

On UG and Materialization [A slightly annotated version]

1. Introduction

This talk: An experiment – and the outcome was surprising
[but I should have seen it coming ...].

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, 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 (Chomsky 2010)

- (1) Externalization of internal (biological) language:
Materialization + Linearization/Localization of the ‘material’

I put linearization/localization aside, focusing on UG and materialization:

- (2) How are elements of UG materialized?

In order to answer that we have to first address:

- (3) What is ‘in there’ – what are the elements of UG?

The envisaged answer: *almost nothing*

Chomsky (2007a:6):

In addition to Merge applicable without bounds, 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

I adopt this, with one important modification:

- (4) In addition to Merge applicable without bounds, 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

– assuming that the ‘lexical’ elements of UG are truly atomic, forming larger more ‘word-like’ units by Merge.

- (5) UG contains:
 - a. A computational faculty (FLN or Narrow Syntax, see below)
 - b. UL, the *Universal Lexicon* of non-composite atomic elements
- (6) *The Anti-Lexicalist Hypothesis* (or the true lexicalist hypothesis ...)

UL contains:

- a. an initial root, $\sqrt{0}$ (Root Zero), and = *The Initial Zero Root Thesis*
- b. an initial functional feature, F_0 (Feature Zero) = *The Initial Zero Feature Thesis*

Feature Zero = the Edge Feature (of Chomsky 2007a, 2008)

[I'm heading towards (29) below and]:

(7) *The Copy Theory of Language Growth*

The growth of lexicon and syntax in the individual involves reiterated Copy & Merge of Root Zero and Feature Zero (- see further below)

- (8) Specific feature 'material' is biologically determined, but it belongs to the third factor (in the sense of Chomsky 2005) rather than to the first factor – that is, it is *not* specifically linguistic
→ *L-uniformity* (no room for UG related variation)

2. Some basic issues

Hauser et al. (2002):

- (9) a. **FLN**: Faculty of Language in the Narrow sense (species-specific)
b. **FLB**: Faculty of Language in the Broad sense
c. **SM**: The sensory-motor interface (the phonological interface, PF)
d. **C-I**: The conceptual-intentional interface (the semantic interface, SF)

In addition, FLB comprises “the biological capacity of humans that allows us ... to readily master any human language without explicit instruction” (Hauser et al. 2002:1571), that is::

- (10) $FLB = FLN + SM + C-I + \text{the acquisition capacity} + \dots$

FLN, in turn, is truly minimal, comprising only recursive Merge (internal/external):¹

Operating without bounds, Merge yields a discrete infinity of structured expressions
(Chomsky.2007a:5)

Notice: FLN is [assumed to be] species-specific, but that does not extend to other subcomponents of FLB (in their entirety). However, FLB is *universal*, no less than FLN, begging the question of how to understand the notion ‘Universal Grammar’.

Faculty of Language, *Narrow Syntax*, *Universal Grammar* and *I-language* are commonly used sloppily, in more or less the same sense, but:

- (11) a. **FLN** = Merge (internal & external)
b. **Narrow Syntax** = FLN + computation of syntactic stuff (building blocks & structures) + transfer (to C-I)
Computation involves Probing, Agree, Matching / Valuation, ...
Syntactic stuff – to be discussed below!
c. **Universal Grammar** =

¹ “ ... only the core computational mechanisms of recursion as they appear in narrow syntax and the mappings to the interfaces” (Hauser et al. 2002:1573).

- c1. FLN (+ some kind of a 'lexicon'), or
- c2. Narrow Syntax (+ some kind of a 'lexicon')
- d. **I-language** = the internal form of any particular language. In other words, an I-language is a specific "state of FL" (the faculty of language), whereas Universal Grammar is "... the theory of the initial state of FL" (Chomsky 2007a:1)

Narrow Syntax only includes computation of "LF", feeding mapping to the C-I interface (cf. Chomsky 2001:3, 15). The mapping to the SM interface = Externalization.

How does this tally with the division of labor between the *first factor* and the *third factor*?

"[T]hree factors that enter into the growth of language in the individual" (Chomsky 2005:6).

