Constraints in Syntax

[2] Classic Constraints

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1. Introduction

Observation:
In addition to the lexicon and structure-building operations, a derivational approach to syntax along the lines sketched in [1] crucially relies on constraints. There are various constraint types. Most importantly, constraints can be *local* or *non-local*.

(1) *Constraint types*:
   a. A local *derivational* constraint (Con^d) applies to syntactic (Merge or Move) operations.
   b. A local *representational* constraint (Con^r) ("filter") applies to an output representation.
   c. A *global* constraint (Con^g) applies to a whole derivation; it correlates non-adjacent steps in the derivation.
   d. A *translocal* constraint (Con^{tl}) applies to sets of output representations; it picks out an optimal output representation among competing output representations.
   e. A *transderivational* constraint (Con^{td}) applies to sets of derivations; it picks out an optimal derivation among competing derivations.

(2) *Complexity of constraint types*:
   derivational constraints, representational constraints $<$ global constraints $<$ translocal constraints $<$ transderivational constraints

Strategy:
If constraint C_1 and constraint C_2 can account for a given phenomenon in the same way and C_1 is less complex than C_2 then, other things being equal, choose C_1.

Note:
This strategy does not imply that transderivational, translocal, or global constraints should be abandoned.

A meta-constraint on constraints:
Constraints should be as general as possible.

Observation 1:
Most of the constraints used so far are derivational constraints (see, e.g., the *Economy Con-*

straint on Merge, or the *Linearization Constraint on Merge*).

(3) *Economy Constraint on Merge*^{d}:
Merge can only apply if it deletes the highest-ranked selectional feature of a LI.

(4) *Linearization Constraint on Merge*^{d}:
The output of Merge in language L_i must conform to the linear precedence statements of L_i.

Observation 2:
In contrast, the *Interpretability Condition* is a representational constraint: It prohibits uninterpretable features in the final output representation, but not during the derivation (where such features are in fact essential).

(5) *Interpretability Condition*^{r}:
Features on LIs that are uninterpretable at level R_i must be removed at level R_{i-1}.

However, this presupposes that we know in the syntax which features are semantically interpretable, and which ones are not. This assumption is not innocuous; but if there is good reason to abandon it, then we end up with the result that the Interpretability Condition is a much more complex constraint, viz., a global constraint that takes into account aspects of the derivation that are post-syntactic (i.e., semantic).

Observation 3:
The constraint *Timing of Feature Deletion* (aka "Earliness") is not a local derivational constraint, a local representational constraint, or a global constraint. To find out whether this constraint is respected by a derivation or not, one has to compare it with other derivations: A derivation respects (6) if, among a class of competing derivations that need to be defined appropriately (e.g., in terms of the same LA), the deletion of a given feature occurs at the earliest step. Suppose, e.g., that derivations D_1, D_2, D_3 and D_4 compete, and a feature F is deleted in step 3 of D_1, step 4 of D_2, step 6 of D_3, and step 9 of D_4. Then, only D_1 respects Timing of Feature Deletion.

(6) *The Timing of Feature Deletion*^{td}:
Uninterpretable features are deleted as soon as possible.

Question:
What kind of constraint is the Inclusiveness Condition?

(7) *Inclusiveness Condition*:
Material that is not part of the lexical array (other LIs, additional features) is inaccessible throughout a derivation.

Answer:
The Inclusiveness Condition should best be viewed not as a syntactic constraint at all; rather, it is a meta-constraint grammars, i.e., a hypothesis about the nature of syntactic operations.

(That said, the Inclusiveness Condition *could* in principle be viewed as a local derivational constraint that restricts every Merge or Move operation.)

2. Movement to SpecC

2.1. Wh-Movement

2.1.1. Embedded Clauses

Problem:
So far, a sentence like (8) cannot be generated:

(8) *Embedded wh-questions in English*:
I wonder what she read

Solution:
A [+wh] C item in English requires movement of a *wh*-phrase in *wh*-questions. It has a selectional feature [*Q*] that must be deleted under identity with a *wh*-phrase bearing a [Q]-feature in SpecC. (The [Q]-feature of *wh*-phrases is often called [wh]-feature. To avoid ambiguity – cf. the relation between V and C on the one hand, the relation between C and D on the other –, the two features are distinguished here.)

(9) *LA of (8)*:
- a. read: { [V], [3pers,–pl,+fem], [+fin,+past], [*D*] > [*D*], [*acc*] }
- b. she: { [D], [3pers,–pl,+fem], [nom] }
- c. what: { [D], [3pers,–pl,–fem,–masc], [acc], [Q] }
- d. Ø: { [T], [3pers,–pl,+fem], [+fin,+past], [*V*,*+fin*,*+past*] > [*nom*] }
- e. Ø: { [C], [+wh], [+fin], [*T*,*+fin*] > [*Q*].
- f. I: { [D], [1pers,–pl,+masc], [nom] }
- g. wonder: { [V], [1pers,–pl,+masc], [+fin,–past], [*C*,*+wh*] > [*D*] }
- h. Ø: { [T], [1pers,–pl,+masc], [+fin,–past], [*V*,*+fin*,*–past*] > [*nom*] }
- i. Ø: { [C], [root], [–wh], [+fin], [*T*,*+fin*].

(10) *Derivation of (8)*:
- a. Merge ($[_V$ read], $[_D$ what]) → $[_{VP}$ $[_V$ read] $[_{DP}$ what]]
- b. Merge ($[_D$ she], $[_{VP}$ $[_V$ read] $[_{DP}$ what]]) → $[_{VP}$ $[_{DP}$ she] $[_{V'}$ $[_V$ read] $[_{DP}$ what]]]
- c. Merge ($[_T$ Ø], $[_{VP}$ $[_{DP}$ she] $[_{V'}$ $[_V$ read] $[_{DP}$ what]]])
  → $[_{TP}$ $[_T$ Ø] $[_{VP}$ $[_{DP}$ she] $[_{V'}$ $[_V$ read] $[_{DP}$ what]]]]
- d. Move ($[_{DP}$ she], $[_{TP}$ $[_T$ Ø] $[_{VP}$ $[_{DP}$ she] $[_{V'}$ $[_V$ read] $[_{DP}$ what]]]])
  → $[_{TP}$ $[_{DP_1}$ she] $[_{T'}$ $[_T$ Ø] $[_{VP}$ t_1 $[_{V'}$ $[_V$ read] $[_{DP}$ what]]]]]
- e. Merge ($[_C$ Ø], $[_{TP}$ $[_{DP_1}$ she] $[_{T'}$ $[_T$ Ø] $[_{VP}$ t_1 $[_{V'}$ $[_V$ read] $[_{DP}$ what]]]]])
  → $[_{CP}$ $[_C$ Ø] $[_{TP}$ $[_{DP_1}$ she] $[_{T'}$ $[_T$ Ø] $[_{VP}$ t_1 $[_{V'}$ $[_V$ read] $[_{DP}$ what]]]]]]

