

this handout and some of the references quoted at
<http://sites.unice.fr/scheer>

WHY PHONOLOGY IS FLAT: THE ROLE OF CONCATENATION AND LINEARITY

- (1) purpose
 - a. Linguistic structure is hierarchical.
Are there different ways or just one way in which hierarchy is expressed in natural language?
 - b. trees are default in all theories and all modules (syntax, semantics, morphology, phonology etc.).
 - c. lateral relations in Government Phonology are a different take
(and GP's genuine contribution to phonological thinking)
 - d. deforestation in phonology
is a consequence (albeit not the goal) of lateral relations:
 - syllable structure (syllable trees)
 - infrasegmental structure (feature geometry)
 - interface with morpho-syntax (the Prosodic Hierarchy)[Scheer 2012: §9]
 - e. below it is argued that the non-arboreal nature of phonology is not just one take among others, but rather *follows* from
 1. a design property of morpho-syntax that is absent from phonology: **concatenation**
 2. an input condition of phonological computation: **linearity**

the presentation is an oral version of Scheer (2013).
- (2) trees vs. lateral relations
properties in CVCV (Lowenstamm 1996, Scheer 2004)
 - a. shared (?)
both establish a hierarchical relation between two items of which one is the head of the construction:
 - phonology: head
 - syntax: projection/labelling.But projection/labelling is perhaps not a property of syntax (Chomsky 2013).
 - b. phonology
trees: items that contract a hierarchical relation are adjacent.
lateral relations: they may or may not be adjacent.
 - c. lateral relations
the items that contract a hierarchical relation are not grouped into higher units in any way (there is no third item created, no transfer/projection of labels).
 - d. lateral relations: no recursion
two items that contract a lateral relation cannot be as a whole engaged in another lateral relation.

- (3) Standard GP
 - a. lateral relations could be recursive
the rhyme governs its onset, but may also dominate a branching nucleus that constitutes a governing domain in its own right.
 - b. lateral relations express tree structure
lateral relations define constituents: branching onset, branching nucleus, coda-onset etc.
 - c. a hybrid model
where lateral relations and trees coexist.
 - 1. redundant (Takahashi 1993)
 - 2. runs the theory into irresolvable trouble (Scheer 2004: §165)
 - d. Standard GP introduced lateral relations but ran out of breath half way:
some tree structure was eliminated, but some survived and was laterally wrapped.
 - e. therefore,
 - 1. either lateral relations are a good idea and phonological structure and causality needs to be made 100% lateral
==> deforestation, CVCV
 - 2. or trees prevail and lateral relations are not a good idea after all
==> the lateral programme needs to be abandoned.

1. Concatenation

- (4) no concatenation, no trees
 - a. in morpho-syntax
trees are the consequence of concatenation, and of nothing else.
 - b. Merge
this is the essence of the universal hierarchy- and tree-creating mechanism Merge (even though concatenation and labelling/projection may be distinct operations).
 - c. if phonology does not concatenate anything, there cannot be any tree-building device in this module: no concatenation, no trees.
- (5) confirmation
 - a. phonology does not exhibit any of the properties predicted by tree-type hierarchy
Neeleman & van de Koot (2006)
 - b. trees have certain formal properties that make predictions regarding the type of phenomena that should be found in a tree-bearing environment:
 - 1. projection
 - 2. long-distance dependencies
 - 3. recursion
 - c. Neeleman & van de Koot (2006) demonstrate that phonological phenomena do not display any of these properties.
 - d. they therefore conclude that the presence of trees in phonology overgenerates: arboreal structure predicts things that are absent from the record.

2. Recursion

- (6) eternal confusion between phenomena and analysis
- a. a long-standing observation:
there is no recursion in phonology
 - b. unfortunately, there is widespread confusion between
 1. recursion as an empirical phenomenon
 2. recursive *analysis* of non-recursive phenomena
 - c. in morpho-syntax,
recursion is an empirical fact, and as such plays an important role in the definition of natural language.
See the controversy between Nevins *et al.* (2009a,b) and Everett (2005).
- (7) recursion: a phenomenon
- a. definition
 1. Recursive structure in natural language has the property of producing grammatically unbounded embedding: grammar happily generates and tolerates an infinite number of embedded clauses (or phrases), and in the case of recursive morphology, an infinite number of embedded morphemes.
 2. The limits on recursive structure in actual production are imposed by performance (factors such as memory), not by competence. That is, speakers will get confused upon the third or fourth level of embedding.
 - b. syntax
Peter thinks [that John says [that Amy believes [that...]]]
 - c. morphology
Czech iterative *-áv*

dělat	"to do"
děl-áv-at	"to do repeatedly/often"
děl-áv-áv-at	"to do even more often"
děl-áv-áv-áv-...-at	"to do really really often"

