Cognition, universal grammar, and typological generalizations[☆]

Guglielmo Cinque

Ca' Foscari University, Venice, Italy

Abstract

We consider here two potential arguments for Universal Grammar other than that based on poverty of the stimulus. One stems from the limited number of notions that are *grammatically encoded* in the languages of the world. The other rests on the fact that of all mathematically possible orders of constituents only a subset is actually attested. Neither limitation appears to follow naturally from cognitive, historical, cultural, processing, or other factors; which makes it plausible to think of them as forced upon us by Universal Grammar, perhaps as a consequence of how it crystallized at some distant point of the evolution of our species.
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How much of language should be attributed, if any, to a language-specific genetic endowment of our species, the traditional ''Language Faculty'' (or ''Universal Grammar''), and how much to non language-specific external factors (general cognition, cultural environment, biological and physical laws, etc.)? This traditional question was resurrected, with the force of new arguments, some fifty years ago by Noam Chomsky, and remains a moot empirical question, guided in the present state of our knowledge essentially by plausibility arguments.

Here, I want to consider possible evidence, different from poverty of the stimulus evidence (Chomsky, 2011; Berwick et al., 2011), for attributing to Universal Grammar a relatively rich content, far richer in fact than most people are used (and perhaps willing) to assume.

The first piece of evidence revolves around the observation that of all the concepts and distinctions that populate our system of thought only a fragment receives a *grammatical encoding* in the languages of the world, arguably the same in all languages.

The second has to do with the quite rigid limits that exist on word order variation (some potential orders are never found). These, and arguably even the less rigid ones (the mere ''tendencies'' of greenbergian typology), point toward a direct involvement of Universal Grammar, despite some recently voiced skepticism (Evans and Levinson, 2009; Dunn et al., 2011).

I take up the two points in turn.

Concerning the first, as I said, only a fraction of our cognitive concepts and distinctions seems to find a grammatical encoding in the languages of the world, where by grammatical encoding I mean encoding in one of the closed classes of categories (affixes, particles, auxiliaries, prepositions, etc.) that belong to the functional rather than the substantive lexicon

of languages (cf. Kayne, 2005a, §2.1, 2009, §5 on the open class/closed class dichotomy). Most cognitive concepts and distinctions do not find any such encoding.[1]

To clarify, let me mention some potential candidates, among the innumerable ones that could be imagined, which as far as I know are grammatically encoded in no language of the world[2] (an observation that is foreshadowed in some of Talmy's, 1985 remarks[3]). Verbal projections in clauses grammatically encode (through affixes, particles, auxiliaries, etc.) distinctions relating to the external and internal temporal constituency of events (tense and aspect) and the speaker's attitude toward the truth of the proposition (mood), but they are never found to grammatically encode such human cognitive universals as ''shame'', ''mourning'', ''sexual taboos'', etc.[4], nor otherwise cognitively significant concepts like ''worry'', ''peril'', ''fear'', ''hunger'', ''love'', ''death'', ''awe of god'', etc. (even those relevant to selection). We could very well imagine the existence of languages that marked grammatically some such distinctions in their verbs, as in the quasi-English examples in (1); yet none are found (a fact which we should find puzzling).

(1) a. He has climb*end* the tree (intended meaning: 'he has worryingly (for the speaker) climbed the tree'; just as some languages can express, through verbal affixes, 'he has surprisingly (for the speaker) climbed the tree', with so called ''mirative'' morphemes – cf. fn.13 below)

     b. He fight*af*/run*af* (intended meaning: 'he is afraid of fighting/running'; just as many languages use V-suffix to express the notion 'is desirous of Ving/wants to V')

     c. He did*ish* it (intended meaning: 'He did it shamelessly'; just as some languages use a V-suffix to express the notion 'V in vain, unsuccessfully', the so-called 'frustrative' aspect affixes – see fn.14 below)

     d. They enter*dan* the forest (intended meaning 'they are entering the forest but it is dangerous for them to)[5]

     e. I say*am* you are wrong (intended meaning: 'I am sympathetic in saying you are wrong')

One could easily multiply such conceivable possibilities.

To say that the external and internal temporal constituency of an event (tense and aspect) or the attitude of the speaker toward the truth of the proposition (mood) are cognitively salient is beside the point. The question remains why these and only these cognitive distinctions are *encoded grammatically* in natural languages out of the many other salient ones.

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[1] Of course, any concept can be expressed linguistically through a combination of lexical (and grammatical) means (paraphrases), but this is very different from the specific sense utilized here of *grammatical encoding* via one of the various closed classes of categories (affixes, auxiliaries, particles, etc.). This notion is also distinct, though not entirely independent from, that of grammaticalization, the historical process whereby certain grammatical categories are recruited from certain lexical (or other grammatical) elements, which undergo semantic bleaching and phonological reduction, as in the case of complementizers deriving from verbs of saying. It should go without saying that grammaticalization presupposes the prior determination of the type and number of grammatical categories which can be the target of grammaticalization processes; a question which is often addressed only implicitly. Heine and Kuteva (2002) list some 170 independent targets of grammaticalization, i.e. separate grammatical categories, which broaden to some 400 if one considers that many of their targets actually correspond to more than one grammatical category; for example, their *complementizer* appears to correspond to different (sub-)categories of complementizers in terms of function and position: finite declarative, infinitival, interrogative, pure subordinator, etc. (see Rizzi, 1997, 2004; Benincà, 2006). In our understanding of this process, what is recruited to fill in one of the grammatical categories provided by Universal Grammar must share some meaning component with the more abstract functional meaning of the grammatical category (cf. word for 'child' > diminutive morpheme; word for 'remain' > durative aspect, etc.). For recent discussion of grammaticalization within the generative approach, see Ijbema (2002, Chapter 1), Roberts and Roussou (2003) and references cited there.

[2] The objection that languages which existed in the past or will exist in the future might have encoded or might encode types of cognitive distinctions other than those encoded by currently existing languages does not have much force. The several thousand languages currently existing (arguably tens of thousands if we take into account the (sometimes not even mutually intelligible) thousands of dialects of officially recognized languages like ''Italian'', ''Hindi'', ''Chinese'', ''Malay'', etc.) are plausibly representative of what one can expect to find as possible or impossible grammatical encodings; and this even if all languages ultimately descend from a common ancestor (the evolutionary plausible hypothesis to make). The reason is that (at least in those few cases where we have reliable documents of earlier stages of some language, and this only covers a time span which is relatively small with respect to the putative first emergence of language in human evolution) languages seem to be able to vary substantially with respect to word order, to the way they express certain constructions (impersonal/middle/unaccusative), or in the inventory of their grammatical morphemes (from isolating to inflectional, to agglutinative morphology). Yet, they do not seem to change beyond certain limits, e.g. developing entirely new types of grammatical morphemes (for example, of the kind mentioned in (1) below).

