

Unifying EPP and COMP-trace effects: constraints on silent elements at the edge *

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April 28, 2017

1 Overview

The status of the EPP is a long-standing puzzle for syntactic theory, which is reflected in the development of its various incarnations and implementations.¹ As discussed by Butler (2004), it has undergone an evolution from a specific condition requiring a subject in each sentence (Chomsky 1981), to a more abstract feature used to ensure that a head projects a specifier (Chomsky 2001, and subsequent), and even to being a general movement trigger, driving head movement in addition to phrasal movement. This modern version of the EPP is arguably the formal feature par excellence, used purely to trigger syntactic operations, without being tied to any interface requirements. As such, it is also a thorn in the side of the Minimalist goal to have syntactic derivation be driven by interface concerns interacting with general principles of economy and efficient computation.

In this paper, we focus on the original empirical domain of the EPP, the requirement that certain subject positions be filled, and argue that characterizing it in terms of a syntactic movement-triggering feature is misguided. Specifically, we will argue in

*Thanks first to Dennis Ott and Radek Šimík, organizers of the workshop at the DGfS annual meeting in 2015, which provided an impetus for us to move forward on this project. We received very helpful feedback on earlier versions of this work from our colleagues at ZAS and the University of Leipzig, in particular from Fatima Hamlaoui and Fabian Heck, and from the audiences at internal colloquium talks at both institutions. Gary Thoms read an early draft of the paper and sent us very detailed and extremely helpful comments for which we are grateful. Finally, the current version of the paper has benefited considerably from the detailed comments and criticisms of three anonymous reviewers.

¹The original expansion of EPP, ‘Extended Projection Principle’, made sense in the theoretical context in which it was proposed, but has been made opaque by subsequent developments. David Pesetsky has proposed to replace it with ‘Extra Peripheral Position’ (Facebook, August 6th, 2015), which is more suggestive of what it actually does. We will simply use the unexpanded acronym to avoid any unwarranted expectations.

20 Section 3.1 that, contrary to what is standardly assumed, the factors conditioning the
21 EPP are actually not syntactic, but phonological, as has also been proposed in one way
22 or another by researchers like Holmberg (2000), Landau (2007), Sigurðsson (2010) and
23 Salzmann et al. (2013). Nonetheless, the operations that it seems to trigger clearly *are*
24 syntactic, which is the focus of Section 3.2. This sheds light on why the EPP has been
25 so difficult to get a handle on, but it also presents a conundrum, as it seems to suggest
26 that aspects of the syntactic derivation depend on phonological information. Under the
27 broadly Minimalist framework we adopt here, this would be clearly countercyclic. In
28 the standard Y-model and its descendants, the output of the (narrow) syntactic deriva-
29 tion feeds into the interpretive components of PF and LF, thus while syntactic informa-
30 tion feeds into PF, phonological information is not available to the syntax. More recent
31 phase-based and multiple Spell-out models (etc. Uriagereka 1999, Chomsky 2001) intro-
32 duce a certain amount of feedback, such that syntactic cycles may be interleaved with
33 non-syntactic ones, but it is normally *not* assumed that phonological information from
34 previous cycles can actually interact with later syntactic cycles. Indeed, the crucial point
35 here is not specific to the Y-model. Rather, it extends to any framework which assumes
36 that the syntactic derivation does not have access to the phonological properties of the
37 structures it manipulates, e.g. as a general principle of modularity (e.g. the Principle of
38 Phonology-Free Syntax, see Zwicky and Pullum 1986), or because phonological content
39 is explicitly inserted at a late stage of the derivation after the narrow syntax has done
40 its work (as in realizational theories of morpho-phonology like Distributed Morphology
41 Halle and Marantz 1993). The EPP thus seems to involve a violation of modularity or
42 countercyclicity.²

43 A novel approach to the EPP is thus required, which must simultaneously be able
44 to handle its unique properties but must also be made to fit in with the broader theory
45 of grammatical architecture. We will argue that such an approach will not only allow
46 a more satisfactory account of the EPP itself, but can also yield a unification with the
47 COMP-trace effect and yield insight into how both of these interact with pro-drop. This
48 paper is intended as an initial contribution in this direction. Our first priority is to make
49 the case that the EPP must be implemented in a way that makes reference to phonological
50 information, and to show that the challenges this poses are real and haven't been taken
51 as seriously as they should be. Our second priority is to develop a proposal for a specific
52 implementation of the EPP, which crucially involves interactions between the syntactic

²We will use the two terms somewhat interchangeably when referring to this issue, because they both point to the problem of syntax depending on phonology, seen from slightly different theoretical perspectives. It's generally a modularity violation, and in a system like the brand of Minimalist we adopt here it specifically violates cyclicity, because modularity is implemented (in part) by the syntax derivationally preceding the phonology.

53 derivation and the construction of prosodic domains at the interface with PF. We will
54 then discuss how the issues of counter-cyclicity and modularity that arise can be dealt
55 with, considering some possible ways to proceed. In the end, we will endorse a kind
56 of overgenerate-and-filter approach, where EPP effects arise through the interactions of
57 independent syntactic and phonological considerations. I.e. the syntax makes an array
58 of structures with different combinations of movement and other operations available,
59 and a PF constraint filters out those which don't satisfy certain prosodic requirements.
60 We will argue that this is the most promising route to pursue given our current state of
61 knowledge, though a number of important empirical and theoretical issues remain to be
62 explored in future research.

63 **2 Background on the EPP and its development**

64 In this section, we consider the basic evidence for assuming some version of the EPP,
65 along with significant developments in how it has been understood over the past 35
66 years.

67 **2.1 Motivations for the traditional EPP**

68 The original formulation of the EPP (Chomsky 1981, et seq.) was based on the obser-
69 vation that clauses require their subject position (now usually identified as Spec-TP) to
70 be filled (see also Svenonius 2002, Bošković 2002, Epstein and Seely 2006, Landau 2007,
71 Joutteau 2008, Cable 2012, for useful background on the EPP and its history). This
72 was intended to include straightforward overt subjects as well as covert ones, such as
73 traces of A- and \bar{A} -movement, *PRO* and *pro*, with the choice among these being regulated
74 separately.

75 The pattern in (1) can be explained in terms the θ -criterion: the verb *mow* has two θ -
76 roles to assign, but when the subject is absent, it only gets to assign one of them, leading
77 to ungrammaticality:

78 (1) *(Dan) mowed the lawn.

79 However, there are cases where there is no thematic requirement for a subject, e.g. with
80 verbs that engage in the causative-inchoative alternation like *shatter*. When used transi-
81 tively, as in (2a), *shatter* assigns two θ -roles, an AGENT role to the subject and a PATIENT
82 role to the object. Yet such verbs can famously also be used intransitively, as in (2b), with
83 the agent role left unexpressed. Crucially, the contrast between (2b) and (2c) shows that

84 the remaining argument, which was the object in (2a), must surface in subject position
85 in English: i.e. it cannot remain in its post-verbal position where it gets its θ -role:

- 86 (2) a. Sandra shattered the pot.
87 b. The pot shattered.
88 c. *Shattered the pot.

89 Given that (2b) is grammatical, the problem with (2c) cannot be that a θ -role has gone
90 unassigned — the AGENT role of *shatter* must somehow be optional. Instead, the issue
91 seems to be the lack of a DP in subject position, which is addressed by moving *the pot*
92 there in (2b). Passive sentences like *The pot was shattered* are parallel in this respect.
93 Again, we need something beyond the θ -criterion to ensure that DPs, which would
94 otherwise be objects, appear in subject position.

95 Of course, GB theory and its descendants have another key mechanism that can be
96 invoked to account for these facts, namely Case theory. As per Burzio's Generalization,
97 no accusative Case should be assigned to the object position in sentences like (2c), given
98 the lack of an external θ -role. The only Case available then is nominative, which was
99 traditionally assumed to be assigned in Spec-IP/TP. It could thus be posited that these
100 DPs are forced to move to subject position by their Case needs. Much subsequent work
101 has called this analytic strategy into question, however, arguing that nominative isn't
102 actually restricted to subjects or to any particular position, and thus Case can't be used
103 to trigger movement (see e.g. Zaenen et al. 1985, Sigurðsson 1989, Marantz 1991, Harley
104 1995, Sigurðsson 2003, McFadden 2004). If that line of work is on the right track, patterns
105 like that in (2) already serve as evidence for the EPP.

106 The really clinching argument, however, has always been based on expletives. Under
107 certain circumstances (related to predicate-class and subject-definiteness), the subject can
108 surface in an unexpectedly low post-verbal position, even in English. However, as (3)
109 illustrates, the normal pre-verbal subject position must still be filled, in this instance by
110 the expletive *there*:

- 111 (3) *(There) is an elephant on my sofa.

112 The grammatical version of (3) shows us that, whatever Case (and other) needs the
113 expected subject DP has, they can be met in situ, without movement up to Spec-TP.
114 Nonetheless, Spec-TP must be filled by *something*. An essentially parallel argument can
115 be extended to *it*-type expletives with post-copular sentential subjects in English:

- 116 (4) [That Julie has two heads] is strange. *vs.* *(It) is strange [that Julie has two heads].
117 (5) [For Jay to wear that] would be sad. *vs.* *(It) would be sad [for Jay to wear that].

118 In all these cases, the requirement for these expletives cannot be thematic, since they

119 essentially double an argument that appears elsewhere in the clause.³ More importantly,
120 they are not easily amenable to an account in terms of the Case needs of DPs. While one
121 can argue that *the pot* has to move to Spec-TP in order to receive nominative Case in (2b),
122 it does not make sense to say that expletives *there* and *it* must be inserted in Spec-TP
123 because they require Case — if they were simply left out of the derivation, their needs
124 would be irrelevant. Rather, they must be entering the derivation for some other reason.
125 These patterns taken together lead to the assumption of a further principle to regulate
126 the distribution of DPs, stated in a simple traditional form in (6):

127 (6) **The traditional EPP**

128 Every clause must have a filled subject position.

129 **2.2 Problems and reformulations**

130 While the evidence is strong that something is needed to cover the descriptive ground
131 of a principle like the EPP, it has long been noted that formulations like (6) are unsatis-
132 fying. For one thing, it is a strangely specific requirement: it applies to subjects but not,
133 apparently, to objects or other kinds of arguments. For another, it does not seem to have
134 any independent motivation. We can argue that the θ -criterion arises from plausible in-
135 terpretive considerations and we can at least suggest that the Case filter is grounded in
136 morphological or perhaps processing considerations (e.g. as a mechanism to distinguish
137 amongst arguments). But nothing of this kind seems to underlie the EPP. This has led to
138 a series of attempts to reformulate the principle or to replace it with something else, in
139 order to capture the relevant facts in a more satisfying way.

140 One approach has been to argue that, contrary to appearances, there is a *semantic*
141 underpinning to the EPP, for example that it is essentially the syntactic implementation
142 of a predication requirement (see e.g. Heycock 1991, Butler 2004). While this has some
143 attractions, we won't discuss it in detail here, as it is at best a partial solution. It leaves
144 open the question of how the purported semantic requirement is actually implemented
145 syntactically, and it is particularly ill-suited to dealing with cross-linguistic variation. It
146 is difficult to imagine, e.g., why English should require its clauses to have a transparently
147 predicational structure any more than languages which lack clear EPP effects. Further-
148 more, a semantic approach will be particularly ill-suited to deal with the phonological
149 aspects of the EPP that we will explore in the rest of this paper, since we assume, as is
150 standard, that LF and PF do not directly communicate with each other.

³We also find *it* in an apparent expletive use with 'weather' verbs like *rain* and *snow*, but with these it is possible to make an argument that *it* plays a (limited) thematic role (sometimes referred to as 'quasi-argumental', see Vikner 1995), so they do not provide as strong support for the existence of something like the EPP.

151 A second response has been to eliminate the EPP entirely, subsuming its apparent
152 effects under independent principles of grammar. The ‘Inverse Case Filter’, the idea
153 that every head that *can* assign Case *must* have a DP to assign that Case to, which can
154 be used to trigger movement to subject position and even insertion of expletives given
155 particular assumptions, was briefly very popular as the basis for many such attempts
156 (see e.g. Martin 1999, Grohmann et al. 2000, Boeckx 2000, Bošković 2002, Castillo et al.
157 2009). However, this approach ran into serious theoretical and empirical problems (see
158 McFadden 2004, for extensive discussion) and has been largely abandoned.⁴ A different
159 elimination strategy, popular more recently, is to have movement to subject position be
160 triggered, not by the EPP, but by directionality conditions on Agree. Bošković (2007)
161 proposes that DP movement to Spec-TP is triggered by conflicting requirements of two
162 distinct Agree relationships involving T and the DP — T probes the DP for ϕ -features,
163 while the DP probes T for Case. While the first relationship can be established in situ,
164 when T asymmetrically c-commands the DP, movement of the DP to Spec-TP is neces-
165 sary so that the DP can c-command T and initiate the second probing operation. Zeijlstra
166 (2012), Bjorkman and Zeijlstra (2014) adopt the same approach, but under the assump-
167 tion that the goal must c-command the probe, which yields the same results.

168 A third response is to generalize the EPP so that it does more work in the theory
169 and is thus less suspect in its specificity. In this spirit, Chomsky (2001) proposes that a
170 generalized “EPP feature” is used to mark which syntactic Agree dependencies are to
171 be accompanied by movement — not just movement to subject position, but movement
172 of all kinds. Rather than constituting a specific (and thus perhaps ad hoc) claim that
173 particular subject positions must be filled, the EPP under this conception is simply the
174 mechanism for encoding the displacement property of natural language. Thus general-
175 ized and divorced from their original purpose, such EPP features are sometimes referred
176 to as “edge features” (Chomsky 2008).

177 As a result of these theoretical developments, invocations of the EPP in recent work
178 can involve two related but distinct concerns. One is the general and more recent notion
179 of something to encode where movement — or Merge more generally — is triggered. But
180 the original concern of the EPP remains: the descriptive requirement, in languages like
181 English, that prototypical finite clauses have subjects, and in particular *overt* ones. This
182 narrower, more traditional sense of the EPP is what this paper will focus on, and from
183 here on out this is the sense we intend when we use the term EPP without qualification.
184 What we will have to say is *not* intended to apply to the more recent sense of the EPP as

⁴One strong argument against the Inverse Case Filter is made by Joutteau (2008) based on Breton and Welsh and is bolstered by facts presented at several different points in this paper. Specifically, it can be shown that the EPP is satisfied in a number of instances by elements which cannot be reasonably analyzed as receiving Case. Thus the EPP cannot be reduced to a need to assign Case.

185 a general formal device for triggering movement or Merge, which, if it exists, must be
186 something distinct from the EPP in our sense.⁵

187 3 Establishing the modularity problem

188 In this section, we will present empirical evidence to show that the EPP in languages
189 like English is conditioned by phonological factors (section 3.1). At the same time, the
190 operation responsible for creating a structure that satisfies the EPP shows the properties
191 of being syntactic, not prosodic (section 3.2), and its output can affect interpretation
192 at both LF and PF. We thus seem to have a syntactic operation that is phonologically
193 motivated — a truly counter-cyclic state-of-affairs that challenges standard views on
194 grammatical modularity. We round off with a discussion of some previous work that
195 has tried to deal with these challenges (section 3.3) but argue that these are ultimately
196 untenable on independent grounds.

197 3.1 The EPP must hold at PF

198 Compelling evidence that the EPP has a phonological side comes from the fact that, in
199 the core cases it is meant to capture, it is a requirement, not just for *any* subject, but
200 specifically for an *overt* one:⁶

- 201 (7) a. I like beans.
202 b. * Like beans. (under the interpretation ‘I like beans’)
203 c. * *pro* like beans.
204 (8) a. It is strange [that Julie has two heads].
205 b. * Is strange [that Julie has two heads].
206 c. * *pro* is strange [that Julie has two heads].

