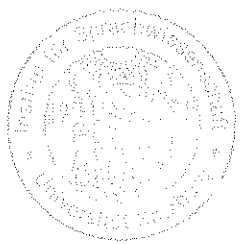
A. Cardinaletti, G. Cinque and G. Giusti (eds.)

Constituent Structure



1988
FORIS PUBLICATIONS
Dordrecht - Holland/Providence RI - U.S.A.

MATCHING PROJECTIONS

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1. Introduction

The hypothesis described below is an investigation of the consequences of maintaining two premisses in the framework of the GB-Theory:

A. Projections do not involve empty heads.
B. Derivations must not be empty, i.e. string vacuous.

1.1 Empty Heads?

Phrases are projections of a head category, according to the X-bar theory. Hence every projection contains a head. There are, however, two different kinds of heads, namely *lexical* heads (i.e. A, N, V, P) and *functional* ones (i.e. C, D, I).[1] Lexical heads are elements of an open class, namely the class of *lexical* elements, whereas functional heads form a closed class of *grammatical* elements. Lexical heads have descriptive content (denotation), functional heads lack descriptive content. They specify the descriptive content of their complements: C-features determine, for instance, the type of the clause, I-features determine the TMA-quality[2] of the VP, D-features determine the discourse representation status of an NP in terms of definiteness, indefiniteness, etc. This difference between lexical and functional heads entails another difference: Functional heads may be represented directly or, unlike lexical heads, *indirectly*. A head is represented directly, if a head-element occupies a head position. Indirect representation means that the presence of a head is reflected

[1] C and D as heads were introduced by Chomsky (1986a) and Abney (1986), respectively.
[2] TMA: Tense-Mood-Aspect.

by the presence of features realized elsewhere. If, for instance, there is no auxiliary to occupy the I-position in English, the I-features are mapped on the head of VP; if there is no [+ W]-complementizer, the complementizer features are mapped on a [+ W]-Phrase. *Empty heads*, i.e. heads without content, should be ruled out in a restricted version of X-bar theory. Phrases of the type illustrated in (1) do not occur as base-generated structures:

(1) a. $[_{AP}$ e NP]
b. $[_{PP}$ e NP]
c. $[_{VP}$ e NP]
d. $[_{NP}$ e PP]

Clauses seem to defy this restriction, however. According to Chomsky (1986a), clauses are CPs, i.e. projections of the functional head C. But main declarative English sentences are apparently defective. There is neither a head element nor a morphological cue for an indirect representation of the head. Are CPs headless? It will be shown that the premiss that there are no headless projection leads to interesting consequences for English. It will shed light on an exceptional property of English as the only Germanic language which lacks the V-second property.[3]

1.2 Empty derivations?

The fact that *do*-support does not arise in English in string vacuous contexts, i.e. with *wh*-subjects, as well as considerations of learnability lead Chomsky (1986a) to the conclusion that string-vacuous derivations should be abandoned. In sentences like (2), the *wh*-element stays in situ:

(2) a. The claim [e [$_{IP}$ which intrigues me]]
b. [e [What intrigues you?]]
c. I wonder [e [what intrigues you]]

A ban against string vacuous derivations of the kind illustrated in (2) has two serious drawbacks. First of all it produces structures with empty heads. It is unclear how the subcategorization restriction

[3] In a V-second language the finite verb occupies the C-position in CP and an arbitrary phrase is moved to the SPEC-C position (cf. Haider and Prinzhorn (eds.) 1986).

for a verb like *wonder* in (2c), which requires a *wh*-element in the head-position of its complement, can be met. Secondly, a *wh*-subject in situ leaves COMP open for *wh*-movement, which leads to ungrammatical structures as in (3):

(3) a. *What did you say who liked best? (Lasnik and Saito 1984, 283)
b. SS: What$_i$ did you say [$_{CP}$ [$_{IP}$ who liked e$_i$ best]]
c. LF: What$_i$ did you say [$_{CP}$ who$_j$ [$_{IP}$ e$_j$ liked e$_i$ best]

Chomsky (1986a) tries to circumvent this problem with the assumption that in LF *wh*-phrases are obligatorily moved and that the ban against empty derivations holds for SS only. (3c) is ruled out on LF, then.

It will be shown that under the hypothesis of matching projections these problems do not arise and that the claim can be strengthened: Vacuous derivations do not occur on any level of representation.

2. Setting The Scene

In this section I will discuss theoretical as well as empirical issues that are not adequately covered by the theoretical framework in its present form. These issues center around the key notions discussed above, namely empty heads and string vacuous derivations.