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, HS] not specific to the faculty of language.

That is (HS' interpretation):

- FLN \approx the first factor (minus interpretation of "part of the environment as linguistic experience")
- FLB includes the first factor, also intersecting with the third factor

Much of what was conceived of as principles of language in the Principles and Parameters approach of the 1980s is now seen as third 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 third factor. Like the first factor, the third factor is genetically decided, but only the first factor is taken to be specific "for language, the topic of UG" whereas the third factor is "not specific to ... [language], and may be organism-independent", that is non-species specific (Chomsky 2008:133). Computational limitations like minimality and PIC (the Phase Impenetrability Condition) are thus subcategories of the third factor, and that would seem to apply to binary branching as well (Chomsky 2005:16). That is:

(12) Narrow Syntax comprises or obeys some third factor components as well as the first factor²

We can opt for defining 'Universal Grammar' as in either (11c1) or (11c2), that is as either being equivalent with FLN (+ some kind of a 'lexicon') or with Narrow Syntax (+ some kind of a 'lexicon'). The more pretinent (or at least the more traditional) understanding is that 'Universal Grammar' is strictly specific to language and to the species, hence tantamount to FLN (+ some kind of a 'lexicon').

[This is not an innocent or a self-evident assumption. Other cognitive systems, including arithmetic and music (cf. Katz & Pesetsky 2009), share some kind of Merge with

² Or else Narrow Syntax = FLN, in which case what is referred to as 'computation of syntactic stuff' in (11b) must be relegated to the interfaces. That is a radical step I will not be taking here.

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.]

Under all approaches, the question arises:

(13) What is the nature and the content of the Universal Lexicon?

3. The Initial Zero Root Thesis

(6)a. UL contains an initial root, $\sqrt{0}$ (Root Zero)

UG provides the infant with a single root, referred to as *Root Zero*, $\sqrt{0}$, as it has no content.

(14) Root Zero and lexical growth:

Root Zero is an ‘empty cell’ that awaits being (more or less) arbitrarily filled with some conceptual content, say {DAD} or {MEOW}. 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, say {MOM}, yielding $\sqrt{2}$ in L_x , and so on. 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.

(15) Internal vs. External Lexicon (of I- vs. E-languages):

I say *internal lexicon* as the initial lexicon is internal to the individual, the development of an external lexicon (DM ‘Vocabulary’) for the purpose of communication being a later and a separate process. 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.

(16) Root content:

Root Zero gets filled with some content, more or less *arbitrarily* (in relation to the world). 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.

[A question raised 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 for those, but there are more possibilities to consider. However, notice that I am strictly limiting my discussion to *internal* roots – where the problem is not observable.]

(17) A note on semantic externalism:

This is not to say that words *cannot* refer to objects in the external world, that is, semantic externalism (Hilary Putnam and others) may not be 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 such reference, it is 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/thinking the item.

(18) Fodorian atomism:

Given the Initial Zero Root Thesis, carving items of the internal lexicon on the basis of experience (plus innate knowledge) is unproblematic – which would seem to be the correct intuition – and the claim that all (linguistic) concepts are primitives in the sense of Fodor (see Fodor & Lepore 1998) becomes more appealing than commonly assumed.

(19) A note on non-linguistic ‘concepts’:

‘Concepts’ in some non-linguistic sense may very well be complex even though internal lexical roots are atomic units in syntax. Thus, the event described by the verb *drink* may be decomposed as, say, ‘an event where some liquid thing passes along a path into a place called mouth’ (cf. Jackendoff 1990:80), but that is irrelevant in syntax [apart from the feature ‘event’]. – Which is not to say that it is uninteresting or unimportant.

4. On the growth of language in the individual

(20) *The Generalized Edge Approach*

The initial stage of language growth involves the carving out of a root or roots. The second stage provides a root or roots with syntactic ‘glue’ enabling them to merge. The ‘glue’ is the **Edge Feature**, EF (Chomsky 2007a, 2008). *The Generalized Edge Approach* (leaving EPP aside): Both External and Internal Merge are preconditioned by EF [and EF is free].