f. Move ([$_{DP}$ what],
[$_{CP}$ [$_{C}$ Ø] [$_{TP}$ [$_{DP_1}$ she] [$_{T'}$ [$_{T}$ Ø] [$_{VP}$ t_1 [$_{V'}$ [$_{V}$ read] [$_{DP}$ what]]]]]])
→ [$_{CP}$ [$_{DP_2}$ what] [$_{C'}$ [$_{C}$ Ø] [$_{TP}$ [$_{DP_1}$ she] [$_{T'}$ [$_{T}$ Ø] [$_{VP}$ t_1 [$_{V'}$ [$_{V}$ read] t_2]]]]]]

g. Merge ([$_{V}$ wonder],
[$_{CP}$ [$_{DP_2}$ what] [$_{C'}$ [$_{C}$ Ø] [$_{TP}$ [$_{DP_1}$ she] [$_{T'}$ [$_{T}$ Ø] [$_{V'}$ t_1 [$_{VP}$ [$_{V}$ read] t_2]]]]]])
→ [$_{VP}$ [$_{V}$ wonder] [$_{CP}$ [$_{DP_2}$ what] [$_{C'}$ [$_{C}$ Ø] [$_{TP}$ [$_{DP_1}$ she] [$_{T'}$ [$_{T}$ Ø] [$_{VP}$ t_1 [$_{V'}$ [$_{V}$ read] t_2]]]]]]]

... → [$_{CP}$ [$_{C}$ Ø] [$_{TP}$ [$_{DP_3}$ I] [$_{T'}$ [$_{T}$ Ø] [$_{VP}$ t_3 [$_{V'}$ [$_{V}$ wonder] [$_{CP}$ [$_{DP_2}$ what] [$_{C'}$ [$_{C}$ Ø] [$_{TP}$ [$_{DP_1}$ she] [$_{T'}$ [$_{T}$ Ø] [$_{VP}$ t_1 [$_{V'}$ [$_{V}$ read] t_2]]]]]]]]]]

(11) *More complex wh-phrases*:
Which book will she buy ?

(12) *Partial LA of (11)*:
a. which: { [D], [3pers,–pl,–fem,–masc], [acc], [Q], [*N*] }
b. book: { [N], [3pers,–pl,–fem,–masc], [acc] }

2.1.2. Root Clauses

Problem:
Root clauses pose an additional problem. There are two Move operations to the C domain: The *wh*-phrase moves as before; in addition, a finite auxiliary or modal verb is fronted. (Movement of a finite main verb is impossible in this context; cf. **What said she?*. In this case, a dummy auxiliary *do* must be inserted: *What did she say?*; this is called "do-support".)

(13) What has she said ?

Assumption:
There are two types of movement:
(i) XP movement = movement of a maximal projection to a specifier position.
(ii) X (head) movement = movement of a minimal projection (= a LI) to a LI position, via *adjunction* to the LI.

(14) *Intended structure of (13)*:
[$_{CP}$ [$_{DP_2}$ what] [$_{C}$ [$_{T_3}$ has] [$_{C}$ Ø]] [$_{TP}$ [$_{DP_1}$ she] [$_{T'}$ t_3 [$_{VP}$ t_1 [$_{V'}$ [$_{V}$ said] t_2]]]]]

Note:
So far, it has been (more or less tacitly) assumed that only maximal projections can be moved. Given that head movement also exists, further assumptions must be made.

(15) *XP vs. X movement*:
a. A feature [*F*] can only trigger XP movement.
b. A feature [*F-LI*] can only trigger movement of a LI.

(16) *Structure Preservation Principle*:

a. XP movement ends up in a specifier position.
b. LI movement ends up in an adjunction position of another LI.

Assumption:
A root C bearing [*Q*] has a [*T-LI*] feature that also triggers movement of the auxiliary.

(17) *LA of (13)*:
a. said: { [V], [–fin,+part], [*D*] > [*D*], [*acc*] }
b. she: { [D], [3pers,–pl,+fem], [nom] }
c. has: { [T], [3pers,–pl,+masc], [+fin,+past], [*V*,*–fin*,*+part*] }
d. what: { [D], [3pers,–pl,–fem,–masc], [acc], [Q] }
e. Ø: { [C], [root], [+wh], [+fin], [*T*,*+fin*] > [*T-LI*] > [*Q*].

Note:
So far, it is only predicted that an empty [+wh] C element requires movement of a bare T. It does not yet follow that T is phonologically empty when a local *wh*-subject is moved, and is realized by an appropriate form of *do* otherwise. (And an attempt to account for this will not be made here.)

Question:
Can it be ensured that C in (17-e) never triggers two Merge operations with separate T LIs, rather than Merge with TP and Move of T?

Answer:
This follows from the assumption that there cannot be more than one T element per clause. Incidentally, similar questions arise with movement to SpecT and SpecC.

2.2. Topicalization

Observation:
Topicalization is similar to *wh*-movement, but it is movement to a [–wh] SpecC position. It is not accompanied by head movement in English.

(18) *Topicalization in English*:
a. [$_{CP}$ John$_1$ C [$_{TP}$ she does not really like t$_1$]]
b. I think that [$_{CP}$ John$_1$ C [$_{TP}$ she does not really like t$_1$]]

Note:
Topicalization systematically goes hand in hand with movement of the finite verb to C in German, Dutch, and the Scandinavian languages:

(19) *Topicalization in German*:
a. [$_{CP}$ Den Fritz$_1$ mag$_2$ [$_{TP}$ sie sehr t$_1$ t$_2$]]
ART Fritz$_{acc}$ likes she$_{nom}$ much

b. Ich glaube [$_{CP}$ den Fritz$_1$ mag$_2$ [$_{TP}$ sie sehr t_1 t_2]]
I think ART Fritz$_{acc}$ likes she$_{nom}$ much

Note:
German has linear precedence statements that are different from those of English. In particular, V (and perhaps T) heads follow their specifiers *and* their complements.