2.1 Theoretical Considerations

2.1.1 Clause Structure in English and German

If we compare a simple English clause with a German clause whose derivation would involve a string vacuous movement, we find a structural similarity, namely an empty C-projection:

(4) a. Es regnet.
b. It rains.

(5) a. [$_{CP}$ e [$_{C'}$ e [es regnet]]]
b. [$_{CP}$ e [$_{C'}$ e [it rains]]]

This similarity disappears, if the derivation is not string vacuous in German:

(6) a. [$_{CP}$ gestern [$_{C'}$ regnete$_i$ [es e$_i$]]]
b. [$_{CP}$ e [$_{C'}$ e [yesterday it rained]]

If we allow string vacuous derivations in German, however, (7) rather than (5a) would be the surface structure of (4a):

(7) [$_{CP}$ Es$_i$ [$_{C'}$ regnet$_j$ [e$_i$ e$_j$]]]

Neither (7) nor (5a) captures the relevant generalization. What we would like to have is a representation for (4a) which captures the fact that a string in which the finite verb appears in second position in the basic order (cf. (8)) simultaneously fulfills the requirements of the matrix V-second order:

(8) daß es regnet. – that it rains.

The representation we need will have the immediate advantage that it characterizes English as a highly restricted V-second language. English resembles a V-second language only in string vacuous contexts (cf. (5a) vs. (5b)). The difference between English and a Germanic V-second language is easy to specify in terms of the accessibility of C and SPEC-C. C is open for any finite verb in a V-second language, in English C is accessible only for finite auxiliaries. In a V-second language, any phrase may move to SPEC-C, in English only *wh*-phrases and a few negative adverbials, as in (9):

(9) With no job *would* he be happy

There is one more property English has in common with a V-second language like German. V-second occurs in embedded clauses only in [-wh]-contexts (cf. Reis 1985; Haider 1986a):

(10) a. Solange man sich wünscht, [*daß* man wo anders *wäre*], als man ist...
as-long-as one himself wishes that one elsewhere were than one is
"As long as one wishes one were somewhere else than one is"
b. Solange man sich wünscht, [man *wäre* wo anders], als man ist...
c. Wenn man dich fragt, [*wo* du gewesen *seist*],...
If one you asks where you been are
"If one asks you were you have been"
d. *Wenn man dich fragt, [wo *seist* du gewesen]...

The English counterpart of (10c, d) is (11a, b):

(11) a. If it is unclear where he *has* been...
b. *If it is unclear where *has* he been...

The difference between the main clause and the embedded clause follows from a difference in subcategorization. Subcategorization requirements have to be met in the head position of the complement, i.e. in the C-position of a clause. In Haider (1986a) it is assumed that the *wh*-phrase in (10c) occupies the C-position, hence the finite verb cannot move to this position. For English this accounts for the lack of AUX-inversion in embedded clauses.[4]

2.1.2 String Vacuous Rearrangements

In German, any phrase may move into the SPEC-C position if the C-position is occupied by the finite verb. In Chomsky (1986a) it is claimed that only maximal projections move to SPEC-C. This is at variance, a first sight, with the fact that in German subconstituents of VP are found in SPEC-C:

(12) a. [Angestarrt] hat er sie.
stared has he her
"He STARED at her"
b. [Geholfen] hat er mir.
helped has he me
"He HELPED me"

In order to save Chomsky's hypothesis, den Besten and Webelhuth (1987) suggest that in (12) the full VP is topicalized after it has been emptied by adjoining the object to its mother-node:

(13) a. [e$_i$ angestarrt]$_j$ hat er [$_{VP}$ sie$_i$ [$_{VP}$ e$_j$]]
b. [e$_i$ geholfen]$_j$ hat er [$_{VP}$ mir$_i$ [$_{VP}$ e$_j$]]

They apply the same method to account for topicalized constituents that contain the verb and the subject:

(14) a. [Ein Außenseiter gewonnen] hat da noch nie.
an outsider won has here yet never
"No outsider has ever won here yet"

[4] I am aware of Chomsky's (1986a) claim, that C as a head position is the target for head movement only. In my opinion *functional* head positions are open for phrases as well, provided they meet the requirements for this position, i.e. provided they are able to bear the specific features required for an element in this position: If C is subcategorized for a [+wh]-element, a *wh*-phrase may occupy this position.

b. [Linguisten gespeist] haben dort noch nie.
linguists dined have there yet never
"No linguists have ever dined there yet"
c. [Kinder gespielt] haben hier noch nie.
children played have here yet never
"No children have ever played here yet"

