

The successor function + Lexicon = Human Language?

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I. What interfaces ‘motivate’

1. SMT: language is a perfect solution to interface conditions imposed on it.
2. Example: Why does adjunction exist, a prima facie imperfection?
 - (i) the C-I-systems (‘richness of expressive power’ at SEM) ‘require an operation of predicate composition’ (Chomsky, 2004).
 - (ii) adjunction (‘pair-Merge’) provides just that.
 - (iii) therefore, adjunction has found a principled explanation.
3. Methodology: The conditions imposed will in part have to be studied via the solutions satisfying them.
4. Motivated by interface conditions:
 - a. adjuncts
 - b. the A/A’ distinction
 - c. displacement
 - d. binarity of Merge
 - e. the EPP-principle
 - f. the relation Agree
 - g. phases
 - h. hierarchy
5. What does not so follow:
 - (i) n -ary Merge qua recursive set-formation;
 - (ii) economy conditions (cyclicity/compositionality, PIC, etc.).

Claim to come:

- (i) The list in (4) might as well reduce to (4a).
- (ii) There is no ‘I(ntentional)’-interface.

II. Debunking hierarchy

‘Suppose that a language has the simplest possible lexicon: just one LI, call it “one.” Application of Merge to the LI yields {one}, call it “two”. Application of Merge to {one} yields {{one}}, call it “three.” Etc. In effect, Merge applied in this manner yields the successor function. It is straightforward to define addition in terms of Merge (X,Y), and in familiar ways, the rest of arithmetic. The emergence of the arithmetical capacity has been puzzling (...) and it has often been speculated that it may be abstracted from FL [the faculty of language] by reducing the latter to its bare minimum. Reduction to a single-membered lexicon is a simple way to yield this consequence.’ (Chomsky in ‘On Phases’)

6. Enumerating a series, I

$$\emptyset = 1$$

$$\text{Merge}(1) = \{\emptyset\} = 2$$

$$\text{Merge}(2) = \{\{\emptyset\}\} = 3$$

$$\text{Merge}(3) = \{\{\{\emptyset\}\}\} = 4 \quad \text{etc.}$$

7. Merge yields succession: $c_0 = \emptyset$ and $c_{n+1} = \{c_n\}$ for each n .

8. $\text{Suc}(X) =_{\text{def}} X \cup \{X\}$

9. Enumerating a series, II

$$X = \emptyset$$

$$= 1$$

$$\begin{aligned} \text{Succ}(1) &= \{\emptyset\} = \{1\} && = 2 \\ \text{Succ}(2) &= \{\emptyset, \{\emptyset\}\} = \{1, 2\} && = 3 \\ \text{Succ}(3) &= \{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\} = \{1, 2, 3\} = 4 && \text{etc.} \end{aligned}$$

10. Algebraic structure of the naturals

- In geometric terms, a line; in algebraic ones, a one-dimensional vector space, every element of which can be expressed as a linear combination of the vectors in its (one-element) base.

11. Is that an adequate formal characterization of the human space of ideas?

- Algebraic structure of the number system is *multi*-dimensional (see e.g., Russell, 1903), hence cannot have evolved from a one-dimensional system.

12. From successor to Phrase Structure

- If Merge/successor is set-formation, there is no reason to restrict it to singleton sets. Thus, let Merge form n -ary sets, and let the restriction of $n=2$ follow from ‘interface conditions’.
- label-free phrase structure in something like the sense of Collins (2002)

$$\begin{aligned} &\{1, 2\} \\ &\{3, \{1, 2\}\} \\ &\{4, \{3, \{1, 2\}\}\} \\ &\{5, \{4, \{3, \{1, 2\}\}\}\} \quad \text{etc.} \end{aligned}$$

13. Labels

- go beyond ‘virtual conceptual necessity’, hence are not part of the system.

Three explanatory factors for syntax suffice:

- interaction of the properties of lexical items
- economy conditions
- interface (‘bare output’) conditions.

14. The fate of hierarchy

‘... is automatic for recursive operations, conventionally suppressed for those that merely enumerate a sequence of objects’ (Chomsky, 2005, fn.).

15. PS ‘naturalized’ (derived), or gone? (Chametzky, 2000, 2003)

16. Getting hierarchy off the ground: Fukui, 2005.

‘Is the nature of the fundamental operation in human language really “combination” alone?’

$$\text{BS} = \{\alpha_1, \dots, \alpha_n\} \quad (n \in \mathbf{N})$$

$$\text{Merge}(\alpha_i, \text{BS}) =_{\text{def}} \{\alpha_i, \text{BS}\} = \{\alpha_i, \{\alpha_1, \dots, \alpha_n\}\}$$

$$\text{E.g., BS} = \{\emptyset\}$$

$$\text{Merge}(\emptyset, \{\emptyset\}) = \{\emptyset, \{\emptyset\}\}$$

17. Is language really (merely) a ‘linking’-system?

III. Evidence for a substantive C-I interface from comparative cognition

18. Methodological problems haunt, possibly involving conceptual impossibilities rather than empirical difficulties: problem of ‘other minds’; inscrutability of reference

19. Syntax-semantics correspondences

events	VP/vP
tensed events / propositions	TP
propositions placed in discourse	CP
predicate composition	adjuncts
predication	Small Clauses

20. Alarm calls in the wild:

If ‘referential at all, then in the mind of the listener who can extract certain information from them’ (Hauser et al., 2002).