(21) The growth of syntax:

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

(22) *The Initial Zero Feature Thesis / Edge Feature Iteration:*

Suppose now that EF = zero functional feature, F_0 , postulated by the *Initial Zero Feature Thesis*. 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 : As soon as F_0 has been materialized as an internal F_1 in L_x , the language faculty has the option of making a copy of it, making F_0 available anew. Subsequently, the new copy of F_0 is raised to the edge of the structure, thereby enabling recursive Merge. That is, the fundamental recursion property of language boils down to Edge Feature Iteration (– if so, the evolutionary introduction of F_0 ‘created language’).

(23) Moro's symmetry problem (2008:1f) (cf. also Chomsky 2010):

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.

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 labelling: YP is no longer available for inspection to H – it being a discontinuous constituent – and the label can be properly assigned.

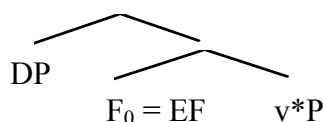
However, the derivation Moro seems to have in mind is countercyclic:

- | | | |
|---------|------------------------------------------------|-------------------------------------------|
| (24) a. | {XP, YP} | sister merger of XP and YP |
| b. | {H {XP, YP}} | head merger |
| c. | {H {XP, YP}} | unsuccessful labelling / YP targeted by H |
| d. | {YP, {H, {XP, YP }}} | movement of YP |
| e. | {YP, {H, { XP XP, YP }}} | successful labelling |

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

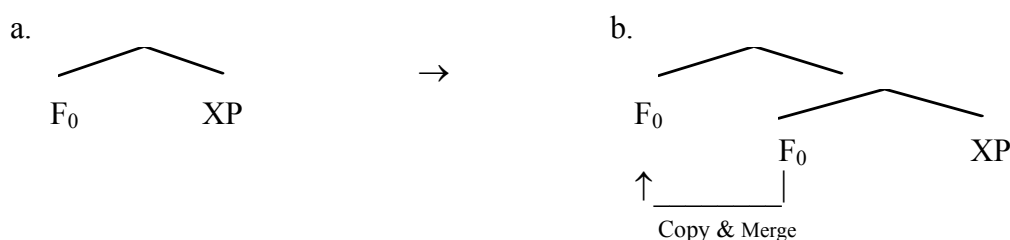
The problem dissolves (putting labelling aside): On the Generalized Edge Approach, symmetric merger, of for instance a subject DP and a v*P, is precluded, that is, either of the two has to serve as a ‘host’ and merge with F₀:

(25)

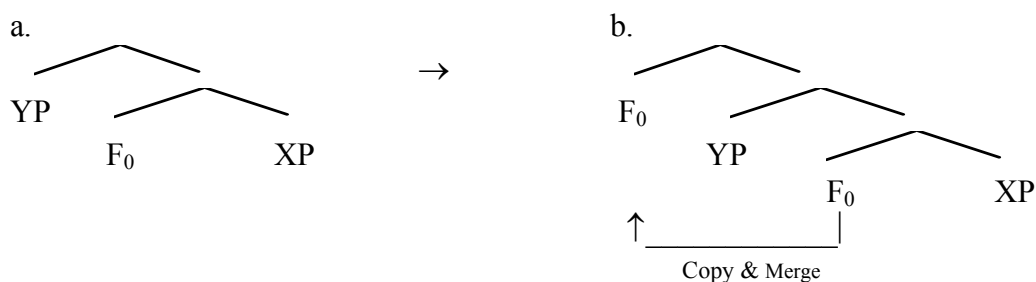


Edge Feature Iteration, some further instantiations:

(26)



(27)



The structures in (26b) and (27b), in turn, have the option of either merging with yet another Edge Feature (yielding ‘composite heads’) or with a larger structure. In the latter case, the computation either comes to an end or proceeds by repeated Edge Feature Iteration.

A computation that takes a structure like (25)/(27a) as input can only proceed by Edge Feature Iteration, that is, adjunct stacking (multiple specifiers) is precluded (whenever we seemingly have multiple specifiers they are separated by silent functional categories).