The adverbials are adjoined to S and then S is topicalized. This derivation is unable, however, to capture a generalization. A subject must not occur in the topicalized constituent, if an object of the verb remains in the non-fronted remnant:

(15) a. *Ein Außenseiter gewonnen hat da noch nie *das erste Rennen*.
an outsider won has there yet never the first race
"No outsider has ever won the first race there yet"
b. *Linguisten gespeist haben dort noch nie *Langusten*.
linguists dined have there yet never crayfish
"No linguists have ever dined crayfish there yet"
c. *Kinder gespielt haben hier noch nie *Tempelhüpfen*.
children played have here yet never hopscotch
"No children have ever played hopscotch here yet"

Although (15) is ungrammatical, there exists a perfect derivation: Let us start with the basic order of (15a), which is given in (16a). First we adjoin the object to S, which results in (16b). Then we adjoin the adverbials to S, which yields (16c). Now we topicalize the basic S-constituent and we get (15a):

(16) a. daß ein Außenseiter da noch nie das erste Rennen gewonnen hat.
b. daß das erste Rennen$_i$ [ein Außenseiter da noch nie e_i gewonnen hat].
c. daß da noch nie$_j$ [das erste Rennen$_i$ [ein Außenseiter e_j e_i gewonnen hat]]].

If string-vacuous movement is not admitted by the grammar, however, (12) cannot be derived by movement, if we want to maintain that the topicalized V-projection is a maximal projection.[5] But if scrambling is not necessary for deriving (12), it is not necessary for (14) either.[6] Hence a decision on vacuous movement crucially affects the analysis of topicalization.

[5] In Haider (1987c) this construction is discussed in detail. It is argued that the V-projection is base generated in the SPEC-C position.

[6] A principled solution for the difference between (12) and (15) can be found in Haider (1987c). It does not make use of scrambling.

2.1.3 Control and Government

In recent work on infinitival complements, e.g. Manzini (1983), Bouchard (1984), Koster (1987), Hornstein and Lightfoot (1987), the difference between (17a) and (17b) with respect to anaphoric and nonanaphoric control is related to the presence or absence of COMP and ungoverned or governed PRO, respectively:

(17) a. She asked me$_i$ [PRO$_i$ to go].
b. She asked me [where [PRO to go]].

Koster (1987, 111ff) suggests that in contexts of obligatory control, i.e. contexts of anaphoric PRO, PRO is governed by the matrix verb. He assumes that the infinitival complement in (17a) is a reduced clause. In his opinion (Koster 1987, 112), it is an S' without COMP and this kind of reduced clause is supposed to be transparent for government. In (17b) there is an overt element in COMP, hence S' is not transparent for government. Thus PRO is ungoverned, whence its nonanaphoric interpretation. Under the CP analysis, this position is difficult to maintain since the structure assigned to (17a) would amount to a CP without C, i.e. maximal projection that contains only a complement but no head. Moreover it is unclear how to draw a distinction between governed subjects in ECM-constructions (18a) and governed subjects in control contexts (18b). The former are assigned case, the latter remain caseless:

(18) a. She expected [*him* to be fired].
b. She expected [*PRO* to be fired].

According to Koster's analysis of obligatory control, PRO is governed by the matrix verb in (18b) just like *him* is governed in (18a). This is unsatisfactory. What we need is an analysis that characterizes an anaphoric PRO as governed but excepts it from case assignment. The concept of matching projections provides such an analysis.

2.2 Empirical Considerations

2.2.1 Reduced Relative Clauses

It is an open problem why the relative pronoun must not be missing if it is the subject. This is not explained under the standard

assumption (cf. Chomsky 1986b, 85) that an empty operator may replace a *wh*-pronoun in English relative clauses:

(19) a. Let us try the restaurant he recommended.
b. *Let us try the restaurant was recommended by him.

(20) a. Let us try the restaurant [O_i [he recommended e_i]]
b. Let us try the restaurant [O_i [e_i was recommended by him]]

If an operator can replace the *wh*-pronoun in (20a) it should be able to do so in (20b). The operator serves as Ā–antecedent for the subject gap and antecedent–governs it, hence ECP is observed and (19b) should be perfect. To attribute the unacceptability to parsing difficulties would be misguided. First there exist predicative constructions of the type (21a) that resemble reduced non-finite relatives and secondly parsing difficulties would turn (19b) into a garden path sentence like (21b), with a perfect secondary reading:

(21) a. Let us try the restaurant recommended by him.
b. The horse raced past the barn fell.

So the conclusion is unavoidable that (20b) is not the proper structural analysis of (19b). An analysis in terms of matching projections will provide a straightforward account of the well-known contrast.

