On UG and Materialization

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Abstract

This paper develops a few simple but central ideas:

1) The Universal Lexicon (the 'lexical' part of UG) contains two elements: an initial root, Root Zero, and an initial functional feature, Feature Zero, identified as the Edge Feature, EF ('zero' as they are void of content, empty 'cells/atoms', as it were).
2) UG = a Minimal Language Generator, containing a) Merge, b) Root Zero, and c) Feature Zero.
3) The Generalized Edge Approach: Both External and Internal Merge are preconditioned by Feature Zero, the Edge Feature .
4) The Copy Theory of Language Growth: The growth of internal language in the individual involves reiterated (formal) Copy & Merge of Root Zero and Feature Zero. – Recursion boils down to Edge Feature (Feature Zero) Iteration.

1. Introduction: The Anti-Lexicalist Hypothesis

In this paper I develop some ideas presented in September 2010 at the Barcelona workshop on the roots of linguistic diversity.[1] This was an exploratory workshop, and so is this paper: it may properly be characterized as an experiment. The outcome–as the outcome of so many experiments–is tentative, and, to tell the truth, it surprised me, even though I should have seen it coming, in view of the development of minimalist theory over the last decade. In a nutshell, the outcome suggests that the 'functional lexicon' of language (Person, Tense, etc.) derives from 3rd factor elements (in the sense of Chomsky 2005), that is to say, from general cognitive categories.

To throw some light on why a simple experiment like the one I'm about to carry out can lead to unexpected results, I start out by citing Chomsky (2010):

> Right at that time [in the 1950s] there was the beginning of efforts to try to do systematic
> accounts of properties of language and it was very quickly understood, came to be understood,

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that far from everything being understood, nothing is understood. That is, everything you look at is a problem. Just pick a sentence at random out of a text and think about it for two minutes and its meaning, its sounds, its structure is completely problematic.

It will be good for the reader to keep these words in mind.

Any model or theory of the language faculty that distinguishes between internal language, I-language, and external language, E-language, has to assume that the two are interrelated by *externalization*. Pointing out, as Berwick & Chomsky do (2008:15), that "[e]xternalization is not a simple task", is an understatement, to say the least. However, little as we know about externalization, it seems clear that we need to distinguish between at least two types or aspects of it, *materialization* and linearization or, more generally, *localization* of the 'material'. Putting localization (in both oral and signed languages aside) I will here focus on materialization, often referred to as 'lexicalization', somewhat misleadingly so.

The experiment I am about to carry out consists of exploring the following two questions on UG elements:

(1)   What is 'in there'–what are the elements of UG?

(2)   How are the elements of UG materialized?

–where the notion 'elements' refers to units or buildings features, as distinct from relations and processes (Agree, Merge, etc.).[2] These are no small questions, but they are simple and basic and it is worrisome that linguistics has not been able to develop any generally accepted answers to them or even any commonly agreed upon ways of approaching or tackling them. Doing linguistics is in this respect somewhat similar to doing chemistry without any knowledge of elements.

Suppose that the linguist X boldly answers the question in (1) by saying, "well, we have to assume at least the Chomskyan categories C, T and little v". The answer would undoubtedly make many linguists happy, but why would or should they agree with X on this? Do they have any methods or heuristics enabling them to come to this conclusion or do they agree because they believe X is adopting something said by Chomsky?

The truth of the matter is that we don't know 'what is in there', and, worse, we do not have any established methods of acquiring reliable knowledge of it, much as many of us would like to. However, adopting the spirit of Chomskyan minimalism, we have at least one method of reasoning about this, by exploring the thesis that UG is truly minimal, not only architecturally but also (and even more plausibly so) 'lexically'.

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[2] These elements are sometimes referred to as 'lexical items' in the minimalist literature, unfortunately so as that notion does not make any sharp distinction between atomic non-composite items and derived composite ones. See shortly.

Mainstream generativism has long pursued mixed lexicalist approaches, where syntax operates on both individual features and complex items. In Approaching UG from Below Chomsky (2007a:6) thus suggests that "[i]n addition to Merge …, UG must at least provide atomic elements, lexical items, each a structured array of properties (*features*) to which Merge and other operations apply to form expressions".[3] However, it is unclear, to say the least, from where or how such 'structured arrays' would enter UG. If some of the units of UG are 'structured' they must somehow 'get structured', raising the question of where and how this structuring takes place. But this is clearly a wrong track, leading to wrong questions. There can be no structuring of linguistic elements feeding UG. Accordingly, I make the minimal assumptions stated in (4).

