On the Order of Syntactic Operations

Lecture 1: A Brief History of Rule Interaction in Syntax

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1. Introduction

Central question:
How do syntactic operations interact?

Background:
(i) Since the beginning of the Chomskyan revolution in linguistics (Chomsky (1957; 1975)), there has been a constant alternation of phases with a focus on *algorithmic* aspects of grammar and phases with a focus on *representational* aspects of grammar.
(ii) In the last couple of years, the main emphasis has arguably been on *representational* aspects in syntax; see, e.g., the cartography project (Rizzi (1997; 2004), Cinque (1999; 2005), among many others) and the nanogrammar project (Caha (2009), Starke (2009)).
(iii) Based on new insights on representations, it is necessary to focus on *algorithmic* aspects of syntax again.
(iv) The research on the order of operations in syntax currently carried out at Leipzig University (see Heck & Assmann (2013) of a recent representative collection of papers) forms part of a more general, and more comprehensive, cooperative research project on IG Bau ('Interaktion grammatischer Bausteine', *Interaction of Grammatical Building Blocks*) that will hopefully result in a long-term graduate programme in phonology, morphology, and syntax.

(1) *Types of interaction of grammatical building blocks in syntax*
- a. *inhibitory, simultaneous*: competition
  - (i) disjunctive blocking (*Subset Principle*, *Elsewhere Principle*, *Blocking Principle*, *Pāṇini's Principle*, *Proper Inclusion Principle*, etc.; Reinhart (1983), Di Sciullo & Williams (1987), Fanselow (1991), Burzio (1991), Richards (1997), Williams (1997)
  - (ii) conflict: strata/levels (Chomsky (1965; 1981), Riemsdijk & Williams (1981), (more generally work that relies on the T-model); defaults: Gazdar et al. (1985), Pollard & Sag (1994), Sag & Wasow (1999); ranking: optimality theory (Prince & Smolensky (2004), Grimshaw (1997), Legendre et al. (1998), Fanselow et al. (1999), Samek-Lodovici (2006))
- b. *excitatory, simultaneous*: cooperation
  connectionist syntax/harmonic grammar (Smolensky (1986), Legendre et al. (1990)), coalition models (Dietrich (1994; 1999), Uszkoreit (1986), Jacobs (1988), Pafel (1998), Featherston (2005); OT syntax with local conjunction (Smolensky (1996; 2006), Aissen (1999; 2003), Fischer (2001), Keine & Müller (2008; 2011), Keine (2010))
- c. *excitatory, sequential*: feeding, counter-bleeding
- d. *inhibitory, sequential*: bleeding, counter-feeding

Note:
Throughout the course, the focus is on sequential interactions of elementary syntactic operations (Merge, Move, Agree).

Goals:

- The first goal is to show the drastic consequences of different orders of syntactic operations for structure-building and probe/goal operations.
- The second goal is to argue for general restrictions on possible orders of syntactic operations by invoking third factor principles (more specifically, principles of efficient computation; Chomsky (2005)).
- The third goal is to provide (via opacity effects) arguments for a strictly derivational organization of the syntactic components of grammars of natural languages.

2. Rule Interaction

(2) *Two types of transparent rule interaction*
- a. *Feeding*:
  - (i) Rule A creates the context in which rule B can apply.
  - (ii) If A applies before B, there is feeding of B by A; A feeds B.
  - (iii) If A does not apply, either B cannot apply; or it can apply because its context is present independently of A.
- b. *Bleeding*:
  - (i) Rule A destroys the context in which rule B can apply.
  - (ii) If A applies before B, there is bleeding of B by A; A bleeds B.
  - (iii) If A does not apply, either B cannot apply because its context is not present independently of A, or B can apply because its context is present independently of A.

(3) *Two types of opaque rule interaction*
- a. *Counter-Feeding* (underapplication):
  - (i) Rule A creates the context in which rule B can apply.
  - (ii) If A applies before B, there is feeding of B by A.
  - (iii) However, the evidence shows that B has not applied even though A has applied.
  - (iv) Therefore, A must have applied *after* B.
- b. *Counter-Bleeding* (overapplication):
  - (i) Rule A destroys the context in which rule B can apply.
  - (ii) If A applies before B, there is bleeding of B by A.

(iii) However, the evidence shows that B has applied even though A has also applied.
(iv) Therefore, A must have applied after B.

Opacity:
Rule interaction in counter-feeding and counter-bleeding environments is opaque because it cannot be determined by simply looking at the respective output representations why rule B has not applied even though its context of application would seem to be present (*counter-feeding*), and why rule B has applied even though its context of application would not seem to be present (*counter-bleeding*).

(4) *Questions raised by output representations*:
  a. Counter-Feeding (underapplication):
     Why could rule B not apply even though its context seems to be present?
  b. Counter-Bleeding (overapplication):
     How could rule B apply even though its context does not seem to be present?