(20) *Verb-final VPs in German*:

a. ... dass Fritz Maria mag
that Fritz$_{nom}$ Maria$_{acc}$ likes

b. Den Fritz$_1$ hat$_2$ sie sehr t_1 gemocht t_2
ART Fritz$_{acc}$ has she$_{nom}$ much liked

Analysis:
Topicalization is triggered by a [*top*] feature on C and a corresponding [top] feature on some other XP. C is always marked [*V-LI*,*+fin*] in German if it bears the feature [root] (the *verb-second* effect). (Assumption: Auxiliaries and modals are also [V] in German.)

2.3. Relativization

Observation:
Relativization is similar to *wh*-movement and topicalization; it moves a relative pronoun (or relative phrase) to SpecC. The relative clause itself is a modifier of an N; it follows N.

(21) *Relativization*:

a. I know [$_{DP}$ a man [$_{CP}$ who$_1$ C [$_{TP}$ t'_1 T [$_{VP}$ t_1 likes cars]]]]
b. She likes [$_{DP}$ the book [$_{CP}$ which$_2$ John gave her t_2]]

Analysis:
(i) A relative pronoun (D) has the feature [rel].
(ii) The head of a relative clause (C) has the feature [*rel*].

3. The A-over-A Principle

(22) *A-over-A Principle*[d] (Chomsky (1964)):
In a structure ... [$_A$ ... [$_A$ ...] ...] ..., an operation can only affect the higher, more inclusive category A.

Note:
The A-over-A Principle is a local derivational constraint. To find out whether a given derivation respects it or not, each (Move) operation must be checked, by taking into account the phrase marker constructed so far.

(23) *A first consequence of the A-over-A Principle*:

a. [$_{DP_1}$ My letter to [$_{DP_2}$ a friend in Italy]] got lost

b. *[$_{DP_2}$ Who] did [$_{DP_1}$ my letter to t_2] get lost ?
c. [$_{DP_1}$ Which letter to [$_{DP_2}$ a friend in Italy]] got lost?
d. *John is the friend [$_{DP_2}$ who] C [$_{DP_1}$ my letter to t_2] got lost
e. This is the letter [$_{DP_1}$ which] t_1 got lost

(24) *Another consequence of the A-over-A Principle*:
a. John heard [$_{DP_1}$ a rumour that you had read [$_{DP_2}$ this book]]
b. *[$_{DP_2}$ What] did John hear [$_{DP_1}$ a rumour that you had read t_2]] ?
c. [$_{DP_1}$ Which rumour that you had read [$_{DP_2}$ this book]] did John hear ?
d. *This is a book [$_{DP_2}$ which] John heard [$_{DP_1}$ a rumour that you had read t_2]
e. This a rumour [$_{DP_1}$ which] John heard t_1

Note:
The A-over-A Principle can be reformulated as a representational constraint on outputs.

(25) *A-over-A Principle*^{r} (representational version):
*... A_2 ... [$_{A_1}$ ... t_2 ...] ...] ...

Note:
Crucially, this formulation relies on the existence of traces, and this is in fact one of the two main reasons why one would want to postulate traces in the first place (the other main reason being that traces are relevant for semantic interpretation).

Motivating traces:
Traces are needed by representational constraints.

Problem:
The A-over-A Principle is too strong and too weak. The first problem is potentially severe; the second problem makes the A-over-A Principle look less plausible.

(26) *Well-formed DP-over-DP examples ruled out by the A-over-A Principle*:
a. [$_{DP_2}$ Who would you approve of [$_{DP_1}$ my seeing t_2]] ?
b. [$_{DP_2}$ Which author] did you read [$_{DP_1}$ a book about t_2] ?

(27) *Well-formed CP-over-CP examples ruled out by the A-over-A Principle*:
a. John wouldn't say [$_{CP_1}$ that Mary thinks [$_{CP_2}$ that Bill is nice]]
b. [$_{CP_2}$ That Bill is nice] John wouldn't say [$_{CP_1}$ that Mary thinks t_2]
c. Fritz hat behauptet [$_{CP_1}$ Maria würde denken [$_{CP_2}$ dass er nett ist]]
Fritz$_{nom}$ has claimed Maria$_{nom}$ would think that he nice is
d. [$_{CP_2}$ Dass er nett ist] hat Fritz behauptet [$_{CP_1}$ würde Maria denken t_2]

(28) *Well-formed VP-over-VP (-over VP) examples ruled out by the A-over-A Principle*:
a. Fritz hat [$_{VP_1}$ [$_{VP_2}$ zu arbeiten] versucht]
Fritz$_{nom}$ has to work tried

b. [$_{VP_2}$ Zu arbeiten] hat Fritz [$_{VP_1}$ t_2 versucht]
to work has Fritz$_{nom}$ tried

c. [$_{VP_1}$ [$_{VP_2}$ Zu arbeiten] versucht] hat Fritz t_1
to work tried has Fritz$_{nom}$

d. Ich [$_{V_3}$ denke] nicht [$_{VP_0}$ t_3 [$_{CP}$ dass er [$_{VP_1}$ [$_{VP_2}$ zu arbeiten] versucht] hat]]
I think not that he to work tried has

e. ?[$_{VP_1}$ [$_{VP_2}$ Zu arbeiten] versucht] denke ich nicht [$_{VP_0}$ t_4 [$_{CP}$ dass er t_1 hat]]
to work tried think I not that he has

f. ?[$_{VP_2}$ Zu arbeiten] denke ich nicht [$_{VP_0}$ t_4 [$_{CP}$ dass er [$_{VP_1}$ t_2 versucht] hat]]
to work think I now that he tried has

(29) *An ill-formed example not ruled out by the A-over-A Principle – AP movement from DP*:

a. You have [$_{DP_1}$ a [$_{AP_2}$ very intelligent] sister]

b. [$_{DP_1}$ [$_{AP_2}$ How intelligent] a t_2 sister] do you have ?

c. *[$_{AP_2}$ How intelligent] do you have [$_{DP}$ a t_2 sister] ?