2.2.2 Topicalized V-Projections in German

In section 2.1.2 it has already been mentioned that the topicalized V-projection may contain the subject in German. Topicalization of a V-projection is subject to a general restriction, however. It is ungrammatical in string vacuous contexts, cf. (23) and (24):

(22) a. [Ein Flugzeug gelandet] ist auf dem roten Platz noch nie.
a plane landed is on the Red Square yet never
"No plane has ever landed on the Red Square yet"
b. [Ein Flugzeug gesichtet] wurde dort noch nie.
a plane sighted was there yet never
"No plane was ever seen there yet"
c. [Ein Außenseiter gewonnen] hat dort noch nie.
an outsider won has there yet never
"No outsider has ever won there yet"

In (22a) the V-projection contains an ergative subject, in (22b) a passive subject, and in (22c) a transitive subject. The adverbials following the finite verb show that V-second applied. If they are missing, however, the examples in (22) are turned into cases of string vacuous derivations, cf. (23) and (24):

(23) a. *[Ein Flugzeug gelandet] ist.
b. *[Ein Flugzeug gesichtet] wurde.
c. *[Ein Außenseiter gewonnen] hat.

(24) a. daß ein Flugzeug gelandet ist.
b. daß ein Flugzeug gesichtet wurde.
c. daß ein Außenseiter gewonnen hat.

The contrast between (22) and (23) is amazing at first sight since string vacuous V-second sentences are wellformed if the first constituent does not contain the matrix verb in D-structure:

(25) a. daß es stimmt.
that it is-right
"that it is right"
b. Es stimmt.
c. daß [geohrfeigt zu werden] schmerzt.
that slapped to be hurts
"that it hurts to be slapped"
d. [Geohrfeigt zu werden] schmerzt.

These examples show that the restriction is a peculiarity of the topicalization of V-projections, since it does not arise with NPs, as in (25b) or CPs as in (25d). The matching projection hypothesis will provide a ready answer for this contrast.

2.2.3 The Matching Effect

Relative clauses without a nominal head, so-called free relatives, are known to obey a matching restriction: The case that is assigned to the NP and that would percolate to the nominal head must match the case assigned to the *wh*-element. Groos and van Riemsdijk (1981) proposed an analysis in terms of COMP-accessibility. The empty head of the NP makes it transparent for government of the head of the embedded CP, namely the *wh*-element. This is then subject to two case requirements which can be met only if the case

assigned from above (i.e. the matrix verb) is the same as the case assigned from below (i.e. the verb in the relative clause). This accounts for the following constrasts:

(26) a. [Wer kommt] wird genommen. NOM-NOM
who$_{NOM}$ comes will-be accepted
"Whoever comes will be accepted"
b. *[Wen du empfiehlst] wird genommen. NOM-ACC
whom$_{ACC}$ you recommend will-be accepted
c. *[Wem du vertraust] wird genommen. NOM-DAT
whom$_{DAT}$ you trust will-be accepted
d. *Wir nehmen [wer kommt]. ACC-NOM
we accept who$_{NOM}$ comes
e. Wir nehmen [wen du empfiehlst]. ACC-ACC
we accept whom you recommend
"We will accept whomever you recommend"
f. *Wir nehmen [wem du vertraust]. ACC-DAT
we accept whom$_{DAT}$ you trust

It is noted already by Groos and van Riemsdijk that there are exceptions of a particular kind. There is no restriction against a mismatch in case if the *wh*-element is neutral in form for two different cases:

(27) [Was ich nicht weiß] macht mich nicht heiß. NOM-ACC
what I not know makes me not hot
"I don't get hot under the collar about things I know nothing of"

(28) [Was dich störte] habe ich beseitigt. ACC-NOM
what you disturbed have I got-rid-of
"I have got rid of what was getting on your nerves"

In German, the neuter pronoun *was* can serve both as ACC or NOM. This is the reason why (27) and (28) are grammatical but not (26b) and (26d), respectively. This is unexpected under the COMP-accessibility hypothesis proposed by Groos and van Riemsdijk. It remains unclear, furthermore, why pied-piped *wh*-elements do not fulfil the matching requirement, neither as a PP (cf. (20)) nor as an NP-internal genitive (cf. (30)):

(29) *Er schoß [[auf wen] sie warteten]. PP-PP
he shot on whom they waited-for

(30) *Er toleriert nur [[wessen Bücher] er liest.
he tolerates only whose books he reads

For the time being, Groos and van Riemsdijk invoke a filter to rule out (29) and (30):