Rule of the thumb:
A rule B that applies *early* will, as a tendency, be fed less often (therefore: counter-feeding), and will also, as a tendency, be bled less often (therefore: counter-bleeding).

Historical note:
The discovery of opacity in rule interaction marks the beginning of generative grammar: Chomsky (1951).

(5) *The first description of a counter-bleeding interation of grammatical rules* (Chomsky (1975, 25-26)):

[Zelig] Harris suggested that I undertake a systematic structural grammar of some language. I chose Hebrew, which I knew fairly well. For a time, I worked with an informant and applied methods of structural linguistics as I was then coming to understand them. The results, however, seemed to me rather dull and unsatisfying. Having no very clear idea as to how to proceed further, I abandoned these efforts and did what seemed natural; namely, I tried to construct a system of rules for generating the phonetic forms of sentences, that is, what is now called a generative grammar. I thought it might be possible to devise a system of recursive rules to describe the form and structure of sentences, recasting the devices in Harris's *Methods* for this purpose, and thus perhaps to achieve the kind of explanatory force that I recalled from historical grammar. I had in mind such specific examples as the following. The Hebrew root *mlk* (''king'') enters into such forms as *malki* (''my king''), *malka* (''queen''), *mlaxim* (''kings''). The change of *k* to *x* in *mlaxim* results from a general process of *spirantization* in post-vocalic position. But consider the construct state form *malxey* (''kings of''). Here we have *x* in a phonological context in which we would expect *k* (cf. *malki*, *malka*). The anomaly can be explained if we assume that spirantization preceded a process of *vowel reduction* that converted *malaxim* to *mlaxim* and *malaxey-X* (''kings of X'', where X contains the main stress) to *malxey-X*. The processes of spirantization and reduction (general, antepretonic) are motivated independently, and by assuming the historical order to the spirantization-reduction, one can explain the arrangement of forms *malki*, *malka*, *malxey*, *mlaxim*. It seemed only natural to construct a synchronic grammar with ordering of rules such as spirantization and reduction to explain the distribution of existing forms. Pursuing this idea, I constructed a detailed grammar, concentrating on the rules for deriving phonetic forms from abstract morphophonemic representations. A version of this was submitted as an undergraduate thesis in 1949, and a more extensive version as a master's thesis in 1951.

Note:
The official discovery of the four types of rule interaction, incl. the terminology (feeding/bleeding, transparent/opaque) goes back to Kiparsky (1973).

3. Opaque Rule Interaction in the Real World

Note:
Opaque interaction of rules is ubiquitous outside of grammatical theory. Two examples: board games and football.

3.1 Counter-Feeding in Risk

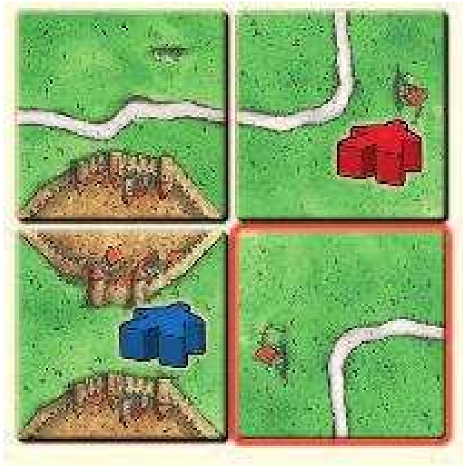
(6) a. *Unit Placement*
The player is assigned new armies and distributes them over his/her countries.

b. *Attack*
The player attacks an adjacent country, using up to three armies and three dice (against two of the defending player), the rule is recursive and can be repeated as long as adjacent troops are available and none of the own neighbouring countries becomes empty).

c. *Movement*
The player freely moves his/her armies within his/her countries. This is possible as long as there is a direct, uninterrupted connection, and no country becomes empty.

Counter-Feeding:
(6-c) could feed (6-b) but does not: (6-b) *underapplies*. Thus, at the end of a complex move, before it is the next player's turn, one may ask why the player does not continue with the attack, given that a sufficient number of armies may now be available.

3.2 Counter-Bleeding im Carcassone



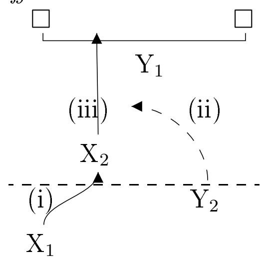
(7) a. *Follower Placement*:
Place a follower on a road, field or city feature of a terrain tile. This is possible if the road, field or city is not connected to another item of the same type that already hosts a follower.

b. *Tile Placement*:
Add a terrain tile in such a way that open road, field, or city features are extended to the tiles it abuts: Roads must connect to roads, fields to fields, and cities to cities.

The basic order in a single complex move is *Tile Placement* before *Follower Placement*, but the output of the last operation acts as the input of the former operation, etc. (cyclic application of rules). This creates *counter-bleeding* interactions: *Tile Placement* can destroy the context for *Follower Placement* but comes too late to do this if *Follower Placement* has applied earlier.

