That-trace effects without traces. An experimental investigation

Martin Salzmann[1], Jana Häussler[2], Markus Bader[3] & Josef Bayer[4]

[1] University of Leipzig, [2] University of Potsdam,
[3] Goethe University Frankfurt, [4] University of Konstanz

1 Introduction

Starting with Perlmutter (1971) and the filter proposed in Chomsky and Lasnik (1977), *that*-trace effects have been mainly conceived as a ban on subject extraction out of an embedded clause introduced by a complementizer. In this paper, we propose an alternative perspective based on the observation that *that*-trace (like) effects arise not only in sentences involving subject extraction but also in sentences without any extraction at all.

For German, the existence of *that*-trace effects has long been denied (e.g., Haider (1983), Grewendorf (1988), Müller (1995)).[1] Subject extraction and object extraction out of a *that*-clause were argued to be equally good or equally bad.[2] Featherston (2005), however, provided experimental evidence for *that*-trace effects in German. For sentences as in (1), Featherston found a contrast between subject extraction and object extraction. Subject extractions as in (1a) received lower ratings than corresponding object extractions as in (1b) (see also Kiziak (2010)).

(1) a. Wer glaubst du, dass den Schüler ausgeschimpft hat?
who.NOM believe you that the pupil told.off has
'Who do you believe told off the pupil?'

b. Wen glaubst du, dass der Lehrer ausgeschimpft hat?
who.ACC believe you that the teacher told.off has
'Who do you believe that the teacher told off?'

In what follows, we show that there is an additional and independent factor that contributes to the degradedness of long subject extraction. As we will see, this factor is independent of subjecthood. Note first that the position of the subject trace relative to the

[1] Yet, the consensus was not perfect (e.g., Fanselow (1987)).

[2] There was assumed to be cross-dialectal variation: Long extraction is fine in Southern varieties but bad in Northern varieties.

complementizer seems to matter. Subject extraction is markedly worse if the trace can only be postulated in the highest clausal position right below C, cf. Bayer (2005), Salzmann and Bayer (2010):

(2) Wer$_i$ glaubst du, dass $^{??}$(morgen) t_i kommt?
who believe you that tomorrow comes
'Who do you believe will come (tomorrow)?'

The ameliorating effect of the adverb (for English see section 3.2) suggests that the degradedness of subject extraction in the variant of (2) without the adverb is related to the adjacency of complementizer and trace. Crucially, the degradedness of C-t sequences is not restricted to subject traces: It obtains with quirky subjects as in (3) and movable adverbs as in (4) as well:

(3) Wem$_i$ denkst du, dass *(immer) t_i graut vor Prüfungen?
who.DAT believe you that always dreads before exams
'Who do you think (always) dreads exams?'

(4) Gestern$_i$ finde ich nicht, dass *(dort) t_i hätte getanzt werden sollen.
yesterday find I not that there had.SUBJ danced become should
'As for yesterday, I don't think that people should have danced (there).'

The data in (2)—(4) seem to suggest a ban on the sequence complementizer-trace. Yet, closer inspection reveals another reoccurring pattern. The degraded sentences do not only share adjacency of complementizer and trace but also adjacency of complementizer and finite verb. What if the degradedness is independent of the position of the trace and rather related to the position of the finite verb relative to the complementizer? If so, the penalty is not so much a *that*-trace effect but a *that*-V_{fin} effect. In section 2, we present two experiments that address this hypothesis.

2 *That*-trace effects without traces

If there is indeed a constraint that penalizes the sequence C-V_{fin}, we expect to see a comparable penalty in configurations with a C-V_{fin} sequence *without* extraction. Verb projection raising yields such a configuration when all non-verbal material occurs inside the verb cluster.

In contrast to verb raising (VR) in (5a), verb projection raising (VPR) in (5b) and (5c) affects more than just the verb. As a result the verb cluster contains non-verbal material: In (5b), the object occurs inside the cluster; in (5c), the subject occurs inside the cluster.