(31) Filter: *[X Wh-Y] if X, Y ≠ 0 (Groos and van Riemsdijk 1981, 204)

The analysis in terms of matching projections will account for (27)-(28) as well as for (29)-(30), without the need of a filter. It will, in addition, make use of recent reanalysis of NP as DP [7] proposed by Abney (1986), which is corroborated by German evidence (cf. Haider 1987b). For our present concern it suffices to note that a free relative is a variant of a DP with a CP complement:

(32) a. [$_{DP}$ Der [$_{CP}$ der kommt]] wird genommen.
he who comes will-be accepted
"Who comes will-be accepted"
b. [$_{DP}$ 0 [$_{CP}$ Wer kommt]] wird genommen.

A free relative clause is a DP which lacks the head, namely D. But if there are no headless projections, (32b) cannot be the adequate structure. Free relatives are an instance of matching projections.

3. Matching Projections

The concept of a matching projection is arrived at if two apparently contradictory premisses are maintained simultaneously, despite apparent empirical counterevidence, namely on the one hand the premiss that phrases are endocentric, i.e. any phrase is the projection of a head element, and, on the other hand, the premiss that there are no empty heads, i.e. that a head must be morphologically manifest, either directly or indirectly. This leaves open the possibility that some other head element may serve as a secondary head. Then its projection acquires the status of a secondary projection as well.

The concept of a secondary head is easy to characterize in terms of a feature system proposed by Muysken (1982) for characterizing projections and their levels:

[7] The determiner D is a functional head, like C or I, which takes a maximal projection as a complement. What used to be the NP is, under this analysis, a DP with an NP as the complement of D. This NP consists of the head N, its complement and its modifier, e.g. an AP.

(33) [+/−m] (m = minimal)
[+/−p] (p = projection)

The four logically possible combinations are given in (34):

(34) a. {−m, +p} = maximal projection
b. {−m, −p} = intermediary projection
c. {+m, −p} = minimal category, i.e. X°-category
d. {+m, +p} = maximal projection consisting of the head-element only

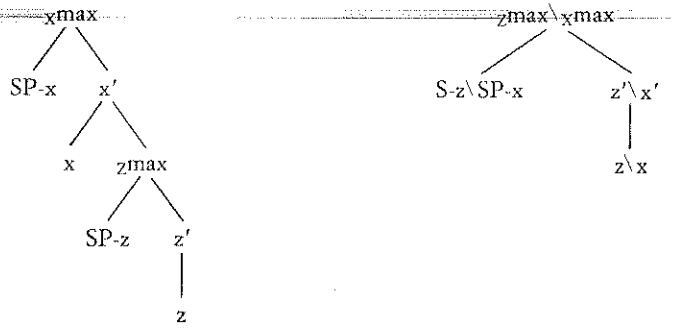
(34) holds both for lexical and for functional heads. Lexical heads are characterized by the feature combinations of [+/−N] and [+/−V] (cf. Chomsky 1970). (34c) is the minimal characterization of a head-category, shared by functional as well as lexical heads. If a head serves as a secondary head, the feature set assigned to it is the union of its own feature set with the feature set of the other head it represents. An immediate consequence of this hypothesis is that only those feature sets can be unified, whose unification remains consistent, i.e. which do not contain features with opposite values. This excludes the union of lexical categories.[8] Functional categories, however, can be represented in the form of secondary specifications. Let us define now a matching projection:

(35) A *matching projection* is a projection superimposed on an existing projection such that the nodes of the primary projection serve as secondary nodes of the superimposed projection.

The matching restricts possible superimposition. Only those projections can be superimposed which have an identical tree geometrical structure: Every node of a matching projection is both a primary and a secondary one. There can be no nodes without a secondary specification, which would arise if the superimposed construction contained less nodes than the primary one. A matching projection looks like the result of telescoping an empty projection on the embedded projection:

[8] Actually, lexical categories are excluded only if there is no feature neutralization, i.e. a neutralization of the contradicting value.

(36) a. b. matching projection.[9]



The claim I want to substantiate in the following section is that an apparently headless projection is a matching projection. Viewed from this vantage point, the problems discussed will receive a straightforward solution.