(30) *Another ill-formed example not ruled out by the A-over-A Principle – DP movement from PP ('preposition stranding')*:

a. Sie spielt [$_{PP_1}$ mit [$_{DP_2}$ dem grünen Auto]]
she plays with the green car

b. [$_{PP_1}$ Mit [$_{DP_2}$ welchem Auto]] spielt sie t_1 ?
with which car plays she

c. *[$_{DP_2}$ Welchem Auto] spielt sie [$_{PP_1}$ mit t_2] ?
which car plays she with

d. [$_{PP_1}$ Mit [$_{DP_2}$ dem grünen Auto]] spielt sie t_1
with the green car plays she

e. *[$_{DP_2}$ Diesem Auto] spielt sie [$_{PP_1}$ mit t_2]
this car plays she with

Outlook: the future:
The A-over-A Principle is formulated in terms of categorial features. The selectional features triggering movement that have been adopted so far ([*D*]/[*nom*], [*Q*], [*top*], [*rel*]) are not (necessarily) categorial, though. What would happen if the A-over-A Principle were revised as an F-over-F Principle?

(31) *F-over-F Principle*[d]:
In a structure $\alpha_{[*F*]}$... [$_{\beta_{[F]}}$ ... [$_{\gamma_{[F]}}$ ...] ...] ..., movement to [$_{*F*]}$ can only affect the category bearing the [F] feature that is closer to [*F*].

Note:
This is in fact (a subcase of) a constraint that is widely adopted in most recent versions of the minimalist program (see below).

Back to the sixties:
In reaction to Chomsky's A-over-A Principle, Ross (1967) developed a theory of *islands*, i.e., categories that are opaque for movement.

4. The Complex NP Constraint

(32) *Complex NP Constraint*^{d} (Ross (1967)):
No element contained in a CP dominated by a DP may be moved out of that DP.

Note on terminology:
It was a standard assumption until the late eighties that NP dominates DP, not DP NP, as assumed here (and in most current work). Hence, the original Complex NP Constraint is a constraint on movement from NP, not from DP. The constraint is still known under its original name, which is therefore also adopted here, even though "Complex DP Constraint" might be more appropriate. The Complex NP Constraint accounts for some of the data that motivated the A-over-A Principle.

(33) *A consequence of the Complex NP Constraint, relative clauses*:
a. *[$_{DP_1}$ Which book] did John meet [$_{DP_2}$ a child [$_{CP}$ who read t_1]] ?
b. *[$_{DP_1}$ Who] does Mary know [$_{DP_2}$ a girl [$_{CP}$ who is jealous of t_1]] ?

(34) *A consequence of the Complex NP Constraint, argument clauses* (see (24-b)):
a. ??[$_{DP_1}$ Which book] did John hear [$_{DP_2}$ a rumour [$_{CP}$ that you had read t_1]] ?
b. *[$_{PP_1}$ How] did John hear [$_{DP_2}$ a rumour [$_{CP}$ that you had fixed the car t_1]] ?
c. ?*The hat [$_{DP_1}$ which] I believed [$_{DP_2}$ the claim [$_{CP}$ that Otto was wearing t_1]] is red

Note:
Movement from argument clauses (selected categories) in complex DPs typically yields much better results than movement from relative clauses (non-selected, modifier categories). However, this does not hold for movement of modifiers themselves, which is completely impossible throughout (see (34-a) vs. (34-b)).

(35) *Complex NP Constraint*^{r} (representational version):
*... α_1 ... [$_{DP}$ ... [$_{CP}$ ... t_1 ...]] ...

5. The Sentential Subject Constraint

(36) *Sentential Subject Constraint*^{d} (Ross (1967)):
No element dominated by a CP may be moved out of that CP if that CP is a subject.

(37) *A consequence of the Sentential Subject Constraint*:
a. [$_{DP_1}$ Who] did the reporters expect [$_{CP}$ that the principal would fire t_1] ?
b. *[$_{DP_1}$ Who] was [$_{CP}$ that the principal would fire t_1] expected by the reporters ?

c. *[$_{DP_1}$ Who] did [$_{CP}$ that Mary was going out with t_1] bother you ?

(38) *Sentential Subject Constraint*^{r} (representational version):
*... α_1 ... [$_{CP}$ ... t_1 ...] ... if CP is a subject.

Note:
Given the terminology adopted so far, "subject" means "element in SpecT". However, movement to SpecT is triggered by [*nom*]. Does that mean that CPs actually bear abstract [nom] Case, so that the can move to SpecT if they are external arguments? If one does not want to make that assumption, the following options are available:
(i) The notion of subject is replaced by the notion of external argument in the formulation of the Sentential Subject Constraint; CPs are never in SpecT (they may be in VP or undergo topicalization).
(ii) CPs are in fact embedded by empty DPs that have abstract Case (compare Kiparsky & Kiparsky (1970)).

6. Subject Condition

Note:
The Sentential Subject Constraint can be generalized: DP subjects are also islands, even if they do not qualify as complex in the sense of the Complex NP Constraint.

(39) *Subject Condition*^{d} (Chomsky (1973), Huang (1982), Chomsky (1986), Freidin (1992)):
No element may be moved out of a subject.

(40) *Subject Condition* (see (23)):
a. *[$_{DP_2}$ Who(m)] has [$_{DP_1}$ a comment about t_2] annoyed you ?
b. *[$_{PP_3}$ About whom] has [$_{DP_1}$ a comment t_3] annoyed you ?

(41) *Subject Condition*^{r} (representational version):
*... α_1 ... [$_\beta$ ... t_1 ...] ... if β is a subject.

7. The Coordinate Structure Constraint

(42) *Coordinate Structure Constraint*^{d} (Ross (1967)):
In a coordinate structure, no conjunct may be moved, nor may any element contained in a conjunct be moved out of that conjunct.

(43) *A consequence of the Coordinate Structure Constraint – movement from a conjunct*:
a. John is [$_{AP}$ proud of [$_{DP_1}$ his father]] and [$_{AP}$ tired of [$_{DP_2}$ his mother]]
b. *[$_{DP_1}$ Who] is John [$_{AP}$ proud of t_1] and [$_{AP}$ tired of [$_{DP_2}$ his mother]] ?
c. *[$_{DP_2}$ Who] is John [$_{AP}$ proud of [$_{DP_1}$ his father]] and [$_{AP}$ tired of t_2] ?