(4)   UG contains:
      a.   A computational faculty (FLN, see below), applying Merge without bounds
      b.   The *Universal Lexicon*, UL, of non-composite atomic elements

In contrast, *adult languages* operate with complex or structured items. Possibly, as internal language gets externalized, thereby getting used for communicative purposes, Narrow Syntax gradually starts internalizing and operating with acquired complex 'communication items' (words/idioms) in tandem with universal categories (cf., e.g., Crain & Thornton 1998). If so, the syntax of adults is a hybrid system, operating with abstract universal features and also with a great number of discrete items of a 'communication lexicon', the number of and the internal space taken up by such items growing with growing age in the unmarked case.

    As for UL, on the other hand, I adopt the *Anti-Lexicalist Hypothesis* or the 'true lexicalist hypothesis' stated in (5):

(5)   The Anti-Lexicalist Hypothesis (or the 'true lexicalist hypothesis')
    UL contains:
      a.   an initial root, $\sqrt{}_0$ (Root Zero)   = *The Initial Zero Root Thesis*
      b.   an initial functional feature, F_0 (Feature Zero) = *The Initial Zero Feature Thesis*

Thus, minimalist reasoning applies not only to the computational but also to the 'lexical' component of UG.

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[3] For another perspective, closer to the ideas pursued here, see Chomsky 2008:139, on the putative correlation between language and arithmetic ("Suppose that a language has the simplest possible lexicon: just one L[exical]I[tem]", etc.). However, while Chomsky assumes that LI comes equipped with the Edge Feature, I argue that the two are combined by Merge (see shortly), seemingly a small but a crucial difference.

2. The computational component(s)

Hauser et al. (2002) introduced a distinction between the faculty of language in the narrow and the broad sense, FLN and FLB, respectively, FLB properly including FLN. In addition to FLN, FLB consists of at least the sensory motor interface, SM, and the conceptual-intentional interface, C-I, sometimes referred to as the (morpho-)phonological and semantic interfaces. FLN, in turn, is truly minimal, comprising "only the core computational mechanisms of recursion as they appear in narrow syntax and the mappings to the interfaces" (Hauser et al. 2002:1573). I assume that the following correlations hold (where the symbol > reads as 'is bigger than'):

(6)   FLB > Narrow Syntax > UG > FLN

A stronger claim would be that the relation between these systems or notions is that of a proper inclusion ("FLB properly includes Narrow Syntax", etc.). For what I know that might be the correct understanding, but I will not maintain that it is, (6) being sufficiently explicit for my purposes.

Hauser et al. (2002) do not really discuss UG and Narrow Syntax, only mentioning these notions in passing. As a matter of fact, they seem to have two contradictory conceptions of the relation between FLN and Narrow Syntax. On page 1573, as cited above, they:

> propose … that FLN comprises only the core computational mechanisms of recursion as they appear in narrow syntax and the mappings to the interfaces

This would seem to suggest the understanding in (6) above, where FLN is 'smaller than' or a 'component of' Narrow Syntax. However, on page 1571, Hauser at al.:

> assume, putting aside the precise mechanisms, that a key component of FLN is a computational system (narrow syntax) that generates internal representations and maps them into the [interfaces]

Here, it would seem that Hauser at al. are assuming that FLN is 'bigger than' Narrow Syntax, the latter being 'a component of' the former.

The traditional understanding of Narrow Syntax is that it feeds mapping to the semantic interface (Chomsky 2001:3, 15), a process that involves more than "only the core computational mechanisms of recursion". I thus adopt the understanding in (6), on which Narrow Syntax is 'bigger than' FLN. More specifically, I assume that Narrow Syntax contains some 3rd factor properties in the sense of Chomsky (2005) in addition to UG (see

shortly), UG in turn comprising FLN and the Universal Lexicon in the sense introduced above.

Chomsky (2005:6) distinguishes between "three factors that enter into the growth of language in the individual", that is:

1. Genetic endowment, apparently nearly uniform for the species, which interprets part of the environment as linguistic experience …
2. Experience, which leads to variation, within a fairly narrow range, …
3. Principles [of biological and computational systems] not specific to the faculty of language.

Chomsky does not define or discuss these notions in relation to the notions of Hauser et al. (2002). My understanding is that the 1st factor is roughly tantamount to FLN (perhaps minus interpretation of "part of the environment as linguistic experience"), whereas FLB intersects with the 3rd factor.[4]

Much of what was conceived of as principles of language in the Principles and Parameters approach of the 1980s is now seen as 3rd factor phenomena, basically non-linguistic or at least not specifically linguistic. In particular, the interfaces as well as general principles of structural architecture and computational efficiency are subcomponents of the 3rd factor. While the 1st factor is taken to be specific "for language, the topic of UG", the 3rd factor is "not specific to … [language], and may be organism-independent" (Chomsky 2008:133), that is, non-species specific. Computational limitations, such as minimality and the Phase Impenetrability Condition, are thus subcategories of the 3rd factor, and that would seem to apply to binary branching as well (Chomsky 2005:16). It follows that Narrow Syntax comprises or obeys some 3rd factor components, hence the understanding in (6) above that Narrow Syntax is 'larger than' FLN. The received generativist understanding of UG, in turn, is that it is specific to language and to the species.[5] If so, it should not contain any (language external or language nonspecific) 3rd factor components, meaning that it should contain FLN but not Narrow Syntax as a whole.

