language we can recognise in Greenberg’s study. This universal is *combination to create meaning*. Different languages may have different patterns of combination, but *all* have combination to create meaning. This simple but fundamental universal gives both enormous power and precision to human language. It has been put forward as a universal by Chomsky (see e.g. 2006) as ‘Merge’, ‘the simplest possible compositional function’ (2007), and is a more elementary and universal mechanism in language than the narrow syntactic recursion proposed as ‘the only uniquely human component of the faculty of language’ in Hauser, Chomsky and Fitch (2002).^{12,13} It is the process combining (meaningless) sound symbols to create

¹² A note on terminology: by combination I mean *all types of combination* in language, including hierarchical and long-distance relationships, and not the narrower sense of Greenberg (1966: 93) on universal 29. ‘Merge’ combines two elements and therefore does not capture multiple combination of phonemes into morphemes for instance. Further, it suggests amalgamation more than neutral ‘combination’ and, for language, does not sufficiently capture the reverse process of decomposition in comprehension. In discussions that overlap with those here, though with a somewhat different focus, Boeckx

meaningful units. It is the cognitive process underlying chunking (an important characteristic of how humans encode information, reducing 'a larger amount of information to a smaller amount ... by imposing a meaning on otherwise meaningless material', Gross 2010 : 258–9, see e.g. Bybee 2010 for its application in language), analogy (see Fauconnier and Turner 2002 : 12) and, significantly, meaning.¹⁴ And, most fundamentally in human communication, it is the ability that enables us to link a meaning in our head to something outside ourselves,

has used the term *Homo combinans* (e.g. 2011, 2012a). Hinzen et al. (2012) cite a standard formulation of 'compositionality' as 'The meaning of a complex expression is a function of the meanings of its constituents and the way they are combined.' On 'recursion' and its 'multiplicity of definitions [which] ... has undermined the broader interpretation of empirical results', see Martins and Fitch (2012). Pinker and Jackendoff (2005 : 201) state that the 2002 paper by Hauser, Chomsky and Fitch 'ignores the many aspects of grammar that are not recursive, such as phonology, morphology, case, agreement, and many properties of words'. They add (see p. 227) that pidgins have combination to create new meaning but do not necessarily have recursion.

¹³ Pinker and Jackendoff (2005 : 222), while strongly criticising Chomsky's Minimalist Program, defend as core assumptions of generative grammar 'that language is a combinatorial, productive, and partly innate mental system'. See also Jackendoff (2002 : 107) who takes issue with 'a fundamental assumption embedded deep in the core of generative theory : that the free combinatoriality of language is due to a single source, localized in syntactic structure'. Jackendoff (ibid.) 'develops the alternative assumption that language has multiple parallel sources of combinatoriality, each of which creates its own characteristic type of structure' and states further (2002 : 111) that language 'comprises a number of independent combinatorial systems, which are aligned with each other by means of a collection of interface systems'. He concludes (2002 : 121) that 'Syntax and phonology are independent combinatorial systems, built from distinct sets of primitive elements combined by distinct sets of formation rules. Neither can be reduced to or derived from the other.' I will discuss Jackendoff's 'multiple parallel sources of combinatoriality' further below.

¹⁴ Jackendoff (2002 : 123–4) states that 'It has become clear from the many approaches to semantics in the literature that semantics is a combinatorial system independent of, and far richer than, syntactic structure. Formal semantics ... and Cognitive Grammar ... differ on about every issue but this one : they are both theories of meaning as a rich combinatorial system.' On conceptual blending see Fauconnier and Turner (2002), and on semantic networks and fields see Aitchison (2012, chapter 9).