207 More or less any version of the EPP will rule out structures like (7b) and (8b), as they
208 lack any representation of a subject. The interesting question is why the same surface

⁵As will become clear, the EPP in this narrower sense is not universal, but must rather depend on language-specific details of syntax, prosody and how they interact with each other, hence the recurring qualification “in languages like English”. Similar requirements for an overt element in particular positions are however found in a number of languages, including e.g. Icelandic (Holmberg 2000, Sigurðsson 2010), Mainland Scandinavian (Sigurðsson 2010), German (Salzmann et al. 2013), Breton (Rezac 2004, Jouitteau 2008) and Welsh (Jouitteau 2008), but with important differences in how the positions are characterized. We will return to the discussion of cross-linguistic variation in section 6.1.

⁶For the moment we are abstracting away from cases involving \bar{A} -bar movement of the subject and the various non-finite clause types, where the subject position does *not* need to be filled by something overt. We will however examine these contexts in detail over the course of the paper, and see how the restrictions placed on them fit in with the phonological side of the EPP. The point for now is simply that there *are* prototypical clause types where a specifically *overt* subject is *required*.

209 strings are ungrammatical with the analyses indicated in (7c) and (8c), i.e. where they
210 are each understood to have silent *pro* subjects. Subject pro-drop languages like Spanish
211 of course *do* allow such clauses with a silent *pro* subject under the right circumstances
212 (see e.g. the contributions in Biberauer et al. 2010, for an overview), as in (9):

213 (9) Hablo español.
214 *pro* speak-1SG Spanish
215 'I speak Spanish.'

215 The standard account is that the EPP would indeed be satisfied by the syntactically
216 present but silent subjects, but that the structures are nonetheless ruled out because
217 English is not a (subject) pro-drop language. I.e. the special silent element *pro* is available
218 in Spanish, but not in English.

219 However, this falls short of an adequate explanation on multiple grounds. First, it
220 may not actually be correct to rule out pro-drop in general in English, given arguments
221 that at least some instances of Non-Obligatory Control (NOC) should be analyzed as (a
222 restricted kind of) pro-drop, even in languages like English (Hornstein 1999, McFadden
223 and Sundaresan under review). Thus the theory would have to account for why pro-
224 drop is not possible in specifically this type of clause. Second, even if we manage to
225 exclude *pro* in prototypical finite clauses, we would still need to explain why there are
226 no *other* silent DPs that could occur in this position. Note that a considerable number of
227 elements have been posited for English that are fully present and active in the syntax,
228 but happen to receive no overt pronunciation: e.g. silent C elements in unembedded
229 declaratives and in some complement clauses, silent T in present-tense clauses lacking
230 an auxiliary, silent *v* with underived verbs, silent D with bare mass nouns and plurals,
231 silent P in 'bare noun-phrase adverbials' like *last week* in *I went to Berlin last week*, PRO
232 subjects in infinitival clauses, all manner of unpronounced copies or traces of movement,
233 and of course a variety of constituents in ellipsis configurations. Once we acknowledge
234 that such null elements exist, we need a story for why *all* of the DPs that are licensed to
235 appear in the subject positions in sentences like (7) and (8) in English happen to include
236 at least one terminal node that is not on that list, i.e. why they all happen to have overt
237 forms. Finally, this approach to the contrast between (7c) and (9) presupposes that there
238 is an explanatory theory of pro-drop that can account for why it isn't available in this
239 context languages like English, including the qualifications noted here. In the absence
240 of such a theory, saying that English is not a (subject) pro-drop language is clearly just a
241 restatement of the facts.

242 Our point is *not* that a theory of the distribution of pro-drop and other silent subjects
243 is impossible — indeed, there is no shortage of proposals on offer. It is rather that,

244 in order to cover everything, such a theory will have to have certain properties. First
 245 and foremost, it will have to make reference to overtness, and given standard views of
 246 grammatical modularity, this means it cannot be implemented entirely in the narrow
 247 syntax. Whether a DP and its subparts have any overt phonology depends at least in
 248 part on phonological information. If such information is only represented on the PF
 249 branch, and the syntax has no access to the phonological properties of the elements it
 250 manipulates, as is standardly assumed, it will be impossible to phrase a constraint that
 251 refers explicitly to overtness purely within the syntax.⁷ Instead, any requirement for
 252 overtness must be stated at a stage in the derivation where phonological information
 253 is available, i.e. somewhere on the PF branch. Once we accept this, we can adopt any
 254 number of syntactic mechanisms for setting up pro-drop structures, interacting with PF
 255 factors governing when subjects do and don't have to be pronounced (see also Duguine
 256 2013, Sundaesan 2014, a.o. for discussion). I.e. English may well have the capacity to
 257 generate pro-drop structures under certain circumstances, but they will be ruled out in
 258 structures like (7c) and (8c) by a version of the EPP that requires *overt* subjects. We will
 259 return to these issues in detail in Section 6.1.

260 A second potential argument that the EPP applies at PF comes from effects with
 261 ellipsis, discussed e.g. by Merchant (2001), van Craenenbroeck and den Dikken (2006).
 262 Extraction from surface subjects in English is generally ruled out (10a), arguably be-
 263 cause such subjects have moved, and moved elements are islands. However, extraction
 264 becomes possible if the extraction site is elided, as in (10b):

- 265 (10) a. * Which Marx brother_i is [a biography of t_i]_j going to appear t_j this year?
 266 b. A biography of one of the Marx brothers is going to appear this year, but I
 267 don't know which (Marx brother).

268 Merchant proposes that what happens in (10b) is that the subject never actually moves,
 269 thus it is not an island to extraction. I.e. the correct structure is (11):

- 270 (11) ... [_{CP} [which (Marx brother)]_i is [~~_{TP} going to appear [a biography of t_i] this~~
 271 year]].

272 Of course, this should lead to an EPP violation since the embedded clause doesn't have
 273 any material in Spec-TP. The fact that it is nonetheless grammatical suggests that the EPP
 274 only applies at PF, after ellipsis, thus it never sees the potentially violating structure, and
 275 (11) is allowed. Such analysis would be impossible with a syntactic EPP. However, we

⁷To clarify, it may be possible to refer to the difference between material that has or has not been affected by a syntactic operation that will lead to silence (e.g. ellipsis), but it will not be possible to refer to material that has a non-zero exponence, since the narrow syntax has no access to exponence.

276 will not rely heavily on this argument for a phonological EPP, as it has recently been
277 challenged by Barros et al. (2014).⁸

278 A further class of evidence for the phonological status of the EPP comes from a com-
279 parison with certain other restrictions on subjects that are usually handled separately,
280 namely the COMP-trace effect.⁹ The central idea, which we will develop throughout the
281 paper, is that the EPP can and should be unified with the COMP-trace effect,¹⁰ the ban
282 on *for-to* and the anti-*that*-trace effect. If this is correct, it provides two pieces of support
283 for a phonological account. First, there is independent evidence for the phonological
284 status of the COMP-trace effect. Second, what the various constraints here have in com-
285 mon is their reference to *silent* subject positions in specific contexts. In other words, they
286 can only be unified via reference to (non-)overtness, and thus the unifying implementa-
287 tion must be situated at PF. The support for this overall approach will develop over the
288 course of the paper, as we develop a single PF-based account that covers all of the rele-
289 vant configurations, and present evidence that they pattern together cross-linguistically.
290 In this section, we will lay out the basics of the COMP-trace phenomenon and present the
291 evidence that it involves something phonological. The logic should be clear that, if the
292 COMP-trace effect and the EPP are to have a unified account, and the COMP-trace effect
293 must hold at PF, then the EPP must hold at PF as well.

294 The COMP-trace effect is exemplified in (12):

- 295 (12) a. Who_i do you think [(that) Alex punched t_i]?
296 b. Who_i do you think [t_i is stupid]?
297 c. * Who_i do you think [that t_i is stupid]?

298 (12a) shows that when an object is *wh*-extracted from an embedded clause into the ma-
299 trix, the complementizer *that* is optional. But when the subject is extracted, *that* suddenly
300 must be dropped, as is clear from the contrast between (12b) and (12c). The first impor-
301 tant point to note is that the COMP-trace effect descriptively amounts to a constraint

⁸The authors call into question the entire logic of placing island constraints at PF based on the possibility of repairing them via ellipsis (see also e.g. Lasnik 2001, Fox and Lasnik 2003, Merchant 2008) by showing that in most cases (crucially including the one in (10b)), there is an alternative source available for the ellipsis which simply doesn't contain the island. So what we are seeing is not actually island repair, but island evasion, which is then obscured by ellipsis. The matter is not entirely settled, since as they note, a series of additional factors seem to be at play specifically with subject island effects that make their results there less robust than with other island types, but we must regard this particular argument for a phonological EPP as questionable. We thank Gary Thoms and an anonymous reviewer for very helpful comments on the issues here.

⁹We thank an anonymous reviewer for comments on a previous version which helped us restructure the exposition of this argument to (hopefully) improve clarity.

¹⁰We make reference to the COMP-trace effect here and throughout, rather than the more traditional *that*-trace effect, for two reasons. One is that similar effects are found in plenty of languages outside English, and the other is that, even in English, it is not about *that* in particular, but about complementizers in general, including in particular *for* in infinitival clauses, as we will discuss in detail below.

302 against a silent subject position in a particular context, just like the EPP. The second
303 is that there is mounting evidence that COMP-trace effects are not actually syntactic, as
304 was long thought, but rather involve something phonological or prosodic (Kandybowicz
305 2006, Bruening 2009, McFadden 2012, Salzmann et al. 2013). For one thing, as we saw
306 for the EPP, ellipsis seems to eliminate the effect (Merchant 2001):¹¹

307 (13) John said that someone would write a new textbook, but I can't remember
308 who_i John said that t_i would write a new textbook.

309 For another, the intonational break created by Right Node Raising (indicated here by the
310 | character), while not completely removing the effect, greatly improves grammaticality
311 (de Chene 1995):

312 (14) ? Who_i does John doubt whether | and Bill suspect that | t_i cheated?

313 Finally, the effect is substantially ameliorated by having an adverbial intervene between
314 the complementizer and the presumed position of the trace (Bresnan 1977, and others):¹²

315 (15) Who_i do you think [that, against better judgment, t_i punched Alex]?

316 We can further underline the connections to the EPP by looking at infinitival clauses.
317 Note first that the COMP-trace effect applies equally well to the infinitival complementizer
318 *for*, as demonstrated by the triple in (16). It is optional in the complement of certain verbs
319 when an object is extracted (16a), but when the subject is extracted, it must be null as
320 shown by the contrast between (16b) and (16c) (Chomsky and Lasnik 1977, Pesetsky and
321 Torrego 2001):

- 322 (16) a. Who_i would you like [(for) Alex to punch t_i]?
323 b. Who_i would you like [t_i to punch Alex]?
324 c. * Who_i would you like [for t_i to punch Alex]?

325 Interestingly, overt *for* is also ruled out when the following subject is null for reasons
326 other than \bar{A} -movement, i.e. when it is (controlled) PRO. (17a) shows again as a baseline
327 that *for* is optionally overt before an overt subject. The contrast between (17b) and (17c)
328 shows that this optionality disappears when the subject is PRO, overt *for* being ruled out.
329 This is thus completely parallel to a COMP-trace paradigm.¹³

¹¹Though again, see Barros et al. (2014) for discussion of how well this argument stands up to closer scrutiny. With COMP-trace effects in particular, their verdict remains inconclusive, as they find *some* evidence for genuine amelioration due to ellipsis and note the existence of the kind of ellipsis-independent arguments we discuss here that COMP-trace effects apply at PF.

¹²We will return to these amelioration effects, and why they work for COMP-trace effect violations but not EPP violations, in section 5.4.

¹³There are both historical and contemporary varieties of English where the facts are different, with overt *for* being possible with a silent PRO subject. However, in these varieties *for* has a rather different syntactic

- 330 (17) a. I would like [(for) you to punch Alex].
 331 b. I_i would like [PRO_i to punch Alex].
 332 c. *I_i would like [for PRO_i to punch Alex].

333 It's important to note at this juncture that the analysis of the distribution of *for* in terms of
 334 the Case needs of the following subject (see e.g. Martin 2001, for a detailed presentation
 335 of this position) is untenable (see e.g. Landau 2006, Sigurðsson 2008, McFadden 2012).
 336 Briefly, it struggles with the optionality of overt *for* in examples like (17a), requires a
 337 problematic conflation of *want*-class predicates with *believe*-class ones for purposes of
 338 Case assignment, and has nothing to offer in the face of (18):

- 339 (18) a. Heinz wants, with all his heart, *(for) Hans to join him in Paris.
 340 b. Who_i does Heinz want, with all his heart, (*for) t_i join him in Paris?

341 (18a) shows that, when the matrix verb is separated from the embedded infinitival by an
 342 adverbial, overt *for* becomes obligatory. In the Case story, *for* is required here to assign
 343 Case to *Hans* because the adverbial prevents the matrix verb *wants* from doing so by
 344 ECM. However, if we *wh*-move the embedded subject into the matrix as in (18b), *for*
 345 is no longer needed, and in fact is ruled out. If Case regulates the distribution of *for*,
 346 (18b) should be just as bad as the version of (18a) without *for*, since there is still nothing
 347 to assign Case to the embedded subject (see Landau 2006, McFadden 2012, for more
 348 detailed argumentation against using Case to model the properties of infinitives).

349 Thus a different story is required for the distribution of *for*. Our approach will be
 350 to unify it with the COMP-trace effect, as both involve ruling out configurations where
 351 an overt complementizer is followed by a silent subject position, which clearly applies
 352 as intended in (18b). Note then that if this is the right characterization of the offend-
 353 ing configuration, it cannot have anything to do directly with traces or movement per
 354 se, but with nullness being a problem in subject position under certain circumstances.
 355 Again, this means that we must be dealing with something at PF, since it is phonological
 356 silence that matters, and the connection to the EPP is reinforced, with the two conditions
 357 amounting to different circumstances under which the subject position is not allowed to
 358 be null.

359 The discussion in this section leads us to the preliminary conclusion, in partial
 360 agreement with Holmberg (2000), Merchant (2001), van Craenenbroeck and den Dikken
 361 (2006), Landau (2007), Sigurðsson (2010) and Salzmann et al. (2013), that the traditional
 362 EPP is not a narrow syntactic condition, requiring that a particular syntactic position be

status, arguably occupying a lower structural position than in the variety of English being described in the main text. Crucially, varieties that allow *for-to* in cases like (17c) also allow things like (16c), where COMP-trace would be violated. Thus the connection between these two phenomena is maintained. See Henry (1992) for careful discussion of the facts in Belfast English.

363 filled at some point in the derivation, but a PF condition requiring the presence of an
 364 overt element. It will be the work of section 4 to figure out how to actually implement
 365 the condition that underlies the EPP, and of section 5 to show how this can be extended
 366 to the various COMP-null effects in a way that captures their phonological properties.

367 3.2 The operations that satisfy the EPP are syntactic

368 If, as we have just argued, the EPP operates by placing restrictions at PF, an obvious
 369 conclusion would be that it triggers DP-movement to subject position and the insertion
 370 of expletives to happen at PF. However, at least in the case of movement, this is clearly
 371 incorrect. EPP-satisfying movement bears all the hallmarks of a syntactic operation,
 372 and furthermore yields LF effects in addition to the obvious PF ones.¹⁴ Given standard
 373 assumptions about the architecture of the grammar, we are left to conclude that displace-
 374 ment that satisfies the EPP is not a PF operation, but quite standard (narrow-)syntactic
 375 movement.