4. The Explanatory Potential of Matching Projections

4.1 Matching Projections and the Structure of CPs in English and German

A *wh*-clause in a vacuous-movement context leads to a headless CP. Hence we have to analyze it as a case of matching projection. A clause like (37a) will have the structure (37b) and not the standard S-structure (37c):

(37) a. Who will believe that?
b. [$_{CP\backslash IP}$ who [$_{I'\backslash C'}$ will [$_{VP}$ believe that]]]
c. [$_{CP}$ e [$_{C'}$ e [$_{IP}$ who [$_{I'}$ will [$_{VP}$ believe that]]]]]

The crucial property of (37b) is the double function of the *wh*-element. It is both a SPEC-C element and a SPEC-I element. Being a SPEC-C element, it occupies the COMP-position. This explains why an embedded *wh*-clause is a *wh*-island despite the fact that the *wh*-pronoun remains in its subject position (cf. (3) in section 1.2).

[9] Notational convention: The back-slash separates the primary specification from the secondary one.

Because it remains in situ, there is no *do*-support with a subject *wh*-phrase. If the vacuous movement case (37a) is analyzed as a matching projection, this analysis extends to the structurally identical declarative variant of (37a), namely (38):

(38) a. He will believe that.
b. [$_{CP\backslash IP}$ He [$_{I\backslash C'}$ will [$_{VP}$ believe that]]]

Since (38a) is a headless CP, we have to analyze it as a matching projection, which turns the subject into a secondary specifier of the C-element. The C-element is represented by the finite verb. This is exactly the situation we find in a V-second language. There the finite verb is moved to the C-position and any phrase may move to the SPEC-C position. English turns out to be a highly restricted V-second language. In declarative clauses its V-second property is limited to matching projections. The same kind of structure is found in a V-second language, e.g. Swedish, but only in contexts of vacuous movement (cf. (39a) vs. (39b)):

(39) a. [$_{CP\backslash IP}$ Många lingvister [$_{I\backslash C'}$ har [$_{VP}$ kommit hit]]]
many linguists have come here
"Many linguists have come here"
b. [$_{CP}$ Hit$_j$ [$_{C'}$har$_i$ [$_{IP}$ många lingvister [$_{I'}$ e$_i$ [$_{VP}$ kommit e$_j$]]]]]

The fact that a declarative clause in English has the same structure as a matching projection structure of a clause in a V-second language permits to characterize English as a restricted V-second language: Even in declarative clauses, the V-second property of English is found in its matching projection structure. In *wh*-clauses we find a full V-second structure but with auxiliaries only. Unlike a real V-second language, a finite main verb cannot move.[10] A further consequence of the fact that a complementizerless declarative clause is a matching projection structure bears on the explanation of the *that*-trace-effect. Embedded finite complement clauses without complementizer are matching projections. Hence the subject is the secondary SPEC-C element. The C-projection is accessible to govern-

[10] This is evidence against Chomsky's (1986a) assumption that for instance a raising verb may move to the I-position. If this were the case, it should move to the C-position, if I moves to the C-position. But this is not the case:

(i) What did he appear to have discovered?
(ii) *What appeared he to have discovered?
(iii) Was scheint er entdeckt zu haben?

ment from the matrix verb. Therefore the subject is governed by the matrix verb exactly in case there is no complementizer. This explains the absence of an ECP-effect in (40a) in contrast to (40b):[11]

(40) a. What$_i$ did she say [e$_i$ had disturbed him]?
b. *What$_i$ did she say [that e$_i$ had disturbed him]?

In (40a), the subject trace is governed only with respect to its secondary specification as SPEC-C-element. Hence this does not interfere with case assignment. This is crucial for improving Koster's (1987) analysis of obligatory control.

4.2 Governed but Caseless PRO

In Koster's analysis it was unclear why the lack of a complementizer makes PRO accessible for government on the one hand, and why on the other hand PRO remains caseless, nevertheless. The relevant distinctions are easy to capture with the concept of matching projections. For ease of reference the examples (17) are repeated under (41):

(41) a. She asked me$_i$ [$_{CP}$ PRO$_i$ to go].
b. She asked me [$_{CP}$ where [PRO to go]].

The complement in (41a) is a headless CP, hence a matching projection. This entails that PRO is a secondary SPEC-C element and therefore in the goverment domain of the matrix verb. In (41b), PRO is simply the subject and out of reach for government by the matrix verb. If governed PRO is an anaphor, we understand why we find an anaphoric PRO in (41a) but not in (41b). The difference between control verbs and ECM-verbs is not affected. Control constructions involve CP-complements. ECM verbs take IP-complements. Hence the difference between (18a) and (18b) repeated as (42a) and (42b) remains as it was:

[11] The fact that the matrix verb governs the C-position and a fortiori the SPEC-C position accounts for case assignment in the following examples, taken from Kayne (1984) and Jespersen (1914):

(i) This is the man [*who* I assure you [e to be a genius]].
(ii) Children [*whom* we thought [e need care]].