symbolically, with our human interlocutor, i.e. combination enables reference.¹⁵

I described this universal as ‘simple’, but it is rather a fundamental and elementary mechanism of human language. The basis or uncombined elements are typically sound symbols or phonemes, and these are meaningless, as Hockett pointed out in the same volume as Greenberg. This is what Hockett (1966 : 12) termed *Duality of Patterning*, meaning that language has two subsystems, one of elements with no meaning in themselves (cenemes, phonological components), the other the arrangement of these into meaningful units (pleremes, morphemes). Similarly, Langacker (2008 : 174 and chapter 6 generally) states that ‘we have to distinguish two kinds of structures and dimensions of organization’, unipolar versus bipolar, where unipolar elements are ‘those whose basis is purely semantic or phonological’ and bipolar elements are ‘based on symbolic considerations’. Compare Jackendoff (2002 : 246) who writes, discussing concatenation of symbols to build larger utterances, ‘This is clearly a different

¹⁵ I am not claiming here that combination to create meaning is unique to human language – it is a characteristic of human cognition (cf. Fauconnier and Turner 2002 and later in this paper) – but it is universal in human language. On reference, compare Tomasello (2003 : 8) who writes : ‘Other animal species do not communicate with one another using linguistic symbols, most likely because they do not understand that conspecifics have attentional or mental states that they could attempt to direct or share.’ It is important to realise that ‘this complex set of cognitive and social-cognitive processes’ is not simply ‘association’ (Tomasello 2003 : 84) : ‘if we look at children’s earliest comprehension and production of real-live linguistic utterances, we see that there is something very special going on. The child encounters an adult making funny noises at her. To make sense of this odd behavior she must attempt to determine the purpose for which that person is making these funny noises. Once she determines that the adult is making these funny noises in an attempt to communicate with her, she still must determine precisely what the adult is attempting to communicate with some particular word. That is to say, the child must determine, first, the adult’s overall communicative intention and, then, the particular way or ways that the new word is contributing to that communicative intention.’

kind of combination than ... Phonological generativity [which] is a way of analyzing meaningful symbols and producing new ones in terms of a repertoire of smaller meaningless units. The present sort of combination puts together meaningful symbols to form larger utterances whose meanings are a function of the meanings of the constituent symbols. The two kinds of combination could have evolved simultaneously or in either order.'

However, rather than there being two subsystems or dimensions of organisation or two types of combination or structural properties as Hockett et al. suggest, what we are dealing with is a single mechanism of combination to create meaning. The base level, typically of phonemes or sound symbols, is uncombined and meaningless: from this language users can combine to create meaning.

Recognition of combination by scholars and its appearance in various guises under different aliases in diverse theories and disciplines¹⁶ shows it to be basic and overarching – as Chomsky points out (2006 : 183–4) with 'Merge or some equivalent', 'we instantly have an unbounded system of hierarchically structured expressions'. And as Langacker points out (2008 : 15–16), 'A defining property of human language is the formation of complex structures out of simpler ones ... a higher-level symbolic structure is itself capable of entering into a combinatory relationship, producing a more elaborate symbolic assembly ... Through repeated combination, at successively higher levels of organization, assemblies having any degree of symbolic complexity can be formed.' He

¹⁶ See e.g. the recent volume on 'compositionality' (Werning et al. 2012) with contributions from formal logic, semantics, psychology, linguistics, philosophy and neuroscience, and major sections on compositionality in language in general, compositionality in formal semantics, lexical decomposition, the compositionality of mind, compositionality and linguistic evolution and communication, and neural models of compositional representation.

concludes (2008 : 170) that ‘composition and compositional patterns have to be a central focus of linguistic investigation’.