Note:
It is not quite clear what the phrase structure of coordination looks like. An assumption that is sometimes made is that *and* is the head of a "coordination phrase", and this would get the word order facts right; but it also raises several problems. E.g.: What about coordinations with three conjuncts: α, β, and γ? If *and* is the head, how can the categorial features (like [A] in (43)) be visible for the selecting head (*is* bearing [*A*] in (43)?)

(44) *A second consequence of the Coordinate Structure Constraint – movement of a conjunct*:
   a. John likes [$_{DP_1}$ Mary] and [$_{DP_2}$ Bill]
   b. *[$_{DP_1}$ Who] does John like t_1 and [$_{DP_2}$ Bill] ?
   c. *[$_{DP_2}$ Who] does John like [$_{DP_1}$ Mary] and t_2 ?

(45) *Coordinate Structure Constraint*^{r} (representational version):
*... α_1 ... [$_\beta$ ... t_1 ...] ..., where β is a coordinate structure.

Note:
This presupposes that a coordinate structure is a constituent. Indeed, it can be moved:

(46) *Coordinate structures are constituents*:
   a. [$_{DP_1}$ Mary] and [$_{DP_2}$ Bill] are t in the garden
   b. [$_{DP_1}$ Mary] and [$_{DP_2}$ Bill], John does not really like t

Note:
There is an interesting exception to the Coordinate Structure Constraint: If movement simultaneously affects both conjuncts, the Coordinate Structure Constraint does not hold. This is known as *Across-the-board rule application*. (See Ross (1967), Williams (1978), Gazdar (1981)).

(47) *Across-the-Board rule application*:
   a. I wonder [$_{CP}$ [$_{DP_1}$ which books] John hates t_1 and Mary likes t_1
   b. I know a man [$_{CP}$ [$_{DP_1}$ who] John [$_{VP}$ saw t_1] and [$_{VP}$ liked t_1]]
   c. The doctor [$_{CP}$ [$_{DP_3}$ who] [$_{TP_1}$ John worked for t_3] and [$_{TP_2}$ Mary relied on t_3]] died

Problem:
It remains unclear how Across-the-board movement (two sources, one moved item) can be accounted for in the incremental approach adopted here.

8. The Upward Boundedness Constraint

Assumption:
Rightward movement (*extraposition*, *heavy NP (DP) shift*) exists. It is typically optional. (Some – optional – [*F*] features can only be deleted by movement to a right-peripheral

specifier.)

(48) *Rightward movement*:

a. [$_{DP}$ The claim t_1] was refuted [$_{CP_1}$ that all languages are context-free]

b. John [$_{VP}$ returned t_1 [$_{PP}$ to the library]] [$_{DP_1}$ all the books [$_{CP}$ which he had borrowed]]

c. [$_{DP}$ A review t_1] came out yesterday [$_{PP_1}$ of this article]]

(49) *Upward Boundedness Constraint*^{d} (Ross (1967)):
No element that is moved rightward may be moved out of the next higher CP.

(50) *Upward Boundedness Constraint*^{r} (representational version):
*... [$_{CP}$ ... t_1 ...] ... α_1 ...

Note:
This constraint is also known as the *Right Roof Constraint* (see, e.g., Perlmutter & Soames (1979)).

(51) *A consequence of the Upward Boundedness Constraint*:

a. [$_{CP_0}$ It is catastrophic [$_{CP_1}$ that [$_{DP_2}$ a review [$_{PP_3}$ of this article]] came out yesterday]]

b. [$_{CP_0}$ [$_{CP_1}$ That [$_{DP_2}$ a review [$_{PP_3}$ of this article]] came out yesterday] is catastrophic]

c. [$_{CP_0}$ [$_{CP_1}$ That [$_{DP_2}$ a review t_3] came out yesterday [$_{PP_3}$ of this article]] is catastrophic]

d. *[$_{CP_0}$ [$_{CP_1}$ That [$_{DP_2}$ a review t_3] came out yesterday] is catastrophic] [$_{PP_3}$ of this article]

(52) *Another consequence of the Upward Boundedness Constraint*:

a. [$_{CP_0}$ Fritz denkt [$_{CP_1}$ dass Antje [$_{DP_2}$ den Versuch [$_{CP_3}$ mit fünf Bällen zu
Fritz thinks that Antje the attempt with five balls to
jonglieren]] aufgegeben hat] [$_{CP_4}$ weil er sie nicht mehr sieht]]
juggle given up has because he her not anymore sees

b. [$_{CP_0}$ Fritz denkt [$_{CP_1}$ dass Antje [$_{DP_2}$ den Versuch t_3] aufgegeben hat] [$_{CP_3}$ mit
Fritz thinks that Antje the attempt given up has with
fünf Bällen zu jonglieren] [$_{CP_4}$ weil er sie nicht mehr sieht]]
five balls to juggle because he her not anymore sees

c. *[$_{CP_0}$ Fritz denkt [$_{CP_1}$ dass Antje [$_{DP_2}$ den Versuch t_3] aufgegeben hat] [$_{CP_4}$
Fritz thinks that Antje the attempt given up has
weil er sie nicht mehr sieht] [$_{CP_3}$ mit fünf Bällen zu jonglieren]]
because he her not anymore sees with five balls to juggle

9. The Left Branch Condition

(53) *Left Branch Condition*^{d} (Ross (1967)):
The leftmost item of an NP cannot be moved out of that NP.

(54) *Left Branch Condition*^{r} (representational version):
*... α_1 ... [$_{NP}$ t_1 ... N ...] ...

Note:
Like the Complex NP Constraint, the original Left Branch Condition presupposes a structure of nominal XPs that differs from the one adopted here, viz., (55-b) (where NP dominates DP) rather than (55-a) (where DP dominates NP), as assumed here and in most current literature.

(55) *DP vs. NP*:
a. [$_{DP}$ D [$_{NP}$ ... N ...] ...]
b. [$_{NP}$ [$_{DP}$ D] ... N ...]

(56) *A consequence of the Left Branch Condition under (55-b)*:
a. *[$_{DP_1}$ Which] did you buy [$_{NP}$ t_1 books] ?
b. *[$_{DP_1}$ Whose] did you meet [$_{NP}$ t_1 sister] ?

Note:
It seems that the Left Branch Condition is needed to rule out (56-a) only if structure (55-b) is adopted. If we assume structure (55-a), the prohibition against movement of *which* will not be needed because (a) the [*Q*] feature that triggers *wh*-movement does not permit head (LI) movement of D, and (b) if the whole DP moves, it has to carry the NP along. (Similar conclusions apply in the case of (56-b) if *whose* does not (fully) occupy SpecD – e.g., if *whose* is analyzed as *who* in SpecD plus *'s* in D.)