(5) a. Tim sagte, dass neulich jemand einen Versuch **habe** abbrechen müssen.
T. said that recently someone a test has abandon must
b. Tim sagte, dass neulich jemand **habe** *einen Versuch* abbrechen müssen.
T. said that recently someone has a test abandon must
c. Tim sagte, dass neulich **habe** *jemand* abbrechen müssen.
T. said that recently has someone abandon must
'Tim said that recently someone had to abandon (a test).'

Below, we present two experiments that make use of verb projection raising. The experiments investigate whether verb projection raising results in degraded structures when the finite verb ends up immediately to the right of the complementizer *dass* ('that'). In (5c), adjacency of *dass* and finite verb is achieved by dropping the adverbial.

2.1 Experiment 1: Verb Projection Raising and Long Extraction behave alike

Experiment 1 directly compares C-V_{fin} sequences in sentences with and without extraction. To this end, the experiment includes sentences involving subject extraction out of an embedded *that*-clause and sentences involving verb projection raising. For further comparison, the experiment also includes sentences involving verb raising.

(6) a. *Long subject extraction*
Wer$_i$ meinst du, **dass** (bestimmt) t$_i$ **habe** schummeln wollen?
who think you that certainly had.SUBJ cheat want
'Who do you think (certainly) wanted to cheat?'

b. *Verb projection raising (VPR)*
Wer meint, **dass** (bestimmt) **habe** *jemand* schummeln wollen?
who thinks that certainly had.SUBJ someone cheat want
'Who believes that certainly someone wanted to cheat?'

c. *Verb raising (VR)*
Wer meint, **dass** (bestimmt) *jemand* **habe** schummeln wollen?
who thinks that certainly someone had.SUBJ cheat want
'Who believes that certainly someone wanted to cheat?'

The three sentence types are constructed in such a way that they closely match each other at the surface. All three sentences contain an embedded clause introduced by the complementizer *dass* ('that'); all three sentences constitute *wh*-questions—yet while the fronted *wh*-subject originates in the embedded clause in long-extraction sentences like (6a), it originates in the matrix clause in VPR sentences like (6b) and VR sentences like (6c). As indicated by the parentheses in (6), the adverb to the right of the complementizer was either present or absent. In long-extraction sentences and VPR sentences, the omission of the adverb results in the sequence C-V_{fin}. In VR sentences, in contrast, complementizer and finite verb are always separated by the subject, independent of the presence of the adverb. Under the hypothesis that the sequence C-V_{fin} is degraded, we expect an ameliorating effect of the adverb for long extractions and verb projection raising but no effect for verb raising.

63 speakers of Standard German—35 from the South (students from the University of Konstanz) and 28 from the North (students from the University of Potsdam)[3] completed a questionnaire containing sentences as in (6). 77 speakers of Swiss German (students of

[3] Students who moved from the North to the South or in reverse direction were excluded from the analyses. The numbers above indicate the number of remaining participants.

the University of Zurich speaking various Swiss German dialects) completed corresponding questionnaires with Swiss German counterparts.[4]

Participants performed a magnitude estimation task (cf. Bard et al. (1996), Cowart (1997)). They judged each sentence in relation to the reference sentence in (7), given at the beginning of the questionnaire and on the header of each page.[5] If participants perceived a sentence twice as good as the reference sentence, they should assign it a value twice as high as the value for the reference sentence; if they perceived a sentence half as good as the reference sentence, they should assign it a value half as high as the reference value.

(7) Ich glaube, dass das Gutachten die Chefin in ihrem Büro gelesen hat.
I think that the review the boss.F in her office read has
'I think that the boss read the review in her office.'

The reference sentence in (7) involves scrambling with morphologically ambiguous arguments—both NPs in the embedded clause are compatible with nominative and accusative case. The ambiguity is resolved by the verb which requires an animate subject. Given the ambiguity and the lack of a context licensing the scrambling operation, the sentence is expected to be of only intermediate acceptability.

Experiment 1 included 30 sentences as in (6) with six conditions per sentence, counterbalanced across questionnaires (each questionnaire contained five sentences per condition but each sentence in only one of its versions), plus 41 fillers, with sentence order randomized.