Language is never created entirely new – we have *always* heard it before, in some shape or form, as it is combined from already existing elements – phonemes of the language (*Kodak*/kəʊdæk/), morphemes (*iPhone*), and constructions (Lewis Carroll’s *Twas brillig, and the slithy toves/Did gyre and gimble in the wabe*).¹⁷ It is the combination of already existing elements that gives the meaning. And this is true of human language generally : as children we construct our language(s) from what we hear around us – we thus acquire already existing, handed-down language, which we can combine creatively, in patterns or schemas we have learnt. This acquisition of second-hand language also gives us the constraints on its use, which will be taken up later in the paper, and rejoins the false Saussurean dichotomy¹⁸ of ‘synchrony’ and ‘diachrony’ – the fact that we produce new combinations using old language.¹⁹

¹⁷ As a native speaker, if I tried to coin an English name for my new daughter that did not use English phonemes or did not follow English taxis, other native speakers would probably say it wasn’t English and that they couldn’t pronounce it. And as her name is in fact *Sakura*, my English non-Japanese-speaking relatives substitute English phonemes and a non-Japanese accent.

¹⁸ See Ottmer (2003 : 32–35) on whether de Saussure himself was in fact so clear cut.

¹⁹ In a recent study entitled ‘Evolved structure of language shows lineage-specific trends in word-order universals’, using data on the Austronesian, Bantu, Indo-European and Uto-Aztecan language families, Dunn, Greenhill, Levinson and Gray (2011) found as follows : ‘First, contrary to the generative account of parameter setting, we show that the evolution of only a few word-order features of languages are strongly correlated. Second, contrary to the Greenbergian generalizations, we show that most observed functional dependencies between traits are lineage-specific rather than universal tendencies. These findings support the view that – at least with respect to word order – cultural evolution is the primary factor that determines linguistic structure, with the current state of a linguistic system shaping and constraining future states.’ This supports the explanation suggested here.

Significantly, if we look outside humans, we can see that the to us apparently simple ability of combining to create meaning, one that we take for granted, is far from so: while chimpanzees, gorillas and orang-utans can be taught to recognise and use a number of words or signs, even up to a few hundred, their ability to combine them meaningfully seems limited.²⁰ And for other species even more so. As Hauser, Chomsky and Fitch (2002: 1576) write, 'It seems relatively clear, after nearly a century of intensive research on animal communication, that no species other than humans has a comparable capacity to recombine meaningful units into an unlimited variety of larger structures.' And outside the laboratory in a natural setting, such abilities are even less evident: we do not typically see adult, let alone infant, chimps combining symbols meaningfully in the wild.²¹ Nor do we see it in domesticated animals, which for several thousand years have been selected, bred and trained by humans.

By contrast, the ability to combine meaningfully is observed in human children already from around 18 months in their so-called 'two-word stage',²² and

²⁰ See e.g. Crystal (2010: 422) and Saxton (2010: 38–40) with references.

²¹ On symbols cf. Matsuzawa (2012: 231–2): 'The association of the symbol and the corresponding things is everywhere in human language but very difficult for chimpanzees.' For research on signs used by baboons and a suggestion that putty-nosed monkeys can combine some sounds meaningfully, see the references in Hinzen et al. (2012). On a combinatorial system of conceptual structure, among other things, in chimpanzees, see the references in Jackendoff (2002: 238).

²² On average (and at around the same age children can build a tower of two blocks and walk up steps – Saxton 2010: 17). The following are examples of two-word utterances used by Victoria, aged 1;9, in *one hour* (cited in Crystal 1986: 76–77 with normalised pronunciations):

Ady horsie	hat off	my hat
baby bed	hat on	my teddy
baby cry	her coat	my tractor
baby doll	here is	she cold

may emerge even earlier in reduplication, for example in the *wee-wee*, *bye-bye*, *ma-ma*, *pa-pa* and similar forms in other languages, and possibly in nascent form with vocal practice in babbling starting at around six months.