[3] ''There are many characteristics of an event's participants that are not marked anywhere in the verb complex, even though they seem as reasonable (from an a priori perspective) as the qualities that *are* marked. Thus, while an argument's numerosity and distribution can be marked, there will be no marking for its color or whether it has a symmetrical arrangement, even though these very qualities are important in other cognitive systems, such as visual perception'' (p. 134). ''It seems that no markers or incorporations indicate notions unrelated to either the referent event or the speech event. If they existed, one might encounter cases like *The chair broke-ka* meaning 'The chair broke and I am currently bored' or 'The chair broke and it was raining yesterday'' (p. 138). Also see Talmy (1988:165f).

[4] Cf. Brown (1991).

[5] The absence of danger morphemes on verbs is especially curious given that one of the classes into which nouns are classified in the Australian language Dyirbal possibly contains 'dangerous things' (in Lakoff's, 1987:92–102, speculative reinterpretation of Dixon's, 1982:178–183, description).

The same is true of every other major phrase that enters a sentence. Limiting ourselves to nominal phrases, we could very well imagine that, in addition to (or in place of) the demonstrative, numeral, adjectival, diminutive, relative clause, etc. modifiers, which are found in language after language,[6] there existed other types of modifier classes. Why is it that languages, along with such distinctions as ''the X close to the speaker. . .'' (=*this X*) vs. ''the X not close to the speaker. . .'' (=*that X*),[7] have no modifiers meaning ''the X dear to the speaker. . .'' (e.g., *dir X*) and ''the X not dear to the speaker. . .'' (e. g., *dar X*)?[8] Why is it that apparently no language encodes distinctions having to do with ''strong/weak'', ''favorable/ unfavorable'', ''rich/poor'', ''burning/freezing'', ''sexually attractive/sexually unattractive'', etc., in the same way as languages encode ''small/big'' in their diminutive/augmentative morphemes? And why is it that languages grammatically encode the notion of approximate number (''fivish''), but no language the notion of magical number?

The list could continue.[9]

Once again, saying that the types of nominal modifiers that we find in language after language are, among our cognitive distinctions, the most important ones to convey in a grammatical form simply begs the question.[10]

This state of affairs makes the endeavour of mapping the number and types of cognitive concepts that receive a grammatical encoding in the languages of the world (as work in the cartographic approach[11] and that in other approaches[12] try to do) well worth pursuing, despite the difficulty of establishing in many cases exact correspondences among languages and despite the fact that what looks like one and the same notion is apparently encoded differently in different languages, with a dedicated morpheme in one and with a morpheme that may also serve to encode other notions in others.[13] If we had an inventory of which cognitive concepts and distinctions receive grammatical encoding in natural languages and which do not, certain important questions could then be raised. Consider the following. Of all grammatical encodings arrived at by inspecting the grammars of different languages, only few appear to occur in *every* language. While all languages have demonstratives and diminutives in their nominal phrases, only some appear to have numeral classifiers. While all languages grammatically encode negation, only some appear to encode mirativity (cf. fn.13); and even fewer ''frustrative'' aspect.[14]

On the basis of this fact, we would seem to be led to the conclusion that each language picks a subset of such encodings from the set of all possible encodings made available by Universal Grammar, thus differing from other

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[6] On the universality of demonstratives see Diessel (1999:1), on that of diminutives Jurafsky (1996:534). Relative clauses, adjectives (Dixon and Aikhenvald, 2004), numerals and approximate numerals (Plank, 2004; Kayne, 2005a, §3.1) also seem to be universal (despite occasional claims to the contrary).

[7] In languages other than English or Italian the value ''the X not close to the speaker'' may be split into two separate values: ''the X close to the addressee'' and ''the X close to neither the speaker nor the addressee''. This is for example the case of certain Italian dialects and of the Oceanic language Gapapaiwa – McGuckin, 2002:301). Languages may also combine the purely deictic distinction based on the speech act participants with other notions (up/down, in/out, close/distant in the linguistic text, etc.).

[8] This is again curious given that 'endearment' is universally encoded morphophonologically (sometimes conflated with 'diminution'). Cf. Cinque (2007) for discussion.

[9] See Cinque (1999:224 fn.10, 2006a,b: fn.26), Cinque and Rizzi (2010,fn10).

[10] Kuteva (2009) makes the potentially interesting suggestion that the notions amenable to grammaticalization are ''basic level notions'' (like temporality, aspectuality, modality, etc.) rather than those semantically more elaborate (though she cites two problematic cases herself). It is however hard to see why expressions of ''surprise'', which are grammatically encoded through mirative morphemes (cf. fn.14 below), or speaker-oriented adverbs like 'oddly', 'strangely enough', etc., should be less elaborate semantically than expressions of ''interest'', ''disgust'' or ''contempt'', which are never grammatically encoded.

[11] See Cinque and Rizzi (2010), and references cited there.

[12] See Bybee et al. (1994), Heine and Kuteva (2002), Kayne (2005a).

[13] For example, the speaker's presentation of some information as surprising (termed ''mirativity'' in DeLancey, 1997) finds an affixal encoding on the verb in many languages. Some, like the Athabaskan language Hare, have a specific particle (*lo*) uniquely used to express mirativity (Bashir, 2010:2, citing DeLancey, 2001). Others, like Bulgarian, utilize the same morphology that is used to express other notions (evidentiality). See Guentcheva (2006), and references cited there. This may indicate that mirativity and evidentiality share a component of meaning and differ with respect to other components, with some languages capitalizing on the shared component (Bulgarian) and others on the differential components (Hare). This recalls the case of languages which ''neutralize'' certain lexical distinctions present in other languages (cf. the Italian adverb *presto*, which renders both English *soon* and *early*, being preverbal when meaning 'soon' and postverbal when meaning 'early'). All of this appears to indicate that comparisons among languages have to be carried out at a finer grained level, smaller than words, as Kayne's work and recent work in nanosyntax (Starke, 2009, 2011; Taraldsen, 2010) seem to suggest.

[14] Common in Amazonian languages, but also found in Papuan languages (see Berry and Berry, 1999:59 on Abun and Lewis, 1972:19 on Sanio-Hiowe) and in other language families, ''frustrative'' aspect morphemes (in their primary function) express the fact that some action is unsuccessful or attempted in vain. See for example the Arawakan Nanti example in (i):

no= neh-**be**-ak-a=ri   (Michael, 2008:251)
1S=see-**frus**-perf-real.a=3mO
'I saw him (but without the expected result).'