Since participants in a magnitude-estimation experiment are free to establish their own scales (as long as they obey the requirements of the task), the raw scores have to be normalized for further analyses. Table 1 gives log-ratios, i.e. log-transformed ratios of raw scores divided by the reference value (cf. Bard et al. (1996)). Positive values indicate higher ratings in comparison to the reference value; negative values indicate lower ratings. The log-ratios show a general penalty for long extractions and verb projection raising (see also Figure 1). The ratings for long-extraction sentences and VPR sentences are consistently lower than the ratings for verb raising sentences. The strength of the penalty differs across the three groups of speakers: From North to South the acceptability of long extractions increases. Crucially, long extractions and verb projection raising both benefit from the presence of an adverb separating complementizer and finite verb. The adverb effect occurs in all three groups of participants. Verb raising sentences, in contrast, are not affected by the presence of an adverb. Numerically, an adverb even decreases the ratings in the Swiss German group and the Southern German group.

Statistical analyses of variance confirm the observations described above. They yield significant main effects of Group ($F1 = 8.4$, $p < .001$; $F_2 = 68.8$, $p < .001$), Construction

[4] In addition to changes in spelling and lexical items, we also adapted the order inside the verbal cluster: In line with Swiss German grammar, the modal verb preceded the lexical verb in the Swiss German sentences.

[5] The Swiss German questionnaires contained a Swiss German version of (7).

(F_1 = 191, p <.001; F_2 =138, p <.001), and Adverb (F_1 = 22.8, p <.001; F_2 = 10.4, p <.01) as well as significant interactions of Construction and Group (F_1 = 7.3, p <.001; F_2 =19.0, p < .001) and crucially also of Construction and Adverb (F_1 = 17.7, p <.001; F_2 = 7.4, p <.01). The latter indicates that the impact of an adverb indeed differs across constructions. The interaction of Adverb and Group as well as the interaction involving all three factors failed significance (all F-values < 1), meaning that the impact of Adverb was the same for all three groups of speakers.

Table 1. Mean ratings in Experiment 1 (log-ratios)

	Long Extraction		*VPR*		*VR*	
Group	–Adv	+Adv	–Adv	+Adv	–Adv	+Adv
Standard German (North)	–.30	–.27	–.16	–.04	.13	.13
Standard German (South)	–.22	–.19	–.18	–.11	.09	.06
Swiss German	–.07	.00	–.09	–.02	.23	.19

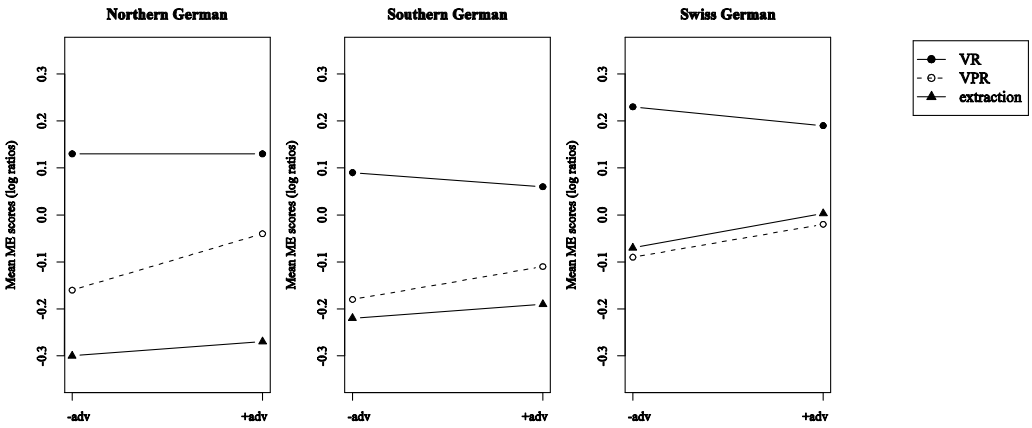

Figure 1. Mean ratings (log-ratios) in Experiment 1

Taken together, the results support the hypothesis that the sequence C-V_{fin} is degraded. We see this degradedness in the case of subject extraction out of a *that*-clause—for which one could argue in favor of a *that*-trace effect—but also in the case of verb projection raising—i.e., in the absence of a trace. For both sentence types, acceptability increases if an adverb breaks the adjacency of complementizer and finite verb.