The ability to combine to create meaning and the remarkable vocabulary learning also observed in children, itself deriving from combination, i.e. combining sound symbols with meaning, can to some extent account for the ‘leap’ or ‘spurt’ in language ability seen in young children.²³ Learning a language is a kind of recursive process – the output of one learning process providing the in-

baby drink	horsie mummy	she hair
baby hat	in there	shut door
baby here	is here	silly hat
baby lie	it gone	that bath
baby like	it off	that car
baby mummy	kiss doll	that hat
Bluey here-y’are	look elephant	that horsie
Bluey where	milk gone	there Bluey
comb hair	more toy	there teddy
come out	mumma back	toy gone
daddy there	mumma drink	waking up
dolly there	mummy off	want on
drink dolly	mummy there	where Bluey
gone milk	mummy toy	where inside
got it	my apple	where there
hat mummy	my bed	you bed

²³ See Crystal (1986 : 111 and 113) on the ‘linguistic leap’ from two-year-old to three-year-old and (1986 : 120) on the ‘spurt’ in vocabulary in the second half of the third year. Radford (2009 : 15–16) states that ‘the central phenomenon which any theory of language acquisition must seek to explain is this : how is it that after a long drawn-out period of many months in which there is no obvious sign of grammatical development, at around the age of 18 months there is a sudden spurt as multiword speech starts to emerge, and a phenomenal growth in grammatical development then takes place over the next 12 months? This *uniformity* and (once the spurt has started) *rapidity* in the pattern of children’s linguistic development are the central facts which a theory of language acquisition must seek to explain.’

put for the next – for example mapping phoneme combinations to referents gives words, learning word meanings and use helps children form categories and so on (see Saffran 2012a and b). And building upon previous learning is how human technologies have progressed – we could not have flying automobiles without a motor or engine, and we could not have a motor or engine without metallurgy, and we could not have metallurgy without fire. And in science, even Newton stood on the shoulders of giants.

Reciprocally, if combination to create meaning is an innate universal, it means that every human has combinatorial competence both as a producer and comprehender of language. We thus use this universal ‘knowledge’ not only to produce language but also to decompose it. As the reverse of combination to create meaning, decomposing meaning encompasses the whole hierarchy of language, from phonemes onwards. As we know, humans have a remarkable ability to rapidly process fluent speech, the many complexities of which we are not able to discuss here.²⁴ Humans without this ability would be unable to understand connected speech, whose sound signal is typically not neatly segmented. The fluency of speech is proof of our universal ability to combine and decompose meaningfully.

This universal would mean that children have an inherited ability and ‘knowledge’ of the structure of human language(s) ; it would therefore be a key to learning and part of the explanation for how they can acquire any given language.²⁵ As they grow, children are exposed to the combinatorial patterns of

²⁴ For word segmentation, for example, Saxton (2010 : 127) on child language acquisition and development lists transitional probabilities, phonological structure, prosodic structure, word class and utterance position (edge or centre).

²⁵ On recent research comparing two approaches to the evolution of compositionality, one appealing to biological evolution, the other focusing on cultural evolution, see Smith and

the particular language(s) around them. The child's universal combinatorial ability becomes language(s) specific as she is exposed to her mother tongue. This explains why we can decompose the sound signal of our own language but cannot segment the foreign language spoken on the train.

Of course, combinations are not always straightforwardly decomposable into their elements. 'Grammar school' does not mean a school where one studies grammar and its meaning depends on context; 'gonna' is not simply segmentable; and a great deal of meaning is implied rather than expressed (cf. Langacker 2008: 54). *Symbolism* is a fundamental universal of human language (cf. Saussure, Deacon 1997), indeed the most fundamental, and will be discussed in a subsequent paper. I will also discuss the relationship between combinatoriality and symbolism. As Langacker (2008) writes, a composite structure is itself symbolic, entrenchment diminishes the salience of composi-

Kirby in Werning et al. (2012). Smith and Kirby hypothesise that compositionality is socially learned.

There is evidence that children can segment words from fluent speech already at seven months (Jusczyk and Aslin, 1995, cited in Saxton 2010: 119). And children overgeneralise this 'knowledge' of the structure of human language(s), as illustrated below (examples from Crystal 1986: 108–109):

Mother: You run on ahead, and I'll catch up with you.

Jane (2;6): Whose head, mummy?