However:
The Left Branch Condition rules out sentences like (57-b) under either (55-b) or (55-a) if we understand "leftmost item" as "leftmost phonologically visible item".

(57) *A further consequence of the Left Branch Condition*:
a. Hans hat [$_{DP}$ D [$_{NP}$ [$_{AP_1}$ neue] Bücher]] gekauft
Hans has new books bought
b. *[$_{AP_1}$ Neue] hat Hans [$_{DP}$ D [$_{NP}$ t_1 Bücher]] gekauft
new has Hans books bought

Note:
Ross noted that there are Left Branch Condition violations in a number of languages; see, e.g., (58). Given (55-b), one can then simply assume that the Left Branch Condition does not hold in these languages; but it is a priori unclear how to reconcile the very existence of data such as those in (58) with the structure in (55-a).

(58) *Left Branch Condition violations in Russian*:

a. $[_{NP_1}\ [_{DP_2}$ Čju] $[_N$ knigu]] ty čitaeš' t_1 ?
whose book you read

b. $[_{DP_2}$ Čju] ty čitaeš' $[_{NP_1}\ t_2\ [_N$ knigu]] ?
whose you read book

Note:
The Left Branch Condition can be generalized. This accounts for more data, but it also raises more problems.

(59) *Generalized Left Branch Condition*^{d} (Ross (1967), Gazdar (1981)):
The leftmost item of an XP cannot be moved out of that XP.

(60) *Generalized Left Branch Condition effects, APs*:

a. $[_{AP_1}\ [_{XP_2}$ How] sane] is John t_1 ?
b. *$[_{XP_2}$ How] is John $[_{AP_1}\ t_2$ sane] ?
c. $[_{AP_1}\ [_{XP_2}$ Ganz schön] neugierig] ist Maria t_1
d. *$[_{XP_2}$ Ganz schön] ist Maria $[_{AP_1}\ t_2$ neugierig]

(61) *Generalized Left Branch Condition effects, TP ('that-trace effect')*:

a. $[_{DP_1}$ What] do you think $[_{CP}$ that John bought t_1] ?
b. $[_{DP_1}$ What] do you think $[_{CP}$ Ø John bought t_1] ?
c. *$[_{DP_1}$ Who] do you think $[_{CP}$ that $[_{TP}\ t_1$ arrived]] ?
d. $[_{DP_1}$ Who] do you think $[_{CP}$ Ø $[_{TP}\ t_1$ arrived]] ?

Note:
The *that*-trace configuration in (61-c) can be excluded; but unfortunately, the Generalized Left Branch Condition also excludes (61-d), which is well formed. Gazdar's solution: Movement from an embedded CP is only apparent here; the external argument *who* of *arrived* is in fact merged in the matrix VP domain. Furthermore, the analysis is incompatible with the idea that external arguments are merged in SpecV and move to SpecT.

(62) *Generalized Left Branch Condition effects, VP (problem)*:

a. $[_{CP}\ [_C$ Ø] $[_{TP}\ [_{DP_1}$ John] $[_T$ Ø] $[_{VP}\ t_1$ likes Mary]]]
b. $[_{CP}\ [_{DP_1}$ Who] $[_C$ Ø] $[_{TP}\ t'_1\ [_T$ Ø] $[_{VP}\ t_1$ likes Mary]]] ?

10. The Wh-Island Condition

(63) *Wh-Island Condition*^{d} (Chomsky (1973)):
Movement must not cross a CP with a *wh*-element in SpecC or C.

(64) *Wh-Island Condition*^{r} (representational version):
*... α_1 ... $[_{CP}\ \beta_2$ ... t_1 ...] ..., where β is a *wh*-element in SpecC or C.

(65) *A consequence of the Wh-Island Condition*:

a. How$_1$ do you think [$_{CP}$ that Mary solved the problem t$_1$] ?
b. *How$_1$ do you wonder [$_{CP}$ whether Mary solved the problem t$_1$] ?
c. [$_{DP_1}$ Which book] do you think [$_{CP}$ that John read t$_1$] ?
d. ?*[$_{DP_1}$ Which book] do you wonder [$_{CP}$ [$_{PP_2}$ to whom] John gave t$_1$ t$_2$] ?

Note:
Wh-Island effects are typically not that strong if the *wh*-clause is an infinitive and the moved item is a complement DP.

(66) *Weak Wh-Island Condition effects*:
??[$_{DP_1}$ Which book] don't you know [$_{CP}$ whether to read t$_1$] ?

Note:
A similar effect arises with topicalization to SpecC. Accordingly, a *Topic Island Condition* has been suggested, and further generalization seems possible.

(67) *Topic Island effects*:
a. [$_{DP_1}$ This book] Mary thinks that Bill gave t$_1$ [$_{PP_2}$ to John]
b. *[$_{DP_1}$ This book] Mary thinks that [$_{PP_2}$ to John] Bill gave t$_1$ t$_2$
c.(?)[$_{DP_1}$ Wen] denkst du [$_{CP}$ dass Maria t$_1$ mag] ?
whom think you that Maria likes
d. *[$_{DP_1}$ Wen] denkst du [$_{CP}$ Maria$_2$ mag$_3$ t$_2$ t$_1$ t$_3$] ?
whom think you Maria likes

11. The Superiority Condition

(68) *Superiority Condition*^{d} (Chomsky (1973)):
In a structure $\alpha_{[*F*]}$... [... $\beta_{[F]}$ ... [... $\gamma_{[F]}$ ...] ...] ..., movement to [*F*] can only affect the category bearing the [F] feature that is closer to [*F*].

Note:
The only difference to the (revised) A-over-A Principle (i.e., the F-over-F Principle) is that β c-commands γ in the Superiority Condition, wheres β dominates γ in the F-over-F Principle.

(69) *Superiority Condition*^{r} (representational version):
*... $\gamma_{[F]}$... [... $\beta_{[F]}$ ... [... t$_\gamma$ ...] ...] ... if the head of which γ is the specifier bears a [*F*] feature in the LA.