376 First of all, what actually undergoes movement is a *syntactic* constituent, not a not a
 377 phonologically or prosodically defined one from the prosodic hierarchy (Selkirk 1986),
 378 like a syllable, prosodic word or major phrase — specifically, a DP in its entirety:

- 379 (19) a. $[_{DP_1} [_{DP_2}$ The man] $[_{PP}$ with the green hat]]_i seemed $[_{TP}$ t_i to be insane].
 380 b. * $[_{DP_2}$ The man]_i seemed $[_{TP}$ $[_{DP_1}$ t_i $[_{PP}$ with the red hat]] to be insane].
 381 c. * $[_N$ Man]_i seemed $[_{TP}$ $[_{DP_1}$ $[_{DP_2}$ the t_i] $[_{PP}$ with the red hat]] to be insane].

382 Second, EPP movement is sensitive to standard syntactic restrictions like locality and
 383 minimality. In (20), *The hungry man* starts out closer to the landing site of Spec-TP than
 384 *the soup* does, so it is the former that moves there (20a), not the latter (20b):¹⁵

- 385 (20) a. $[_{DP_1}$ The hungry man]_i will t_i devour $[_{DP_2}$ the soup].
 386 b. * $[_{DP_2}$ The soup]_i will $[_{DP_1}$ the hungry man] devour t_i.

387 (21) illustrates a different type of minimality effect. *Matilda* is contained within the
 388 larger DP *a relative of Matilda*. Since the larger DP is itself eligible to move to Spec-TP, as

¹⁴In the discussion going forward, we use the term “EPP-satisfying” rather than “EPP-driven” or “EPP-triggered” in anticipation of the discussion about how to deal with the apparent countercyclicity of the situation. If the operations discussed here really are syntactic, calling them EPP-driven would suggest that the EPP must apply in the syntax. By saying instead that they are EPP-satisfying, we leave open for the time being what the order of operations really is.

¹⁵We are abstracting away from concerns that arise under analyses where *wh*-object movement always passes through Spec-*vP*, which might imply that such objects would be closer to Spec-TP, at a relevant intermediate stage of the derivation, than the subject, in a lower specifier of *vP*. As noted by an anonymous reviewer, the proposals to ensure that it is still the subject that raises to Spec-TP in such configurations are all implemented syntactically, so the general point remains that EPP movement is syntactic.

389 in (21a), *Matilda*, though of the right syntactic category, may not be sub-extracted to do
390 so, yielding ungrammaticality in (21b):¹⁶

- 391 (21) a. $[_{DP_1}$ A relative of $[_{DP_2}$ Matilda $]]_i$ arrived t_i .
392 b. * $[_{DP_2}$ Matilda] $_i$ arrived $[_{DP_1}$ a relative of $t_i]$.

393 Both (20b) and (21b) violate relativized minimality (Rizzi 1990, etc.). If we adopt the
394 proposal that DPs are phases (e.g. Svenonius 2004), then (21b) also violates locality —
395 specifically, the Phase Impenetrability Condition (PIC). Another locality contrast is seen
396 in (22). Raising succeeds in (22a), which we can attribute to the raising infinitive being
397 a TP, hence not a phase. On the other hand, raising is impossible in (22b), where the
398 embedded clause is finite, hence a CP and a phase. A-movement out of this embedded
399 clause from Spec-TP thus violates the PIC, yielding ungrammaticality:¹⁷

- 400 (22) a. $[_{DP}$ Matilda] $_i$ seems $[_{TP}$ t_i to be lazy].
401 b. * $[_{DP}$ Matilda] $_i$ seems $[_{CP}$ that t_i is lazy].

402 Such sensitivity to minimality and locality would be unexpected if EPP-satisfying
403 movement were implemented at PF. This holds even under a framework like Distributed
404 Morphology where a portion of the post-syntactic PF derivation can involve movement
405 on partially hierarchical structures. Such post-syntactic movement is heavily restricted
406 in ways quite different from syntactic movement and would thus be predicted to yield
407 patterns rather different from what we've seen here for EPP movement (see especially
408 Embick and Noyer 2001, for discussion). Abstracting away from the expectations of
409 particular theories of PF movement, there is no evidence for the relevance of prosodic
410 or phonological wellformedness conditions (e.g. linearity, adjacency, stress-placement
411 and phonotactics) for movement to subject position. EPP-satisfying movement in an
412 English-like language thus bears the fingerprint of a (narrow-)syntactic operation, not of
413 a morpho-phonological one.

414 Further evidence that EPP-satisfying movement takes place in the narrow syntax
415 comes from the fact that it has clear *interpretive* consequences. First, it affects anaphoric
416 binding possibilities. In (23a), *every male senator* is in an embedded clause, thus does not
417 c-command the anaphor *himself* in the matrix. Since there is no other c-commanding
418 potential antecedent, the sentence is ruled out:

¹⁶The most widely adopted analysis of quantifier float (Sportiche 1988, etc.), does involve the extraction of a DP out of a larger nominal category that is also eligible to be moved. However, this is clearly subject to heavy restrictions, which are again syntactic, so the special flexibility of quantified NPs does not affect the general point being made here that movement to subject position is subject to syntactic rather than phonological/prosodic restrictions.

¹⁷Getting out of the phase via the escape hatch in Spec-CP is ruled out because this would require \bar{A} -movement to Spec-CP, so that the subsequent A-movement step to the matrix Spec-TP would constitute improper movement.

- 419 (23) a. * It seems to himself_i [_{CP} that every male senator_i is silly].
 420 b. Every male senator_i seems to himself_i [_{TP} t_i to be silly].

421 (23b) is largely parallel, except that *every male senator* raises out of the embedded clause,
 422 satisfying the matrix EPP, and ending up in a position where it does c-command *him-*
 423 *self*. The sentence is grammatical under the interpretation indicated, which tells us that
 424 binding has succeeded. Since *every male senator* started out in a position from which pre-
 425 cisely that binding was ruled out in (23a), we can conclude that it is the EPP-satisfying
 426 movement that feeds the binding. While we can debate whether the relevant stage for
 427 binding is LF itself or some earlier point in the syntactic derivation, what is clear is that
 428 it cannot be on the PF branch, since binding feeds into the determination of reference,
 429 which clearly is an issue handled on the (output of the) LF/interpretive branch.

430 Similar arguments can be made with respect to changes in scope relations. In (24a),
 431 no EPP-satisfying movement has occurred in the matrix clause, with the EPP being met
 432 instead by expletive *it*. The only available scopal reading is the surface one ($\exists \gg \forall$),
 433 namely that there is a single cook who has the impression that all of the dishes stink:

- 434 (24) a. It seems to one cook [_{CP} that every dish stinks]. ($\exists \gg \forall$; $?*\forall \gg \exists$;))
 435 b. [Every dish]_i seems to one cook [_{TP} t_i to stink]. ($\exists \gg \forall$; $\forall \gg \exists$)

436 In (24b), the matrix EPP is satisfied instead by raising the embedded subject into matrix
 437 Spec-TP. In this position, *every dish* c-commands *one cook*, and as a result we get the
 438 additional interpretation $\forall \gg \exists$; i.e. for every dish, there seems to be one cook who
 439 thinks it stinks, but there may be several different cooks for the different dishes.¹⁸ Again,
 440 under the assumption that scope relations are determined based on c-command at LF,
 441 this tells us that EPP-satisfying movement feeds into LF, thus cannot take place on the
 442 PF branch.

443 While EPP-satisfying movement affects LF, it nevertheless clearly does not occur on
 444 the LF branch itself, because it has obvious PF effects. E.g. *every dish* is pronounced
 445 earlier in the string in (24b) where it has undergone EPP-satisfying movement into the
 446 matrix clause than in (24a) where it has not. Under the modular architecture of the
 447 grammar assumed here, operations on the LF branch should be invisible to PF, just as
 448 operations on the PF branch should be invisible to LF. The only appropriate portion of
 449 the derivation for an operation like EPP-satisfying movement that has both LF and PF
 450 effects is the narrow syntax, which feeds into both.

¹⁸The inverse scope of $\exists \gg \forall$ is still available due to scope reconstruction at LF. For those speakers who find the $\forall \gg \exists$ reading marginally available in (24a), QR could be assumed to be responsible. What matters is that there is a clear contrast between the two sentences with respect to the availability of this reading, showing that the movement to matrix subject position in (24b) has an effect on scope relations.

451 The data up to this point show that the EPP has the rather puzzling constellation of
452 properties in (25):

453 (25) The EPP must be stated at least in part at PF, as it is sensitive to phonological
454 properties of the configurations it regulates. Nevertheless, the movement respon-
455 sible for creating structures that satisfy the EPP bears the structural hallmarks of
456 a syntactic operation, and its output feeds both LF and PF interpretation, thus it
457 must take place in the narrow syntax.

458 Given standard assumptions about the architecture of the grammar that are adopted
459 here, the EPP thus appears to involve a violation of modularity. Our ultimate goal must
460 thus be an analysis of this constellation of facts that somehow resolves the modularity
461 issue.

462 3.3 Some relevant prior work on a phonological EPP

463 Before we tackle the modularity issue head on, it will be useful to first discuss some
464 relevant earlier work. We are by no means the first to arrive at the conclusion that
465 the EPP must be at least partly phonological and to explore analytical possibilities for
466 integrating this idea with standard architectural assumptions. We thus make clear how
467 our approach relates to those who have come before and why we cannot simply adopt
468 the solutions that they have proposed.

469 An important starting point that set the stage for much of what followed is Holmberg
470 (2000)'s work on stylistic fronting (SF) in Scandinavian. Holmberg is led by the pecu-
471 liar properties of that construction to conclude that the fronted (adverbial or participial)
472 element, like *tekin* 'taken' in Icelandic (26), is essentially behaving like an expletive, sat-
473 isfying a need to have something in Spec-TP which is independent of syntactic category,
474 but crucially requires overttness:

475 (26) *Tekin_i hefur verið t_i erfið ákvorðun.*
476 taken has been difficult decision
477 'A difficult decision has been taken'

478 This is what the EPP is for Holmberg, who argues that since it cares only about the
479 overttness of the element, it must be sensitive to phonological features. This leads him
480 to concerns about when SF takes place that are quite similar to ours in section 3.2 about
481 EPP-satisfying movement, and with similar conclusions:

482 "The analysis whereby SF is movement of just a phonological form might
483 seem to imply that SF takes place after Spell-Out, in the phonological com-
484 ponent. I will show, however, that apart from affecting just the phonological

484 form of categories, SF has the properties of a regular syntactic operation, be-
485 ing dependent on syntactic structure and formal features in a manner not
486 expected from an operation in the phonological component. SF must there-
487 fore take place prior to Spell-Out.” (Holmberg 2000, p. 447)

488 There are serious issues, however, with the analysis Holmberg develops. He proposes
489 that finite I(nfl) bears a feature [P], which is “an uninterpretable feature checked by a
490 phonologically visible category moved to or merged in [Spec, IP]” (Holmberg 2000, p.
491 456). [P] is clearly syntactic, as it is used to trigger move and merge, yet it is sensitive
492 to a limited kind of phonological information. Holmberg argues that the syntax cannot
493 look into the details of what he calls the ‘phonological feature matrix’ of an element, but
494 it can see the presence of that matrix, i.e. it can tell the difference between elements that
495 have overt phonology and those that do not. An important problem with this is that,
496 as Holmberg himself notes, it is incompatible with a view on grammar that adopts Late
497 Insertion of morpho-phonological material. A second issue is that the location of the [P]
498 feature on I is stipulative, i.e. it gives us no insight into why it should be subject posi-
499 tions that are special in this way. Third, because [P] is a syntactic feature, even though
500 the EPP depends on phonological information, it is actually satisfied during the syntactic
501 derivation, not at PF. Specifically, [P] can be checked by an element with overt phono-
502 logical material at an intermediate stage of the derivation, which subsequently moves to
503 a higher position, meaning that the subject position doesn’t actually need to be overtly
504 filled. Holmberg makes use of this to deal with certain facts about SF in subject relatives,
505 and indeed an EPP of this type might seem at first glance to simplify the treatment of
506 \bar{A} -bar movement of subjects. The problem is, if the EPP is satisfied when the subject
507 position is filled by an overt DP at *any* stage of the derivation, it becomes impossible to
508 unify it with the COMP-trace phenomenon, since the offending configurations in those
509 cases are precisely ones involving subject positions made empty by \bar{A} -bar movement —
510 a unification that, as we have already seen, is independently quite desirable.

511 Another important paper in this tradition is Landau (2007). Landau’s EPP involves
512 a version of Holmberg (2000)’s [P] feature that requires elements with overt phonology,
513 but with a fundamental reinterpretation of how it works. First, [P] is purely phono-
514 logical, not operative in syntax, so it must always work in tandem with independent
515 syntactic features like Case and [wh] to make movement happen: the syntactic feature
516 triggers the dependency between the moving element and the landing site, and the [P]
517 feature ensures that it will be pronounced in the landing site, rather than in situ. This
518 provides a way around the countercyclicity problem. Second, [P] is a *selectional* feature,
519 imposing a p-selectional requirement at PF much like s-selectional features impose a
520 requirement at LF. This ensures that it can only be satisfied in a strictly local configura-

521 tion (essentially sisterhood), i.e. it's only a selectional requirement that could force overt
522 movement. This also means that the dependency will be with the head of the selected
523 element. In general then, a p-selected phrase must specifically have an overt *head*. Lan-
524 dau uses this to account for things like subject-object asymmetries in the requirement for
525 overt complementizers and the distribution of bare nouns. But perhaps unsurprisingly,
526 Landau's approach runs into some of the same problems as Holmberg's. His proposal
527 makes it possible for the [P] feature to be posited on essentially any head, indicating
528 the need for overt movement, thus leaving it obscure why it should so frequently be the
529 subject position that requires something overt across languages. Landau also has the
530 EPP apply derivationally, rather than to the output, meaning that it can be satisfied by
531 movement copies and thus ruling out a unification with COMP-trace effects. Furthermore,
532 in order to allow for the prevalence of silent PRO, he assumes that T in control clauses
533 lacks the [P] feature. This makes it impossible to connect the ban on overt *for* before
534 PRO to the various other COMP-null configurations and to the EPP, as we will do here.
535 Additionally, there is a series of independent issues with how the [P] feature is parasitic
536 on other syntactic features, especially Case/ ϕ -features, and how this is used to deal with
537 cross-linguistic variation.¹⁹

538 Sigurðsson (2010) is in particular concerned with distinguishing between two differ-
539 ent sides of apparent EPP effects: NP-movement, which he argues is entirely syntactic,
540 being driven by the computation of person, and what he calls the Filled Left Edge Effect
541 (FLEE), which requires that the left edge of a finite clause be overt, unless there is a spe-
542 cial function associated with leaving it empty. He characterizes FLEE as "a performance
543 target, a 'desirable PF goal'" (Sigurðsson 2010, p. 184). This means that operations car-
544 ried out to satisfy it, including expletive insertion, Stylistic Fronting, locative inversion
545 and topicalization, may actually take place in PF. Sigurðsson thus manages the dual
546 syntactic-phonological nature of the EPP by having FLEE apply at PF, but dividing up
547 the operations that can satisfy it between syntax and PF. NP movement is clearly syn-
548 tactic, but happens to create configurations that satisfy FLEE, and then there is a battery
549 of other, partly language-specific operations, which can manipulate the structure at PF

¹⁹First, he makes the [P] on finite T (i.e. the one ensures that a DP will be pronounced overtly in Spec-TP) parasitic on Case/ ϕ features, but the evidence that movement to Spec-TP is orthogonal to case and agreement is by now quite considerable (see Marantz 1991, Sigurðsson 2003, McFadden 2004, Sigurðsson 2009, Sundaresan and McFadden 2009, Preminger 2014, among many others). Second, he posits a parametrization of whether Case/ ϕ -features are located on D or N to deal with cross-linguistic variation in the possibility of bare noun subjects, but there is no independent evidence for such parametrization or that it actually correlates with the distribution of bare nouns. Third, this purported variation makes it quite difficult to understand how p-selection really works, since allowing the NP to be selected across the DP when the the relevant features reside on NP seems to go against the strict locality of p-selection that is important elsewhere, and it underlines the somewhat odd status of [P] as a phonological feature that is parasitic on syntactic dependencies.