Mother: Don't argue!

Hugh (3;0): I don't argme.

Dena (8;0): I had a nightmare ... Well, it was a morningmare, really, 'cos it was five past seven.

We can even comprehend combinations made long before we were born – for example *friendly* (Old English *freondlice*), *friendship* (Old English *freondscipe*), *Easter Day* (Old English *Easterdæig*).

tionality (1987)²⁶ and, as mentioned above, chunking is an important characteristic of how humans encode information. This is as true for phonology as it is for 'grammar' – we store ready-made, meaningful chunks of phonemes as 'words'. Evans and Green (p. 756) write on grammatical constructions: 'The compositional structure ... may be essential to the initial creation or construction of that expression, but once the construction is entrenched and gains the status of a unit, this compositional scaffolding is no longer required. Despite this, the compositional structure remains immanent: we may still recognise the compositionality of well-entrenched units, but it does not follow that we "build them from scratch" each time we use them ... For example, we might argue that the compound noun *bluebottle* or the idiomatic expression *have a butchers at* represent cases where the individual components are no longer recognised as making a contribution to the construction as a whole, and that these expressions have therefore been reanalysed as simplex units, at least at the semantic pole.' This is indeed likely; however, for further discussion see Howe (1996, chapters 1 and 2) on the morphology of the personal pronouns in the

²⁶ Cited in Evans and Green (2006: 756). Langacker (2008: 164) writes that although component structures 'motivate the composite structure to varying degrees, and may supply most of its content, they should not be thought of as building blocks that need only be stacked together to form the composite whole'. He adds (2008: 166): 'While component structures serve to evoke a composite structure, and provide a way of apprehending it, the latter should not be thought of – in any strict or literal sense – as being constructed out of them. Stepping-stones are not the same as building blocks.' As stated, combining to create meaning and symbolism are both fundamental universals of human language. Although in this paper I am focusing on the first, in language they are closely connected. Further, it is important to remember that language is both synchronic and diachronic – children combine meaningfully and can decompose meaningful combinations, but they also acquire entrenched or second-hand combinations which to them can be combinatorial (*under the bed*), conventional (*under the weather*) or arbitrary (*understand*) (cf. Langacker's figure 6.9, 2008: 173).

Germanic languages and reanalysis of ‘simplex’ forms as complex and extension of morphemes from these.

A consequence of combination to create meaning are the levels of structure described by linguists. These ‘levels’ likely arise from combination, chunking and entrenchment of simpler component symbols to create a more complex one (cf. Langacker 2008 : 171) – commonly pronounced, rhythmic sequences of phonemes are chunked as syllables (cf. Jackendoff 2002 : 243–4 with references) and so on. Langacker states (2008 : 207) : ‘Constituency is observed in symbolic assembles when a composite structure at one level of organization functions in turn as component structure with respect to a higher level.’ The connections between these ‘levels’ is a complex topic beyond the scope of this paper. Jackendoff (2002 : chapter 1 and chapter 5, e.g. 112–113) posits distinct, independent levels of combinatoriality with ‘interfaces’ between. For example he states (2002 : 121) : ‘Syntax and phonology are independent combinatorial systems, built from distinct sets of primitive elements combined by distinct sets of formation rules. Neither can be reduced to or derived from the other.’ He adds (2002 : 424) : ‘Phonological structure since the late 1970s has been viewed as composed of a number of independent generative subcomponents, each of which is responsible for its own characteristic form of structure or *tier* ... Here we have extended this approach to the whole of language. Each of the major components of linguistic structure – phonology, syntax, and semantic/conceptual structure – is the product of an independent generative system, and each is further subdivided into independent tiers. The notion of a generative system is of course nothing new here – even within the individual components. What is new, I think, is the explicit recognition that this is the way the grammar is put together globally.’