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[4] As FLB properly includes FLN and as the latter is not part of the 3rd factor in the relevant sense, it follows that FLB is not properly contained in the 3rd factor.

[5] However, this widely adopted assumption is not innocent or a self-evident. Other cognitive systems, including arithmetic and music (cf. Katz & Pesetsky 2009) share some kind of Merge with language. The question of whether it is exactly the same kind of Merge hinges on (at least the question of) whether the Edge Feature, preconditioning linguistic Merge (see below), is specific to language. To the best of my knowledge, the answer to that important question is unknown.

The terms faculty of langue, Narrow Syntax, UG, and even I-language are commonly used vaguely and in more or less the same sense, which is obviously rather unfortunate.[6] I thus felt it was necessary to briefly sort out how these notions relate to each other, at least in my understanding. However, regardless of how we conceive of these notions and of the computational component(s) of language, the unanswered and 'highly undiscussed' questions in (1) and (2) arise under all approaches. Having introduced the notion of Universal Lexicon, UL, we can restate them as in (7):

(7) a.   What are the elements of UL?
     b.   How are they materialized in language?

These are truly basic questions, but they are not easy to pursue. One reason for that is that we need to distinguish between internal (I-language) and external (E-language) materialization, as we will see shortly. Thus, typological observations or other traditional linguistic methods have no clear bearing on early (internal) materialization in the language growth process.

3. The Initial Zero Root Thesis

Reconsider the Anti-Lexicalist Hypothesis, repeated here.

(5) *The Anti-Lexicalist Hypothesis* (or the 'true lexicalist hypothesis')
     UL contains:
     a.   an initial root, $\sqrt{}_0$ (Root Zero)   = *The Initial Zero Root Thesis*
     b.   an initial functional feature, F_0 (Feature Zero) = *The Initial Zero Feature Thesis*

Following much recent work (Marantz 1997, Arad 2005, etc.), I assume that basic parts of speech, such as nouns and verbs are formed by merger of functional features with a root, $\sqrt{}$.

According to the *Initial Zero Root Thesis* in (5a), UG provides the infant with a single initial root, referred to as *Root Zero*, $\sqrt{}_0$, as it has no content. Figuratively speaking, it is an 'empty cell' that awaits being (more or less) arbitrarily filled with some conceptual content, say {DAD}.[7] As soon as $\sqrt{}_0$ has been filled with some content, yielding an *internal lexical root*, Root One or $\sqrt{}_1$, in some internal language, L_x, the language faculty creates a copy, making $\sqrt{}_0$ available anew, this new copy awaiting to get arbitrarily filled with some content,

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[6] I-language is strictly speaking individual-specific, that is, "a state of FL" (Chomsky 2007a:1), "some element of the mind of the person who knows the language, acquired by the learner" (Chomsky 1986:22).

[7] Small case capitals indicate that the elements in question are concepts (and not words or morphemes), and the curly brackets indicate that they are silent, that is, have not been spelled out or realized as words/morphemes.

say {MOM}, yielding $\sqrt{2}$ in L_x, and so on.[8] Notice the resemblance with the Copy Theory of Movement (and, in a way, with prokaryotic fission), suggesting that the growth of syntax in the individual may be tightly related to the growth of the individual's internal lexicon. Call this lexical growth *Internal Lexical Merge*.[9]

Two further aspects need to be highlighted here. First, I say *internal lexicon*, I-lexicon, as the initial lexicon is internal to the individual, the development of an *external lexicon*, E-lexicon, for the purpose of communication being a later and a separate process. The growth of the initial internal lexicon is independent of its externalization, whereas the external lexicon (initial and late(er)) is obviously dependent on the internal lexicon, expressing or externalizing it (as well as some other parts of internal language).[10] The idea that there is a distinction to be drawn between the two might at first sight seem odd (like other ideas we are not used to), but it is simple and natural: The language faculty carves out a mind-internal (linguistic) object, a root, before the externalization component can put a label or a 'name' on it.