550 to satisfy FLEE in case NP movement hasn't already applied in a way that would do
551 so. While this avoids the countercyclicity problem, it leaves a number of challenging
552 issues open. First, Sigurðsson (2010) devotes significant attention to laying out a theory
553 of NP movement driven by Person, and he is refreshingly explicit on the assumptions
554 about syntactic features, the application of Agree and clause structure needed to make
555 this theory work. However, his discussion of the implementation of FLEE and of the
556 various operations which can satisfy it at PF is nowhere near as explicit, and this makes
557 it quite difficult to evaluate the suggestion that these operations could take place at PF.
558 He suggests "that PF is more complex and 'more syntactic' than often assumed" (Sig-
559 urðsson 2010, p. 185), but does not develop the idea further. Certainly, locative inversion
560 and topicalization behave like narrow syntactic movement in the sense that we argued
561 for EPP-satisfying DP movement in section 3.2. One could of course argue that the
562 structural considerations we discussed there can also play a role in a PF-movement com-
563 ponent, but this would require a rather different theory of PF movement which, as far
564 as we are aware, is not on offer.

565 A final paper to be mentioned in this connection is Salzmann et al. (2013), which
566 comes closest to the approach that we will adopt in terms of its coverage. In particular,
567 it is very much concerned with using a phonological version of the EPP to also cover
568 the *that*-trace effect. This means that, unlike for Holmberg (2000) and Landau (2007), the
569 EPP actually applies at the surface following all syntactic movement, so that it cannot be
570 satisfied by intermediate movement steps. This is of course what allows the unification
571 with the *that*-trace effect. However, like Landau (2007), Salzmann et al. (2013) assume
572 that the EPP is limited to finite clauses, which means that their story cannot be extended
573 to any of the *for-to* facts. While one could plausibly argue for having a separate account
574 of how the distribution of *for* interacts with PRO, it seems highly problematic to us to
575 separate the *for*-trace effect from the *that*-trace effect. Finally, Salzmann et al. (2013) don't
576 actually develop a theory of how a phonological EPP could trigger syntactic operations.
577 They adopt a version of Holmberg (2000)'s [P] feature, but implement the details in
578 a simplified way that restates the cyclicity puzzle rather than solving it. Specifically,
579 [P] is an uninterpretable feature which attracts a phonologically visible category in the
580 syntax, but which cannot be *checked* until the relevant bit of structure is transferred
581 to this interfaces. The standard timing of the triggering ensures that we get syntactic
582 movement, while the delay in the checking is required so that items can only satisfy the
583 EPP in their surface position, not intermediate ones, which is of course crucial to the
584 account of *that*-trace effects. This timing split is clearly suspect, as it is essentially just a
585 *pointer* of sorts to a countercyclic dependency. As the authors themselves note, it is also
586 difficult to see why this set-up wouldn't lead to rampant multiple attraction to the EPP

587 position — since attracting an element doesn't lead to checking of the P feature until the
588 interfaces, there is nothing to prevent the feature from continuing to attract. Another
589 way to look at this is as a violation of economy in the form of last resort: i.e. how can
590 the [P] feature trigger movement in the syntax if the movement doesn't yield checking
591 at that stage?

592 **4 Implementing the EPP as a PF-constraint**

593 While the proposals discussed above represent clear progress in the right direction, we
594 will reject them for the reasons given here, and turn now to developing our own.

595 The intuition we will try to formalize is the following one. The requirement for a
596 non-zero pronunciation is presumably the sort of thing that can be stated at PF, because
597 it involves phonological information. However, identifying that position through direct
598 reference to subjects or positions like Spec-TP clearly involves syntactic information,
599 and thus does not seem to be at home at PF. We need a way then to define the relevant
600 position targeted by the EPP in terms that should make sense at PF, and ideally there
601 should also be a phonological or prosodic reason for why this position in particular
602 should have to be filled by something overt.

603 **4.1 The subject position and Intonational Phrases**

604 What is special about Spec-TP, or more generally the position occupied by the subject,
605 that could lead it to being singled out by the EPP at PF? The idea we would like to
606 pursue is that it has to do with a confluence of two factors which are relevant for how
607 syntactic structure interacts with the construction of prosodic domains. The first factor
608 is the position of the subject at or near the left edge of the clause. It is commonly argued
609 that clauses, and in particular root clauses, correspond with an important prosodic do-
610 main called the Intonational Phrase (henceforth IntP) (see An 2007, Truckenbrodt 2007,
611 Selkirk 2011, Hamlaoui and Szendrői 2015, and much earlier work cited there). The
612 second factor is how the position usually occupied by the subject relates to syntactic
613 phases. Under standard phase theory (Chomsky 2001, etc.), what is sent to the inter-
614 faces is a phase domain, i.e. the complement of the phase-defining head. Given that C
615 is such a phase-defining head, TP will be the spellout domain of the CP phase, with the
616 usual subject position in Spec-TP being at the left edge of this domain. While there is
617 significant disagreement on the details, it is commonly assumed that such spellout do-
618 mains play an important role in the mapping between syntactic structures and prosodic

619 domains (Adger 2003b, Kratzer and Selkirk 2007, Kahnemuyipour 2009, Downing 2010,
620 Selkirk 2011, and many others).

621 What we would like to propose is that these two factors taken together will ensure
622 that the portion of the clause where subjects normally appear will be at the left edge of
623 an IntP in the contexts where we see EPP and COMP-null effects. This will allow us to
624 derive the overtiness requirement by means of a proposal we adopt from An (2007, 61):

625 (27) **Intonational Phrase Edge Generalization (IPEG)**

626 The edge of an IntP cannot be empty (where the notion of edge encompasses the
627 specifier and the head of the relevant syntactic constituent).

628 The reason why such a constraint should hold has to do with how prosodic structure is
629 built up hierarchically. IntPs are constructed on top of prosodic words (which are built
630 on top of feet, syllables, morae etc.), and An (2007) argues (following Nespor and Vogel
631 1986, among others) that this implies that the boundary of an IntP must correspond to
632 the boundary of a prosodic word. Assuming that only elements with an overt pronun-
633 ciation can constitute prosodic words, this derives the requirement that the edge of an
634 IntP will have to contain overt material. If the subject position at or near Spec-TP finds
635 itself at the left edge of an IntP in cases where we see EPP and related effects, we can
636 reduce the phonological side of the EPP to the IPEG in (27).

637 We have a bit of work to do, however, because An (2007) is almost entirely concerned
638 with CPs (rather than TPs) being parsed as Intonation Phrases, and thus he uses the
639 IPEG in his paper primarily to regulate the overtiness of complementizers like *that* (po-
640 tentially alternating with overt material in Spec-CP like moved *wh*-phrases or relative
641 pronouns). If IntPs generally correspond to CPs, the subject position in Spec-TP would
642 have to be regulated by something other than IPEG. However, it is important to recog-
643 nize that An does not argue or assume that CPs are *generally* parsed as IntPs. Indeed,
644 his paper is not about CPs in general, but specifically about what he refers to as ‘Clauses
645 in Noncanonical Positions’. This includes clauses that appear in subject position, are
646 topicalized or extraposed, or are otherwise separated from the preceding context, e.g. by
647 intervening adverbial material. This is why, in line with the IPEG, they typically require
648 overt complementizers. CPs appearing in ‘canonical’ position, i.e. as the immediate com-
649 plement of a clause-embedding verb, are *not* obligatorily parsed as independent IntPs.
650 In other words, a CP in a non-canonical position has to map its left edge onto the left
651 edge of an IntP not because it is a CP, but because it appears in a position where its
652 left edge is somehow set off from any preceding material, and thus cannot be parsed
653 into the same IntP as that material. It thus seems reasonable to think that a syntactic
654 constituent of any category appearing in these non-canonical positions will be parsed as

655 being at the left edge of an independent IntP. Such constituents just happen to frequently
656 be CPs because CPs, as complete clauses, have a certain amount of flexibility in their
657 syntactic distribution.

658 The question then is how IntP boundaries are determined in contexts where they
659 are not forced by something external like the beginning of the utterance or a prosodic
660 break introduced by an adverbial or extraposition structure. It is here that we think
661 phase theory is relevant. We propose that spellout domains, i.e. the complements of
662 phase-defining heads, correspond by default to IntPs. As the chunk of structure shipped
663 from the narrow syntax to the interfaces, it is reasonable to think that they will function
664 as a starting point for building prosodic structure, though the ultimate outcome may
665 be obscured by independent factors. That is, we do not expect that phasal domains
666 will always end up being parsed as independent IntPs, because the mapping between
667 syntactic structure and prosodic domains is not one-to-one. But this does mean that, in
668 the default case, Spec-TP will be at the left edge of an IntP, and thus will be subject to the
669 IPEG. The EPP and the various COMP-null restrictions can then be construed as a sub-case
670 of this constraint, and the contexts where an overt subject is not required will be argued
671 to fall out from it as well. Note crucially that (27) makes no direct reference to subjects,
672 Spec-TP or any other specific syntactic position. This is what makes it a plausible PF
673 constraint, and it means that we should find mismatches under certain circumstances
674 between what it and a traditional syntactic EPP would predict. For example there should
675 be no typical EPP effects when independent factors prevent Spec-TP from being at the
676 left edge of an IntP, or when some other overt element appears in the left edge of the
677 IntP, satisfying the IPEG without the need for a subject. We summarize this prosodic
678 version of the EPP as in (28):

679 **(28) Overt Subject Requirement (OSR):**

680 Constraints against configurations with an empty subject position, including the
681 EPP, the COMP-trace effect and the ban on *for-PRO-to*, arise when the standard
682 subject position in Spec-TP, as the left edge of the spellout domain of a CP phase,
683 appears at the left edge of an Intonational Phrase, and thus must be overt to
684 satisfy the IPEG.

685 Before we begin a detailed development of the approach described in (28), it is im-
686 portant that we understand a bit more about how our use of the IPEG to regulate the
687 distribution of overt subjects interacts with An (2007)'s own use of it to regulate com-
688 plementizers. The central intuition we are pursuing here is that there are two different
689 ways for a syntactic phrase to end up aligned with an IntP, one categorial and the other
690 positional. The categorial route is essentially our innovation, according to which the

691 complement of a phase head constitutes a spellout domain, shipped to PF as a unit,
692 and thus will by default be aligned with the left edge of an IntP. TPs tend to end up as
693 IntPs by this route because they appear as the complement of the phase head C.²⁰ The
694 positional route, on the other hand, is the one that An (2007) was primarily concerned
695 with. A syntactic phrase in a non-canonical position — e.g. subject, adjunct, topicalized
696 or extraposed — will also be aligned with an IntP, at least at its left edge, because it is
697 not in a tight relationship with what precedes it. I.e. these are positions that typically
698 have either a clear intonational break or nothing at all to their left.²¹

699 We will generally follow An (2007) on the determination of IntPs by position and in
700 general on the distribution of overt complementizers. Our contribution will be in work-
701 ing out the details of IntPs by category, and the really interesting effects will come out
702 of how the the two routes interact, and how subjects interact with complementizers and
703 other aspects of the syntactic structure. While a single syntactic phrase will occasionally
704 be identified as being aligned with an IntP by both routes, more frequently they will
705 disagree, putting boundaries in different locations. Again, TPs will typically be iden-
706 tified as IntPs by the categorial route as complements of a phase head, and CPs will
707 frequently be identified as IntPs by the positional route due to their ability, as complete
708 clauses, to appear in the various non-canonical positions. This means we will often have
709 configurations where both a TP and its dominating CP will be aligned with a left IntP
710 boundary, and thus both will be forced to have something overt to satisfy the IPEG.²²

²⁰Of course this default status as an IntP by the categorial route should in principle apply to all phase domains, not just TPs. We thus expect overtness effects within the vP phase as well (though the effects of IntP Extension, which we will introduce below, would predict that the IntP status of vPs would frequently be obscured by movement operations). See An (2007, section 5.1.2) for discussion of some relevant evidence. We must leave the exploration of these issues to future research.

²¹Note that this does *not* imply that any phrase in subject position or any of the other non-canonical positions will obligatorily constitute an independent IntP, which would be obviously incorrect for the vast majority of DP subjects. Rather, the left edge of these constituents must align with the left edge of an IntP, with nothing being said here about the right edge of the IntP. The right edge of the constituent may also align with the right edge of an IntP, but it is also entirely possible that the IntP will contain more material, perhaps including the entire matrix clause. For our purposes, as we are concerned with the applications of the IPEG through the OSR to regulate overt subject distribution, being at the left edge of an IntP is all that matters, even if the IntP as a whole aligns with a larger constituent containing the constituent in question.

²²Note that we do *not* predict that two distinct IntPs will be diagnosable in the prosodic realization in such cases, as PF repair mechanisms can be expected to simplify matters when two boundaries of the same type appear so close to one another, something akin to an OCP effect. For us it must simply be the case that such repair takes place *after* the evaluation of the IPEG. In general, it should be clear that what we are concerned with in this paper is a layer in the determination of prosodic structure that is very close to the syntax, essentially at the syntax-prosody interface. We should not expect that actual surface realization of prosody will reflect this too transparently, as various prosody-specific factors may intervene which will obscure the mapping.

711 4.2 The basics of overt and non-overt subjects

712 Let us begin then with how we can use the OSR as stated in (28) to cover the basic
713 patterns associated with the EPP. Typical finite clauses are straightforward.²³

- 714 (29) a. [A book]_i is t_i on the shelf.
715 b. There is a book on the shelf.
716 c. * Is a book on the shelf.

717 The basic premise laid out in the OSR is that, all other things being equal, TPs will
718 be parsed as IntPs, thus by the IPEG they require an overt edge. Hence, the standard
719 subject position Spec-TP must be filled by overt material, which is accomplished in (29a)
720 by having internally merged the DP *the book* there, and in (29b) by having externally
721 merged expletive *there*. In (29c), on the other hand, neither of these things has been
722 done, so the edge of the IntP remains empty, and the sentence is straightforwardly ruled
723 out by the OSR.

724 One crucial difference between an EPP formulated as a requirement for a filled Spec-
725 TP and one formulated as a requirement for an overtly pronounced left edge of IntP, as
726 in OSR, is in the treatment of non-overt subjects. An unpronounced movement copy, PRO
727 or little *pro* in Spec-TP will satisfy the former but violate the latter precisely because it is
728 silent. A big part of the evaluation of our prosodic EPP will thus be to carefully consider
729 clauses with non-overt subjects to see whether it can cover them correctly. Note, first of
730 all, that a parse of (29c) with either a PRO or *pro* subject as in (30) will be correctly ruled
731 out by the OSR, without needing recourse to any specific theory of control or pro-drop:

- 732 (30) * PRO/*pro* is a book on the shelf.

733 We have no reason to expect this kind of structure to be treated differently from the ones
734 in (29) — it has a TP parsed as an IntP, which however has a phonologically empty left
735 edge. As far as the OSR is concerned, it is irrelevant that there is something there in the
736 syntactic representation; it cares only about the phonological side of things, and thus
737 (30) is ill-formed. What we need to do now is to ensure that the OSR doesn't similarly
738 — but incorrectly — rule out structures where silent subjects are in fact licit.

739 Let us then consider infinitives. Spec-TP in the embedded clauses in (31) is filled
740 syntactically — by controlled PRO in (31a) and by the trace of the raised subject in (31b)
741 — but of course neither is pronounced overtly, and yet the sentences are unobjectionable:

²³Finite root clauses raise a question for the IPEG at the CP level, in that we expect them to be IntPs by the positional route, and thus to require an overt complementizer, and yet such an overt complementizer is in fact impossible. There are several reasonable ways to deal with this, and the choice among them doesn't interact crucially with our central concerns here, so we will set the issue aside. See An (2007) for discussion and proposals.