The case of the *wh*-element is not assignable in its base position.

(42) a. She expected [$_{IP}$him to be fired].
b. She expected [$_{CP}$PRO to be fired].

If this analysis is on the right track, the fact that verbs that do not require obligatory control are verbs that select a *for*-complementizer should not be causally related, as Koster (1987, 113) tries to argue:

(43) a. She signalled to follow her.
b. She signalled [for me to follow her].

First of all, there are verbs that select a *for*-complement, but require obligatory control:[12]

(44) a. She preferred [for me to leave].
b. She$_i$ preferred [PRO$_i$ to leave].

The difference between *prefer* and *signal* is a difference with respect to implicit arguments. The latter has one, but not the former:

(45) a. She signalled me$_i$ [PRO$_i$ to follow her].
b. *She preferred me to leave.

Moreover, with respect to the control properties of German, the counterparts of these verbs behave exactly as in English, but German does not have any complementizers for infinitival complements (cf. Tappe 1984). If the cue for the difference were the presence of a complementizer in another context, this cue would be missing in German and hence the distinction could not be learned.

4.3 Reduced Relatives and ECP

A reduced relative is a CP with an empty operator in COMP. If the operator were to bind the subject, this would be a context of vacuous movement,[13] hence there must be a matching projection. If we check this construction for ECP, we find an ungoverned subject gap in reduced relatives, cf. (46a) vs. (46b):

[12] Sentence (44b) cannot be interpreted as: *She prefers for someone to leave.*
[13] Vacuous movement context in representational terms: *[X$_i$ Y Z$_i$], if Y = 0.

(46) a. Let us try the restaurant [$_{CP\backslash IP}$ which [$_{C\backslash I'}$ was [recommended]]].
b. *Let us try the restaurant [$_{CP\backslash IP}$ e [$_{C\backslash I'}$ was [recommended]]].

Since relative clauses with a subject *wh*-phrase are cases of vacuous movement, the *wh*-phrase remains in situ and the relative clause in (46b) has to be analyzed as a matching projection. Since the *wh*-phrase is missing, this structure contains a subject gap. This gap is ungoverned and violates ECP. This is the reason for the ungrammaticality of (46b) and for the impossibility of reduced variants of relative clauses with a relativized subject. It is impossible to have an empty operator in the matching projection structure, since there would be no variable to be bound because the operator position coincides with the variable position.

4.4 Non-Matching V-Projections

Topicalization of V-projections provides crucial evidence that non-matching secondary projections in vacuous movement contexts lead to ungrammaticality. It is easy to see why there is no matching projection for V^n-topicalization:

(47) a. daß [ein Flugzeug [[$_{VC}$ gelandet] ist]]].
b. *[Ein Flugzeug gelandet] ist.

In the base structure, which is identical with the structure found in clauses introduced by a complementizer, the verbs form a constituent, the verbal cluster. A non-vacuous movement variant of (47b) shows that in topicalization structures the non-finite verb is part of a constituent that does not contain the finite verb.:

(48) [Ein Flugzeug gelandet] ist *hier noch nie.*

Since the structure of the topicalized constituent does not match a substructure, a matching projection cannot be achieved. Hence we are faced with a context of vacuous movement for which there is no matching projection. The fact that these structures are ungrammatical is strong support for the matching requirement and against vacuous movement, for whenever matching is possible, the structure is grammatical:

(49) a. daß [$_{V\text{-}max}$ es [$_{VC}$stimmt]].
b. [$_{V\text{-}max\backslash CP}$es [$_{VC\backslash C'}$ stimmt]] [14]

[14] I provided some evidence elsewhere (cf. Haider 1985; 1986a; 1986b; 1987a)

4.5 The Matching Effect

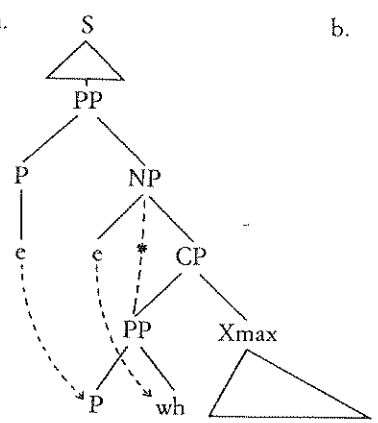
Free relatives are headless DPs, hence they are matching projections with the *wh*-element serving as secondary D-head. This entails immediately that the *wh*-element must be a *wh*-pronoun. As a pronoun, it is both a lexical category and a maximal projection, i.e [+m, +p]. Qua lexical category, i.e. [+m], it can serve as the secondary head for another X°-position, which is [+m], too. This property covers all the phenomena for which Groos and van Riemsdijk had to invoke the filter (31), cf. (50):