Second, by saying that Root Zero is more or less *arbitrarily* filled with some conceptual content, I mean that the content is largely arbitrary in relation to the external world.[11] The ontological and epistemological status of the content is completely irrelevant from a linguistic point of view, that is, humans are capable of thinking and talking about concepts regardless of their putative reference to objects in the real world. The examples are countless and entirely obvious: *God*, *Satan*, *Paradise*, *Hell*, *alpha*, *elf*, *ghost*, *angel*, *Atlantis*, *Twin Earth*, *Martian*, *Star Wars*, *Artoo*, *square root*, *Sally*, and so on (*Sally* could be a cat or a dog, a boat or a car, the girl next door, an imaginary person in a story, a hurricane, or whatever).[12] We can obviously have long discussions of a concept without ever having had any external experience of it and such discussions typically seem meaningful and rational to ourselves, even though they may be completely absurd from the point of view of those who do not share our beliefs (political debates are just one example). Notice that this is not to say that words *cannot* refer

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[8] Alternatively, root cell copying is free (as copying of Feature Zero, see below).

[9] The resemblance with syntactic movement might suggest that the internal lexicon is built and stored like a syntactic tree, where a newly carved root is stored at the left edge of the storage tree and where the zero root cell is subsequently left adjoined to the tree, awaiting to be recopied.

[10] The external lexicon, containing audible, visible or tactile signs and signals, is referred to as the Vocabulary in Distributed Morphology, DM (see, e.g., Harley & Noyer 1999), whereas DM does not assume any (separate) internal lexicon.

[11] This is a somewhat imprecise formulation, as the content is not socially arbitrary.

[12] A question raised at the Barcelona workshop was how to understand the fact that children commonly use roots/words in a non-target sense, for instance *cat* meaning both 'cat' and 'dog'. Possibly, the child knows the meaning of *cat*, simply using the term for other animals in lack of specific expressions (E-lexemes) for those, but there are more possibilities to consider. However, I am strictly limiting my present discussion to *internal* roots–where the problem is not observable.

to objects in the external world, that is, I am not claiming that semantic externalism (see, e.g., Putnam 1975) is entirely nonsensical. However, it is to say that concepts (and words) need not have any mind-external reference, and it is also to say that even for those items that do have mind-external reference or correlative, like, say, *house*, the correlative correlates to just a part of their meaning (Chomsky 2007b, 2010), and the reference (as well as the meaning) is in fact also relative to the individual that happens to be using the item (in speech/writing or thinking/interpretation).[13] So, a person called Mary could say to me "This house is beautiful" and I could easily agree with her and we could have a long and a seemingly meaningful and rewarding discussion about the beauty of the house without us meaning the same house or the same kind of beauty (given that the 'same kind of beauty' is a possible notion)–a common everyday experience, even in long marriages. Chomsky's famous example *Colorless green ideas sleep furiously* illustrates the same point (and also further points which I will not address here).

Notice in this connection that miscommunication and misunderstanding is not the same as absent communication and no understanding, that is, miscommunication can be a perfectly functional linguistic act. And even if there is no miscommunication and I and Mary happen to be talking about exactly the same house and precisely the same kind of beauty (given that possibility), both *house* and *beauty* have vastly broader meanings than those we can possibly have in mind in any given clause or situation. When I say "I painted the house brown", I mean the exterior of the house, not its interior (Chomsky 2007b), but when I say "I bought the house new" I mean both the exterior and the interior. So, when I and Mary talk about "the house" we can of course be referring to the 'same object in the external world' (assuming that that notion makes at least some sense), but that tells us almost nothing about the general meaning of the concept {HOUSE}or of the word *house*.[14]

So, the content the child puts into Root Zero (and its copies) may be completely arbitrary in relation to the external world (which is not the same as saying that it has to be arbitrary). That raises the question of where the content comes from. Without discussion, I assume that it is based on non-linguistic knowledge, both world knowledge drawn from experience and inherent (biologically preconditioned) conceptual knowledge or representations. Given the Initial Zero Root Thesis, carving items of the internal lexicon on the basis of world knowledge is unproblematic (which would seem to be essentially the correct intuition), and the claim that all concepts are primitives in the sense of Fodor (1970, 1994, 1998, see also Fodor and Lepore 1998) becomes intuitively more appealing than commonly assumed, provided that we understand Fodor's 'concept' notion as tantamount to our 'internal lexical root'. Notice that 'concepts' in some non-linguistic sense may be

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[13] That is, the 'externalism' in semantic externalism is more about the world than language.