- 742 (31) a. Beau tried [PRO to eat the samosa].
743 b. Carrie_i seemed [t_i to find the solution].

744 A traditional account, which conceives of the EPP simply as a condition that subject
745 positions be filled, has no problem ruling these sentences in due to the presence of PRO
746 and the trace, but our PF story has some work to do. For the raising example in (31b), one
747 option is to take advantage of the standard assumption that raising infinitives are TPs
748 lacking a CP layer, and thus do not constitute phases. This means that the embedded TP
749 will not be a spellout domain, and hence will not be parsed as an IntP by the categorial
750 route. Therefore, the OSR simply does not apply, because the IPEG is not relevant.²⁴
751 This is the first case where we see a clear difference from a simple requirement for an
752 overt Spec-TP: what matters for our approach is not the Spec-TP position or subjects per
753 se, but that which occurs at the left edge of an IntP. For the example in (31a), things are
754 not so simple. Unlike raising infinitives, control infinitives are normally assumed to be
755 CPs and hence phases, thus under our approach their TP complements would constitute
756 IntPs by the categorial route. As such, we would incorrectly predict that the silence of
757 the subject in (31a) would lead to a violation of the OSR. One way to obviate this would
758 be to propose that the standard analysis is wrong, and control infinitives actually do not
759 count as phases (or perhaps they constitute ‘weak phases’), thus their TPs don’t form
760 IntPs, just like with raising infinitives.

761 However, there is good reason to reject this line of argumentation. Such an analytic
762 strategy works with raising infinitives only because they appear as complement clauses,
763 i.e. in a canonical position in An (2007)’s sense. This means that there will always be
764 material from the matrix clause immediately to their left, and so we can say that the
765 relevant empty Spec-TP position is somewhere in the middle of a larger IntP containing
766 both matrix and embedded material, not causing any problems for the IPEG and the
767 OSR. For non-raising infinitives (like control infinitives), however, this can’t work as a
768 general solution, because they are not restricted to complement position. While some
769 kinds of obligatory control (OC) infinitives appear as complements that are tightly con-
770 nected to their selecting verb, infinitival clauses with various types of NOC can appear as
771 adjuncts, subjects and root clauses, and even certain OC clauses can appear as adjuncts
772 under the right circumstances (see Landau 2013, ch. 6 and 7 for extensive documenta-
773 tion of the possibilities here). In other words, these infinitives can appear in An (2007)’s
774 non-canonical positions, where there is no possibility of them being included in an IntP
775 with preceding material.²⁵ The relevance of this should be especially obvious in cases

²⁴This solution may not work for all raising infinitives. See footnote 25.

²⁵In fact, even raising infinitives can appear in a plausibly non-canonical position, separated from the selecting verb by an adverbial, as in (i):

776 like (32) where the non-finite clause is sentence-initial:

- 777 (32) a. [To eat the samosa] would be a mistake.
778 b. [To eat all the samosas in one go], Beau would need a lot of spicy chutney.
779 c. [To eat a samosa and finally die happy!]

780 In such examples, it doesn't matter what the internal structure of the non-finite clauses
781 is, whether they constitute phases or whether they can be included in the same IntP as
782 the matrix clause. They will be at the left edge of an IntP, because they are at the left
783 edge of the utterance (and the utterance must of course be aligned with an IntP edge).
784 So if we want to analyze this kind of non-finite clause in a way that doesn't run afoul of
785 the OSR, we can't do it by saying that they aren't at the left edge of an IntP and hence
786 aren't subject to the IPEG.

787 Rather, we must assume that the left edge is actually filled, i.e. that the OSR applies
788 and is satisfied. What the left edge is filled by is not difficult to see — the leftmost
789 overt material is the infinitival marker *to*. Of course, this *to* is not a subject and it is
790 presumably not in Spec-TP, but recall that our version of the EPP based on the IPEG
791 has nothing specifically to do with subjects or the Spec-TP position but with the left
792 edge of the phrase aligned with an IntP. The edge consists of both the relevant head
793 and its specifier, and so in order for *to* to satisfy the IPEG in these infinitival clauses, we
794 must simply ensure that it occupies the highest head in their structure. We propose to
795 relate this to the fairly uncontroversial idea that control infinitives, while perhaps not
796 as reduced as raising infinitives, are still structurally smaller than typical finite clauses
797 (see Wurmbrand 2001, Boeckx et al. 2010, McFadden 2014, among many others). For
798 concreteness, let us make the simplest assumption that *to* is in T, and these types of
799 non-finite clauses simply lack the CP layer, as indicated in (33a). What we must rule out
800 is an analysis like that in (33b), where the clause contains silent structure above the head
801 where *to* is realized:

- 802 (33) a. [_{TP} (^{IntP}PRO To_T [eat the samosas])] would be a mistake.
803 b. [_{CP} (^{IntP}C [_{TP} PRO To_T [eat the samosas]])] would be a mistake.

804 We use (^{IntP} to represent the left boundary of an IntP in our structures, which helps to
805 clarify the contrast here (but will not generally represent right boundaries of IntPs, as
806 they are less relevant for our concerns and not always easy to diagnose). Crucially, (33a)

-
- i. Carrie seemed, when last I checked, [to have already found the solution].

It would certainly seem that there is an intonational break before the embedded clause here, suggesting a boundary between IntPs: thus, even for raising infinitives we cannot always rely on the idea that they are parsed into the IntP of a higher clause. We must be able to generalize the kind of account suggested for non-raising infinitives to cover these particular cases as well, or potentially an analysis in terms of IntP Extension, as we will discuss later. We know of no reason to think that this should prove problematic.

807 obeys the OSR even though Spec-TP is silent, because *to* is overt and realizes the highest
 808 head in the structure, i.e. the TP and hence the IntP has an overt left edge. In contrast,
 809 a structure like (33b) would be ruled out because the left edge is the head C and its
 810 specifier, neither of which contains overt material.

811 The precise identity of the head realized by *to* is not crucial as long as it is the highest
 812 in these control infinitives. But it is commonly assumed that finite auxiliaries in English
 813 occupy T as well, and so we need to ensure that our analysis doesn't predict that they
 814 could also satisfy the OSR. This would undermine our account of the EPP by incorrectly
 815 allowing null subjects in finite clauses with auxiliaries, along the lines indicated in (34):²⁶

816 (34) *Celine said that [_{TP} *ec* will_T [play hockey]].

817 So we need a way to ensure that the *to* in control infinitives is treated differently from
 818 finite auxiliaries in a way that matters for OSR.

819 One avenue would be to propose that while *to* really is in T, auxiliaries occupy some
 820 head below T, call it F, as in (35):

821 (35) *Celine said that [_{TP} (^{IntP}*ec* T [_{FP} will_F [play hockey]]]].

822 The left boundary of the IntP is still aligned with TP here, but the edge of TP is empty,
 823 as *will* is further down in FP, and thus the OSR is violated. We will pursue an alternative
 824 here, which allows us to maintain the standard intuition that *to* and the finite auxiliaries
 825 occupy the same position. What distinguishes them, instead, for the purposes of their
 826 ability to satisfy the OSR, is the structure of clauses in which they appear. Finite clauses
 827 include an additional phrase above the one headed by the auxiliaries which is missing
 828 in control infinitives — for concreteness we can call it FinP — as indicated in (36a). It is
 829 this phrase which is the complement of C and which hosts overt subjects in its specifier,
 830 as in (36b).²⁷

831 (36) a. *Celine said that [_{FinP} (^{IntP}*ec*_i Fin [_{TP} *t*_i will_T [*t*_i play hockey]]]].

832 b. Celine said that [_{FinP} (^{IntP}*she*_i Fin [_{TP} *t*_i will_T [*t*_i play hockey]]]].

833 The left edge of IntP in these structures would be the Fin head and its specifier. The OSR
 834 thus rules out (36a) where they are both silent, the overt auxiliary in T simply being too
 835 low. An overt subject in Spec-FinP is required, as in (36b). The relevant contrast with
 836 control infinitives is that they simply don't project FinP, so that T is the highest head
 837 and is overtly realized by *to*, as in (33a), thus satisfying the OSR without the need for an

²⁶Here and in what follows, we indicate such null subjects as *ec*, as it is irrelevant to our concerns whether they are analyzed as PRO, *pro* or something else.

²⁷We have indicated the silent *ec* subject moving up to Spec-FinP in (36a), just to preserve the parallel with (36b). For purposes of the OSR it doesn't actually matter whether it makes it to Spec-FinP or stays in situ down in vP, since it is silent either way.

838 overt subject.²⁸ We will see in section (5.5) that this analysis of the difference between
839 finite clauses and control infinitives will also allow us to handle connections between
840 embedded subjects and the complementizer *for*.

841 A version of what we say here about non-raising infinitives must apply analogously
842 to gerundival clauses, which can also happily appear in non-canonical positions with no
843 overt subject (e.g. *Eating the samosas would be a mistake*). With these it would be the head
844 realized as the *-ing* suffix (perhaps with the verb moved up to it) that fills the left edge.
845 They presumably have an even more reduced structure than infinitives, so the relevant
846 head is even lower than T, but what is crucial is that they do not project any structure
847 higher than the *-ing* head, so that it will count as the edge for purposes if the IPEG.²⁹

848 5 Interactions with the CP layer

849 Where things get complicated, and where we think our account of the EPP in terms of
850 the OSR really shows its merits, is when we consider how restrictions on the overtiness
851 of subjects interact with \bar{A} -movement and the appearance of complementizers.

852 5.1 Subject *wh*-movement and comp-trace effects

853 We've gotten a first view of how to deal with null subjects in non-finite clauses. Now
854 we can turn to the other main context in which English clauses have non-overt subjects,
855 namely when the subject has undergone *wh*-movement, as in (37a):

- 856 (37) a. Who punched Alex?
857 b. [_{CP} Who_i [_{TP} t_i punched Alex]]?

858 Under the standard analysis, *who* has moved from Spec-TP to Spec-CP, as indicated by
859 the bracketing in (37b). At PF, then, Spec-TP is empty, yielding an IntP without an overt
860 left edge, and we would expect a violation of the OSR, contrary to fact. Again, the
861 traditional syntactic version of the EPP has no problem here, since it can be satisfied
862 by the unpronounced copy of *who* in Spec-TP. Derivational accounts of a prosodic EPP
863 (e.g. Holmberg 2000, Landau 2007) can handle such configurations as well, since an

²⁸In what follows, we will stick to a simplified CP/TP system with subjects in Spec-TP for simplicity in cases where the distinction doesn't matter, but this should be understood as shorthand for the kind of analysis presented here.

²⁹Something similar could be entertained for imperatives, which, as an anonymous reviewer points out, pose obvious questions for our analysis, being root clauses that do not require an overt subject. We will not attempt here to analyze ECM infinitives with *believe*-class verbs, bare infinitives with causative and perception verbs or the various types of small clauses, though we think that our approach sets up plausible avenues to consider for each of them in future research.

864 element with overt phonology does occupy Spec-TP at some point in the derivation.
 865 This avenue is not available to us however, as we will need to rely on *surface* overtness
 866 to cover the various COMP-null configurations going forward. A reasonable response
 867 would be to adopt the minority analysis of subject *wh*-questions in English, according to
 868 which they don't actually involve overt *wh*-movement (see e.g. Chomsky 1986, Brillman
 869 and Hirsch to appear). Since root subject questions lack any overt realization of C, the
 870 default subject position in Spec-TP is directly adjacent to the normal landing site for
 871 *wh*-movement in Spec-CP, thus the structure for (37a) under the movement analysis in
 872 (37b) is string-identical to the non-movement one in (38):

873 (38) [_{CP} [_{TP} (^{IntP}Who punched Alex)]]?

874 Since *who* remains in Spec-TP under this analysis, the left edge of the presumed IntP
 875 aligned with TP is filled, and no problem arises with the OSR.

876 Now, when the *wh*-element is the subject of an *embedded* clause, and the question has
 877 matrix scope, it is clear from the surface order that it must have moved out of Spec-TP.
 878 We thus predict that the EPP in the form of the OSR should crop up here. Interestingly,
 879 precisely here is where we find the COMP-trace effect, demonstrated again in (39):

- 880 (39) a. Who_i did you say (^{IntP}Alex punched t_i?)
 881 b. Who_i did you say that (^{IntP}Alex punched t_i?)
 882 c. * Who_i did you say that (^{IntP}t_i punched Alex?)
 883 d. Who did you say t_i punched Alex?

884 The grammaticality of (39a) and (39b) is straightforward. In both, it is the embedded
 885 object that has moved, so the embedded subject surfaces in Spec-TP, at the left edge of
 886 the expected IntP, and there is no danger of violating the OSR. The ungrammaticality
 887 of (39c) is also expected based on the OSR. The embedded subject has *wh*-moved from
 888 embedded Spec-TP into the matrix clause; thus, the IntP corresponding to the embedded
 889 TP has no overt left edge, violating the OSR and leading to ungrammaticality. This is the
 890 kernel of how we will unify the various COMP-null effects with the EPP, and it makes it
 891 clear why we cannot adopt a derivational view of the EPP, but really must depart from
 892 Holmberg (2000) and Landau (2007) and have the OSR apply to the output of the syntax.

893 The question that will be crucial to making all of this work is how we keep the OSR
 894 from ruling out (39d), doing so in such a way that we don't accidentally let (39c) in
 895 through the back door. Here we also have *wh*-movement of the embedded subject, hence
 896 an empty embedded Spec-TP. We expect there to be an IntP with no overt material in its
 897 left edge, and yet the sentence is grammatical. Given our approach, the outlines of the
 898 strategy we must pursue should be clear. It must be that the presence of the overt *that* in
 899 examples like (39c) requires the embedded TP to be aligned with the left edge of an IntP,

900 while the absence of an overt *that* in examples like (39d) makes it possible that there is
901 no such IntP edge, as indicated. As with the control infinitives, we can imagine different
902 options for achieving this. However, most of them can be ruled out with a bit of careful
903 consideration. To pave the way for this, we want to first lay out some additional data.
904 This will allow us to quickly reject several classes of analyses that depend on specific
905 properties of the *that*-trace configuration that don't generalize to the others.

906 First, recall that the COMP-trace effect is significantly ameliorated when something is
907 done to break things up prosodically in the right place near the offending configuration,
908 e.g. by an intervening adverbial as in (40):

909 (40) Who_i do you think [that, against better judgment, punched Alex]?

910 Second, there is not just a *that*-trace effect, but a general COMP-trace one, extending also
911 to configurations with *for*. We repeat the crucial example here as (41):

912 (41) * Who_i would you like [for t_i to punch Alex]?

913 This means that whatever is wrong with (39c), it has nothing to do with finiteness. Third
914 problems again arise not just with overt complementizers before traces, but before any
915 kind of silent subject, including PRO in infinitives, as shown in (42a) repeated from above:

- 916 (42) a. I_i would like [(**for*) PRO_i to punch Alex].
917 b. [(**For*) PRO_{arb} to punch Alex] would be rude.

918 Assuming that we're correct in bringing these patterns together, this tells us that the
919 problem with structures like (39c) involving the classic *that*-trace effect has nothing to
920 do with traces or movement. The example in (42b) broadens the picture by showing that
921 the pattern is not restricted to complement clauses, but is found in subject clauses as
922 well. So we have a fairly general ban on overt complementizers preceding silent subject
923 positions of any kind.

924 Before we seize too strongly on that formulation however, there is one last pattern
925 that needs to be added to the discussion. This is the so-called 'anti-*that*-trace effect',
926 which has periodically received attention in the literature on the *that*-trace effect, and
927 has recently been treated in detail by Douglas (to appear). The pattern is found in
928 restrictive relative clauses, as in (43):

- 929 (43) a. The bassist [(who/that) Matt visited *ec*] was tall.
930 b. The bassist [***(who/that) *ec* visited Matt] was tall.