3.3 Counter-Feeding in Football: Offside

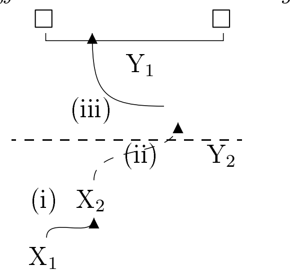
Offside & Counter-Feeding



Question:
Why is this an offside goal? (Underapplication of scoring rule)

3.3.1 Counter-Bleeding in Football: No Offside

Offside & Counter-Bleeding



Question:
Why is this not an offside goal? (Overapplication of scoring rule)

4. Opacity in Phonology

4.1 Counter-Feeding in Phonology

(8) *Two rules in Sea Dayak (Austronesian)* (Kenstowicz & Kisseberth (1979)):

a. *Vowel nasalization*:
An oral vowel is nasalized when there is a nasal consonant immediately preceding it.

b. *Cluster simplification*:
A cluster that consists of a nasal consonant and a voiced stop is optionally reduced to a nasal consonant.

Observation:
Cluster simplification creates a contexts in which a following vowel becomes adjacent to a nasal consonant; nevertheless, here the following vowel stays oral.

(9) *Rule order in Sea Dayak*:
Vowel nasalization precedes cluster simplification.

(10)

/naŋga/	UR
nãŋga	Vowel nasalization
nãŋa	Cluster simplification
nãŋaʔ	other rules

(11)

/naŋga/	UR
naŋa	Cluster simplification
nãŋã	Vowel nasalization
*nãŋãʔ	other rules

Question (from an output perspective – underapplication of nasalization):
Why is there no nasalization of the second /a/ in nãŋaʔ?

4.2 Counter-Bleeding in Phonology

(12) *Two rules in Tiberian Hebrew* (Kenstowicz & Kisseberth (1979)):

a. *Vowel epenthesis*:
A vowel is inserted in final consonant clusters.

b. *ʔ deletion*:
ʔ is deleted outside of syllable onsets.

(13) *Rule order in Tiberian Hebrew*: Vowel epenthesis precedes ʔ deletion.

Note:
If ʔ deletion could apply first, it would bleed epenthesis. However, epenthesis is not bled. The conclusion thus is that epenthesis must apply first.

(14) a. Epenthesis:
/melk/ → melex "king"
(See Chomsky's Master's thesis above.)

b. ʔ deletion:
/qaraʔ/ → qārā "he called"

c. Interaction: Epenthesis precedes deletion:
(i) /dešʔ/
(ii) dešeʔ
(iii) deše "grass"

Question (from an output perspective – overapplication of epenthesis):
Why is there vowel epenthesis in deše?

Terminology:
Why does counter-bleeding qualify as *excitatory*, like *feeding* and *cooperation*?
Why does counter-feeding qualify as *inhibitory*, like *bleeding* and *competition*?

Excitatory interaction:
Feeding, counter-bleeding and cooperation have in common that one grammatical building block (rule, operation, constraint, ...) enhances another one. This may mean that the application of the second building block becomes possible as a result of the application of the first one (feeding); that the application of the second building block is not blocked because the first one has not yet applied (counter-bleeding); or that the application of the second building block leads to results that it could not have if the first one had not applied (cooperation).

Inhibitory interaction:
Bleeding, counter-feeding and competition have in common that one grammatical building block (rule, operation, constraints, ...) impedes another one. This may mean that the application of the second building block becomes impossible as a result of the

application of the first one (bleeding); that the application o fthe second building block is blocked by the lack of application of the first one (counter-feeding); or that the two building blocks compete for application (competition).

5. Opacity in Syntax

Note:
Opaque rule interactions occur in syntax in exactly the same way that they occur in phonology (or, for that matter, in morphology). Still, for some reason, the relevant terminology (counter-feeding, counter-bleeding) is not that widespread in syntactic work.

5.1 Counter-Feeding in Syntax: Wanna-Contraction in English

(15) *Control vs. Exceptional Case Marking (ECM)*

- a. Who do you want to meet ?
- b. Who do you wanna meet ?
- c. Who do you want to meet Mary ?
- d. *Who do you wanna meet Mary ?

Analysis (Bresnan (1972), Arregi & Nevins (2012)):
There are two relevant operations, viz. (i) wanna-contraction and (ii) wh-movement. Wanna-contraction precedes wh-movement.

(16)
- a. *Wanna-contraction* (optional):
  Contract *want* and *to*, yielding *wanna*, under strict phonological adjacency.
- b. *Wh-movement* (obligatory):
  Move a wh-phrase to SpecC.

Observations:
In (15-ab), *want* and *to* are adjacent to begin with; wanna-contraction can apply without problems. In (15-cd), the ECM-subject *who* initially shows up between *want* and *to*. Wh-movement of *who* would result in feeding of wanna-contraction, but it doesn't because (by assumption) this operation applies too late: *counter-feeding*.