(28) Stop and survive:

Chomsky (2008:139): if a lexical item “lacks EF, it can only be a full expression in itself; an interjection.” Let us generalize this:

If a structure lacks EF (F_0), the computation comes to an end, yielding an expression that can ‘survive’ without further computation.

(29) UG = *The Minimal Language Generator*, MLG, consisting of:

- a. Root Zero
- b. Feature Zero (the Edge Feature)
- c. Merge (internal/external)

[I am assuming (for simplicity/ease) that MLG is language- and species-specific, but it is not evident that it is (both or either). – This is an empirical issue.]

(7) *The Copy Theory of Language Growth*:³

The growth of lexicon and syntax in the individual involves reiterated Copy & Merge of Root Zero and Feature Zero.

5. On F-atoms, language uniformity and variation

(30) *F-atoms*:

Much as root copying, Edge Feature 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 non-raised copy is ‘filled’ with some conceptual content, yielding an F-atom, F_x , in some internal language, L_x ⁴

Assuming that basic categories like (abstract) Person, Number, Tense, Negation, etc., represent F-atoms, I hypothesize that F-atoms are limited in number, innate (i.e. biological) and universal – but they are *not* narrowly linguistic, instead being 3rd factor entities

³ Cf. Chomsky (2005:5): “... ‘process of learning’” (Gallistel 1997, 1999), though “‘growth’” might be a more appropriate term ...”.

⁴ That is, it is the raised copy that is ‘empty’, in contrast to what is generally the situation in ‘overt syntax’. One task, then, is to develop some understanding of how ‘visible, overt raising’ relates to covert copy & move.

[It seems to be a general property of language that abstract basic categories of the T-system, like Person, Number, Tense, etc., enter (at least) a double matching relation, a low one with an element of the ν -system and a higher one with an element of the C-system (see recent work, e.g. Sigurðsson 2009, 2010, to appear a, b (2011)). That is, specific values (like 1st person, Past tense, etc.) represent complex relations, resulting from intricate computations in Narrow Syntax. Similar observations extend to other basic categories, including C/case.]

(31) Derivational directionality:

Pre-syntactic ‘storage’ of F-atoms and concept roots \rightarrow Syntax \rightarrow The interfaces

Alternatively, the F-atom storage is part of the C-I interface, the derivation having pre-syntactic as well as post-syntactic access to the C-I interface

(32) *L-uniformity* (adapted from Sigurðsson 2004):⁵

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

That is, there is *no L-selection*, and language variation is exclusively a matter of Externalization.

Non-trivial questions raised:

What are the F-atoms?

Is their materialization principled in one way or another (cf. Cinque and others)?

[Not surprisingly, these important questions triggered some debate at the workshop, but, obviously, no one knows exactly what is a possible feature / F-atom 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 ν -, T- and C-systems, identifying the F-atoms operative in each of them (perhaps along the routes explored in the recent works mentioned above and in the works of Rizzi, Cinque, Ramchand and others)].

Given the Minimal Language Generator view of UG, there can be no UG related parameters.

The question of whether there are any *biologically determined* Externalization parameters (as distinct from ‘points of variation’ or, simply, ‘differences’) is a more complex one. 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.

[Plausibly, underspecification gives rise to variation, much as crossroads in 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 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)

⁵ For a related conception, cf. the Strong Uniformity Thesis of 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.

limits to language variation. Underspecification is (presumably) compatible with both phenomena (acquisition & limited variation), but it does not make any specific claims or predictions about either one, that is, it remains to be shown that an underspecification approach to language variation can reach the level of explanatory adequacy.]

6. The surprising result

External Materialization (in E-language) is preceded by Internal Materialization (in I-language), the latter involving conceptual rather than narrowly linguistic activation ('lexicalization').

[It is nevertheless the case that central categories like Person, Tense, etc., get 'grammaticalized', showing properties that are (or seem to be) specifically linguistic. One more non-trivial task, then, is to develop some coherent understanding of how this comes about. This is a real issue – we should stop pretending that we know the answers and start looking for them instead.]

– I'll stop there.

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