While I agree with Jackendoff's approach (2002 : 130) to extend this idea 'to every part of the grammar, so that it becomes a fundamental architectural design principle', his multiple generative components with five 'interfaces' and six sets of 'rules' (see the sketch on p. 125) seem less plausible evolutionarily. How would such things have evolved? Indeed, Jackendoff concedes (2002 : 130) that 'the connection between functional and neural theories is far in the future'. I believe we should rather attempt to account for the hierarchical complexity of language with the unitary, elementary mechanism of combination to create meaning outlined here.

It is undoubtedly a main characteristic of intelligence that we are able to 'put two and two together' – we do not see simply 22, but 4 – we have the ability to see meaning by combining (cf. Hauser 2009²⁷). It is the basis of compare and contrast, identifying sameness or difference.²⁸ As blending theorists have highlighted, meaning construction can 'give[s] rise to more than the sum of its parts' – an ability central to human intelligence and imagination (see Evans and Green 2006 : 400–1). The ability to combine symbols to create meaning would certainly have been of very significant communicative and thus evolutionary advantage. Such an ability would represent a 'Great Leap Forward' in expressive power and precision – and reciprocally comprehension – as Chomsky has pointed out, with a finite inventory 'generat[ing] an infinity of expressions' (2002 : 87).²⁹ We can therefore theoretically justify its inheritance in humans.

²⁷ Cited in Boeckx (2012b).

²⁸ Cf. Fauconnier and Turner (2002 : 11–12) : 'connectionist modeling, like neuroscience, has come to recognize that identity, sameness, and difference, far from being easy primitives, are the major and perhaps least tractable problems involved in modeling the mind'.

²⁹ Though Chomsky does not believe the 'radically false' 'dogma' that language evolved for communication (2007), also (2002 : 76–77).

Its presence as a universal is thus much easier to account for than myriad inherited rules and constraints, as touched on at the beginning of this paper. Indeed, Fauconnier and Turner state (2002: 33) that ‘From the standpoint of cognitive science, the everyday capacities of the well-evolved human mind are the best candidates for complexity and promise the most interesting universal generalizations.’ Gray (2012) states that co-opted structure is commonly posited in evolutionary biology.³⁰ On comprehension, Saxton (2010: 124 with references) writes that ‘infants possess very powerful mechanisms for processing and analysing rapid auditory information. Subsequent studies suggest that this ability is not confined to speech, but applies equally well to rapid sequences of auditory tones and even to visual stimuli ... Cross-domain segmentation abilities suggest that speech does not occupy a privileged position in human cognition ... The ability to perform these kinds of analyses both across species³¹ and across different kinds of stimuli suggests a domain-general learning capacity for language.’

This universal is deliberately stated here in as elementary or ‘minimal’ a way possible. It must be sufficiently generic to account for the fact that – as Greenberg’s ‘universals’ and subsequent work clearly shows – human languages vary significantly. Overspecific combinatorial principles would mean we should expect little variation in human language. Our aim must be a complete theory of human language that both explains its universality *and* its variation.

³⁰ And as Langacker (2008: 207) points out, hierarchical organisation or constituency is ‘evident in virtually every realm of human functioning’, for example perceptual grouping, whole-part hierarchies, hierarchical categorisation, planning a complex endeavour, and complex motor routines. Gray (2012) suggests, following others, that syntactic hierarchy may have evolved in the control of complex tool manufacturing sequences.

³¹ Cotton-top tamarins, Saffran et al. (2008), cited in Saxton (ibid.).