[14] In fact, it can be argued that any NP has infinitely many readings, but, as the issue is only partly relevant in the present context, I will not discuss it further.

complex even though internal roots are atomic units in syntax. Thus, the event described by the verb *drink* may very well be decomposed as, say, 'an event where some liquid thing passes along a path into a place called mouth' (see Jackendoff 1990:80), but, apart from the feature 'event', that is obviously irrelevant in syntax–which is not to say that it is uninteresting.[15]

4. On the growth of internal language in the individual

Now, consider the growth of internal syntax in the individual. The initial stage involves the carving out of a root or roots. The second stage provides a root or roots with syntactic 'glue' enabling them to merge. This 'glue' is referred to as the Edge Feature, EF, in recent minimalist work. Chomsky (2008:139) takes it to be a feature of lexical items – "and optimally, only of" lexical items, however only considering the EF of C and v*, assuming that EF may act as a probe and trigger movement or Internal Merge, thereby replacing the EPP feature in earlier generative approaches. Contending that EPP is an epiphenomenon that should clearly not be given any primitive or axiomatic status (Sigurðsson 2010), I explore a related but a slightly different approach, where *both* External and Internal Merge are preconditioned by EF, and where EF comes for free. Call this the *Generalized Edge Approach*.

Given this approach, it might seem possible that the first three stages in the growth of internal syntax simply involve: 1) root carving (yielding $\sqrt{}_1$, $\sqrt{}_2$ …); 2) item formation by merger of EF and $\sqrt{}$; 3) symmetric merger of items. This is sketched in (8) (here, the curly brackets denote a set).

(8) a.   Stage 1 $\sqrt{}_1$, $\sqrt{}_2$ …   (root carving)
      b.   Stage 2 $[_I \text{EF} \sqrt{}]$ …   (I(tem)-formation)
      c.   Stage 3 $\{I_x, I_y\}$ (symmetric I-merger)

For reasons to be immediately explicated, however, I contend that symmetric merger is categorically impossible, claiming that every instance of merger is with an Edge Feature. I thus replace (8) with (9):

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[15] Another tantalizing issue is that morphologically complex E-words, say *helicopter* or *government*, correspond to or express atomic I-roots. Morphological derivation is an E-language 'shortcut method' (making PF economic use of familiar morphological units) to build new 'communication items', but it does not have any one-to-one correlation to internal language, that is, there is no semantic compositionality of, e.g., *govern* and *ment* in *government*. The atomic I-root {GOVERNMENT} is conceptually related to the atomic I-root {GOVERN}, but that is not a linguistic fact. Similarly, {KILL} and {DIE} are conceptually related without that being a linguistic or a syntactic fact.

(9) a. Stage 1 $\sqrt{}_1, \sqrt{}_2 \ldots$ (root carving)
     b. Stage 2 $[_I \text{ EF } \sqrt{}] \ldots$ (I-formation, by free EF merger)
     c. Stage 3 $\{EF, I\}$ (I-extension, by free EF merger)
     d. Stage 4 $\{X, [EF\ I]\}$ (item/structure merger)

That is, much as a root has to merge with an Edge Feature to build an item, an item has to merge with an additional Edge Feature to be able to build a larger structure (by merging with another item or structure). Similarly, the outcome of Stage 4 can merge with yet another item or structure, Z, given that it has first merged with additional Edge Feature, yielding $\{Z, [EF\ I_x [EF\ I_y]]\}$, see further shortly. We may refer to this as *Edge Feature Iteration*.

Suppose now that the Edge Feature actually is the zero functional feature, F_0, postulated by the *Initial Zero Feature Thesis* in (5b) above. Suppose also that all atomic functional features, call them *F-atoms*, are, formally, copies of Feature Zero, much as all lexical roots are copies of Root Zero. Edge Feature Iteration can then be understood as involving copying and raising of F_0, any new copy of F_0 being raised to the edge of the structure, thereby enabling recursive Merge. That is, the fundamental recursivity property of language boils down to Edge Feature Iteration.[16]

Edge Feature Iteration resolves the recalcitrant *symmetry problem* discussed by Moro (2000, 2008) and Chomsky (2010). Moro claims that symmetric structures, such as the one in (8c), are unstable and cannot be properly labeled, their instability being resolved by one of their members 'leaving' or 'moving out', as it were, yielding an asymmetric labeled structure that can function as input to further computation. Call this *Moro's Generalization*. Adopting it, Chomsky (2010) suggests that unlabelled structures are uninterpretable at the C-I interface.

I take it that the insight behind Moro's Generalization is basically on the right track, but there are slight inconsistencies in his solution. Discussing the symmetry problem with respect to maximal categories, Moro contends (2008:1f):

> Labels are … derived computationally, via inspection within the search space of a head. When two maximal projections are Merged (either IM or EM), the resulting {XP, YP} can be either an adjunct structure – where either XP asymmetrically projects turning the other into a specifier–or an unlabelled syntactic object where none projects. If this is the case, such as for copular sentences, it is reasonable to assume that the configuration crashes because the search space for any head H that merges with it is ambiguous.
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>   On the other hand, if either XP or YP is targeted by H and then raised (yielding, for example: {YP, {H, {XP, ~~YP~~}}}), the derivation can proceed, because the computational mechanism has overcome the problem of labeling: YP is no longer available for inspection to H - it being a discontinuous constituent - and the label can be properly assigned.