French *re-* prefixation (about the same in English)

faire	"to do"
re-faire	"to do again"
re-re-faire	"to do with two repetitions"
re-re-re-faire	"to do with three repetitions"
re-re-re-re-...-faire	"to do with n repetitions"

- (8) recursion in analysis
 - a. there are recursive *analyses* of non-recursive phenomena
 - b. prosodic constituency was long held to be non-recursive (the Strict Layer Hypothesis, e.g. Selkirk 1984)
 - c. but when the SLH was OTed, it was broken down into four different component constraints, and recursion became an option (i.e. non-recursion may be violated): Selkirk (1996: 189ff).
 - d. since then prosodic constituencies where an ω dominates an ω' are common: e.g. Booij (1996), Peperkamp (1997), Truckenbrodt (1999).
 - e. Hulst (2010) has gathered cases of this kind of analysis regarding for example the internal structure of segments (melodic organisation).
 - f. \Rightarrow this does not make the phenomena at hand recursive.
- (9) major line of division
 - a. empirically speaking, nothing that resembles the phenomena under (7)b,c and their pre-theoretical description has been reported in phonology.
 - b. this *empirical* situation is the reason why the absence of recursion is firmly established as a major property that sets phonology (and semantics) apart from morpho-syntax.
 - c. e.g. in the debate on the genesis of language as a Darwinian adaptation
 - 1. Hauser *et al.* (2002): no
 - 2. Pinker & Jackendoff (2005a,b): yes
- (10) van Oostendorp (2010)
 - a. non-recursion in phonology may be due to a phonology-specific restriction on the tree-building device.
 - b. the mere presence of a tree-building device in a computational system does not mean that literally anything can dominate anything, i.e. that there are no restrictions on how trees are built.
 - c. syntax:
the tree-building system is restricted in such a way that X" cannot be the mother of Y".
 - d. Hence there are restrictions built into tree-building devices, and these may be idiosyncratic for each computational system: X-bar in syntax prohibits mother-daughter relationships between two maximal projections; in phonology, two items of the same kind happen to be unable to dominate each other (i.e. recursion: two syllable nodes, two onsets etc.).
 - e. the analogy between syntactic and phonological trees is incomplete:
 - 1. it is not the case that the X-bar restrictions on trees are arbitrarily imposed, i.e. do not follow from anything.
 - 2. the prohibition for two maximal projections to enter a mother-daughter relationship stems from projection: X" is a projection of x – X could never be the label attached to a node whose terminal is a y.
 - 3. there is no equivalent in phonology that could motivate the phonology-specific restriction against recursion.
 - 4. this restriction thus continues to beg the question: there should be recursive structure in phonology, unless there is a good reason against its existence.

- (11) explanation for the absence of recursion
Scheer (2004: §2, 2011: §802ff)
- a. phonology is flat
 - b. there is no tree-building device (Merge or equivalent) because nothing is concatenated.
 - c. recursion is formally defined as a node that is dominated by another node of the same kind.
 - d. hence there can be no recursion in absence of a tree-building device
 - e. \implies
 1. no concatenation, no trees
 2. no trees, no recursion

3. Linearity

- (12) linearity
is an input condition to phonological computation
- a. phonological computation takes as its input a fully linearized string
 - b. this is undisputed
 - c. where exactly linear order is created is currently debated:
 1. GB: *in* the syntax (phrase structure rules)
 2. Kayne's (1994) RCA (Linear Correspondence Axiom): at the end of syntax
 3. minimalism: post-syntactically, i.e. somewhere "at PF"
 - d. some relevant literature
Richards (2004, 2007), Bobaljik (2002), Embick & Noyer (2001, 2007) and Embick (2007).
- (13) linearity precludes concatenation
- a. nothing could possibly be concatenated in an environment where pieces are already
 1. chosen and
 2. fully linearized
 - b. \implies linearity enforces the absence of concatenation
- (14) hierarchy in a non-concatenative environment
- a. phonology cannot use concatenation, and hence trees
 - b. but still needs to express hierarchy
 - c. \implies need for an alternative way to implement hierarchy
 - d. \implies lateral relations
 - e. lateral relations are a creature of linearity
 \implies and hence unworkable in morpho-syntax