Note:
This presupposes that one of the following statements holds:

- There is no structural subject in control infinitives.
- There is an empty subject in control infinitives (PRO, Chomsky (1981)), which does not block phonological adjacency.
- If there is an overt subject in control infinitives, and this is deleted by Equi NP deletion (or some other rule), then this latte rule must apply early, so that it can feed wanna-contraction.

- If the movement theory of control (MTC) is adopted (Hornstein (2001), Boeckx, Hornstein & Nunes (2010)), control movement to the matrix θ-position must take place early, so that it can feed wanna-contraction.

5.2 Counter-Bleeding in Syntax: Reflexivization in Imperatives

(17) *Reflexivization in Imperatives*:

- a. *Wash you!
- b. Wash yourself!

Analysis (Perlmutter & Soames (1979) and many others, but also cf. Pullum (1979))

(18)
- a. *Principle A*:
  An anaphor is bound within its minimal clause.
- b. *Imperative subject deletion*:
  In imperatives, subjects are deleted.

Note:
Subject deletion would bleed satisfaction of Principle A, but it doesn't if Principle A applies earlier in the derivation.

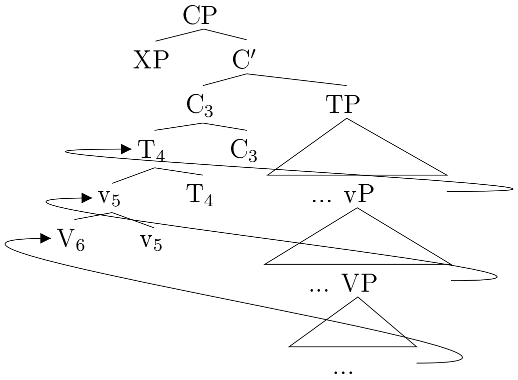
(19) *Not a complication*:
Fuck you!

Observation (Dong (1992)):
This is an epithet construction consisting of a quasi-verb and an NP (in this order); there is no imperative subject deletion.

5.3 Counter-Bleeding in Syntax: Verb-Second in Germanic

Observation (Chomsky (1986; 1991)):
Given standard assumptions about head movement as adjunction of X^0 to X^0, verb-second clauses in languages like German or Danish are opaque.
If verb-second movement is analyzed as movement ov V to T, followed by movement of the complex T+V head to C, the final output representation looks as though it should be ungrammatical: V is separated from its trace (t_V) by an intervening head (viz., the trace t_T of T). This should violate the Head Movement Constraint (Travis (1984)) or whatever derives this constraint (the Empty Category Principle (ECP) in Baker (1988), Relativized Minimality in Rizzi (1990), etc.). Problems get even worse if the predicate phrase is split up into vP and VP, and V must first move to v, which then moves to T. Thus, the Head Movement Constraint (HMC) should bleed V to C movement. However, as Chomksy notes, if the HMC (or minimality) is not checked in the final output representation, but is a constraint on the movement operation as such, then the existence of (two-step) verb-second movement is derived as a prototypical instance of counter-bleeding.

(20) *Verb-second under standard assumptions*



5.4 Counter-Bleeding in Syntax: Remnant Movement in German

Observation:
Exactly the same kind of argument can be made with remnant movement constructions (cf. Müller (1998)).

(21) *Traces within moved categories: anti-freezing with remnant movement vs. freezing effects*:

a. [$_{\mathrm{VP}_2}$ t_1 Gelesen] hat das Buch_1 keiner t_2
read has the book no-one

b. *Was_1 denkst du [$_{\mathrm{VP}_2}$ t_1 gelesen] hat keiner t_2 ?
what think you read has no-one

c. *Was_1 hat [$_{\mathrm{VP}_2}$ t_1 gelesen] keiner t_2 ?
what has read no-one

(22) a. *Condition on Extraction Domain* (CED; Huang (1982), Chomsky (1986), Browning (1987), Cinque (1990)):
(i) Movement must not cross a barrier.
(ii) An XP is a barrier iff it is not a complement.

b. *X-Criterion*:
An [X]-marked XP must show up in SpecY, where Y requires [X] (= $\mathrm{Y}_{[\bullet \mathrm{X} \bullet]}$).

(From (22-b) it follows that a [topic]-marked XP must show up in $\mathrm{SpecC}_{[\mathrm{top}]}$, a wh-phrase must show up in $\mathrm{SpecC}_{[\mathrm{wh}]}$, a [Σ]-marked XP must show up in Specv[Σ] (scrambling), etc.)

Observations:

- In (21-a), VP topicalization should bleed scrambling via the CED, but it doesn't because it applies too late – scrambling applies earlier, when VP is still in situ and the CED can be respected by extraction: counter-bleeding.
- In (21-bc), VP movement (topicalization or scrambling) blocks scrambling via the CED because it applies earlier – scrambling applies later, when VP has already undergone movement, which violates the CED: bleeding.

Question:
What determines the order of operations presupposed here?

Answer:
The order here is determined by the most basic principle of a derivational grammar, the Strict Cycle Condition, more on which later.