2.2 Experiment 2: More evidence for the deviance of C-V_{fin} sequences

The ratings for VPR sentences in Experiment 1 are strikingly low in comparison to VR sentences, even in the presence of an adverb. One might therefore object that it is simply the presence of VPR that leads to degradation, not the sequence C-V_{fin}. Experiment 2 aims to overcome this caveat by investigating a different type of VPR sentences, namely VPR involving impersonal passives as in (8a). For comparison, Experiment 2 includes

corresponding VR sentences as in (8b) with the PP-complement preceding the cluster and hence separating complementizer and finite auxiliary.

(8) a. **dass** (sofort) **hätte** *darüber* informiert werden sollen, …
that immediately had.SUBJ about.it informed become should
b. **dass** (sofort) *darüber* **hätte** informiert werden sollen,
that immediately about.it had.SUBJ informed become should
'that one should have (immediately) informed people about it …'

In addition to the factor Construction (VPR vs. VR), the factor Adverb varies the occurrence of an adverb to the immediate right of the complementizer.

92 speakers of Standard German (all students from the University of Konstanz) completed a questionnaire. As in Experiment 1, they performed a magnitude estimation task. The reference sentence, given in (9), again involves scrambling in the embedded clause, though this time with unambiguous NPs.

(9) Ich glaube, dass den Bericht der Chef in seinem Büro gelesen hat.
I think that the report the boss.M in his office read has
'I think that the boss read the report in his office.'

Each questionnaire contained 24 sentences like (8) and 76 filler sentences, with sentence order randomized. Experimental sentences occurred in one of four versions each, counterbalanced across questionnaires.

The ratings in Experiment 2 (cf. Table 2) replicate the findings from Experiment 1. As in the previous experiment, without the adverb, VPR sentences are markedly worse than VR sentences. Once the adverb, e.g., *sofort* ('immediately') in (8), is present, the contrast vanishes. Thus, we see again an interaction of Construction and Adverb: in VR sentences, i.e. in sentences in which the PP fills the slot between C and V_{fin}, the presence or absence of the adverb has no effect; in VPR sentences, the presence of the adverb substantially increases the acceptability. Statistical analyses of variance confirm this impression of an interaction ($F_1 = 63.0$, $p < .001$; $F_2 = 22.1$, $p < .05$). The two factors reached significance as main effects as well (Construction: $F_1 = 42.2$, $p < .001$; $F_2 = 31.1$, $p < .001$; Adverb: $F_1 = 37.9$, $p < .001$; $F_2 = 7.2$, $p < .05$).

Table 2. Mean ratings in Experiment 2 (log-ratios)

VPR		*VR*	
–Adv	+Adv	–Adv	+Adv
–.03	.14	.19	.19

As a final remark, note that the overall acceptance of VPR sentences is higher in Experiment 2 than in Experiment 1. Though one has to be cautious to compare magnitude estimation scores across experiments, we feel encouraged to do so here because the reference sentences (7) and (9) are almost identical. Furthermore, the improvement is not only visible in higher raw scores but also in a reduced difference between VPR sentences

and VR sentences. We surmise that the higher acceptability of VPR sentences in Experiment 2 is related to the ease with which a particular constituent can be accommodated within the cluster. Apparently, it is easier with complements than with subjects; arguably this can be related to the fact that cluster-internal material is usually focused; focus in turn is typically associated with objects rather than with subjects.[6]

3 Analysis

The previous section has established the following facts: a) embedded clauses with subject extraction as well as embedded clauses without extraction are degraded if there is no phonetic material between the complementizer and the finite verb, b) such structures improve once there is overt material between complementizer and finite verb, and c) it does not seem to matter what kind of material intervenes, i.e. adverbs as in (2)—(4), (6a/b) and (8a), DPs as in (1a) and (6c), and PPs as in (8b) have the same ameliorating effect.