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[16] If so, it is a reasonable conjecture that the evolutionary introduction of F_0 'created language'.

However, the derivation Moro seems to have in mind is countercyclic, as sketched in (10):

(10) a. {XP, YP}   (symmetric merger of XP and YP)

   b. {H {XP, YP}}   (head merger)

   c. {H {XP, YP}}   (unsuccessful labeling / YP targeted by H)

   d. {YP, {H, {XP, ~~YP~~}}}   (movement of YP)

   e. {YP, {H, {$_{XP}$ XP, ~~YP~~}}}   (successful labeling)

That is, labeling "via inspection within the search space of a head" is given a second (backtracking countercyclic) chance, after YP-raising out of the symmetric structure.

   As symmetric merger, of for instance a subject DP and a vP, is categorically precluded under the Generalized Edge Approach, the symmetry problem dissolves (putting labeling aside). Either DP or vP has to serve as a 'host' and merge with F_0, as illustrated for a hosting vP in (11).
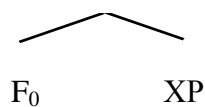
(11)

DP

   F_0 = EF   vP
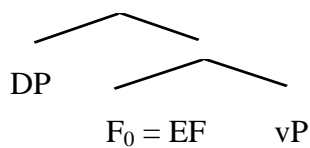
The structure in (11) accords with the traditional assumption that the subject DP is a 'specifier' of vP. Nothing in the approach, so far, blocks the reverse relation, where vP is a 'specifier' of DP. It is unclear how or even whether this should be blocked (cf. the discussion in Chomsky 2010).[17]
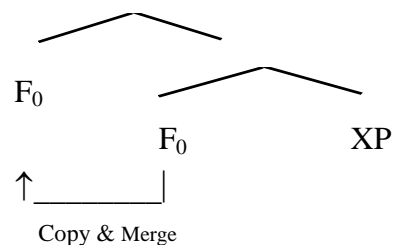
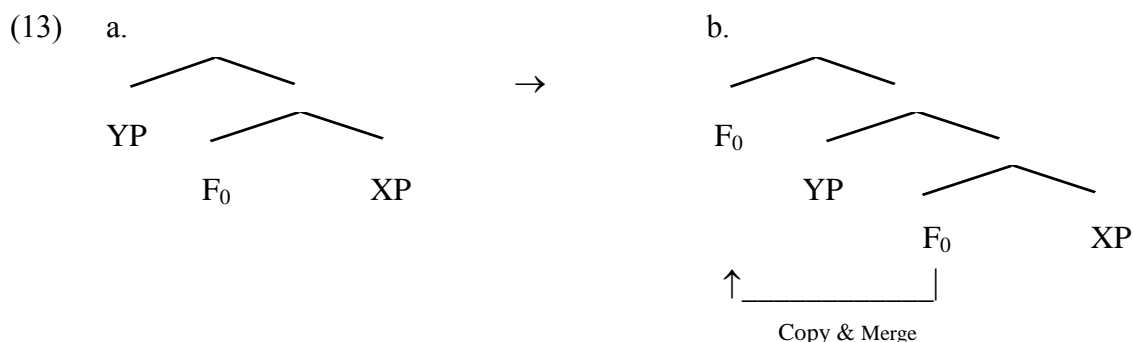   Two further instances of Edge Feature Iteration are sketched in (12) and (13).

(12)   a.   b.

      F_0 XP   → F_0

                                                F_0 XP

                                           ↑_____|
                                            Copy & Merge

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[17] Certain types of nominalizations might in fact involve vP 'specifiers' of D, but I put the issue aside.

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(13) a.   b.

Copy & Merge

The structures in (12b) and (13b), in turn, have the option of either merging with yet another Edge Feature (yielding 'composite heads', cf. Sigurðsson 2010) or with a larger structure. In the latter case, the computation either comes to an end or proceeds by repeated Edge Feature Iteration.

Another welcome result of the Generalized Edge Approach and of Edge Feature Iteration is that adjunct stacking (multiple specifiers) is precluded. Whenever we seemingly have multiple specifiers they are separated by silent functional categories, that is, a computation that takes structures like (11) and (13a) as input can only proceed by Edge Feature Iteration. In case it does not proceed *Stop and Survive* applies.[18]

(14) Stop and survive:
      If a structure lacks EF (F_0), the computation comes to an end, yielding an expression that survives without further computation.