21. Symbol use in captivity:

- ‘No evidence that apes used any of the symbols they learned to *refer* to objects or events, or that those symbols had any function other than to request food or drink’ (Terrace, 2005; see also McPhail, 1998)
22. Seriation:
- Non-associative, meaningful, hierarchical and ‘recursive’ seriation in *cebus appella* (McGonigle&Chalmers, 2006).
23. Context-freeness:
Fitch&Hauser, 2004, Frederici, 2005, Gentner et al., 2006, on AⁿBⁿ grammars.
24. The ‘duality of semantics’ is not extra-linguistic.
‘C-I incorporates a dual semantics, with generalized argument structure as one component, the other being discourse-related and scopal properties.’ (Chomsky, 2005)
25. The problem of functional explanation
- That we couldn’t have achieved certain things, if certain mechanisms hadn’t existed, is no explanation of these mechanisms.
26. Conclusion
There is no empirical or conceptual evidence for the existence of an ‘I(ntentional)’ interface.
- IV. Adjuncts: the absence of hierarchy**
27. The adjuncts I am talking about:
- right-merged, not left-merged; not selected; stack (iterate); do not enter Agree or Theta-relations; take scope, but not via C-command; unlabeled (Uriagereka, 2003); interpreted *compositionally* by *conjoining* the predicates they express:
walk quickly: $\exists e[e \text{ is a walking } \& e \text{ is quick}]$
28. There is some – very scarce – evidence for adjunction in monkeys (Zuberbuehler, 2003).
29. Chomsky, 2004, on adjuncts:
- a. adjunction of α to β does not change any properties of β .
 - b. β behaves ‘as if α is not there apart from semantic interpretation’.
 - c. an adjunct construction is not the projection of any head.
30. The generalized successor function yields adjuncts, a flat, non-categorial system:
- Adjuncts fail to involve categorial projection – as does Merge.
 - Adjunction is crucially symmetric – as is Merge.
 - Asymmetries of PS enter not through Merge but the argument-of relation, which is integral (as opposed to conjunctive, see Hinzen, 2003):
John ran does not mean: $\exists e[\text{running}(e) \& \text{John}(e)]$, but:
 $\exists e[\text{ran}(e) \& \text{THEME}(\text{John}, e)]$
- V. The locus of hierarchy in grammar (see Hinzen&Uriagereka, 2006)**
31. Syntax is ontologically productive:
- If semanticity of non-adjuncts (phrases, sentences) is not independently given, and intrinsically correlates with specific formal conditions, it should *follow* from those conditions as opposed to motivate them. This is only possible in a *multi-dimensional* system, like the arithmetical one, where higher-dimensional space entail lower-dimensional ones as a matter of formal necessity.
32. The nominal paradigmatic hierarchy, with asymmetric entailments:
abstract>mass>objectual/count>animate
e.g., beauty >sand >mug >man
33. Selectional restrictions storable over the layers of this hierarchy:
- a. We gave the man/*institution/*beauty our pictures.
 - b. I saw most men/*beer.

- c. It's a 'man eat man' world.
 d. *count cow/meat
 e. chop meat/a cow (into pieces)
 d. He's more man than you'll ever be.
34. Syntax tracks paradigmatic complexity:
 (*the) beauty
 *we saw different beauties in the museum.
 much/little beer
 four mugs
 Si Kikò ay naliligò.
 Kiko is taking a bath
35. The verbal paradigmatic hierarchy, with asymmetric entailments:
 states < activities < achievements < accomplishments
 e.g., live < run < reach < construct
36. Syntax tracks paradigmatic complexity:
 a. Saddam lives
 *Saddam is living
 *Saddam lives in two months
 b. Saddam is running
 *Saddam runs in two months
 c. Saddam is reaching his hideout
 Saddam reached his hideout in two months.
 *the hideout's reaching (by Saddam).
 d. Saddam is constructing a hut.
 Saddam constructed his hut in two days,
 the hut's construction by Saddam.
37. None of these hierarchies [and also clausal ones] are plausibly relationally or semantically grounded: they cannot be blamed on the 'structure of reality'. An *internalist* explanation (Chomsky, 2000) for the structure of reference is called for.
38. That internalist explanation must invoke a multi-dimensional syntax:
 (i) there are asymmetric entailments;
 (ii) they correlate systematically with syntactic complexity;
 (iii) they follow from nothing external to the system;
 (iv) if they are to follow from the architecture of the syntax, it must be a multi-dimensional one.

VI. Conclusion

- Syntax isn't one-dimensional seriation, though the system may *begin* there. Reconstructing structure-building in successor terms leaves out the categorial hierarchies what marks out language against iterative and adjunctive systems. These hierarchies are not plausibly boosted semantically, or from the interface, though the latter may *restrict* the use we can make of the generative engine implied. Replace the project of 'motivating from interface conditions' by a Wittgensteinian 'use theory of meaning'.
- Whatever operation accounts for categorization, it does not seem to be *recursive*. What looks like infinite recursion in the clausal domain is the periodicity of a V-T-C sequence, which contains the whole categorial resources of human thought.