Haspelmath writes (2006 : 17) that ‘It is illusory to think that linguistic diversity can be captured by a few holistic types, or a few word-order types, or a few parametric switches.’ And Jackendoff (2002 : 426) concludes that ‘the dominant view of Universal Grammar as a highly complex specification of all possible grammars – whether in terms of parameters or ranked constraints – is untenable. It does not allow enough room for the range of idiosyncrasy in language.’³²

Conversely, however, an issue on the other side of this elementary but powerful mechanism is of course constraint. As Pinker and Jackendoff state (2005 : 219) in their discussion of ‘Merge’, a ‘vast number of logical possibilities for constructing erroneous derivations’ must be kept in check; and in their criticism of Hauser, Chomsky and Fitch’s (2002) view that recursion is the only feature unique to human language ‘the fact that actual human languages are a miniscule and well-defined subset of recursive languages is unexplained’ (2005 : 217). Pinker and Jackendoff (2005 : 230–1) suggest that language is ‘not just any old recursive system but embodies at least four additional design constraints’: (i) ‘its recursive products are temporally sequenced’; (ii) ‘syntactic trees have a characteristic structure, in which each constituent contains a distinguished member’; (iii) ‘syntax is not just a recursive representational system externalized’ but ‘maps multi-directionally (in production and comprehension) *among* systems’; and (iv) ‘the details of the recursive struc-

³² Just a glance at Wright’s *English Dialect Grammar* from a hundred years or so ago illustrates the astonishing degree of variation in a single language, in this case English. And Wright was compiling his grammar precisely because ‘pure dialect speech’ was ‘rapidly disappearing’ (1905 : vii). If we multiply this by the thousands of languages in the world, the tens or possibly hundreds of thousands of dialects, and the registers of individual speakers, we are presented with an indisputable fact of variation.

tures are largely arbitrary and learned'. The mechanism of combination to create meaning can itself be a constraint: Chomsky et al.'s visiting Martian (Hauser, Chomsky and Fitch 2002: 1569), if he/she/it could communicate, might have used a very different mechanism. And if his/her/its language did not have combination to create meaning, it would not be language as we know it.

To what extent constraints are universal in the sense of 'Universal Grammar', neurocognitive, language specific, functional, real world or external is a complex question that cannot be answered simply here (cf. Tomasello 2003: 194). However, to give a frivolous reply, in his *Origin of Species by Means of Natural Selection*, Darwin could not write *god* when he meant *dog*. Nor could he write *dgo* or *ogd*. Why can we symbols not simple together put, then, higgledy-piggledy, any old way, or in fact grammatically in the case of this question in German?³³ The answer, of course, is that it is the way they are combined that is conventional and significant in a language. The taxis is important. As Langacker writes (2008: 168): 'An expression's composite meaning is not just a pile of component meanings, but an integrated structure where elements relate to one another in very specific ways ... Grammar consists of conventionally established patterns for putting together symbolic assemblies. As viewed in C[ognitive] G[rammar], these patterns are themselves symbolic assemblies.' Pattern in language will be discussed in a forthcoming publication.

Unlike theories that put forward particular grammatical constraints as universal, postulating them as neurocognitive, language specific, functional, real world or external poses far fewer problems – one does not need to explain

³³ *Warum können wir Symbole nicht einfach zusammenstellen?*

how – and why – such grammatical constraints got there by evolution, as already stated, and one can account more easily for the differences in the types of combination between languages clear from Greenberg's implicational universals. We can state that children do not acquire a contentless, contextless rule system, but an already (typically) spoken language with its patterns of usage and content, and it is this that constrains their combinations. We can note further that language learning by children is a source of constraint on language structure (see Saffran 2012b).

We can also view this the other way round: rather than postulating constraints, i.e. what is not allowed, ungrammatical or irregular, we can postulate usage patterns, schemas or templates, learned on the basis of input of a particular language (cf. Tomasello 2003, Langacker 2008).³⁴ Chomsky, Hauser and Fitch (2002: 1577) of course state correctly that 'A child is exposed to only a small proportion of the possible sentences in its language' but conclude 'thus

³⁴ Cf. Evans and Green (2006: 754): 'In the cognitive model, the schema does not give rise to the instance but follows from it: the schema represents a pattern that emerges from entrenched units as a consequence of usage.' And Langacker (2008: 221): 'Since schemas are the reinforced commonalities of occurring expressions, they amount to positive characterizations of what actually occurs in language use ... the positive characterization of conventional patterns can indicate implicitly (and quite effectively) that options outside their range are nonconventional and will be judged ill-formed.'