The possible other side of the coin is the ''success'' aspectual morpheme of the Salishan language Spokane (Carlson, 1996:59).

languages in what grammatical encodings it activates (cf. Jackendoff's, 2002:263 view of Universal Grammar as a ''toolkit'').

Would this be a correct conclusion? I think there are reasons to reject it, and to adopt the stronger (and more interesting) conclusion that all languages grammatically encode the entire set and do not vary from each other in this respect. In Cinque (1999), some cross-linguistic evidence bearing on clausal grammatical encodings was presented to this effect.[15] It consisted of two steps. The first was the observation that the grammatical morphemes for Mood, Tense, Aspect and Voice enter a syntactic hierarchy to which the order of these morphemes in the various languages conform.

For example, when they are overtly realized in some language epistemic Mood morphemes appear further away from the verb than Tense, whether both precede ((2)), or follow the verb ((3)):

(2) a *khong cà*? kamlang thamngaan naj   hông samùt   (Thai – Cinque, 1999:159)
        EPIST FUT PROG   do   work   in   library
        'I will probably be working in the library'
     b Jaan *mosii kuda*   bin   de   a   riid   (Guyanese Creole – Gibson, 1986:585)
        Jaan **EPIST PAST**.can ANT(erior) DUR(ative) PROG read
        'John probably could have been reading'

(3) a Anti-ci   re'an-*aha-kon*   (Garo (Sino-Tibetan) – Cinque, 1999:72)
        market-to go-**PAST-EPIST**
        'He must have gone to the market'
     b Ku say-ka   cwuk-*ess-keyss*-kwun-a!   (Korean – Cinque, 1999:53)
        that bird-NOM die-**PAST-EPIST**-EVAL-DECL
        'That bird must have died!'

And Aspect morphemes are invariably closer to the verb than Tense morphemes, whether both precede ((4)), or follow ((5)) the verb:

(4) a i *pahn kin*   kangkang rais   (Ponapean (Micronesian) – Cinque, 1999:160)
        I **FUT HAB** eat.PROG rice
        'I will habitually be eating rice'
     b *pê*   wa *ajco* apu   to hane   (Canela-Crahô (Macro-Ge, Brazil) – Cinque, 1999:162)
        PAST 1sg **HAB** PROG do thus
        'I always used to do that'

(5) a Nunqan ulle-ve tulile lo:van-d'e-*ngne-re*-n   (Evenki (Altaic) – Cinque, 1999:154)
        she meat-ACC outdoors hang-IMPF-**HAB-PAST**-3sg
        'She used to hang meat outdoors for some time (for drying)'
     b Yau-r-edib-*eb-a*-su   (Yareba (Papuan) – Cinque, 1999:162)
        sit-CM-FREQ-**HAB**-**PRES**-3sgMasc
        'He habitually and repeatedly sits down'

Similar rigid orderings are found with modals, causative, perception verbs, etc. Despite their pre- or post-verbal positioning, the relative order of the various grammatical morphemes remains constant (is, more abstractly, the same). This requires recognizing and undoing the effects of a number of factors that come to obscure the unique universal structure of sentences; for example, the displacement of VPs or of larger portions of the sentence (for which see more below). Such displacements may in fact falsify the stated generalizations in that Mood morphemes in some languages appear closer to the verb than Tense morphemes and Tense morphemes closer to the verb than Aspect morphemes, but these (rare) orders may still be interpreted as arising from a unique universal base order (Mood Tense Aspect V) through more marked movement options, as is the case for the rarer order N Dem Num A briefly discussed below for the nominal case. See Cinque (2012). Once these effects are undone, an articulate order (hierarchy) of functional morphemes emerges, a fragment of which is given in (6)[16]:

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[15] The same seems to be true of nominal grammatical encodings. See, for example, Kayne (2003) and Cinque (2006b) for evidence that numeral classifiers are also present in so-called ''non-numeral classifier languages'' like English and Italian.

[16] For our purposes it is immaterial whether some such grammatical notions will turn out to be further decomposable into more elementary notions.

(6) $Mood_{speech\ act}$
  $Mood_{evaluative}$
    $Mood_{evidential}$
      $Mod_{epistemic}$
        $Tense_{past/future}$
          $Mod_{necessity}$
            $Mod_{possibility}$
              $Aspect_{habitual}$
                $Aspect_{repetitive}$
                  $Aspect_{frequentative}$
                    $Mod_{volition}$
                      $Aspect_{celerative}$
                        $Tense_{anterior}$
                          $Aspect_{terminative}$
                            $Aspect_{continuative}$
                              $Aspect_{continuous}$
                                $Aspect_{retrospective}$
                                  $Aspect_{durative}$
                                    $Aspect_{prospective}$
                                      $Mod_{obligation}$
                                        $Aspect_{frustrative}$
                                          $Aspect_{completive}$
                                            $Voice_{passive}$
                                              Verb

The second step consisted in the recognition that the various classes of adverbs (more accurately, AdvPs) are also ordered among each other in a syntactic hierarchy, and that this hierarchy turns out to match exactly the hierarchy of Mood, Tense, Modality, Aspect and Voice heads, as can be seen if we juxtapose the two hierarchies:

(7) a $Mood_{speech\ act}$
     $Mood_{evaluative}$
     $Mood_{evidential}$
     $Mod_{epistemic}$
     $Tense_{past/future}$
     $Mod_{necessity}$
     $Mod_{possibility}$
     $Aspect_{habitual}$
     $Aspect_{repetitive}$
     $Aspect_{frequentative}$
     $Mod_{volition}$
     $Aspect_{celerative}$
     $Tense_{anterior}$
     $Aspect_{terminative}$
     $Aspect_{continuative}$
     $Aspect_{continuous}$
     $Aspect_{retrospective}$
     $Aspect_{durative}$
     $Aspect_{prospective}$
     $Mod_{obligation}$
     $Aspect_{frustrative}$
     $Aspect_{completive}$
     $Voice_{passive}$
     Verb

b $AdvP_{speech\ act}$ (frankly,..)
  $AdvP_{evaluative}$ (fortunately,..)
  $AdvP_{evidential}$ (allegedly,..)
  $AdvP_{epistemic}$ (probably,..)
  $AdvP_{past/future}$ (then,..)
  $AdvP_{necessity}$ (necessarily,..)
  $AdvP_{possibility}$ (possibly,..)
  $AdvP_{habitual}$ (usually,..)
  $AdvP_{repetitive}$ (again,..)
  $AdvP_{frequentative}$ (frequently,..)
  $AdvP_{volition}$ (willingly,..)
  $AdvP_{celerative}$ (quickly,..)
  $AdvP_{anterior}$ (already)
  $AdvP_{terminative}$ (no longer,..)
  $AdvP_{continuative}$ (still,..)
  $AdvP_{continuous}$ (always,..)
  $AdvP_{retrospective}$ (just,..)
  $AdvP_{durative}$ (briefly,..)
  $AdvP_{prospective}$ (imminently,..)
  $AdvP_{obligation}$ (obligatorily,..)
  $AdvP_{frustrative}$ (in vain,..)
  $AdvP_{completive}$ (partially,..)
  $AdvP_{manner}$ (well,..)
  Verb