3.1 A phonological EPP

Descriptively, it seems that the sequence C+V_{fin} is penalized. Instead of postulating a corresponding filter, we propose an explanation in terms of a phonological EPP: We argue for a designated functional projection in the German middle field between C and vP that needs to be overtly filled at PF. We refer to this projection as FP, but other labels like TP are conceivable as well.[7] What is crucial for our purposes is that as proposed in Holmberg (2000) for Stylistic Inversion in Icelandic, the head of this projection does not have any phi- or case-features that would attract a goal; rather, it only has a P-feature that attracts a phonologically visible category irrespective of its syntactic category. Assuming a minimal German sentence structure with the functional sequence CP-FP-vP, most constituents will be located either vP-internally (focused objects and the like) or in multiple specifiers of vP (subjects, scrambled/presuppositional/topical material and adverbials, ordered according to information-structural/semantic principles). F will simply attract the closest accessible constituent; given the Phase Impenetrability Condition (Chomsky (2001)), this will invariably be elements in Spec, vP, thus often the subject, adverbials like *heute* 'today' functioning as stage topics, or scrambled objects.

If in the case of subject extraction, Spec, FP remains empty since there is no material left in the middle field as in (2) or (6a), the result is ungrammatical. The phonological EPP thus captures what used to be referred to as a *that*-trace effect. Additionally, it captures the non-subject cases in (3) and (4). Most importantly, however, it also covers the data in (6b) and (8a) which are degraded even though they do not involve extraction. An account in terms of a phonological EPP can thus provide a unified explanation for phenomena that would seem quite diverse and unconnected under an extraction/locality

[6] For more discussion about the acceptability of VPR in Standard German and references, cf. Bader and Schmid (2009: 224).

[7] It cannot be TopP because fronting is not always related to topichood, cf. the fronting of the participle in (16) below. Holmberg and Nikanne (2002) use the label TP for a similarly flexible position in Finnish, as does Gutiérrez-Bravo (2007) for Spanish.

perspective as in much previous work on *that*-trace effects. In other words, '*that*-trace effects' are just epiphenomenal.

It should be pointed out that the proposal made here differs somewhat from the phonological EPP proposed in Holmberg (2000) where it holds derivationally so that an XP may satisfy the EPP in different locations.[8] In our approach, this is crucially not possible since the EPP holds at surface structure. Furthermore, while Holmberg (2000) documents minimality effects, i.e. only the closest category can be attracted, such effects are difficult to identify in German given the free word order in the middle field: If constituents can occur in more or less freely ordered specifiers of vP in German, just about any category will qualify as a goal for F as long as it happens to be in the highest specifier of vP.[9]

The workings of our approach can be illustrated as follows: Take as an example (2) from above, repeated here for convenience:

(10) Wer$_i$ glaubst du, dass $^{??}$(morgen) t$_i$ kommt?
who believe you that tomorrow comes
'Who do you believe is coming (tomorrow)?'

In the variant without the adverb, at the completion of the vP-phase, the only element in Spec, vP is the *wh*-subject. Consequently, it will be attracted by F to Spec, FP. Importantly, the P-feature of F cannot be satisfied at this point; rather, P-feature checking takes place at the point when FP is transferred to the interfaces, i.e. when the matrix verb is merged and triggers spell-out of the complement of the phase head C.[10] However, since the *wh*-phrase has moved on to Spec, CP in the meantime, the specifier of F is no longer filled (under the assumption, cf. footnote 8, that the lower copy is immediately PF-deleted). As a consequence, the P-feature cannot be checked at the moment of transfer and the derivation crashes. This derivation is depicted schematically in (11):

(11) * believe [$_{CP}$ who$_i$ [$_{FP}$ t$_i$ F$_{[P]}$ [$_{vP}$ t$_i$ … comes]]]

[8] Landau (2007) also proposes an EPP with a phonological component, but in his account, the EPP is a selectional requirement which is parasitic on a syntactic Agree-triggering feature. It is thus never the P-feature that acts as a probe. Furthermore, he assumes that the EPP can be checked derivationally, i.e. be satisfied even if the copy of the XP in Spec, TP is eventually deleted. On our account below, this is not possible, the assumption being that a copy of X is immediately PF-deleted once X moves on. The result is thus the opposite of Landau's proposal even though both approaches check the EPP at the phase-level.