(70) *A consequence of the Superiority Condition*:
a. Who$_1$ t$_1$ saw what$_2$?
b. *What$_2$ did who$_1$ see t$_2$?
c. I wonder [$_{CP}$ who$_1$ t$_1$ bought what$_2$]
d. *I wonder [$_{CP}$ what$_2$ who$_1$ bought t$_2$]

12. The Clause Non-final Incomplete Constituent Constraint

(71) *Clause Non-final Incomplete Constituent Constraint*[d] (Kuno (1973)):
It is not possible to move any element of a category α (α = DP or CP) in a clause non-final position out of α if what is left over in α constitutes an incomplete α.

(72) *Incompleteness*:
A DP/CP α is incomplete if an obligatory element is missing.
(An obligatory element may, as a first approximation, be an element that is obligatorily selected.)

Origin:
Kuno suggests the Clause Non-final Incomplete Constituent Constraint as a more general version of the Sentential Subject Constraint, which it is therefore supposed to replace.

(73) *A consequence of the Clause Non-final Incomplete Constituent Constraint, object DPs*:
a. $[_{DP_1}$ Which man] did you buy $[_{DP}$ a picture of t_1] ? (see (26-b))
b. $[_{PP_2}$ Of which man] did John give $[_{DP}$ a picture t_2] to Bill ?
c. ?*$[_{DP_1}$ Which man] did John give $[_{DP}$ a picture of t_1] to Bill ?

Note:
In (73-a), the DP is clause-final; in (73-b), the DP counts as complete (recall that arguments of N are optional). Only in (73-c) are both requirements violated: The DP from which movement takes place is in a non-final position, and if movement occurs, it counts as incomplete (*of* has an obligatory [*D*] feature).

(74) *A consequence of the Clause Non-final Incomplete Constituent Constraint, subject DPs*:
a. $[_{DP_1}$ Which cars] did the explosion damage $[_{DP}$ the hoods of t_1] ?
b. $[_{PP_2}$ Of which cars] were $[_{DP}$ the hoods t_2] damaged by the explosion ?
c. *$[_{DP_1}$ Which cars] were $[_{DP}$ the hoods of t_1] damaged by the explosion ?

Note:
(74-b) is expected to be ungrammatical under the Subject Condition. However, it has been suggested that these kinds of PPs may in fact be merged outside the subject DP (see Cinque (1990)), in which case the Subject Condition would be compatible with (74-b) (and the Clause Non-final Incomplete Constituent Constraint would be vacuously fulfilled here).

(75) *A consequence of the Clause Non-final Incomplete Constituent Constraint, CPs* (see (37)):
a. $[_{DP_1}$ Who] did the reporters expect $[_{CP}$ that the principal would fire t_1] ?
b. $[_{DP_1}$ Who] was it expected by the reporters $[_{CP}$ that the principal would fire t_1] ?
c. *$[_{DP_1}$ Who] was $[_{CP}$ that the principal would fire t_1] expected by the reporters ?

Note:
The Clause Non-final Incomplete Constituent Constraint can be reformulated as a representational constraint on outputs.

(76) *Clause Non-final Incomplete Constituent Constraint*^{r} (representational version):
*... α_1 ... [$_\beta$ ... t_1 ...] ... if (a)–(c) hold:
a. β = DP or CP.
b. β is in a clause non-final position.
c. β is incomplete.

(77) *An apparent problem*:
[$_{DP_1}$ Who] does John think [$_{CP_2}$ Mary has persuaded t_1 [$_{CP_3}$ that Bill is a spy]] ?

Note:
(77) does not violate the Clause Non-final Incomplete Constituent Constraint because the only CP from which movement takes place is CP_2; and CP_2 is incomplete after the movement operation, but it is in a clause-final position.

(78) *A real problem?*
a. [$_{DP_1}$ Which man] did you buy [$_{DP}$ a picture of t_1] from Mary ?
b. [$_{DP_1}$ Which tree] did you see [$_{DP}$ the leaves of t_1] in the yard ?

Note:
Kuno assumes that (78-ab) are well-formed, and he takes this to follow from the Clause Non-final Incomplete Constituent Constraint. The idea is that what is problematic about the starred data is "the fact that the incomplete ... phrases are followed by nonoptional elements [...] In [(78-ab)], ... incomplete ... phrases appear either clause-finally or, if not, are followed only by optional elements in the sentences." But does this follow from the constraint?

13. The Post-Sentential Subject Extraction Constraint

(79) *Post-Sentential Subject Extraction Constraint*^{d} (Zaenen & Pinkham (1976)):
It is impossible to move a DP across a sentential subject.

Note:
Unlike the Clause Non-final Incomplete Constituent Constraint, this constraint is supposed to complement (rather than replace) the Sentential Subject Constraint.

(80) *A consequence for wh-movement*:
a. [$_{DP_1}$ Who] do you think [$_{CP_1}$ that [$_{DP_2}$ Bill's resignation] would surprise t_1] ?
b. *[$_{DP_1}$ Who] do you think [$_{CP_1}$ that [$_{CP_2}$ for Bill to resign] would surprise t_1] ?

(81) *A consequence for topicalization*:
a. [$_{DP_1}$ John] [$_{DP_2}$ Bill's resignation] would not surprise t_1
b. *[$_{DP_1}$ John] [$_{CP_2}$ for Bill to resign] would not surprise t_1

(82) *Post-Sentential Subject Extraction Constraint*^{r} (representational version):
*...α_1 ... [... β ... [... t_1 ...] ...] if β is a sentential subject.

A generalization?
(i) Sentential Subject Constraint:
All sentential subjects are islands.
(ii) Post-Sentential Subject Extraction Constraint:
The domain to the right of a sentential subject is an island.
→
(iii) Most general constraint:
All sentences with sentential subjects are islands.

Problem:
Sentential subjects themselves can be moved.

(83) *Movement of sentential subjects*:
That John would be late, Mary didn't think was very likely.

14. Conclusion

The problem with most of the constraints discussed so far is the lack of generality; these constraints often look construction-specific. Should syntactic constraints be permitted to mention specific categorial features, or specific selectional features? Ideally, the answer is no. Still, some of the constraints are not subject to this critique. Most notably, this holds for the the A-over-A principle (in particular, its F-over-F revision) and for the Superiority Condition. It therefore does not come as a surprise that the combination of these two conditions is widely considered valid nowadays. (The combined constraint is known as the *Minimal Link Condition*; more on this constraint is to come later.)