(8) to (11) show the fixed order of a necessarily incomplete, and small, sample of pairs of adverbs, with examples from English:

(8) a Whenever I meet him, John has *always just* returned from abroad
     b *Whenever I meet him, John has *just always* returned from abroad

(9) a   John can *normally* be *briefly* seen in his office on Mondays.
     b *John can *briefly* be *normally* seen in his office on Mondays.

(10) a   John *fortunately no longer* smokes
     b *John *no longer fortunately* smokes

(11) a   John *frequently completely* forgets his duties
     b *John *completely frequently* forgets his duties

Restricting attention to one of these pairs, that in (8), one finds exactly the same rigid order in Italian ((12)), Bosnian/Croatian/Serbian ((13)) (Cinque, 1999:37; from Ljiljana Progovac p.c.), Hebrew ((14)) (Cinque, 1999:39; from Ur Shlonsky, p.c.), and Chinese ((15)) (Cinque, 1999:41; from James C.-T. Huang, p.c.):

(12) a   Ogniqualvolta lo incontro, Gianni è *sempre appena* tornato dall'estero
         Whenever him (I) meet, Gianni is *always just* returned from abroad
     b *Ogniqualvolta lo incontro, Gianni è *appena sempre* tornato dall'estero
         Whenever him (I) meet, Gianni is *just always* returned from abroad

(13) a   Kad god ga sretnem, on se *uvijek upravo* vraća iz grada
         Whenever him (I) meet, he REFL always just returns from town
     b *Kad god ga sretnem, on se *upravo uvijek* vraća iz grada
         Whenever him (I) meet, he REFL just always returns from town

(14) a   Kše-'ani pogeš 'oto, John *tamid bidiuk* xozer me-kul
         When (I) meet him, John always just returns from abroad
     b *Kše-'ani pogeš 'oto, John *bidiuk tamid* xozer me-kul
         When (I) meet him, John just always returns from abroad

(15) a   Mei ci wo pengjian ta, ta *zongshi ganggang* cong guowai huilai
         Every time I meet him, he always just from abroad returned
     b *Mei ci wo pengjian ta, ta *ganggang zongshi* cong guowai huilai
         Every time I meet him, he just always from abroad returned

My point then was that the match in (7) can hardly be accidental, and that the hierarchy of (evaluative, evidential, irrealis..) Mood, (epistemic, alethic, root,..) Modality, (past, future, anterior,..)Tense, (habitual, perfect, completive,...) Aspect and (impersonal, middle, passive,..) Voice verbal morphemes and that of the corresponding classes of adverbs are the two sides of the same coin.[17] The former are heads, the latter phrases in specifier position, possibly of one and the same functional projection (or of two adjacent projections – Cinque, 2002:fn.6). In Cinque (2006a) it was further argued that functional heads, in addition to affixes, particles and auxiliaries, can also be expressed by restructuring (i.e., modal, aspectual and motion) verbs, which also show a rigid order among each other, compatible with the order manifested by the other types of heads.

That adverb(P)s are functional or grammatical elements might seem implausible as in many languages adverbs appear to be an open class. But this is actually an illusion. The number of different *classes* of adverb(P)s, each containing from one member (''already''), to few members (repetitive adverb(P)s), to very many members (manner adverb(P)s), is actually a closed set of classes (even if larger than the set given in the fragment in (7)b) (Cf. Cinque, 2006a:9 fn.22). As a matter of fact in several languages adverbs are reported to form a closed, and small, set. This happens when all classes contain few members and/or the grammatical notions in question are expressed by other means (see Dixon, 1982:40; Schachter, 1985:21ff; Reesink, 1990; Cinque, 1999:213 fn.79, 2006b:9 fn.22, and references cited there).

Languages may thus differ depending on whether they grammatically encode the different moods, tenses, modals, aspects and voices through (bound or unbound) functional heads (affixes, particles, auxiliaries, restructuring verbs), or

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[17] As noted there, this bears some resemblance to the operator and satellite distinction of Dik's functional grammar (cf. Dik, 1997; Hengeveld, 1989).

corresponding functional adverbial modifiers. In the latter case, they may give (and have given) the impression of not encoding grammatically certain aspects (say, ''habitual'' or ''celerative'' aspects, in Italian), or tenses (say, present or past, in Chinese), or moods (say, evaluative and evidential mood, in English). But this is the wrong impression. The same aspects, tenses, and moods are encoded functionally in a different way: via aspectual adverbs or restructuring verbs in Italian, via temporal adverbs in Chinese, and via evaluative and evidential adverbs in English (*luckily*, *oddly*, *allegedly*, *reportedly*, etc.), all of them arguably exponents of the same grammatical notion, merged in the same functional projection of the clause.[18]

If correct, these considerations point to the conclusion that languages may not differ at all in the classes of cognitive concepts and distinctions that they encode *grammatically*.

Since these are a (small) subset of all the cognitive concepts and distinctions that are found in our system of thought, we cannot escape the conclusion, I think, that they are forced upon us by the make-up of our Language Faculty (or Universal Grammar); perhaps a consequence of the way it crystallized at some distant point in the evolution of our species.[19]

Another property found in language after language is the existence of grammatical means to encode contextual information concerning prior states of affairs. If a child is asleep and one knows (or knows that the addressee knows) that (s)he has already been sleeping for a while, one cannot help but say ''(S)he is *still* asleep'' (in English) or use a *still*-tense (in Bantu languages – Dahl, 1985:176) or an aspectual suffix (in Garo – Bybee, 1985:143), or a particle (in Lai Chin – Kavitskaya, 1997:202), or a special auxiliary (in Karen – Jones, 1961:17), even if the simpler ''(S)he is asleep'' would perfectly fit the objective situation. Languages abound with such grammatical excrescences; among these also 'no longer' (''(S)he is no longer asleep'' instead of the simple ''(S)he is not asleep'', which would fit the situation), 'already', 'again', 'even'; 'other' in the nominal phrase, etc.[20] Although we have no difficulty in imagining some language working perfectly well without such grammatical encodings of contextual information, no such language is apparently found. It could be objected that our cognitive make-up forces us to take knowledge of the speech situation into account[21], but then why is it that no language grammatically encodes *other* aspects of the speech situation as well, to allow ''(S)he is nick asleep'' to mean '(S)he is asleep and did not want to go to sleep', or '(S)he is asleep and it's day time', etc.)? This is a legitimate question to pose, whether the answer will ultimately come from Universal Grammar, from some external factor, or from a combination of the two. It is a variant of the type of questions that ''we need to keep asking. Why are certain readily imaginable parameters not found in syntax?'' (Kayne, 2011, §5).[22]