Cf. Crystal (1986: 76–77) on the examples of two-word utterances used by Victoria, cited in the footnote earlier: '... several interesting features of this "two-word" style stand out. For instance, various sets of sentences "go together", because they all begin with the same word – *baby* and *mummy*, especially. Several other sentences all end with *there* ... It's almost as if the child picks up a certain pattern and "rings the changes" on it. You can sometimes hear children of this age going through a litany of sentences all beginning or ending with the same word, almost as if they were drilling themselves ... Another point to note is that the order of the words usually corresponds to what you'd expect in an adult sentence: the child says *my bed* and *got it*, and not *bed my* and *it got*. Sometimes you get both orders ... But on the whole, Victoria seems to have learned a lot about the main patterns of English word order – and she's only 1;9.'

limiting its database for constructing a more general version of that language in its own mind/brain'. This 'poverty of stimulus' argument disregards the fact that the child hears the combinatorial patterns of its language – sound symbols, words and constructions – thousands of times, again and again, even more so for the most frequent patterns in the language, which are precisely the ones he or she will produce most as a proficient language user. These patterns are abstracted from use to produce schemas or templates for production.³⁵ As Deacon states (1997 : 89–90), 'Because the combinatorial rules encode not objects but ways in which objects can be related, new symbols can immediately be incorporated and combined with others based on independent knowledge about what they symbolize.'³⁶ We know also that repetition – practice – is crucial to expertise, whether it be language, manual dexterity, walking, a musical instrument or sport. Further, it is difficult to explain why we would have evolved a different learning mechanism for syntax or 'grammar' to words and their meanings.³⁷

³⁵ Compare here a study of computational constraints on syntactic processing in a nonhuman primate (cotton-top tamarins) by Fitch and Hauser (2004). The authors conclude (p. 379–80) that 'the limitation we have demonstrated might indicate an over-reliance on superficial aspects of stimuli, which prevents tamarins from perceiving more abstract relations available in the signal'.

³⁶ And of course the child is not simply learning combinatorial patterns. As Tomasello states, 'as the young child internalizes a linguistic symbol ... she learns the human perspective embodied in that symbol', for example granularity-specificity (*thing, furniture, chair, desk chair*), perspective (*chase-flee, buy-sell, come-go, borrow-lend*) or function (*father, lawyer, man, American*) (2003 : 13).

³⁷ Compare the quote from Saxton (2010 : 124) above and Tomasello (2003 : 195) : 'regardless of whether or not there is a universal grammar, children must still learn the individual linguistic items and constructions of the language into which they are born, and this requires them to master many and various concrete pieces of language and to make some straightforward abstractions across them. To repeat : this must happen regardless of one's theory. The question is whether we need in addition an innate universal grammar, along with a second set of acquisition processes to link up to it, and what functions this extra factor might serve.'

The schemas or templates derived from patterns of usage produce acceptable, 'grammatical' and understandable combinations for that language. This might be a more plausible explanation for the human instinct or motivation to interact with other humans and the positive act of communication than negative constraints, if we accept that language evolved because it enabled humans to communicate.

In conclusion, then, we can put forward combination to create meaning as a universal of human language. To show that it is indeed a fundamental universal, we must imagine what human language(s) would be like without it; we can see then that it would barely be 'language' at all. It would be a number of isolated sounds; but these sounds could not be combined to create morphemes, nor could morphemes be combined to create compounds, nor would there be syntax; nor would we be able to combine an intonation pattern with meaning. Indeed, our 'language' would have no words. And a baby would never progress beyond a cry for food or comfort.

Therefore, we predict that there are no human languages that do not have this mechanism: all human language(s) now, all spoken in the past by modern humans, and all spoken in the future, have, had and will have combination to create meaning.

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