(23) *Strict Cycle Condition* (Chomsky (1973), Perlmutter & Soames (1979)):
Within the current cyclinc node α, a syntactic operation may not target a position that is included within another cyclic node β that is dominated by α.
(Assumption: Cyclic nodes are XPs.)

5.5 Counter-Bleeding in Syntax: Reconstruction for Principle A

Observation:
Reflexive pronouns can undergo movement, or they can occur in phrases that undergo movement. After the movement operation, they should not be able to satisfy Principle A of the binding theory.

(24) *Reconstruction*

a. dass [$_{\mathrm{DP}_{[\Sigma]}}$ sich $]_1$ der Fritz_1 gestern im Spiegel gesehen hat
that REFL the Fritz yesterday in the mirror seen has

b. [$_{\mathrm{DP}_{[\mathrm{top}]}}$ Himself $]_1$ John_1 does not really like

c. [$_{\mathrm{DP}_{[\mathrm{top}]}}$ Sich selbst $]_1$ gibt Maria_1 immer als letzte den Kaffee
REFL self gives Maria always as the last one the coffee

d. [$_{\mathrm{DP}_{[\mathrm{top}]}}$ Bücher über sich $]_1$ hat er_1 keine gelesen
books about REFL has he none read

e. [$_{\mathrm{DP}_{[\mathrm{wh}]}}$ Welche Bilder von sich $]_1$ hat die Diva gehasst ?
which books about SELF has the diva hated

f. [$_{\mathrm{DP}_{[\mathrm{wh}]}}$ Which book about $\mathrm{himself}_{1/2}$] does John_1 think that Bill_2 likes ?

(25) a. *Principle A*:
An anaphor is bound within its minimal clause.

b. *X-Criterion*:
An [X]-marked XP must show up in SpecY, where Y requires [X] (= $\mathrm{Y}_{[\bullet \mathrm{X} \bullet]}$).

Analysis:
Movement would bleed satisfaction of Principle A, but it does not if Principle A can apply earlier (e.g., because it may be an 'anywhere principle'; see Belletti & Rizzi (1988)).

(26) *Reconstruction and Anti-Reconstruction*:

a. Which claim [$_{CP}$ that John$_1$ made] was he$_1$ willing to discuss ?
b. *Which claim [$_{CP}$ that John$_1$ was asleep] was he$_1$ willing to discuss ?

Standard analysis (Lebeaux (1988), Freidin (1994), Chomsky (1995), Epstein et al. (1998), Fox (2000)):

- CP in (26-a) is an adjuct, CP in (26-b) is an argument.
- Adjuncts can be merged *late*, after wh-movement.
- This is counter-cyclic. However, the violation of the Strict Cycle Condition can be tolerated in these cases.

(27) a. *Principe C*:
An R-expression must not be c-commanded by a co-indexed item.
b. *X-Criterion*:
An [X]-marked XP must show up in SpecY, where Y requires [X] (= $Y_{[\bullet X \bullet]}$).
(Here: A wh-phrase is moved to SpecC.)
c. *Adjunct insertion*:
Adjuncts can be inserted counter-cyclically, after regular structure-building has finished.

Reconstruction: Counter-bleeding:
From this perspective, (26-b) instantiates a case of *counter-bleeding*: Wh-movement, as such, could help to avoid a violation of Principle C (as an instance of bleeding), but cannot achieve this because Principle C is checked before wh-movement (since the CP here is not an adjunct, it must be merged early); this gives rise to a reconstruction effect. (This presupposes that Principle C, unlike Principle A, is not an anywhere principle.)

Question from a representational perspective:
Why does a violation of Principle C show up here, even though there is no co-indexed c-commanding item in the structure?

Anti-reconstruction: Counter-feeding:
In contrast, (26-a) instantiates *counter-feeding*, i.e., underapplication of Principle C: Adjunct insertion would feed a violation of Principle C, but it doesn't because it takes place (or at least can take place) too late, at a stage of the derivation where the wh-phrase has already undergone movement. When it enters the structure, the adjunct is not c-commanded by *he*.

Question from a representational perspective:
Why is there no violation of Principle C, given that there is a counter-bleeding Principle C effect in other contexts?

(28) *A more fine-grained analysis*:

a. (1) Adjunct insertion; (2) Principle C; (3) X-Criterion:
*(26-a), *(26-b)
b. (1) Principle C; (2) Adjunct insertion; (3) X-Criterion:
^{ok}(26-a), *(26-b)
c. (1) Principle C; (2) X-Criterion; (3) Adjunct insertion:
^{ok}(26-a), *(26-b)
d. (1) Adjunct insertion; (2) X-Criterion; (3) Principle C:
^{ok}(26-a), ^{ok}(26-b)
e. (1) X-Criterion; (2) Adjunct insertion; (3) Principle C:
^{ok}(26-a), ^{ok}(26-b)
f. (1) X-Criterion; (2) Principle C; (3) Adjunct insertion:
^{ok}(26-a), ^{ok}(26-b)

Assumed order: (28-b) or (28-c)
Principle C applies first.
Then, X-Criterion or Adjunct insertion applies.