Consider now word order, a primary locus of variation among languages. Despite the great differences observable, it is clearly not the case that anything goes. Many possible orders of constituents are *never* found, and those that are found are represented by vastly different numbers of languages (plausibly, a non accidental fact). Furthermore clear *tendencies* can be detected which tie together certain orders to certain other orders (Greenberg's implicational generalizations). All of these cases should ideally be made to follow in a principled manner.

The first case can be exemplified with the order of Demonstratives, Numerals, Adjectives and Nouns in the languages of the world. Of the 24 mathematically possible orders of these four elements, only 14 are attested (in the sample used in Cinque, 2005, based on Greenberg, 1963 and other sources).[23] At any rate, clearly unattested as canonical orders[24] in anyone's sample are the orders in (16):

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[18] Certain African and Formosan languages appear to have both little verbal inflection and a reduced class of adverbs. They nonetheless express the same notions through 'adverbial' auxiliaries. See, for example, Koopman (2004, §4.6.2) on Maasai and Holmer (2010) on Seediq.

[19] As Paola Benincà conjectured in discussing once these questions. All of this seems to me to suggest that Universal Grammar may turn out to have, in addition to the basic operation Merge, a rather rich and specific content (also see below).

[20] The high 'functional' adjective *other* (Kayne, 2005a:13) appears to be encoded grammatically in all languages, and is often assigned by grammarians to a specific grammatical category. Cf. the ''allotive specifier'' of Jacaltec (Church and Church's, 1961:165f) and the ''déterminatif d'altérité'' of Wolof (Diagne, 1971:91ff).

[21] Evans and Levinson (2009:437) say that among the ''functional features that all languages need in order to be adequately expressive instruments'' is ''the ability to indicate [..] prior states of affairs, [..], to distinguish new from old information, etc.''.

[22] Natural languages also seems to abound in grammatical means to deny not only what is said but also what may just be *implied* by the addressee; for example, the special ''presuppositional'' negative particle of many Romance languages (*mica* in Italian, *pas* in Catalan, etc. – Cinque, 1999:167 fn.4); the *dáj* sentence final particle of Lao (Crisfield, 1974:42). One may again wonder why this should be the case. We can certainly conceive of a human language without such grammatical means at its disposal, or with different grammatical means, which praise or ridicule instead of simply denying what is implied by the addressee.

[23] The attested orders are Dem Num A N, Dem Num N A, Dem N Num A, N Dem Num A, A N Dem Num, N A Dem Num, Dem A N Num, Dem N A Num, N Dem A Num, Num A N Dem, Num N A Dem, N Num A Dem, A N Num Dem, N A Num Dem. Dryer (2009/2011) claims that three of the orders which are unattested in the sample utilized in Cinque (2005) are in fact attested in his sample, even if by exceedingly few languages (namely, Num N Dem A, Dem A Num N and N Num Dem A, all of which involve an unexpected, from my perspective, position of the adjective). I think there are reasons to doubt that such orders are genuinely attested. See Cinque (in preparation) for discussion of the data and sources, and for a survey based on a larger sample than those utilized in Cinque (2005) and Dryer (2009/2011).

[24] I abstract away here from the special orders created by the separate fronting of an adjective, or a demonstrative for focus reason. See Cinque (2005: fn.23) and Cinque (in preparation).

(16) a. Num Dem A N
      b. Num Dem N A
      c. A Dem Num N
      d. A Dem N Num
      e. Num A Dem N
      f. A Num Dem N
      g. A Num N Dem

To these the three orders that Dryer (2009/2011) claims to be attested might possibly be added if they are only apparently attested.

The existence of possible and impossible orders of these four elements clearly calls for a principled account. The one suggested in Cinque (2005) involves a unique merger of these elements ([Dem [Num [A [N]]]]) and different leftward movement options of phrases containing the N (options that appear to play a role in other constructions). Each language selects one (or more) particular combination(s) of these movement options, yielding the unique (or the alternative) order(s) it displays of these four elements. The account discriminates the possible from the impossible orders by being able to derive the former but not the latter.[25]

Whether this particular account of the possible and impossible orders is correct or not is another matter. In any event, there is little doubt that an account of the observed pattern (whatever that turns out to be) is needed, which can hardly be couched, it seems, in terms of cultural or historical biases (Evans and Levinson, 2009; Dunn et al., 2011).[26] In particular, why should certain orders be excluded by all cultures? Alternatively, what historical laws should prevent their emergence?

Building on an insight of Hawkins's (1983), the account suggested in Cinque (2005) tried at the same time to give a rationale for the different numbers of languages instantiating each of the possible orders, as a function of the specific cost attached to each movement option (whether total, unmarked, hence more languages, or partial, more marked, hence fewer languages; with pied piping, unmarked, hence more languages, or without, more marked, hence fewer languages; etc.). See Cinque (2005, in preparation) for more detailed discussion.

If something along these lines is correct, there is reason to believe that word order is regulated by deep seated principles that are largely determined by Universal Grammar, with movement (Internal Merge) crucially involved in the account.