Given the Anti-Lexicalist Hypothesis, UG is a *Minimal Language Generator*, MLG, consisting of Merge and UL, UL in turn comprising only Root Zero and Feature Zero.[19]

(15) UG = a Minimal Language Generator, MLG, consisting of:
      a.   Merge (Internal/External)
      b.   The Universal lexicon, UL, comprising:
            b1.   Root Zero
            b2.   Feature Zero (the Edge Feature)

Accordingly, language growth must involve 'propagation' of roots and features. Assuming that internal language growth *only* involves root and feature propagation, I adopt the *Copy Theory of Language Growth*, stated in (16).[20]

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[18] That is, Stop and Survive is a general phenomenon (and not confined to interjections, as suggested in Chomsky 2008:139).

[19] Notice that 'not being part of UG' does not imply 'nonuniversal' (a common misconception). That is, some features of language may well be universal without being part of UG (see also shortly).

(16) The Copy Theory of Language Growth:

The growth of internal language involves reiterated Copy & Merge of Root Zero and Feature Zero.

5. Some further challenges

Much as root copying, Edge Feature or Feature Zero copying is formal, that is, what is copied is a structural entity, a 'structural atom', as it were. And much as Root Zero has no content, Feature Zero is void of linguistic content. Whenever it is formally copied, the new copy may be 'filled' with some conceptual content, yielding an F-atom, F_x, in some internal language, L_x.

Assuming that basic categories like Negation, Person, Number, Tense, etc., represent or at least reflect F-atoms, I hypothesize that F-atoms are limited in number, innate (i.e. biological) and universal.[21] But, they are *not* narrowly linguistic in the sense that they are not stored in or "given by" UG, instead being derived from 3rd factor entities (general conceptual entities). This is the surprising result mentioned at the beginning of this essay: UG does not contain any contentful elements, such as Person and Tense. As Narrow Syntax nevertheless operates with such elements, this means that it must be a meeting place for UG and the 3rd factor (as expected given the conclusion in (6) above that Narrow Syntax is 'bigger than' UG).

Recall that I am still only considering internal language. On the Minimal Language Generator view of UG, there can be no UG related parameters. That is, L(anguage)-uniformity must apply.

(17) *L-uniformity*:[22]

Any (normal individual, hence any) language, L_x, has access to any F-atom, F_x, regardless of whether or how F_x is expressed in (the externalized form of) L_x

Thus, there is no selection of F-atoms (*L-selection* in the sense argued against in Sigurðsson 2004), notwithstanding frequent claims to the opposite (see, e.g., Ritter & Wiltschko 2009).

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[20] Cf. Chomsky (2005:5): ''… ''process of learning'' (Gallistel 1997, 1999), though ''growth'' might be a more appropriate term …''.

[21] I can see no good reasons to assume that this does not or should not include categories that are only sporadically expressed in external languages (such as honorificity and other social markers).

[22] See Sigurðsson 2004. For a related conception, see the Strong Uniformity Thesis in Boeckx 2009, but notice that Boeckx' formulation focuses on "principles of narrow syntax" rather than on putative selection vs. non-selection of F-atoms. L-uniformity is compatible with but not entailed by Boeckx's formulation.

Externalization variation is a fact, but the question of whether there are any biologically determined (i.e., non-trivial) externalization Parameters (as distinct from trivial 'points of variation') is complex and moot. For any deeper understanding of that question to emerge, a scrutiny and comparison of different modes of externalization, including tactile as well as visible sign languages, would seem to be required. I leave it at that.[23]

It is commonly assumed that a theory should 'provide answers', notwithstanding the fact that all theories are inevitably either slightly or grossly wrong. What a theory should do, however, is raise new research questions. Among the questions raised by the present study are the following ones.

A.   What are the F-atoms of internal language and how can linguistics (and science in general) acquire some knowledge of them?
B.   What are the properties and the nature of the I-materialization process that 'manifactures' general cognitive categories (time, location, participant, etc.) into F-atoms (Tense, Definiteness, Person, etc.), that is to say, into units applicable in internal language?
C.   What are the properties and the nature of the E-materialization process that externalizes internal language material?

Not surprisingly, these questions triggered some debate at the Barcelona workshop, but, obviously, no one knows exactly what is a possible F-atom or even 'only' what is a possible external feature in languages and what is not (cf., e.g., Chomsky 2000, n. 31, 2001, fn. 8, 2002:123). One task, then, a non-trivial one, is to tease apart each of the v-, T- and C-systems, identifying the F-atoms operative in each of them.[24]

E-materialization is preceded by I-materialization, the latter taking conceptual rather than narrowly linguistic elements as input. It is nevertheless the case that I-materialization yields or 'produces' categories, such as Person and Tense, showing properties that are or at least seem to be specifically linguistic. Yet another non-trivial task, then, is to develop some coherent understanding of how this comes about.