(50) a. *[Wessen Haus] brennt ist glücklich. (NP-pied piping)
whom$_{GEN}$ house burns is happy
"Anybody whose house burns down is happy"
b. *Sie erschießen [auf wen] wir blicken. (PP-pied piping)
they shoot on whom$_{ACC}$ we look
"They shoot at whoever we are looking at"

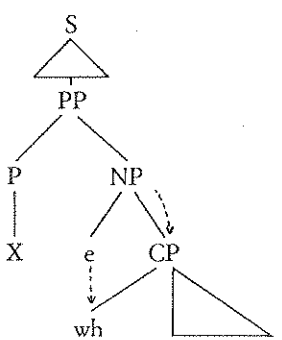
In (50a) the D-position would be projected on a DP, in (50b) on a PP, since in both cases the argument the free relative represents is a DP.

The fact that ungrammaticality arises also in cases where the matrix verb and the embedded one both require the same PP is a consequence of non-matching projections. It is impossible to project a PP onto a CP and achieve a matching projection:

(51) a.



b.



that in German the I-position coincides with the C-position and that the subject is internal to V-max.

In order to project the empty P in (51a) onto the P in COMP and the empty N onto the N in the PP in COMP, both the PP and the NP would have to be projected onto the same node, namely the PP. This is impossible, however, since the NP is embedded in the PP. (51b), a free relative contained in a PP, permits a matching projection and is grammatical, as (52) illustrates:

(52) Dieser Reporter stürzt sich auf [was man ihm zeigte].
this reporter jumps himself on what$_{ACC}$ one him showed
"This reporter jumps on anything one showed to him"

Finally, it becomes clear why the matching effect is not a matching in terms of abstract case but of surface case form only:

(53) a. Das, was du sagst, ist richtig.
it$_{NOM}$ that$_{ACC}$ you say is right
"What you say is right"
b. Was du sagst, ist richtig.
what$_{ACC/NOM}$ you say is right
"What you say is right"

In (53b) the *wh*-element is the primary head of the *wh*-chain. Hence it must be ACC. As a secondary head it represents the head of the DP. The DP is assigned NOM. This case percolates to the head, which is the *wh*-element. Hence this must be compatible with two different case requirements. This is possible only if we interpret case assignment as case checking and if there is an element that is neutralized with respect to the crucial case difference. The neuter pronoun in German is such an element: As a primary head it fulfils the requirement of being an ACC-form but as a secondary head it simultaneously functions as a NOM-form.

Eventually it is worth pointing out that under the analysis discussed above it is predicted that a free relative will exhibit NP-like properties as well as sentential ones simultaneously. Free relatives can be extraposed like any sentential constituent:

(54) Ich habe gelesen [was du empfohlen hast].
I have read what you recommended have
"I have read what you recommended"

In Groos and van Riemsdijk's view the extraposed constituent is the embedded sentence and the empty NP is left in situ just as with full NPs like in (55):

(55) Ich habe *das* gelesen [was du empfohlen hast].
I have that read what you recommended have

If this assumption were correct we would expect that extraposition of free relatives out of PPs is possible as well. But this is not the case, as illustrated by (56d):

(56) a. Der Reporter hat sich auf das, [was man ihm zeigte] gestürzt. (cf. (52))
b. Der Reporter hat sich auf das gestürzt [was man ihm zeigte].
c. Der Reporter hat sich auf [was man ihm zeigte] gestürzt.
d. *Der Reporter hat sich auf [−] gestürzt [was man ihm zeigte].

The ungrammaticality of (56d) is a straightforward consequence of the absence of preposition stranding in German only if it is assumed that there is no NP with an empty head left inside the PP. Under the analysis given above, extraposing the free relative coincides with removing the NP constituent. This yields a stranded preposition.

5. Conclusions

This paper starts from two premisses: There are no empty heads and there are no empty derivations. It is shown that these premisses receive considerable empirical support in the analysis of several hitherto unsolved problems. English turns out to be a particularly constrained V-second language. The matching effect of free relative clauses is predictable and can be explained without resort to a filter. The alternation between obligatory and optional control that depends on the presence or absence of an element in the COMP-position just as well as the limitations of VP-topicalization in German or the long-standing problem why reduced relatives must not lack a subject pronoun receives a straightforward explanation. The explanation is based on one hypothesis: Projections of *functional heads* may take the form of *matching projections*. They may appear as virtual projections superimposed on a structurally isomorphic primary projection.

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