This may even be true of the non absolute generalizations which tie together the order of constituents in different phrases (many of Greenberg's 1963 universals). The fact that almost all of these generalizations have exceptions (Dryer, 1992, 2007; Cinque, 2012) should not deter us from seeing the underlying pattern, and postulating the presence of deep seated principles governing it (with any deviation from the ideal orders having consequences on the number of languages that instantiate each type, the more deviations, the fewer languages). The basic generalizations that we can glimpse from the most polarized cases of "head-initial" (rigid VOS)[27] and "head-final" (rigid SOV) languages is that, in the former, (functional) heads (in the clausal and nominal domains) precede V and N whereas modifier phrases follow V and N (COMP° NEG° Tense° Aspect° V AdverbPs, PPs and (argument and circumstantial) DPs; Det° Number° N AdjPs
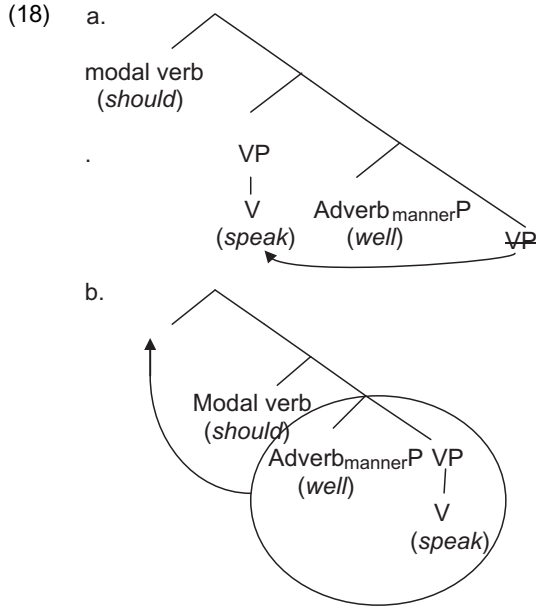
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[25] The possible reduction of the Merge order [Dem [Num [A [N]]]] to semantic composition is an interesting but orthogonal question. What is relevant here, as Rizzi (2009) remarks in the General Discussion following his presentation (p.219f), is how the possible and impossible orders of the four elements can be precisely discriminated by an algorithm that does not overgenerate.

[26] In their work, Dunn, Greenhill, Levinson and Gray considered the distribution of pairs of word orders (AN/NA, NumN/NNum, DemN/NDem) in a subset of the world's language families and found that word order correlations are stronger within a family than across families (hardly a surprising fact). The conclusion which they reached on the basis of these data (that word order is determined by cultural factors rather than by Universal Grammar principles) is in my opinion unwarranted. Even disregarding diachronic considerations, if they had considered the entire sequence of Dem Num A and N (as Greenberg did) rather than just the order of pairs of these elements, they would have realized that many potential orders are never found (cf. (16) above), which poses a puzzle to any culturally based account. Consideration of just pairs of elements rather than of the entire sequence that enters a phrase may actually be misleading from a typological point of view, as shown by the following case (Cinque, 2012). If one considers only the orders NA/AN, NNum/NumN, NDem/DemN, without considering their *total* order, one is led to put four languages like Lalo (Tibeto-Burman – Björverud, 1998:116ff), which has N A Dem Num, Turkana (Nilo-Saharan – Heine, 1980:51), which has N Num A Dem, Rendille (Cushitic – Heine, 1981:181), which has N Dem Num A, and Gungbe (Niger-Congo – Aboh, 2004, chapter 3), which has N A Num Dem, in one and the same type, as all of them are: NA, NNum, NDem. Yet, while the order found in Gungbe is the overwhelmingly prevalent postnominal order of these elements, the orders found in Lalo, Turkana and Rendille are very rare in the languages of the world (cf. Cinque, 2005:319f, in preparation). Thus one runs the risk of not singling out the correct subtypes and of misrepresenting the number of languages belonging to each.

[27] VSO languages share many properties with VOS languages (and many in fact display both orders), but are possibly not all as polarized as rigid VOS languages.

NumeralPs (restrictive) Relative Clauses DemonstrativePs).[28] The opposite is true for the "head-final" case, where heads (in the clausal and nominal domains) follow V and N whereas modifier phrases precede them (AdverbPs, PPs and (argument and circumstantial) DPs V Aspect° Tense° NEG° COMP°; DemonstrativePs (restrictive) Relative Clauses NumeralP AdjPs N Number° Det°).[29] This is the abstract, perfect, mirror-image relation from which most (possibly all) languages depart to varying degrees. The perfect mirror image of the two abstract types of languages cannot however be the result of merging symmetrically the heads and phrases directly to the left and to the right of V and N, in syntax (or in the passage to the sensory-motor interface, if linearization is taken to occur there). Cf. Kayne (2011) for the same conclusion, based on different considerations. Both the "head-initial" and the "head-final" orders must be *derived* orders if we want them to originate from one and the same representation at a more abstract level; one which also expresses the correct relative scope of the various elements involved.

The pure "head-initial" and "head-final" languages can then be seen as the product of the application of two different sets of movement options to the same structure of Merge, common to all languages. Consider a simple case concerning verbal projections.

If we want to capture the fact that manner adverbs take scope over the lexical verb whether they precede it (typically in "head-final" languages) or follow it (typically in "head-initial" languages), and that modal (functional) verbs also take scope over the lexical verb (and the manner adverb), whether they come after (typically in "head-final" languages) or before (typically in "head-initial" languages) (**Adv$_{manner}$ V Mod** in "head-final" languages vs. **Mod V Adv$_{manner}$** in "head-initial" languages), neither of the two orders (and underlying hierarchical structure) can be taken to be more primitive than the other. Rather, both have plausibly to derive from a common representation, which directly expresses, in terms of c-command, the relative scope of the elements involved (see (17), with English words), apparently via two different sets of movements (which derive two different hierarchical structures (see (18)a–b), which will ultimately determine linearization along the lines of Kayne, 1994, where antisymmetric c-command maps to precedence):

(17)

modal verb
(*should*)

Adverb$_{manner}$P
(*well*)

VP
|
V
(*speak*)

---

(18)   a.

modal verb
(*should*)

b.

Let us abstract away from criterial, wh-, focus, topic, etc. movements of DPs, PPs and AdvPs (in the sense of Rizzi, 1997, 2004, 2010), and concentrate on the raisings of verbal projections in the derivation of the ''head-initial'' and ''head-final'' canonical word orders of languages. In the ''pure'' case, the VP raises by pied piping material in one of the only two existing ways: progressive and regressive pied piping (as in **whose** pictures pied piping, and in *pictures of* **whom** pied piping, respectively).[30]

In ''head-initial'' languages, VP raises around the manner AdverbP pied piping (here vacuously) any material it c-commands (much as *whose* pied pipes all the material it c-commands in [*whose pictures of the ceremony*] *did you see* t?):[31]

(19)   a. $[_{AdvP}$ well $[_{VP}$ speak]]   →

       b. $[[_{VP}$ speak] X $[_{AdvP}$ well t]]

       c. $[_{Vmod}$ should $[[_{VP}$ speak] X $[_{AdvP}$ well t]]]

In ''head-final'' languages, where projections of a verbal head raise with regressive (*pictures of whom*) pied piping, VP carries along the projection hosting the $\text{Adverb}_{manner}\text{P}$ (to the Spec of a head intermediate between it and the modal and then) to the Spec of the modal; after which it is the modal that raises to its own checking position (pied piping in the *pictures of whom* fashion the chunk that moved over it):