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[23] Plausibly, underspecification gives rise to variation (see Biberauer et al. 2009), much as crossroads in a landscape. That is, the acquirer or the 'traveler' cannot get any further without opting for one road or the other. However, it is advisable to sharply distinguish between the non-trivial notion of *Parameter* and general 3rd factor underspecification. Parameters were supposed to solve the 'logical problem of acquisition' and account for (and make predictions about) limits to language variation. Underspecification is compatible with both acquisition and limited variation, but it does not make any specific claims or predictions about either one. That is, it does not reach the level of explanatory adequacy.

[24] This task is made even more difficult than commonly assumed by the fact that atomic elements of internal and external language do not stand in a simple one-to-one correlation, an important issue that I will however not discuss here (but see Sigurðsson 2009 and related work).

References

Biberauer, T., A. Holmberg, I. Roberts & M. Sheehan. 2009. *Parametric Variation: Null Subjects in Minimalist Theory*. Cambridge: Cambridge University Press.

Boeckx, C. 2009. Approaching parameters from below. To appear in *Biolinguistic Approaches to Language Evolution*, ed. by A.M. Di Sciullo & C. Boeckx. Oxford: Oxford University Press.

Chomsky, N. 2000. Minimalist inquiries: the framework. In *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*, ed. by R. Martin, D. Michaels & J. Uriagareka, 89–155. Cambridge, MA: MIT Press.

Chomsky, N. 2001. Derivation by phase. In *Ken Hale: A Life in Language*, ed. by Michael Kenstowicz, 1–52. Cambridge, MA: The MIT Press.

Chomsky, N. 2005. Three factors in language design. *Linguistic Inquiry* 36:1–22.

Chomsky, N. 2007a. Approaching UG from Below. In *Interfaces + Recursion = Language? Chomsky's Minimalism and the View from Syntax-Semantics*, ed. by H. M. Gärtner & U. Sauerland, 1–30. Berlin: Mouton de Gruyter.

Chomsky, N. 2007b. "On Referring" revisited. Presented at Harvard University on October 30th 2007, as part of the series "Internalist Explorations Of Meaning". http://blip.tv/file/471951

Chomsky, N. 2008. On Phases. In *Foundational Issues in Linguistic Theory. Essays in Honor of Jean-Roger Vergnaud*. Ed. by R. Freidin, C.P. Otero & M. L. Zubizarreta, 133–166. Cambridge, MA: MIT Press.

Chomsky, N. 2010. Restricting stipulations: consequences and challenges. Presented at the University of Stuttgart, March 24, 2010.

Crain, S. & R. Thornton. 1998. *Investigations in Universal Grammar: A Guide to Experiments on the Acquisition of Syntax and Semantics*. Cambridge, MA: MIT Press.

Fodor, J. & E. Lepore. 1998. 'The emptiness of the lexicon, critical reflections on James Pustejovsky's *The Generative Lexicon*'. *Linguistic Inquiry* 29:269–288.

Gallistel, C. R. 1996. Neurons and memory. In *Conversations in the cognitive neurosciences*, ed. by Michael S. Gazzaniga, 71–89. Cambridge, MA: MIT Press.

Gallistel, C. R. 2000. The replacement of general-purpose learning models with adaptively specialized learning modules. In *The cognitive neurosciences*, ed. by Michael S. Gazzaniga, 1179–1191. 2nd ed. Cambridge, MA: MIT Press.

Hauser, M., N. Chomsky & W. T. Fitch. 2002. The faculty of language: what is it, who has it, and how did it evolve? *Science* 298:1569–1579.

Jackendoff, R. 1990. *Semantic Structures*. Cambridge, MA: The MIT Press.

Katz, J. & D. Pesetsky. 2009. The Identity Thesis for language and music. http://ling.auf.net/lingBuzz/000959.

Moro, A. 2008. Rethinking symmetry: a note on labelling and the EPP. Ms. Vita – Salute San Raffaele University.

Putnam, H. 1975. The meaning of 'meaning'. In *Mind, Language and Reality: Philosophical Papers*, Vol. 2:215–271. Cambridge: Cambridge University Press.

Ritter, E. & M. Wiltschko. 2009. Varieties of INFL: TENSE, LOCATION, and PERSON. In *Alternatives to Cartography*, ed. by H. Broekhuis, J. Craenenbroeck & H. Riemsdijk, 153–202. Berlin: Mouton de Gruyter.

Sigurðsson, H. 2004. Meaningful silence, meaningless sounds. *Linguistic Variation Yearbook* 4:235–259.

Sigurðsson, H. 2009. Language Quarks. *Iberia* 1/1:169–183.

Sigurðsson, H. 2010. On EPP effects. *Studia Linguistica* 64:159–189.