931 (43a) shows us that restrictive relatives with an object gap are flexible — they can op-
932 tionally be introduced by an overt relative pronoun or complementizer. But when the
933 relative has a subject gap, an overt pronoun or complementizer becomes obligatory, as

934 shown in (43b). Thus, in direct contrast to the COMP-trace effect, in (43b) we have an
 935 empty subject position, preceded by an overt element in C or Spec-CP, and yet the sen-
 936 tence is perfectly grammatical. Indeed, it is the only way to realize the configuration,
 937 as the version leaving off the overt complementizer is ruled out. However we rule out
 938 COMP-trace and for-PRO configurations, we will have to ensure that it does not overapply
 939 to rule out anti-*that*-trace configurations like (43b).

940 5.2 Subject relatives, the anti-*that*-trace effect and IntP Extension

941 A closer look at the subject-gap relatives shows us that they have something important
 942 to tell us about the interactions between complementizers and subjects with respect to
 943 conditions of overtness at the left edge, which can help us find a way forward here.
 944 As a background, An (2007) shows, on the basis of data from several languages, that
 945 restrictive relative clauses do not have to be parsed as separate IntPs, i.e. the restrictive
 946 relative context does not count as a non-canonical position. The English facts are that,
 947 as discussed, restrictive relatives are in principle possible without an overt element in
 948 Spec-CP:

- 949 (44) a. I saw the child [_{CP} who/that [_{TP} Mary was waiting for]].
 950 b. I saw the child [_{CP} ∅ [_{TP} Mary was waiting for]].

951 If the embedded CP were an independent IntP, then by the IPEG, something would have
 952 to be overt in its edge, i.e. either in Spec-CP or in the C head itself. I.e. one of the
 953 variants in (44a) would be required. We thus take the grammaticality of (44b) to mean
 954 that it must be possible to parse the restrictive relative as part of the IntP including the
 955 head noun to its left. Furthermore, much like complement clauses, restrictive relatives *do*
 956 show signs of being parsed as their own IntPs, by the positional route, when adverbial
 957 material appears between the clause and the structural material it depends on, in this
 958 case the head noun:

- 959 (45) a. I saw the child yesterday [_{CP} (^{IntP} who/that [_{TP} Mary was waiting for])].
 960 b. ?* I saw the child yesterday [_{CP} (^{IntP} ∅ [_{TP} Mary was waiting for])].

961 This in turn must mean that the relative clause is subject to the IPEG. Thus (45a) is
 962 grammatical, where the left edge of CP is filled by an overt relative pronoun or comple-
 963 mentizer, but (45b), where this edge is empty, is significantly degraded. All of this tells
 964 us that restrictive relatives are not IntPs by the categorial route and, when they are ad-
 965 jacent to their head nouns, they are not IntPs by the positional route either. Only when
 966 separated from the head noun (as in 45a) do they become IntPs by the positional route.

967 Note now that all of the examples An (2007) discussed were relatives with an object
 968 (or at least non-subject) gap. If we bring back the subject relatives, we find something
 969 both interesting and surprising from the standpoint of An's system. Unlike with the
 970 object relatives, adding an adverbial between the head noun and the relative clause has
 971 no effect, as shown by the *lack* of contrast between (46) and (47). When the relative has a
 972 subject gap, an overt element in the CP edge is simply obligatory.

- 973 (46) a. I saw the child [_{CP} (^{IntP}who/that [_{TP} was waiting for Mary])].
 974 b. *I saw the child [_{CP} (^{IntP}∅ [_{TP} was waiting for Mary])].
 975 (47) a. I saw the child yesterday [_{CP} (^{IntP}who/that [_{TP} was waiting for Mary])]
 976 b. *I saw the child yesterday [_{CP} (^{IntP}∅ [_{TP} was waiting for Mary])]

977 Under An (2007)'s system, this means that subject relatives behave like they are obli-
 978 gatorily parsed as IntPs, thus subject to the IPEG. But as far as their external syntax is
 979 concerned, they are no different from the object gap relatives. This means that they actu-
 980 ally shouldn't be IntPs by the positional route when they appear immediately adjacent
 981 to the head noun as in (46). The fact that they are ungrammatical when there is nothing
 982 overt at the CP edge, as in (46b), tells us that they are aligned with an IntP nonetheless.
 983 The alternative conclusion we are led to is that subject relatives must be IntPs by the
 984 categorial route instead.

985 How is that possible? We have said that a syntactic constituent will be parsed as being
 986 aligned with an IntP when it constitutes a spellout domain, i.e. the complement of a
 987 phase-defining head. But here we are looking at CPs, which should actually correspond
 988 to the entire phase, rather than just to its spellout domain. What we expect here, as in
 989 general for CPs, is that the spellout domain should be the TP, which is hence aligned
 990 with the IntP. As such, the IPEG in the form of the OSR should require something overt
 991 in the edge of TP, not the edge of CP. And yet, here we have a structure where the
 992 edge of TP seems to be empty, while the edge of CP seems to be obligatorily filled. We
 993 would like to propose that the solution to the puzzle lies precisely in this confluence
 994 of unexpected facts. That is, the unexpected possibility of silence in the edge of TP is
 995 related to the unexpected requirement for overtness in the edge of CP.

996 The kernel of the solution lies in the observation that these two positions are related
 997 by *wh*-movement in these examples. At least in the variant of (46a) with the relative
 998 pronoun *who*, what appears overtly in Spec-CP is precisely the element that *would* have
 999 been overt in Spec-TP had the movement not occurred.³⁰ We would like to pursue the

³⁰In the variant of (46a) with *that*, we could either follow the minority analysis claiming that this really is another form of the relative pronoun rather than a complementizer as indicated in (i) (e.g. Arsenijević 2009, Kayne 2014), or we can assume that a null operator moves from Spec-TP to Spec-CP as in (ii), so that the two edges are still connected by *wh*-movement, if not *wh*-movement of an overt element.

1000 idea that the IntP that is normally aligned with TP is, in subject relatives, aligned with
 1001 the position where *who* and *that* appear, whereas in an object relative, it is aligned with
 1002 the position where the subject appears below them. This is why object-gap relatives
 1003 require an overt subject, with the material identifying it as a relative clause being op-
 1004 tionally overt, whereas subject-gap relatives can have a null subject, with the one of the
 1005 relativizers being overt.

1006 We see two plausible ways of implementing this idea. One is to say that the whole
 1007 configuration as usually described, involving an overt element in the edge of CP and
 1008 a silent subject position in Spec-TP, is just an illusion. Instead, the *who* or *that* actually
 1009 occupies Spec-TP and never undergoes *wh*-movement to Spec-CP. This would of course
 1010 be analogous to an analysis of local subject *wh*-questions as also not involving movement
 1011 to Spec-CP as discussed surrounding (38) above. The general idea would be that local
 1012 *wh*-movement of subjects from Spec-TP to Spec-CP is either unnecessary (because Spec-
 1013 TP is already sufficiently local to C for the relevant feature-checking relationships to be
 1014 established) thus ruled out by economy, or it is in fact directly ruled out, e.g. by anti-
 1015 locality (see e.g. Erlewine 2016; 2017, Brillman and Hirsch to appear, Douglas to appear,
 1016 for some relevant discussion). This would make things straightforward from the point of
 1017 view of the OSR and the IPEG, as indicated in (48):

1018 (48) I saw the child [_{CP} [_{TP} (^{IntP} *who/that* was waiting for Mary)]]

1019 TP aligns with the left edge of an IntP as usual, and its edge is filled overtly by either
 1020 *who* or *that*, satisfying the OSR. The reason why these elements are obligatorily overt in
 1021 subject relatives unlike object relatives is precisely that they are in this lower position,
 1022 occupying the edge of an IntP (by the categorial route). The edge of CP is not filled by
 1023 anything overt, but this is not a problem, since CP is not aligned with an IntP in this
 1024 case, thus the IPEG doesn't apply to it.

1025 The tricky part about making this implementation work is what happens in examples
 1026 like (47a), where an adverb intervenes between the head noun and the subject relative.
 1027 Given the behavior of object relatives in this context, as shown by the contrast in (45), we
 1028 expect the relative clause itself in this context to be an independent IntP by the positional
 1029 route, meaning that the left edge of CP should require something overt. We would then
 1030 predict something like (49a) to appear instead of (47a), where we have *who* or *that* in
 1031 Spec-TP satisfying the IPEG/OSR on the lower IntP, and an overt element like *that* in
 1032 Spec-CP, satisfying the IPEG on the higher IntP. This doubling is, however, clearly ruled
 1033 out. The alternative would be to adopt an analysis where subject relatives — in contrast

-
- i. [_{CP} *that*_i C [_{TP} *t*_i was waiting for Mary]]
 ii. [_{CP} Op_i *that* [_{TP} *t*_i was waiting for Mary]]

1034 to object relatives — lack not only *wh*-movement, but the entire CP layer, as in (49b):

- 1035 (49) a. *I saw the child yesterday [_{CP} (^{IntP}that [_{TP} (^{IntP}who/that was waiting for
1036 Mary])]
1037 b. I saw the child yesterday [_{TP} (^{IntP}who/that was waiting for Mary)]

1038 There would thus be only one IntP that needed to have a filled edge. While technically
1039 workable, such an analysis faces serious challenges, so we would rather not adopt it.³¹

1040 Instead, we will pursue an alternative implementation of the idea that *who* and *that*
1041 in subject relatives appear in the edge of the IntP normally aligned with TP.³² The idea
1042 is that, in this configuration, the IntP boundary is actually passed up from TP to CP as
1043 a result of the *wh*-movement. Specifically, *wh*-movement from what would have been an
1044 IntP by the categorial route *extends* the IntP up to include the landing site of that move-
1045 ment. Consider that there are a number of recent proposals, which differ in their details
1046 and terminology, but all pursue the intuition that the size of a phase can be affected by
1047 movement and other dependencies that cross would-be domain boundaries, e.g. Phase
1048 Extension (den Dikken 2007), Phase Sliding (Gallego 2010), Domain Suspension (Bobaljik
1049 and Wurmbrand 2013). Adopting this basic intuition, we propose the following:

1050 (50) **IntP Extension**

1051 Given a syntactic constituent XP that would normally be aligned with an bound-
1052 ary IntP by the categorial route, if an element moves from the edge of XP into a
1053 constituent YP which contains XP, the IntP will be aligned with YP instead.

1054 IntP Extension will straightforwardly solve the problem of subject relatives and the
1055 anti-*that*-trace effect, and (51) gives an indication of how things will proceed. As matters
1056 stand in (51a), the TP would be mapped onto an IntP by the categorial route, because
1057 it is a spellout domain in the complement of a phase-defining C head.³³ However, the
1058 *wh*-movement step in (51b) extends the domain that will be mapped on an IntP up to
1059 include the whole CP:

³¹For one thing, we would have to worry about how the relativization semantics and connection with the head noun are handled without a CP. For another, in the absence of the CP layer, we would presumably no longer have a phase, thus the TP wouldn't be a spellout domain, and therefore not actually be an IntP by the categorial route. Doubtless there are ways to deal with each of these concerns, but for now it does not look like a particularly promising avenue.

³²We thank two anonymous reviewers for a series of comments on the rather different approach to *wh*-moved subjects in an earlier draft, which indirectly inspired the alternative we propose here.

³³To avoid any misunderstanding: what we indicate in (51a) does not actually correspond to a real intermediate form, since an IntP isn't actually formed, even temporarily, on TP. IntP formation follows all of the relevant syntactic derivation, so it cannot happen until at least the stage in (51b). What (51a) shows is rather where the IntP *would* be formed, if this structure were to be sent to the interfaces as is, without the *wh*-movement step.

- 1060 (51) a. [_{CP} C [_{TP} (^{IntP}who was waiting for Mary)]]
 1061 b. [_{CP} (^{IntP}who_i C [_{TP} t_i was waiting for Mary)]]

1062 In the structure that actually gets interpreted by PF in (51b), TP is not aligned with
 1063 an IntP boundary, and thus there is no requirement for an overt subject from the OSR.
 1064 Instead, the IntP is aligned with the CP, and so it is the edge of CP that has to have an
 1065 overt element — either the moved *who*, or *that*, potentially as a realization of C itself.
 1066 It should also be clear that IntP Extension will not overgenerate in an obvious way and
 1067 undermine the general EPP effects of the OSR. It only provides a way for the TP edge to
 1068 be empty when something from within the TP edge moves up into CP, i.e. we essentially
 1069 need \bar{A} -movement of the subject. \bar{A} -movement of an object or adverbial won't come from
 1070 the edge of TP and thus won't trigger extension. Note also that movement of an auxiliary
 1071 to C as in subject-auxiliary inversion won't be able to do it, because the starting point
 1072 of that auxiliary must actually be below the edge of Spec-TP. As discussed surrounding
 1073 example (34) in section 4.2, English auxiliaries must be lower than T, or they would be
 1074 expected to be able to satisfy the OSR in the absence of an overt subject, contrary to fact.
 1075 Another way to think about this is that IntP extension only happens when an element
 1076 that would have satisfied the IPEG in its starting position moves up, bringing the edge
 1077 of the IntP with it.

1078 5.3 Extending IntP Extension

1079 Now note that, whatever detailed implementation of the IntP Extension idea we adopt
 1080 to handle the behavior of subject relatives, will straightforwardly carry over to local
 1081 subject *wh* questions. As discussed above, these could involve overt *wh* movement of
 1082 the subject from Spec-TP to Spec-CP, as in (52a), which would be parallel to the kind of
 1083 analysis that is required for non-subject questions. Alternatively, they could lack such
 1084 movement, with the *wh*-subject remaining in Spec-TP, as in (52b):

- 1085 (52) a. [_{CP} (^{IntP}Who_i [_{TP} t_i punched Alex])]?
 1086 b. [_{CP} [_{TP} (^{IntP}Who punched Alex)]]?

1087 We saw that the non-movement analysis gave us a way to maintain a simple view of
 1088 the EPP in terms of the OSR, where Spec-TP is generally at the edge of an IntP and
 1089 thus must have something overt in it. The movement analysis, on the other hand, raised
 1090 the question of how its empty TP edge could be made to square with the OSR. Given
 1091 the possibility of IntP Extension, however, we now have a way to analyze (52a) that
 1092 is consistent with OSR. Here, as in the case of the subject relatives, we expect TP to
 1093 correspond to an IntP, but the element that would normally be overt in that edge *wh*-

1094 moves up to the edge of Spec-CP. In line with (50), this would extend the IntP up to CP,
1095 simultaneously allowing the edge of TP to be empty, and requiring the edge of CP to be
1096 overt. In principle then, either a movement or non-movement analysis of local subject
1097 *wh*-questions is compatible with our prosodic version of the EPP, and we can ultimately
1098 decide between them based on their independent merits.³⁴

1099 This finally brings us back to long-distance subject *wh*-movement, as in (39c) and
1100 (39d) above, repeated here as (53a) and (53b).

- 1101 (53) a. *Who_i did you say that (^{IntP}t_i punched Alex?
1102 b. Who_i did you say t_i punched Alex?

1103 Again, in such examples there can be no question that overt *wh*-movement has applied.
1104 And again we are left with the puzzle of figuring out why such structures are possible
1105 just when there is no overt complementizer in the embedded clause. We have to set
1106 things up so that the overt complementizer in (53a) forces the embedded TP to be parsed
1107 as an IntP, as indicated, leading to problems with the OSR because of its non-overt
1108 edge, whereas something allows TP to not be parsed as an IntP when there is no overt
1109 complementizer as in (53b).