[9] Alternatively, if all specifiers of vP count as equidistant to F, minimality will simply not have any visible results in German.

[10] This type of feature-checking may strike one as somewhat unorthodox as there is a delay between movement and checking, but this seems unavoidable to capture the surface-sensitivity of the constraint. Alternatively, one could have F attract at the point of transfer as a last resort; this would also work, but it would involve counter-cyclic movement, something with which we would rather like to dispense. In our account, attraction is cyclic while checking is not. We also have to make sure that F stops attracting once it has a constituent in its specifier. It is not so obvious how this can be ensured if the P-feature is not checked until transfer. One way of doing so is to split the P-feature into 2 sub-features, one being checked at the moment of attraction and one at the moment of transfer.

In the variant of (10) with an adverb, however, there is a constituent in Spec, vP in addition to the *wh*-subject. Consequently, the adverb can be attracted to Spec, FP (in case it is the highest specifier or if all specifiers are equidistant, cf. fn. 9). The *wh*-phrase will move to Spec, CP. When the complement of C (containing FP) is spelled-out, the P-feature of F can be checked since its specifier is filled. Thus, the derivation converges:[11]

(12) believe [$_{CP}$ who$_j$ [$_{FP}$ tomorrow$_i$ F$_{[\not P]}$ [$_{vP}$ t$_i$ t$_j$… comes]]]

As for the VPR cases without an adverb in (6b) and (8a), there is simply no element in Spec, vP of the highest verb (the Aux) (in (6b), the subject is in the specifier of a lower verbal projection, in (8a) the same holds for the PP-complement). As a consequence, there is no accessible goal for F, and its P-feature cannot be checked.[12] The following structure illustrates this for (6b):

(13) *… [$_{CP}$ that [$_{FP}$ F$_{[P]}$ [$_{vP1}$ has [$_{vP2}$ [$_{vP3}$ someone cheat] wanted]]]] = (6b)

Things are different in the corresponding VR-cases in (6c) and (8b) where there is material in the highest Spec, vP, which can consequently be attracted by F. The following structure illustrates this for (6c):

(14) … [$_{CP}$ that [$_{FP}$ someone$_i$ F$_{[\not P]}$ [$_{vP1}$ t$_i$ has [$_{vP2}$ [$_{vP3}$ t$_i$ cheat] wanted]]]] = (6c)

Before moving on to English, we briefly need to address V2-structures, where it is not fully obvious how the EPP is satisfied:

(15)	a.	Peter	schläft.	b.	Wer	kommt?	(16)	Im	Haus wird gearbeitet.
		Peter	sleeps		who	comes		in.the	house becomes worked
		‘Peter sleeps.’			‘Who is coming?’			‘In the house people are working.’	

For the subject-initial cases in (15), we will assume, in accordance with much of the literature, cf. e.g. Travis (1984), that these are not CPs, but contain less structure. In our current model they would be FPs with the subject satisfying the EPP. Cases like (16), which are normally analyzed as CPs, can be accommodated if the participle *gearbeitet* satisfies the EPP by moving to Spec, FP (from Spec, vP1):[13]

(17) [$_{CP}$ [In the house]$_i$ C°-becomes$_j$ [$_{FP}$ [$_{vP2}$ t$_i$ worked]$_k$ F$_{[\not P]}$ [$_{vP1}$ t$_k$ t$_i$ [$_{v'}$ t$_j$ t$_k$]]]]

[11] An alternative derivation of this sentence is conceivable where the *wh*-phrase is attracted instead of the adverbial. In that case, the derivation will crash as in (11) unless one opts for counter-cyclic movement of the adverbial, as discussed in the previous footnote.

[12] Note that we presuppose that all verbal projections are vP-phases.