(84) *F-over-F Principle*^{d}:
In a structure $\alpha_{[*F*]}$... [$_{\beta_{[F]}}$ ... [$_{\gamma_{[F]}}$ ...] ...] ..., movement to [*F*] can only affect the category bearing the [F] feature that is closer to [*F*].

(85) *Superiority Condition*^{d} (Chomsky (1973)):
In a structure $\alpha_{[*F*]}$... [... $\beta_{[F]}$ ... [... $\gamma_{[F]}$ ...] ...] ..., movement to [*F*] can only affect the category bearing the [F] feature that is closer to [*F*].

Note:
The constraints discussed here (in [2]) are all local (derivational or representational). Is it possible to reformulate constraints like, e.g, the F-over-F Principle and the Superiority Condition as, e.g., transderivational constraints? Indeed, there is a straightforward reformulation, even though it is not fully equivalent.

(86) *Shortest Paths Condition*^{td} (Chomsky (1993)):
Minimize the length of movement paths.
(Given the set of derivations RS that are based on the same LA, choose the derivation in RS in which movement paths have minimal length.)

(87) *Movment path* (informal):
A movement path is the set of nodes that are crossed by movement operation. A movement path α is shorter than a movement path β if α has fewer nodes than β.

15. Exercises

Exercise 3:
Consider the following examples. They are all ungrammatical because they violate some constraint. Which example violates which constraint(s)?

(88) a. *What$_1$ did Bill buy potatoes and t_1 ?
b. *How$_1$ do you believe the stories [$_{CP}$ that John fixed your car t_1] ?
c. *The proof that the claim t_1 was made by the Greeks was given in 1492 [$_{CP_1}$ that the world was round]
d. *[$_{DP_1}$ Which rock star] were admirers of t_1 arrested ?

Exercise 4:
(89) looks like a violation of the Wh-Island Condition. Do the derivational and representational versions of the constraint in (63) and (64) on page 41 make identical predictions? Is there another constraint that also excludes (89)?

(89) *[$_{DP_1}$ Who] do you wonder [$_{CP}$ [$_{DP_2}$ which picture of t_1] John likes t_2] ?

Exercise 5:
The following grammatical sentences from French, German, and English are all potentially problematic for the system of constraints developed so far because they all appear to violate some constraint. Which constraints are violated by these examples, and why are they violated?

(90) a. Combien as-tu lu de livres ?
how many have you read of books
b. Was hat gelesen zu haben den Fritz geärgert ?
what$_{acc}$ has read to have the Fritz$_{acc}$ annoyed
c. Whose books did which students read ?
d. Was hat sie wem zu lesen empfohlen ?
what$_{acc}$ has she$_{nom}$ whom$_{dat}$ to read recommended
e. (?)This is a man to whom liberty we could never grant

Exercise 6:
Consider the following two sentences. Both are completely ungrammatical. As we have seen, (91-a) can be excluded by the Complex NP Constraint. What about (91-b), where DP_2 has been topicalized? Discuss the derivational and representational versions of the Complex NP Constraint. Is there another constraint that (91-b) violates?

(91) a. *I wonder [$_{CP}$ [$_{DP_1}$ which book] John met [$_{DP_2}$ a child who read t_1]
b. *[$_{DP_2}$ A child who read t_1], I wonder [$_{CP}$ [$_{DP_1}$ which book] John met t_2]

Exercise 7:
All *wh*-phrases must move to a clause-initial position in multiple *wh*-questions in Bulgarian (see Rudin (1988), Richards (1997), Bošković (2002)). Let us assume that all instances of such multiple *wh*-movement target Spec$C_{[+wh]}$. (This would seem to imply that $C_{[+wh]}$ can have more than one [*Q*] feature in Bulgarian.) Interestingly, the order of [Q]-marked DP arguments in Spec$C_{[+wh]}$ positions must be identical to the base order of the DP arguments within VP; see (1-a) vs. (1-b). In simple *wh*-questions, the VP-internal order can be reversed by *wh*-movement; see (1-c) (where V has undergone LI-movement to C, which is irrelevant in the present context).

(1) *Multiple and simple wh-movement in Bulgarian*:

a. $[_{CP}$ Koj$_1$ $[_{C'}$ kogo$_2$ $[_{C'}$ $C_{[+wh]}$ $[_{TP}$ t'_1 T $[_{VP}$ t_1 običa t_2]]]]] ?
who$_{nom}$ whom$_{acc}$ loves

b. *$[_{CP}$ Kogo$_2$ $[_{C'}$ koj$_1$ $[_{C'}$ $C_{[+wh]}$ $[_{TP}$ t'_1 T $[_{VP}$ t_1 običa t_2]]]]] ?
whom$_{acc}$ who$_{nom}$ loves

c. $[_{CP}$ Kakvo$_2$ $[_{C'}$ $[_{C_{[+wh]}}$ pravi$_3$] $[_{TP}$ Ivan$_1$ T $[_{VP}$ t_1 t_3 t_2] ?
what does Ivan

Questions:
(i) The phenomenon in (1-ab) is reminiscent of Superiority Condition effects in English. Does it follow from the Superiority Condition?
(ii) One might account for the difference between (1-a) and (1-b) by the constraint in (2). What kind of constraint is this (Con^d, Con^r, Con^g, Con^{td}, or Con^{tl})?
(iii) Would (2) also account for Superiority Condition effects in English?
(iv) Would (2) be compatible with (1-c)?
(v) Try to reformulate (2) without mentioning the levels "D-structure" and "S-structure", by exclusively referring to syntactic categories.
(vi) Why is (2) not really a "good" constraint?

(2) *[Q]-Isomorphism*:
If $\alpha_{[Q]}$ c-commands $\beta_{[Q]}$ at D-structure, $\alpha_{[Q]}$ also c-commands $\beta_{[Q]}$ at S-structure.

Exercise 8:
Languages like Italian exhibit so-called *pro-drop* constructions: A subject pronoun that is interpreted as a topic cannot be overtly realized. Suppose that there is a non-overt pronominal empty category *pro* in these contexts. Furthermore, a subject pronoun that is not a topic must be overtly realized, and cannot be *pro*. Account for this generalization by invoking two constraints; one of them should be transderivational/translocal.

(3) *Pro-drop in Italian*:

a. $[_{TP}$ pro$_{[top]}$ Ha cantato]
b. *$[_{TP}$ Lui$_{[top]}$ ha cantato]