1110 One could again imagine that when there is no overt complementizer, even finite
1111 clauses can avoid counting as phases (along the lines of Doherty 2000). The embedded
1112 clause would then be a TP, thus not a phase, and there would be no IntP by the categorial
1113 route. There are problems with this approach, however. One is that we would need an
1114 account of when complement clauses can be TPs rather than CPs, which would have to
1115 ensure that we couldn't leave off the CP layer e.g. when an adverbial intervenes between
1116 the selecting predicate and the embedded clause, or when the clause gets itself into a
1117 derived non-canonical position. Otherwise we would not be able to explain why an
1118 overt realization of C is required in those contexts. Even if we could develop such
1119 an account, there is evidence from the effects of \bar{A} -movement on binding that these
1120 embedded clauses are not (particularly) reduced and actually do constitute phases (see
1121 Douglas to appear, for convincing arguments to this effect from opacity effects involving
1122 A-bar reconstruction in cross-clausal binding).

1123 Thus it seems that we cannot explain the lack of an IntP aligned with the embedded
1124 TP in long-distance subject questions by claiming that CP is missing.

1125 Instead, we will pursue the idea that IntP Extension is at work again here. This is
1126 entirely reasonable, since again we need a TP to fail to behave as an IntP when something

³⁴ATB subject *wh*-questions like *Who invited and kissed Mary*, brought to our attention by an anonymous reviewer, might be of relevance here, in particular as regards the treatment of the second conjunct. If their correct analysis requires literal, overt, ATB movement, then we would need to go with the IntP Extension account.

1127 is *wh*-moved out of its edge. The difference when compared to the subject relatives is
 1128 that in this case the extension would have to go beyond the embedded CP, as the moving
 1129 element continues moving, i.e. we will have to assume multiple steps of extension. The
 1130 edge of the IntP initially associated, by the categorial route, with the edge of embedded
 1131 TP, can thus be extended as far as the *wh*-subject moves — in the cases at hand up to the
 1132 matrix CP, as illustrated by the steps in (54).³⁵

- 1133 (54) a. $[_{TP} (^{IntP} \text{Who punched Alex})]$
 1134 b. $[_{CP} (^{IntP} \text{Who } [_{TP} \text{ t}_i \text{ punched Alex}])]$
 1135 c. $[_{CP} (^{IntP} \text{Who did you say } [_{CP} \text{ t}_i [_{TP} \text{ t}_i \text{ punched Alex?}]])]$

1136 Again, this kind of successive-cyclic IntP extension should not overgenerate in an obvi-
 1137 ous way, since it is restricted to cases of successive-cyclic *wh*-movement of an embedded
 1138 subject, and can only serve to extend the IntP associated with the TP where the subject
 1139 starts out. IntPs constructed elsewhere in the structure will not be affected and thus will
 1140 still have to have something overt to satisfy the IPEG. Furthermore, this story for why
 1141 long-distance subject *wh*-movement does not run afoul of the OSR, avoids the problems
 1142 associated with the assumption of a lack of intervening CPs. The embedded clause is
 1143 still a CP and acts as an intermediate landing site for the *wh*-movement of the embedded
 1144 subject, indeed crucially so, and so the binding facts discussed in Douglas (to appear),
 1145 referenced above, can be accommodated.

1146 5.4 Integrating the comp-trace effect

1147 What we need to make this approach complete is an explanation for the actual *that*-trace
 1148 effect, i.e. why an overt complementizer gets in the way of the kind of derivation laid out
 1149 in (54). What we propose is that IntP Extension is blocked by the intervention of an overt
 1150 element at the crucial position. Given that we are concerned with the determination of
 1151 prosodic domains, this is a reasonable assumption. One way to think about it is that the
 1152 first step of the extension relies on treating the subject as though it were simultaneously
 1153 in Spec-TP and Spec-CP, but this only works as long as the copies of the subject in the
 1154 two positions are indistinguishable from each other in terms of linearization. If some-
 1155 thing overt intervenes between the two positions, like an overt *that*, then the copy of *who*
 1156 in Spec-TP will follow *that*, while the copy in Spec-CP will precede it (see also Erlewine
 1157 2016; 2017, Douglas to appear, for the idea that an intervening overt complementizer

³⁵This does not mean that there can be no other IntPs boundaries parsed along the way, either by the positional or by the categorial route, just that this particular left boundary is extended up to the matrix. These and other details like additional intermediate movement steps are left out in (54) for perspicuity.

1158 causes problems in COMP-trace configurations due to contradictory linearization state-
1159 ments, based on Fox and Pesetsky 2005's approach to cyclic linearization). In other
1160 words, we can imagine that IntP Extension applies unproblematically in a structure like
1161 (55a), but not in one like (55b):

- 1162 (55) a. [_{CP} who_i [_{TP} who_i punched Alex]]
1163 b. [_{CP} who_i that [_{TP} who_i punched Alex]]

1164 One can even imagine that (55a) is derived via deletion of *that* in (55b) in order to
1165 facilitate IntP Extension, somewhat analogous to the cases discussed by Merchant (2001)
1166 where ellipsis eliminates structures that would be ill-formed at PF. In any case, it should
1167 be clear that, if IntP Extension fails in such cases of long-distance subject \bar{A} -movement,
1168 ungrammaticality will necessarily ensue: the embedded TP will be aligned with an IntP
1169 by the categorial route, but it will have an empty left edge due to the movement of the
1170 subject, leading to a violation of the OSR.

1171 To bring it all together, we can summarize as follows. The OSR requires that the
1172 edge of TP (as a spellout domain) be filled by overt material. If something moves from
1173 the edge of TP to a higher position, thereby extending the IntP to CP (IntP Extension),
1174 this requirement can be loosened — yielding clauses with local subject *wh*-movement,
1175 including subject relatives. Additional steps of *wh*-movement of this element can extend
1176 the IntP even further, yielding an embedded clause with completely empty left edges,
1177 both in TP and CP, which will then be parsed into the IntP built around the matrix
1178 clause: e.g. long-distance subject *wh*-movement structures. However, if the complemen-
1179 tizer in the embedded clause is overt, it disrupts the IntP Extension operation already
1180 in that clause. This means that the TP must remain an IntP, and since its edge is empty
1181 (the subject having moved to Spec-CP), it violates the IPEG via the OSR. Further *wh*-
1182 movement of the subject can do nothing to repair this, and thus there is no route from
1183 this intermediate structure to a grammatical instance of long-distance *wh*-movement.

1184 Hence the COMP-trace effect comes down to two mutually incompatible requirements.
1185 The overt complementizer ensures that its TP complement will be parsed as an IntP, but
1186 the subject trace ensures that this TP will have an empty edge. This runs afoul of the
1187 OSR, causing a crash. With long-distance extraction of something other than the subject,
1188 these problems don't arise because the embedded subject surfaces overtly in Spec-TP
1189 satisfying the OSR.³⁶

³⁶Note that successive-cyclic IntP Extension provides us with yet another option for analyzing raising infinitives. I.e. we could posit that the infinitival TP would be parsed as aligned with an IntP, but raising of the subject from its left edge extends the IntP, in steps, up to the ultimate landing site in the matrix Spec-TP. Thus the embedded TP can have an empty left edge on the surface without violating the OSR.

1190 To round off the discussion of the COMP-trace effect, we need to address how *that*-
1191 trace amelioration effects like those in (56) are derived:

- 1192 (56) a. Who_i do you think [that | against better judgment | punched Alex]?
1193 b. ? Who_i does John doubt whether | and Bill suspect that | cheated?

1194 Note that both the intervening adverbial and right-node-raising structure above typically
1195 lead to marked changes in sentence-prosody, introducing an intonational break between
1196 the overt complementizer and the following material (notated by the placement of |).
1197 We can expect this to create an additional IntP boundary by position, with the mate-
1198 rial following the complementizer counting as being in a non-canonical position in An
1199 (2007)'s terms. This prosodic restructuring, which takes place right at the linear position
1200 where the COMP-trace configuration would arise, would then prevent that configuration
1201 from blocking IntP Extension.

1202 We note two important points about how this comes about. First, it cannot be a mat-
1203 ter of adverbial elements like *against better judgment* serving to fill the edge of an IntP,
1204 thereby satisfying the OSR even with a silent subject. This would undergenerate on the
1205 one hand, failing to explain the right-node-raising cases like (56b), and it would over-
1206 generate on the other, leading us to expect that all sorts of COMP-trace and even general
1207 EPP violations could be rescued by inserting an overt clause-initial adverb, contrary to
1208 fact.³⁷ Second, and relatedly, if the COMP-trace effect is about blocking IntP Extension,
1209 then the amelioration effect has to come down to *unblocking* the Extension. This will
1210 correctly limit the effects to cases involving *wh*-movement of the subject, covering the
1211 right-node-raising cases but not general EPP violations. And it will also explain why the
1212 amelioration effect does not work for *for*-PRO configurations:

- 1213 (57) a. * I_i would really like [for to see the end of the movie].
1214 b. * I_i would really like [for, just in this one case, to see the end of the movie].

1215 In this case, the silence of the embedded subject is not due to *wh*-movement, thus there
1216 is nothing to trigger IntP Extension, and so the insertion of the adverbial makes no
1217 difference.

³⁷Indeed, we ultimately need an explanation for why clause-initial adverbials cannot satisfy the OSR, in spite of being overt elements in approximately the right position. It could be that none of the relevant adjunction sites is precisely at the relevant edge position, or that their status as adjuncts somehow disqualifies them, e.g. due to timing issues related to late adjunction. We must leave this question open, though we will briefly return to it in section 6.2.

1218 **5.5 The distribution of *for***

1219 The remaining patterns we need to cover have to do with the particular distribution of
 1220 *for* in infinitives. The *for*-trace facts fall under the account of the COMP-trace effect just
 1221 described, but we still need to deal with the facts when no subject movement is involved.
 1222 Let us begin with the data in (58), repeated from section (3.1), where the infinitive is the
 1223 complement of a verb. The optionality of overt *for* in (58a) tells us that, as expected
 1224 for verbal complements, the embedded clause is not an obligatory IntP by position. We
 1225 argued in section 4.2 that examples like (58b) with a null PRO subject involve a reduced
 1226 structure, which means that the head realized by the infinitival marker *to* — which we
 1227 are calling T for concreteness — ends up as the highest in the clause. Additional evidence
 1228 that this analysis is on the right track is furnished by a comparison with (58c):

- 1229 (58) a. I would like [_{CP} (for) you to punch Alex].
 1230 b. I_i would like [_{TP} PRO_i to_T [punch Alex]].
 1231 c. *I_i would like [_{CP} for PRO_i to punch Alex].

1232 (58c) looks parallel to COMP-trace examples on the surface, as it involves an overt com-
 1233 plementizer followed by a silent subject, but the details are different as there is no subject
 1234 movement involved. It is ungrammatical, in contrast to (58b), because the complemen-
 1235 tizer rules out the reduced structure. I.e. it must be a CP and a phase, meaning that the
 1236 phrase below will be parsed as an IntP by the categorial route, causing the null subject,
 1237 in turn, to violate the OSR.

1238 We must say a bit more, however, to ensure that we get the intended contrast be-
 1239 tween sentences like (58b) and (58c). Consider then the sentences in (59). The infinitives
 1240 here are utterance-initial subject clauses, thus clearly aligned with a left edge of Intp by
 1241 position, and so by the IPEG they must have overt left edges. Again, for (59a) with its
 1242 null complementizer and null subject, we can propose a reduced TP structure, where *to*
 1243 is in T, and thus at the left edge, satisfying the IPEG.³⁸ The overt *for* in (59b) indicates
 1244 that we cannot have a reduced structure here, but must rather have a complete CP. The
 1245 CP is at the left edge of the utterance, thus also at the left edge of an IntP by position,
 1246 and *for* itself can satisfy the IPEG here. However, since this is a phase, its complement
 1247 will also be an IntP by the categorial route, and thus also be subject to the IPEG via the
 1248 OSR. This is where the problem arises — given the nullness of PRO, it cannot satisfy the
 1249 OSR here, yielding ungrammaticality:

- 1250 (59) a. [_{TP} (^{IntP}PRO To_T [cuss with your grandma here]] is rude.
 1251 b. * [_{CP} (^{IntP}For [_{FinP} (^{IntP}PRO [_{TP} to_T cuss with your grandma here]])] is rude.

³⁸Here and in the following examples, it doesn't matter whether PRO appears in Spec-TP or somewhere lower down — the overtness of *to* is sufficient to satisfy the IPEG, and so the emptiness of PRO is irrelevant.

1252 To further ensure that the overt *to* cannot satisfy the OSR here as it could in (59a, we
 1253 propose that what matters is not finiteness but the difference between CPs and reduced
 1254 clauses — non-finite CPs contain the additional phrase above TP which we have been
 1255 calling FinP as well. We thus update the structures in (58) above as follows:³⁹

- 1256 (60) a. I would like [_{CP} (for) [_{FinP} (^{IntP}you [_{TP} to_T punch Alex]]].
 1257 b. I_i would like [_{TP} (^{IntP}PRO_i to_T [punch Alex]].
 1258 c. *I_i would like [_{CP} for [_{FinP} (^{IntP}PRO_i [_{TP} to_T punch Alex]]].

1259 Since it is the complement of the phase head C, this FinP is what aligns with the edge of
 1260 an IntP by the categorial route, and thus it is where something overt is required. This is
 1261 indeed where overt subjects appear, satisfying the OSR, but infinitival *to* is still down
 1262 in T, and so it cannot satisfy the OSR in these non-reduced infinitives. This is entirely
 1263 parallel to our analysis of why finite auxiliaries, also in T, cannot satisfy the OSR.

1264 While the details are different from the COMP-trace effect, there is thus a basic pattern
 1265 of mutually incompatible requirements that is common to the configurations with an
 1266 overt complementizer followed by a silent subject. I.e. the presence of the overt comple-
 1267 mentizer ensures in various ways that the following structure will be parsed as an IntP,
 1268 but the silent subject entails that this IntP will not have an overt left edge and thus will
 1269 violate the IPEG.⁴⁰ Note, incidentally, that the account presented here can be seen as a
 1270 further argument against traditional Case-based theories of the distribution of overt *for*,
 1271 as it achieves far better empirical coverage, and also captures the fact that the distribu-
 1272 tion of overt *for* is, for the most part, entirely parallel to that of overt *that* (as also nicely
 1273 described by Pesetsky and Torrego 2001).⁴¹

1274 6 The OSR isn't really about subjects

1275 Our implementation of the EPP in the OSR, in terms of a PF constraint requiring overt
 1276 material in at the left edge of an IntP, has the consequence that it can't really be about
 1277 subjects.⁴² In this section, we will explore the consequences of this shift in perspective,

³⁹The left IntP boundary indicated at the edge of TP in (60b) is at best optional in this sentence, appearing only by position, but we indicate it here to show that nothing will go wrong if, e.g., we insert an adverbial here, since *to* is overt in T.

⁴⁰Note that the anti-*that*-trace effect avoids this problem because the overt element in CP is actually a realization of local IntP Extension via \bar{A} -movement of the subject.

⁴¹There are some differences and additional complexities, e.g. in clausal complements of adjectives and nouns, where *for* tends more strongly to overtness than *that*, but these are differences of degree rather than kind. Apparent categorial contrasts in the distribution of the two complementizers reported in the literature usually reflect the comparison of examples that don't actually constitute a minimal pair. See McFadden (2012) for relevant discussion.

⁴²So calling it the "Overt Subject Requirement" is really a bit of a misnomer, in this sense.

1278 which will offer a way to understand certain types of cross-linguistic variation as well as
1279 a series of minor constructions in English where the EPP can be satisfied by something
1280 other than the subject.

1281 6.1 The EPP, pro-drop and cross-linguistic variation

1282 We predict that if a language has an English-style EPP, then it shouldn't allow subject
1283 pro-drop.⁴³ Our re-implementation of the EPP as the OSR is not a requirement that Spec-
1284 TP be filled in the narrow syntax, but that there be overt material in a certain position at
1285 PF. Hence *pro*, as a silent pronoun, cannot satisfy the requirement, and we would expect
1286 every run-of-the-mill pro-drop root clause like Spanish (61) to violate it:

1287 (61) *pro* hablo español.