[13] For concreteness’ sake, we assume an ascending order in the verbal complex; in our analysis, the VP containing the participle (remnant-)moves to the specifier of the auxiliary to derive the descending order. For some reason, the finite verb, which is arguably in v, cannot satisfy P even if it is the only accessible element as e.g. in (11). We can think of the following reasons: either it cannot move to a phrasal position because it is a head (but see Holmberg (2000: 461)), or movement of the entire vP containing the finite verb is blocked because comp-to-spec movement is not an option, as is often assumed, cf. Pesetsky and Torrego (2001).

Note finally that our phonological EPP accords well with an older observation by Haider (2006: 236) that the middle-field must not remain empty after vP-topicalization:

(18) a. dass [eine Hymne gesungen wurde]
that a hymn sung.PASS was
'that a hymn was sung'
b. [Eine Hymne gesungen]$_i$ wurde [*(nicht) t_i].
a hymn sung.PASS was not
'There was (no) hymn singing.'

If a vP containing all material of the middle field is topicalized, the result is bad, exactly what one would expect under our approach. Once some constituent, e.g. the sentential negation, is left behind, the P-feature of F can be checked and the result is grammatical.

3.2 Extension to English

We propose a phonological EPP for English according to which Spec, TP must be phonetically filled.[14] This immediately captures the basic *that*-trace facts: First, it explains the basic subject-object asymmetry as in (19):

(19) a. *Who$_i$ did you say that t_i came to the party?
b. Who$_i$ did you say (that) Mary loves t_i?

In (19a), Spec, TP remains empty at the point of transfer so that the derivation crashes while in (19b), the embedded subject checks the P-feature of F. Second, our approach also captures *that*-trace effects with locative inversion (Bresnan (1994)):

(20) [In which villages]$_i$ do you believe (*that) t_i can be found examples of this cuisine?

Again, Spec, TP illicitly remains empty on the surface, leading to a crash. Third, a phonological EPP also accounts for the observation that *that*-trace effects vanish under *there*-insertion (cf. Bayer (2005: 235)):

(21) What$_i$ do you think that there would be t_i necessary to do with these people?

Here, *there* satisfies the EPP.[15] Fourth, the Adverb Effect also follows naturally under our proposal: It has been noted that *that*-trace effects can be ameliorated by intervening adverbs, cf. Culicover (1993: 558):

(22) This is the tree Op$_i$ I think that *(just yesterday) t_i had resisted my shovel.

[14] Independent arguments in favor of a PF-perspective on the English EPP have been advanced in van Craenenbroeck and den Dikken (2006).

[15] So far, we have been assuming that the EPP is checked via internal merge. This would imply for the example at hand that *there* must first be merged in Spec, vP. The same may have to be assumed for high adverbials. Alternatively, our assumptions could be modified to the effect that the EPP can also be checked via external merge. As far as we can tell, this would not have any negative consequences for our account.

We assume that the adverb occupies Spec, TP and therefore satisfies the EPP.

Under the view proposed above that the EPP holds representationally, instances of raising and long extractions without *that* pose potential problems since the EPP seems to be satisfied derivationally in these constructions:

(23) a. John$_i$ seems t_i to like Mary. b. Who$_i$ do you think t_i left?

In the case of raising, we follow proposals in favor of discarding the EPP for non-finite clauses, cf. Grohmann et al. (2000), Bošković (2002); the intermediate movement step is instead triggered by locality. Instances of long extraction as (23b) are more recalcitrant as it seems that the embedded Spec, TP (of a finite clause in this case) remains empty. Here we follow Bayer (2005: 245f.) and Salzmann and Bayer (2010) who propose that what looks like long subject extraction is actually just short extraction with the *do-you-think*-part functioning as a parenthetical. The crucial evidence for this reanalysis comes from cases where the 'do you think'-part is incompatible with the phrase structure of the sentence (for more evidence, cf. the sources mentioned above):[16]

(24) Who could **do you think** challenge his version of the accident?
http://query.nytimes.com/mem/archive-free/pdf?res=F10811FD3D5415738DDDA10894DD405B8485F0D3

We can thus conclude that reinterpreting the English EPP leads to an alternative account of *that*-trace effects without reference to locality. English differs from German in the types of elements that can satisfy the EPP. This is due to independent differences in word order freedom: Since English is a non-scrambling language, relatively few elements can reach Spec, vP and thus become eligible for attraction by T.[17]

3.3 A general problem: relative clauses with a complementizer only

It is well-known that English subject relatives do not show *that*-trace effects:

(25) I saw the man [Op$_i$ that t_i came into the room].