Side remark:
It is not clear whether the data really show what they are supposed to show. Cf. Chomsky (2004) for a different approach that does without counter-cyclic insertion of adjuncts (adjuncts are located on a different level, in quasi-three-dimensional representations); also see Fischer (2004, ch. 3 & 5) for an alternative aacount that resorts to different levels of embedding as the relevant factor.x

6. Deriving Opacity Effects from the Order of Operations in Syntax

Observation:
Both excitatory and inhibitory sequential interaction of operations can easily be captured in derivational models of grammar where all rules (more generally, building blocks) apply (or can apply) one after the other.

Challenge:
How can the order of operations be determined?

Proposals:

- extrinsic ordering
- obligatoriness vs. optionality
- specificity
- anti-specificity

- strict cyclicity
- strata/levels
- rule vocabulary
- minimal search

6.1 Extrinsic Ordering

Assumption (Chomsky & Halle (1968) on phonology; Bierwisch (1967), Wurzel (1987; 1998), Halle (1992; 1994) on morphology; Chomsky (1965), Perlmutter & Soames (1979) on syntax):
Rules can be extrinsically ordered.

(29) *Extrinsic vs. intrinsic rule ordering* (Chomsky (1965)):
   a. In some cases, the order of rules is determined intrinsically, by the makeup of the rules.
   b. In some cases, the order of rules must be determined extrinsicially, by stipulation; it follows from nothing.

Objection (Pullum (1979)):
The extrinsic/intrinsic distinction is not what is relevant. Suppose there is a universal principle determining that a rule with property A has to precede a rule with property B. Is this then an instance of extrinsic or intrinsic rule ordering?

(30) *Pullum's suggestion*:
   a. *Parochial* rule ordering is language-specific (subject to variation) and not determined by general principles.
   b. *Universal* rule ordering follows from general properties of UG.

Conclusion Koutsoudas (1966; 1973), Pullum (1979), McCawley (1998):
Massive extrinsic (or parochial) rule ordering is not really conceptually attractive; where possible, rule ordering should be made to follow from general principles.

(31) *Universally Determined Rule Application* (UDRA; Koutsoudas (1973), Pullum (1979)):
All restrictions on the application of rules are determined by universal principles.

6.2 Obligatoriness vs Optionality

(32) *Obligatory Precedence Principle* (Ringen (1972), Pullum (1979)):
Obligatory rules apply before optional rules.

Assumption (Pullum (1979):
Reflexivization is obligatory, imperative subject deletion is optional.

(33) *Reflexivization*: obligatory

   a. You kick you
   b. You kick yourself

(34) *Imperative subject deletion*: optional
   a. You go home at once!
   b. Go home at once!

6.3 Specificity

Note:
Specificity has standardly been assumed for instances of *inhibitory simultaneous* interaction of building blocks (see above); but it can be extended to *sequential* interaction.

(35) *Specificity* (Sanders (1974), Pullum (1979)):
More specific rules apply before less specific rules.
(For any representation R, which meets the structural description of each of the two rules A and B, A takes applicational precedence over B with respect to R if and only if the structural description of A properly includes the structural description of B.)

(36) *Extraposition is more specific than it-deletion*
   a. Structural description (SD) of EXTRAP: X [NP it [S that/for X]] X
   b. Structural description (SD) of ITDEL: X [NP it [S X]] X

(37) *Extraposition precedes (and bleeds) it-deletion*:
   a. *It that Purvis has been made Professor of Verbs is great
   b. It is great that Purvis has been made Professor of Verbs (extraposition)
   c. That Purvis has been made Professor of Verbs is great (it-deletion)

Observation:
Extraposition is optional, it-deletion is obligatory. Wouldn't the Obligatory Precedence Principle predict the reverse application?

Answer (Pullum (1979)):
Indeed, but the two principled are *ranked*: In the case of conflict, Specificity is respected, and the Obligatory Precedence Principle is violated.

Note:
Specicifity as a means to predict the order of operations has more recently been re-discovered in minimalist syntax for operations like Move, Merge, and Agree; see van Koppen (2005), Lahne (2012), Georgi (2012).

Criterial vs. intermediate movement steps (Georgi (2012)):

- There are two types of internal Merge: criterial internal Merge and intermediate internal Merge.

- Internal Merge may bleed Agree with a subject (e.g., anti-agreement in Berber).
- Either both types of internal Merge bleed Agree, or none of them does, or criterial internal Merge does and intermediate internal Merge does not; but the fourth possibility seems to be generally unavailable:
  - Criterial internal Merge, intermediate internal Merge > Agree
  - Agree > criterial internal Merge, intermediate internal Merge
  - Criterial internal Merge > Agree > intermediate internal Merge
  - *Intermediate internal Merge > Agree > criterial internal Merge
- Criterial internal Merge (triggered by specific features) is inherently more specific than intermediate internal Merge (triggered by general edge features).
- This predicts a universal ordering of criterial and intermediate Merge.