4. Real-world properties of language shape grammar

(15) summary:

linearity and concatenation

a. are in complementary distribution:

1. morpho-syntax has concatenation, but no linearity
2. phonology has linearity, but no concatenation

b. trees

1. are a creature of concatenation
2. cannot exist in absence of concatenation (no concatenation, no trees)
3. are a necessary condition for recursion (no trees, no recursion)

c. linearity

1. excludes concatenation: linearized pieces cannot be concatenated
2. thus enforces an alternative way of expressing hierarchy

d. thus, lateral relations

are the result of

1. a necessary design property of natural language: concatenation
2. a real-world property that is imposed on language from the outside: linearity

e. recall from Martinet's double articulation etc. that

it is concatenation (la seconde articulation) that makes the difference between animal and human communication.

(16) linearity and concatenation

- a. are two real-world properties that any implementation of human language (the one we know or other logically possible systems) is confronted to and will have to cope with.
- b. some mechanism must glue together pieces that are retrieved from long-term memory.
- c. linguistic structure must somehow be made ready for being produced and perceived by one (or more) of the five senses that humans use in order to exchange with the world around them. This task implies linearity, which is thus a necessary property of phonology (or rather: the externalization mechanism).

(17) Third Factor & Cie

- a. a strong trend in linguistics in the past two decades:
explain properties of grammar by extra-grammatical, "more general" properties of the cognitive system (of the species or beyond).
- b. Chomskian minimalism and biolinguistics
Chomsky (2005), Boeckx *et al.* (2012), Samuels (2009)
- c. anti-chomskian "Cognitive" Grammar (e.g. Taylor 2002)

- (18) "more general" properties
- a. the more general language-unspecific cognitive properties that everybody is after are often called for but less often named.
 - b. understandably enough, when they are, people end up with notions that are so general that one wonders in which way they could be considered in scientific terms, let alone be inspected with scientific instruments.
 - c. can we hope, for example, one day to understand what
 1. "figure/ground relations" or
 2. "cognitive salience"is?
 - d. "the more global [...] a cognitive process is, the less anybody understands it."
Fodor (1983: 107)
- (19) historical evolution of the study of mind: narrowing, not broadening of focus
- a. phrenology
historically, 18th-19th century physician Franz-Joseph Gall, who first argued that the cognitive system falls into a number of distinct computational systems, indentified broad and (as we know today) highly composite cognitive functions in what was called phrenology then.
 - b. objects of inquiry in phrenology:
 - combativeness
 - destructiveness
 - firmness
 - benevolence
 - veneration
 - cautiousness
 - love
 - wit
 - hope
 - c. Fodor (1983) shows that cognitive science could only make progress because Gall's broad functions were progressively abandoned and replaced by more humble objects of inquiry, which are smaller and more homogeneous.
 - d. these are the fields of scientific inquiry that contemporary cognitive science (and also neuroscience) is after: among others,
 - attention
 - vision
 - audition
 - language
- (20) conclusion
concatenation and linearity may well count as
- a.
 1. third factors
 2. "more general" properties
 - b. but they are a little different in kind from "figure/ground", "salience" and the like: they are Fodorian, rather than Gallian.
 - c. we know what they mean and how to characterize them.

- (21) concatenation and linearity
- a. are not really cognitive
(though this word has a strong polysemic record these days):
 - b. linearity
is enforced from the outside, i.e. by the physical and physiological environment: the properties of the five senses that humans are gifted with by evolution.
 - c. concatenation
 1. is found elsewhere in the cognitive system (of humans or beyond): in vision for example.
 2. but always exists out of functional necessity: some pieces *need* to be concatenated.
 - d. this is rather not what is currently understood as a "more general cognitive property" in the literature.

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