(20)   a. $[_{AdvP}$ well $[_{VP}$ speak]]   →

       b. $[[_{AdvP}$ well $[_{VP}$ speak]] X t]]   →

       c. $[_{Vmod}$ should $[[_{AdvP}$ well $[_{VP}$ speak]] X t]]→

       d. $[[[_{AdvP}$ well $[_{VP}$ speak]] X t]] $[_{Vmod}$ should t]]

---

[30] In Cinque (2005) I had tentatively conjectured that such raising could be due to the need to transmit the relevant feature (nominal or verbal) to the extended projections of NP and VP, although I had to assume the presence of a different mechanism (Agree) for apparent cases of non total raising. But the ''trigger'' of such raisings is perhaps, more simply, the need to satisfy checking requirements (VP to the Spec of PerfectP; modalP to the Spec of $\text{Tense}_{future}\text{P}$; NP to Spec of NumberP; etc.), with such movements partly obscured in the case of *pictures of whom* pied piping. So, now I would assume that even Dem Num A N is derived by raising plus pied piping of the *pictures of whom* type as shown by the fact that in the ''pure'' ''head-final'' case the Number head and the Determiner head follow N (Dem Num A PL N Det) while in the ''pure'' ''head-initial'' case they precede N (Det PL N A Num Dem). Cf. footnotes 28 and 29 above and Cinque (2012) for exemplification.

[31] The derivation is arguably more complex than represented here, but in ways which do not affect the point. In (18a) the VP [speak] would actually raise above the modal pied piping in the progressive mode the following AdvP, after which the modal would raise to its licensing position pied piping in the progressive mode the trace of the earlier movement. See Cinque (2012) for discussion.

Thus, the derivations of the "pure" types of "head-initial" and "head-final" languages differ only in terms of the type of pied-piping that they employ ("progressive", or of the *whose pictures* type, for "head-initial" languages, and "regressive", or of the *pictures of whom* type, for "head-final" languages).[32] Followed consistently, these two derivations create hierarchical structures which, for (rigid) "head-initial" languages, linearize all heads to the left of the VP in their order of merge and all phrases (DPs, PPs and AdvPs) to the right of the VP in the reverse order of their order of Merge; and, for (rigid) "head-final" languages, all heads to the right of the VP in the reverse order of their order of Merge and all phrases (DPs, PPs and AdvPs) to the left of the VP in their order of Merge:[33]

(21)   a. C° T° Asp° VP DP_2 $AdvP_3$ PP $AdvP_2$ DP_1 $AdvP_1$ ("head-initial")
        b. $AdvP_1$ DP_1 $AdvP_2$ PP $AdvP_3$ DP_2 VP Asp° T° C° ("head-final")

One might think that base generation (merger) of the $Adv_{manner}P$ and the modal verb directly to the left or to the right of the VP complying with scope (c-command) requirements, as shown in (22)a–b, would be a simpler alternative to the merger and movement account of Cinque (2005):

(22)   a.   b.

        modal verb   modal verb

                    $Adverb_{manner}P$ $Adverb_{manner}P$

            VP   VP
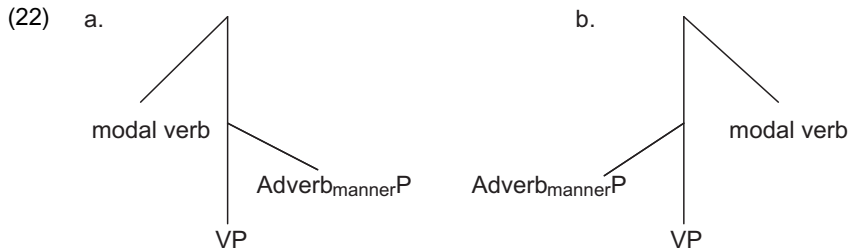
Quite apart from its incompatibility with antisymmetry (Kayne, 1994; and in particular Kayne, 2011), two considerations show this idea to be untenable. For one thing, a scope-compliant direct merger of $Adverb_{manner}P$ and the modal with VP would not only be compatible with (22)a–b, but also with such rarer linear orders as [modal [$Adv_{manner}P$ [V]]] and [[V] $Adv_{manner}P$] modal] (see for example the Hindi case mentioned in fn.37), thus failing to distinguish them from the frequent ones (namely [Mod [[V] [$Adv_{manner}P$]]] ((22)a) and [$Adv_{manner}P$ [V]] Mod]) (22)b). More seriously, the scope-compliant direct merger could not derive many of the attested orders. This is easier to see with the orders of Dem Num A N considered above, for which we have more data concerning the attested and unattested orders. If the scope relation of these nominal modifiers is with Dem taking scope over Num, A and N, Num taking scope over A and N and A taking scope over N ([Dem [Num [A [N]]]]), it is clear that the attested orders (23) cannot be derived by direct merger of Dem, Num and A with NP in a manner that complies with their relative scope:

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[32] For similar analyses, though implemented in partly different ways, see Kayne (1994), Koopman and Szabolcsi (2000), Julien (2002), Mahajan (2003), Svenonius (2007), Biberauer et al. (2008), Jayaseelan (2010).

[33] I take the morphology of verbs to be essentially the same in "head-initial" and "head-final" languages. In both language types some verbal affixes cannot be separated from the root (suspended under coordination), may show syncretism or suppletion, and may have multiple exponence. I take these to be merged already fused with the root, and to undergo checking (Chomsky, 1993:27f). The "agglutinative" affixes typical of "head-final" languages, which are apparently "non-closing" and can be suspended under coordination, I also take to be merged already fused with a silent (sometimes overt) auxiliary (cf. Kornfilt, 1996). In this respect, the Turkish verbal form in (i) is identical to" the Italian verbal form in (ii), modulo raising of the verbs with regressive pied piping in Turkish (followed by phonological fusion of the auxiliary), and progressive pied piping in Italian:

(i)   [[Gel-miş ve   git-miş]-Ø-**ti-m**]   (cf. Kornfilt, 1996,110)
      come-perf and   go-perf-Ø-**PAST-1sg**
      'I had come and gone'
(ii) [Er-o   [venu-to   e   anda-to]]
      be.PAST-1sg come-perf   and   go-perf
      'I had come and gone'

If Italian had regressive pied piping (and phonological fusion of the auxiliary), (ii) would look exactly like Turkish (i):

(iii) [[venu-to   e   anda-to]-er-o]
      come-perf   and   go-perf-be.PAST-1sg

(23) a.   Dem N Num A
      b.   N Dem Num A
      c.   N Num A Dem
      d.   N A Dem Num
      e.   A N Dem Num
      f.   N Dem A Num

For example, in (23a), Num cannot be closer to the N and yet take scope over both A and N (if crossing branches are barred):

(24)

Dem   N   Num A
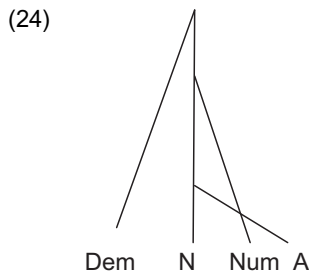
Similar considerations hold for the remaining orders of (23).[34]

Languages depart from the ideal cases of (21) above to varying degrees, some minimally (the rigid SOV and VOS languages), others more substantially, even if their departures from the ''pure'' case still let us recognize them as approximations to one or the other type (tendentially ''head-initial'' or tendentially ''head-final''). SVO languages, for example, typically approximate the ''head-initial'' type (Dryer, 1991), but involve various kinds of departures from the ''pure'' case, and in fact can hardly be regarded as a homogeneous type (like any other type, for that matter). Cf. Cinque (2011, 2012).