6.4 Anti-Specificity

Note:
Chomsky (2000) adopts the opposite view.

(38) *Anti-Specificity* (Chomsky (2000; 2001; 2005; 2008)):
More general rules apply before less general rules.

Assumption: Move is defined in terms of more general Merge
(i) Merge
(ii) Move = Merge plus Agree plus Pied Piping
(iii) (39) follows from Anti-Specificity.

(39) *Merge before Move* (Chomsky (2000), Frampton & Gutmann (1999)):
Suppose that the derivation has reached stage Σ_n, and Σ_{n+1} is a legitimate instance of Merge, and Σ'_{n+1} is a legitimate instance of Move. Then, Σ_{n+1} is to be preferred over Σ'_{n+1}.

(40) *Expletive constructions in English*:
a. There$_1$ seems [$_{\text{TP}}$ t$_1$ to be [$_{\text{PP}}$ someone$_2$ in the room]]
b. *There$_1$ seems [$_{\text{TP}}$ someone$_2$ to be [$_{\text{PP}}$ t$_2$ in the room]]

Note:
There is quite a bit of additional evidence for Merge before Move; see Frampton & Gutmann (1999), Hornstein (2001; 2009), Drummond (2011), Weisser (2013), Witkoś (2013), among others.

6.5 (Strict) Cyclicity

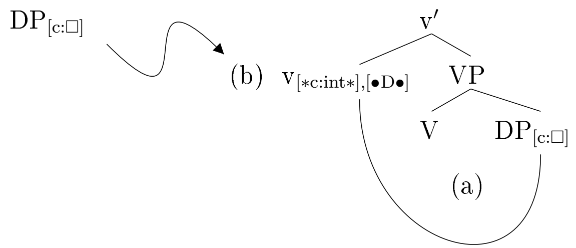
Observation (McCawley (1984; 1998)): Cyclic rule application predicts orders among operations; and the smaller the cyclic domains are, the more orders are predicted.

(41) *Cyclic Principle*:
Any operations to the cyclic domain D_x will precede any operation to the cyclic domain D_{x-1}.

Side remark:
In what sense do the Cyclic Principle and the Strict Cycle Condition (see (23)) differ? And is the latter needed at all? It has sometimes been claimed that the Strict Cycle Condition is not needed if the Cyclic Principle is adopted; see Jacobson & Neubauer (1974), Pullum (1979). However, this is not the case: A rule applying in a higher cycle may change the context for the application of a rule in a lower cycle, such that, e.g., the second rule can now apply (as part of the higher cycle). This interaction is excluded by the Strict Cycle Condition, but not by the Cyclic Principle.

Question:
What does the Cyclic Principle predict for the order of Merge and Agree in (42), where v has a subcategorization feature for external Merge of the external argument ([•D•], and a probe feature for case assignment [*c:int*] that will trigger Agree?

(42) *Stage Σ:*



Options:

- Assumption: Each phrase is a cyclic node.
  Then the Cyclic Principle does not predict any order of Merge and Agree here.
- Assumption: Each projection is a cyclic node.
  Then the Cyclic Principle may or may not predict an order Agree before Merge, depending on the exact interpretion of "operation to the cyclic domain".
  - Agree applies in v′, Merge applies in vP: Agree before Merge.
  - Agree applies in v′, Merge applies in v′ (both features are on v′): no order predicted.

6.6 Strata/Levels

Assumption:
If two rules (more generally, building blocks) are assigned to different strata, or levels, which are in a fixed order, then the two rules will also have to apply in a fixed order. See Kiparsky (1982a), Bermúdez-Otero (2008; 2011) on phonological strata; Kiparsky

(1982b) on morphological strata; Riemsdijk & Williams (1981) (e.g., Principle A applies at NP-structure, wh-movement applies at S-structure), Chomsky (1981) on syntactic levels.

A version of this proposal:
Some rules apply in core areas of a grammatical component; other rules apply at *interfaces* (before of after the core component). Pullum (1979): *Post-cyclic* (post-syntactic, phonology-oriented) operations will always be fed and bled by cyclic (genuinely syntactic) operations. *Pre-cyclic* (pre-syntactic, lexicon-oriented) operations will never be fed or bled by syntactic operations.

More recent work:
Post-syntactic operations always come too late to feed syntactic operations. Such *counter-feeding* effects have been argued for by Watanabe (2012) (on default agreement with numerals in Slavic); Embick (2000) (on deponent verbs in Latin), and Sauerland & Elbourne (2002) (on blocked scope inversion with scrambling in Japanese and German).