Here, it seems that Spec, TP remains empty at PF. The same problem obtains in German dialects that have a relative complementizer *wo* but no relative pronoun:

(26) de Maa, [Op$_i$ wo t_i singt]
the man C sings
'the man that sings' (Swiss German)

We do not have a straightforward solution to this problem. For the English case, one might claim with Dekkers (1999) that what looks like a complementizer is actually a relative pronoun and that short subject relatives (like short subject questions) are just

[16] This type of account cannot be extended to long object extraction without *that*. For those cases, we must assume that there is extraction via a CP with a zero complementizer.

[17] Note, though, that English has predicate inversion (cf. den Dikken (2006)) and thus allows APs, PPs and VPs to satisfy the EPP.

TPs; for the German dialects, however, this does not work because in some dialects *wo* co-occurs with a relative pronoun, suggesting that *wo* really is in C.

4 Conclusion and outlook

In this paper we have identified an important factor that accounts for the degradedness of subject extraction in German, but this factor has nothing to do with extraction as such: C-V_{fin} sequences are degraded. We have interpreted this as following from a phonological EPP holding in the German middle field according to which the specifier of the functional head F between vP and CP must be overtly filled at surface structure. As a consequence, the degradation of long subject extraction ('*that*-trace effects') is just a by-product. We have also shown that our analysis can be readily extended to English by assuming that Spec, TP must be filled phonologically.

Given the subject-object asymmetry detected in Featherston (2005) and Kiziak (2010) with examples like (1a) that do contain a filled middle field (with a definite object), there are arguably additional (perhaps partly non-syntactic) factors involved in German which our analysis does not capture. The degradedness of subject extraction that used to be thought of as arising from the violation of one single syntactic constraint thus emerges as the cumulative effect of the interaction of different and partly locality-unrelated factors. Our account generally predicts that only constituents that can reach Spec, vP can satisfy the EPP. Examples like (1a) would thus only be well-formed if the definite object is scrambled to Spec, vP. Unfortunately, the data in Featherstone's experiment do not discriminate between a scrambled and a non-scrambled parse so one cannot assess whether the prediction is borne out.[18]

Conversely, a different explanation will have to be found for the following "*that*-trace-effects at LF", cf. Kayne (1981):

(27) a. Je n' ai exigé qu' ils arrêtent personne.
I not have demanded that they arrest no.one
'I did not demand that they arrest anyone.'
b. *Je n' ai exigé que personne soit arrêté.
I not have demanded that no.one be arrested

(28) *I know perfectly well *who* thinks that *who* is in love with him.

Obviously, these do not follow under PF-based approaches. Arguably, they can be related to a ban on extraction of constituents/features which have been moved to a high position (topic position or scope position), cf. Bayer (2005).

[18] Kiziak (2010: 216ff.) tests and discusses this issue in some detail. Unfortunately, the results are inconclusive.

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Martin Salzmann
University of Leipzig
Department of Linguistics
Beethovenstraße 15
D-04103 Leipzig

martin.salzmann@uni-leipzig.de

Jana Häussler
University of Potsdam
Department of Linguistics
Haus 14/35
Karl-Liebknecht-Straße
D-14476 Potsdam

jana.haeussler@uni-potsdam.de

Markus Bader
Johann Wolfgang Goethe-University
Fachbereich Neuere Philologien
Institut für Linguistik
Grüneburgplatz 1
D-60629 Frankfurt am Main

bader@em.uni-frankfurt.de

Josef Bayer
University of Konstanz
Department of Linguistics
Universitätsstraße 10
Fach D 191
D-78457 Konstanz

josef.bayer@uni-konstanz.de