A sentence of SVO English like *If today Mario can already speak English well with his friends*. . . in a rigid ''head-initial'' language would have an order like *If can speak English well with his friends already Mario today*. . . (cf. Malagasy, Seediq, Toba Batak),[35] while in a rigid ''head-final'' language it would have the order *Today Mario his friends with already well English speak can if*. . . (cf. Japanese, which has very few non ''head-final'' characteristics – cf. Kayne, 2005b and Cinque, 2012, fn.11).

In other words, SVO languages have derivations which depart from the ''pure'' one deriving rigid ''head-initial'' languages ((18)a) by abandoning at some point the consistent pied piping of the *whose pictures* type, with the effect of not reversing the order of the higher specifiers. Thus to derive *If today John can already speak English well with his friends*. . . the VP (*speak*) raises around *English*, after which it raises around *well* pied piping *English* (*speak English well*), which (simplifying) then raises around *with his friends* (*speak English well with his friends*). At this point (again simplifying) *can* is merged and raises around *already*, but without pied piping (in the *whose picture* mode) the material it c-commands (first departure from the ''pure'' derivation).[36] The second departure from the ''pure'' derivation is that it stops there, with the effect that the subject *John* and the scene setting AdvP *today* remain preverbal.

Similar departures from the ''pure'' derivation of rigid ''head-final'' languages are attested in some (non-rigid) SOV languages. For example, in Hindi, the lexical V and the auxiliaries can be separated by the negation and (certain) adverbs.[37] This suggests that the projection hosting the lexical verb may raise without pied piping (in the *pictures of whom*

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[34] This is why even in a framework which allows for direct merger of phrases reflecting scope, like that of Abels and Neeleman (2012), movement (to the left) is still necessary to derive the orders in (23).

[35] Even though, they too present inconsistencies. See Rackowski and Travis (2000), Pearson (2001,2007), Travis (2005), Holmer (2005), Cole and Hermon (2008).

[36] This is what Jayaseelan (2010) calls ''stranding'', which is a property of SVO languages, but not of rigid ''head-initial'' languages. In an Italian sentence like *Gianni parla ancora l'inglese bene* '(lit.) Gianni speaks still English well'), the extraction of the VP *parla* from a left branch – [[parla [l'inglese]]ᵢ bene tᵢ] – is plausibly allowed by the fact that the VP, given Kayne's (1994, Chapter 3) definitions of specifier, category, segment and c-command, does not count as included in the left branch.

[37] See (i) from (Mahajan, 1989:225)

(i) Raam roTii khaataa nahiiN/to/roz thaa
     Ram bread eat (imp.m.s.) not/emphatic/every day be (past.m.s.)
     'Ram habitually did/did not eat bread/ate bread every day'

mode) certain AdvPs, just as we saw it happen with SVO English, modulo the difference in the type of pied piping involved.[38]

Although it seems possible to reconstruct the two ''pure'', apparently mirror-image, types of ''head-initial'' and ''head-final'' languages (as typological work of the '70's, later abandoned, had envisioned[39]) and their possible movement account (of the type sketched here, in the works cited in fn.32, and in Cinque, 2012), various puzzles remain. For example, (1) why is it that all languages depart (to different degrees) from the ''pure'' cases? Or, in different words, why is cross-categorial uniformity only a tendency? (2) Why are languages with non-total raising (SVO, and non rigid SOV) more numerous than rigid VOS and rigid SOV (cf. Cinque, 2012, §8)?

Despite our lack of understanding of what precisely regulates the canonical word order of languages one cannot fail to glimpse the presence of a highly structured underlying system of abstract principles (obscured in part by its interaction with other systems). The conclusion that Universal Grammar may be crucially involved in regulating the canonical word order of languages is in fact supported by the observation that word order is mastered by children at a very early stage of acquisition (see the discussion in Rizzi, 2011 and references cited there).

In conclusion, both the richness of the functional lexicon, which appears to have been recruited specifically and arbitrarily for language from the system of thought, and the highly constrained system underlying permitted word order variation among languages, seem to me to suggest that Universal Grammar may turn out to be much richer than usually thought.

Venturing a speculative conjecture, if under this scenario the child comes equipped with the abstract functional lexicon and with the operation Merge, which builds hierarchical structures conforming with interface (semantic scope) requirements (External Merge), and allows limited movement (Internal Merge) options, then (s)he essentially only needs to recognize what pieces of the structure the functional and contentive words encountered correspond to, and what movements are involved in the derivation of the canonical (and the informationally marked) word order of the language; a highly simplified task.

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[38] This possibility is entertained in Jayaseelan (2010:fn.10), but taken not to be attested in ''head-final'' languages. Hindi also fails to raise the extended projection of the verb around the finite complementizer *ki*, with the effect of having it preverbal and initial rather than postverbal and final as in rigid ''head-final'' languages.

[39] Cf. in particular Lehmann (1973, 1978a,b), Vennemann (1973, 1974), Antinucci (1977). The treatment of word order presented here (and in Cinque, 2012) is closer to Lehmann's than to Vennemann's, as it recognizes the following basic word order generalization: that the functional heads of the extended projections of the ''pivots'' V, N, etc. are on the opposite side of their phrasal modifiers (complements and adjuncts), the further generalization being that the elements that precede the pivot, whether heads or phrasal modifiers, are in their order of Merge, while those that follow the pivot are in the reverse order of the order of Merge; an effect that we traced back to the two ways movement can pied pipe material: either progressively or regressively. Also see Vennemann's (1974:fn.2) discussion of certain problematic aspects of his own operator/operand generalization; in particular those regarding determiners and (singular, dual, plural) number words, whose behavior as heads of the extended projection of N is documented in Dryer (1992).

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