6.7 Rule Vocabulary

Assumption (Arregi & Nevins (2012, ch. 6)):
Assuming a Distributed Morphology approach, there are various operations that apply post-syntactically (after all regular syntactic operations) but before phonological realization: *copying*, *fission*, *dissimilation*, *impoverishment*, *metathesis*). Here the order is relevant, and it follows from how close to syntax, or close to phonology, a given post-syntactic operation is: Rules where concepts like hierarchy play a role apply before rules that mention phonological features.

6.7.1 Minimal Search

Suggestion (Chomsky (2013)):
If anything, Move should be simpler than Merge “since it requires vastly less search” because external Merge “must access the workspace of already generated objects and the lexicon”.

7. Deriving Opacity Effects from Enriched Representations: The Dark Ages, 1975–1995

Observation:
In a derivational approach, opacity effects follow in an a very simple, natural way.

Question:
How can opacity effects be derived in a strictly *representational* approach where rule order plays no (or at least not a big) role?

Standard strategy:

Representations are enriched with abstract material that encodes (what would otherwise qualify as) earlier derivational steps.

- Phonological opacity: *turbid phonology* (Goldrick (2000)), *virtual phonology* (Bye (2001)), *coloured containment* (Oostendorp (2006; 2007), Trommer (2011)).
- Syntactic opacity:
  - *traces*, including intermediate traces (Chomsky (1977; 1981; 1986), Fiengo (1977), Lasnik & Saito (1984) Gazdar (1981), Gazdar et al. (1985), Pollard & Sag (1994), Levine & Sag (2003), Grimshaw (1997), Legendre et al. (1998)
  - *copies* (Chomsky (1995))
  - *empty pronominal elements* (*pro*, Chomsky (1982), Rizzi (1986); PRO (Chomsky (1981))

Syntax vs. phonology:
These abstract items can sometimes independently be motivated in syntax, less so in phonology: *semantic interpretation* (as a variable).

7.1 Simple Cases

(43) *Counter-bleeding with reflexivization and imperative subject ‘deletion’*:
pro Wash yourself!

(44) *Counter-feeding in wanna-contraction constructions: control vs. exceptional case marking*
a. Who$_1$ do you want PRO to meet t$_1$?
b. Who$_1$ do you wan-PRO-na meet t$_1$?
c. Who$_1$ do you want t$_1$ to meet Mary ?
d. *Who$_1$ do you wan-t$_1$-na meet Mary ?

Stipulation (Chomsky (1981)):
Traces block adjacency of *want* and *to*, PRO for some reason does not.

7.2 More Complex Cases

Note:
In other cases, deriving opacity effects in syntax by enriching representations is not as straightforward because it does not suffice to postulate abstract elements; there also have to be *special constraints* or *mechanisms* that refer to them, and these constraints do not qualify as good from a minimalist point of view.

(45) *A conceptual problem*:
The *effects* of constraint interaction are integrated into the definition of a single constraint, which makes this constraint extremely implausible.

7.2.1 First Case: Reconstruction

(46) *Principle A* (revised):
At S-structure, an anaphor is chain-bound in its binding domain.

(47) *Chain-Binding* (Barss (n.d.)): α chain-binds β iff (a), (b), and (c) hold:
a. α and β are co-indexed.
b. α occupies an A-position.
c. (i) α c-commands β, or
(ii) α c-commands a trace of γ, where $\gamma = \beta$ or γ dominates β.

Note:
The concept of *chain accessibility sequences* Barss (1986)) which extends the chain binding proposal is even more complex.

7.2.2 Second Case: Remnant Movement

Problem:
In output representations, a trace may or may not be included in a moved item (with its antecedent outside), depending on whether the trace is bound or unbound. This will have to be reflected in the representational constraint.

(48) *Freezing and anti-freezing*:
At S-structure, a bound trace t may not be included in a moved XP if the antecedent of t is excluded by XP; an unbound trace may be includedd in a moved XP even though the antecedent of t is excluded by XP.

7.2.3 Third Case: Head Movement

Claim:
Solving the locality problem with iterated head movement in a purely representational approach requires either additional abstract objects and mechanisms (like index percolation; Baker (1988), Brody (1995; 2002)), or a radically different approach to head movement (see Roberts (2010)).

7.3 Conclusions

- First, empty categories are dubious from a minimalist perspective if they are conceived of as items that specific constraints refer to (see Chomsky's (1981) Empty Category Principle (ECP), or the licensing conditions for *pro* in Rizzi (1986) (vs. Holmberg (2005))).
- Second, constraints that explicitly model effects of the interaction with other constraints are even more dubious.
- Third, it turns out that there are instances of opacity in syntax which cannot be addressed by simply enriching output representations, and having more complex constraints refer to that:
  - counter-feeding effects involving anti-reconstruction, derived by late adjunct insertion;

  - counter-bleeding effects involving (i) CP-pied piping, (ii) relative operator movement and (iii) CP reconstruction, as analyzed in Lechner (2010) (a *Duke-of-York* derivation; Pullum (1976), McCarthy (2003));
  - counter-bleeding effects involving Merge and Agree on the vP and TP level (Müller (2009), Assmann et al. (2012), and next lecture)

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