1288 That such sentences are perfectly fine tells us that the OSR simply can't apply in the
1289 same way in these languages, or at least that they have some way of satisfying it that
1290 doesn't involve an overt subject. We will say more about this second possibility directly.
1291 For now, note that if we're on the right track, these languages also shouldn't display the
1292 other properties of English discussed above which, while not traditionally subsumed
1293 under the EPP, we have argued to be derivable from the OSR.

1294 This seems to be essentially correct. It is not just that subject pro-drop languages
1295 allow the subject to be null — even when it is overt, it has commonly been observed that
1296 languages like Italian and Spanish also allow the subject to appear post-verbally, i.e. not
1297 in Spec-TP, and apparently not at the left edge of anything (Rizzi 1982):

1298 (62) Sono cadute alcune pietre.
1299 are.3PL fallen some stones
'Some stones fell down.'

1300 Strikingly, as has been known for some time, these languages also seem to be oblivious
1301 to the COMP-trace effect (Rizzi 1982):

1302 (63) Chi_i credi che t_i abbia telefonato?
1303 who_i think-2SG that t_i has-SUBJ telephoned
'Who do you think called?'

⁴³There are several different types of pro-drop, which differ according to the constraints under which pronouns can be left silent (see Biberauer et al. 2010, for discussion). It is quite reasonable to think that different types of pro-drop have different underlying mechanisms, which may well have different implications for what we predict regarding the EPP. What is most directly relevant for our purposes here is the possibility of dropping the subject, hence our repeated reference specifically to **subject** pro-drop.

1304 Relatedly, they seem to have no problem with overt complementizers in non-finite clauses
1305 without overt subjects (Rizzi 1982).⁴⁴

1306 (64) Tenterò di lavorare di più
try.FUT.1SG C work.INF of more
1307 'I will try to work more.'

1308 These connections provide strong support for our unification of COMP-null effects with
1309 the EPP. While these connections have been observed before (see e.g. Pesetsky to ap-
1310 pear, for an overview), the proposals made to account for them have typically posited
1311 an indirect relationship between these patterns and have relied on outdated or ques-
1312 tionable theoretical assumptions (like the ECP or a crucial role for Case in regulating the
1313 presence and position of certain complementizers, see McFadden 2012, for some relevant
1314 discussion). Our proposal instead ties them together in a direct and straightforward way
1315 without any assumptions beyond what we propose for the EPP itself. For us, these are
1316 all just expressions of the OSR, so they should also pattern together cross-linguistically,
1317 as summarized in (65):

1318 (65) The EPP, the ban on pro-drop, the comp-trace effect and the ban on *for*-PRO all
1319 reduce to the requirement in OSR for something overt in the left edge of a clause.
1320 If a language has a way to avoid running afoul of the OSR, then *all* of these
1321 requirements should be lifted, all other things being equal.

1322 This leads us to the question then of how a language could actually avoid the OSR
1323 and lack all of these restrictions. The simplest possibility is that the IPEG itself, which
1324 underlies the OSR, is parametrized somehow, so that it simply does not apply in lan-
1325 guages like Spanish and Italian. Languages would thus simply differ in the constraints
1326 that apply to their prosodic systems. While this is certainly possible, it calls into question
1327 the conceptual motivation for the IPEG offered by An (2007). It is also not particularly
1328 satisfying because, in the absence of a theory of such prosodic variation, it simply stipu-
1329 lates the difference and offers no predictions about what other properties of a language
1330 should correlate with it. A more interesting possibility is that something like the OSR, or
1331 rather the IPEG, is indeed quite general, but languages differ in the syntactic structures
1332 that they produce for mapping onto prosodic units. Thus, what the OSR applies to in
1333 Spanish or Italian looks quite different from what it applies to in English. As a result,
1334 the elements that are forced to be overt by the OSR are parametrized across languages.

1335 We will mention here one concrete instantiation of this possibility, based on ideas of
1336 Barbosa (1995), Alexiadou and Anagnostopoulou (1998), which seems to have a lot of

⁴⁴Note that Italian *di* is more akin to English *for* than English *to*, i.e. it is located somewhere in C, not in T. See Rizzi (1997) for some discussion of its precise position.

1337 the right properties and is quite promising, though we won't develop it in detail here.
 1338 What these authors proposed is that pro-drop languages satisfy the EPP, not with the
 1339 subject, but with the verb, which moves to T in the languages under discussion, and
 1340 carries a representation of the ϕ -features of the subject in the form of agreement. The
 1341 specifics of their proposals for reinterpreting the EPP were syntactic, but we can adapt
 1342 the basic idea.⁴⁵ The verb does indeed move to a higher position in the relevant pro-
 1343 drop languages than in languages like English, and if we can establish that it is indeed to
 1344 the highest head in the spellout domain below C, then the facts will follow quite nicely.
 1345 To be consistent with our discussion of control infinitives and English finite auxiliaries
 1346 above, let us call this head Fin. Since FinP will be aligned with the relevant IntP that is
 1347 determined by the categorial route below the phase head C, it is what requires an overt
 1348 left edge by the IPEG/OSR. The verb in Fin will satisfy this requirement, and thus the
 1349 subject position in Spec-FinP is free to be empty — either because the subject is a silent
 1350 *pro*, because it appears in some post-verbal position, or because it has been \bar{A} -moved to
 1351 some higher position. Note that this doesn't work in languages like English, because
 1352 no verb moves to the highest head in the clause, as we discussed in the context of finite
 1353 auxiliaries and control infinitives in sections 4.2 and 5.5. Example (66) indicates the
 1354 details of the structure of a pro-drop sentence in Spanish under this analysis:

1355 (66) [_{CP} C [_{FinP} (^{IntP} *pro* hablo_i [t_i español]]].

1356 Of course, it is reasonable to think that different types of pro-drop languages can get
 1357 around the OSR in different ways, not just via verb movement. But the attractiveness of
 1358 this approach is that it connects variation in the factors tied together in (65) to indepen-
 1359 dently observable syntactic differences among languages.⁴⁶

1360 More broadly, the approach to the English-style EPP here outlines a template that
 1361 could be extended to phenomena in a number of languages, which don't necessarily in-
 1362 volve subjects, but do boil down to a requirement for *something* to be overt in some edge
 1363 position (essentially what Sigurðsson 2010, refers to as Filled Left Edge Effects). The
 1364 details vary considerably from language to language and among specific instantiations
 1365 in single languages, but they could all potentially be reduced to different applications
 1366 of something like An (2007)'s IPEG, requiring overt material to demarcate the edge of a
 1367 prosodic constituent. The variation may be attributable to differences in which prosodic

⁴⁵For example, for Alexiadou and Anagnostopoulou (1998) the idea was that the EPP is not about filling a subject position, but about checking a nominal feature of AGR.

⁴⁶This kind of approach clearly will not work for languages like Dholuo, as explicitly argued by Cable (2012), where we do not observe typical EPP effects, but also don't generally find pro-drop. One can perhaps imagine that such languages avoid the OSR in a more fundamental way relating to how syntactic structure maps onto IntPs, but we will not speculate further here, leaving a proper consideration of this type of language from within our system for future work.

1368 domain is relevant, what syntactic positions map onto the domains and what kinds of
1369 operations are available for moving things into and out of these positions and manipu-
1370 lating the size of the domains. We have argued here that the English EPP results from
1371 having the IPEG refer to IntP, with a left IntP boundary being mapped by default onto
1372 TP/FinP by the categorial route, coupled with (fairly general) syntactic movement of
1373 DPs to Spec-TP, *without* syntactic movement of any verbal elements as high as T/Fin.

1374 But change any one of those pieces, and a different surface pattern will arise, e.g.
1375 standard a subject pro-drop pattern if we add V-to-T movement. Similarly, an IntP built
1376 at a higher level, coupled with particular patterns of verb movement, could be respon-
1377 sible for V2 patterns.⁴⁷ The fact that both head and phrasal elements are relevant could
1378 also provide a way to approach the rather complex interactions between the positions
1379 of subjects and verbal elements in Celtic languages like Scottish Gaelic (see Thoms 2016,
1380 and citations there for some relevant data) which have thus far eluded successful anal-
1381 ysis in terms of a traditional EPP. This approach may also offer a clue as to why it is
1382 specifically in *embedded* clauses that many partial pro-drop languages are more likely to
1383 allow subject pro-drop: root clauses are typically at the left edge of the utterance, hence
1384 their left edge generally aligns with an IntP. Embedded clauses, on the other hand, often
1385 have their edge internal to the utterance, which makes it possible for them to be parsed
1386 into an IntP containing material from the matrix clause, meaning that they will not nec-
1387 essarily be subject to the IPEG. We also see a clear connection here, though there are
1388 important differences in assumptions, to the approach of Hamlaoui and Szendrői (2015),
1389 where IntPs generally map onto clauses, but there is flexibility in what syntactic con-
1390 stituent is involved, depending on how high in the structure verbal material is realized
1391 in the language.

1392 6.2 Non-subject EPP satisfiers

1393 The fact that the OSR isn't really about subjects or even Spec-TP, but about the edge of
1394 IntP, is why certain subject positions are not required to be overt — they happen not to
1395 be at the edge of an IntP. We have seen this for certain kinds of non-finite clauses and
1396 for examples with *wh*-movement of the subject. An important prediction related to this

⁴⁷The fact that something overt is required in the pre-verbal position, deriving the descriptive V2 pattern, would have to imply, in our system, that the traditional analysis of V-to-C movement plus movement of a (topical) element to Spec-CP can't be quite right. If CP is at the edge of the relevant IntP, then the verb in C should be sufficient to satisfy the IPEG. Rather, we would have to assume that at least one additional phrase is projected above the landing-site of the verb movement, which does not have an overt head and thus requires something overt in its specifier to satisfy the IPEG. Questions, conditionals and other V1 environments would either have the verb move higher or would lack the phrase above the landing site of the verb altogether.

1397 is that we should also find cases where the usual subject position *is* at the edge of an
1398 IntP, but the subject need not overtly appear there, because something other than the
1399 subject is there which can satisfy the OSR. Certain expletives like *there* could be seen as
1400 instances of this pattern, and we've already argued as much for the infinitive marker *to*
1401 and now for verbs that have moved particularly high in languages like Spanish. Here
1402 we will look at some suggestive evidence that the pattern is fairly general, as it should
1403 be, even in languages like English.

1404 First, this offers a way to analyze locative inversion, in which a certain class of loca-
1405 tive PPs can appear pre-verbally, with the expected subject appearing in a post-verbal
1406 position as in (67a). Largely parallel to this are also other cases where the subject is
1407 extraposed, but the usual subject position is filled by some other element, e.g. partici-
1408 ple preposing in (67b) (Thoms and Walkden 2015), *so*-inversion in (67c) (Toda 2007) and
1409 comparatives with VP ellipsis in (67d) (Culicover and Winkler 2008):⁴⁸

- 1410 (67) a. **Across the table** marched an army of ants.
1411 b. **Sitting at the table** should be a bottle of wine chosen especially for you by
1412 the sommelier.
1413 c. Our comments should be robust, and **so** should be our response.
1414 d. John has bought more books **than** has Mary.

1415 In all of these cases, there is evidence that the syntactic subject has been extraposed to a
1416 post-verbal position, yet the sentences are grammatical even without the insertion of an
1417 expletive. This strongly suggests that the various pre-verbal elements — the PP in (67a),
1418 the participial vP in (67b), *so* in (67c) and *than* in (67d) — are satisfying the EPP here,
1419 even though they do not otherwise behave like subjects. Note also that this is strongly
1420 reminiscent of the way that Holmberg (2000), Sigurðsson (2010) look at the phenomenon
1421 of Stylistic Fronting in Icelandic, as involving an adverbial or participial element moving
1422 up to an EPP position, essentially behaving like an expletive in clauses that lack an overt
1423 subject.

1424 We can also use our approach as a way to understand some anomalous facts about
1425 what are typically regarded as sentential subjects, i.e. embedded clauses that appear
1426 in what looks like the subject position of the matrix clause, as in (68a). According to
1427 various diagnostics, these don't actually seem to behave like real subjects in Spec-TP. For
1428 example, they don't participate in subject-auxiliary inversion, and in fact can't appear in
1429 interrogative matrix clauses, as shown in (68b) (Adger 2003a):

- 1430 (68) a. [That Medea killed her children] upset Jason.

⁴⁸See Thoms and Walkden (2015) for summarizing discussion of these structures and evidence regarding the position and subject status of the various components, along with references. Thanks again to Gary Thoms for pointing us to the relevance of the additional constructions that parallel locative inversion.

1431 b. * Did [that Medea killed her children] upset Jason?

1432 Nonetheless, these clauses must satisfy the EPP for the matrix clause, since no expletive
1433 is required (or even allowed) to accompany them:

1434 (69) a. * It/there [that Medea killed her children] upset Jason.

1435 b. * [That Medea killed her children] it/there upset Jason.

1436 This makes sense under our analysis as long as these clauses are in the left edge of the
1437 IntP, even if they fail to count as subjects for some other reason. Finally, our approach
1438 may also be a way to understand why no expletive subject is required (or, again, allowed)
1439 in a certain kind of parenthetical with *as*:

1440 (70) Irene was drunk, as (*it) was clear from her slurred speech.

1441 Postal (2004) argues convincingly that *as* isn't the subject here, yet seems to satisfy the
1442 EPP. For us, the grammaticality of (70) follows quite simply, since the left edge of IntP is
1443 overtly filled by *as*, satisfying the OSR.

1444 It goes beyond what we can tackle in this paper to propose specific analyses for the
1445 syntactic patterns presented in this subsection, and indeed there is good reason to think
1446 that they differ in their details. What they all have in common is that they involve an
1447 overt non-subject, appearing in a clause-initial position (or positions) that may not be the
1448 actual subject position in Spec-TP, but is in our terms at the left edge of the relevant IntP,
1449 and thus is relevant for the OSR. What we *can* say is that this position is distinct from the
1450 position(s) occupied by clause-initial adverbials, since as noted in section 5.4 above, the
1451 latter are *not* able to satisfy the OSR. Rather, this must be a functional position projected
1452 in the left periphery of the clause that can exceptionally be filled by something other
1453 than the subject.⁴⁹ The ways in which the specific elements described here find their
1454 way into that position may well be language- or even construction-specific, but they all
1455 have in common the fact that they provide a way to satisfy the OSR without an overt
1456 subject in the normal position.⁵⁰

⁴⁹The behavior of adverbials in Stylistic Fronting in Scandinavian is in a sense the exception that proves the rule — they are able to satisfy some version of the OSR not as adverbials, but because in these languages, unlike in English, there is a syntactic movement operation (i.e. Stylistic Fronting) that can apply to them to bring them into the relevant position at the left edge.

⁵⁰This may provide a way to accommodate the impression, noted by an anonymous reviewer, that we have here a collection of relics from an earlier V2 stage in the history of English. Earlier stages of language applied the IPEG one way or another to an edge corresponding to a syntactic position that could be filled by a variety of topic-like constituents, while the contemporary language applies it, in the form of the OSR, to an edge corresponding to a syntactic position that is normally filled by the subject. Certain relics of the previous stage are accommodated by special syntactic mechanisms that let something other than the subject appear in a syntactic position that occupies that edge.

1457 7 Back to the modularity problem

1458 We hope to have shown that a prosodic characterization of the configuration ruled out
1459 by the EPP gets the basic facts right and can also be fruitfully extended to explain other
1460 phenomena like the COMP-trace effect. However, this just serves to underline the issue
1461 of countercyclicity or a violation of modularity which we laid out in Section 3 and sum-
1462 marized in (25). With the specific formulation we have adopted in the OSR, there can
1463 be no doubt that it must apply to the output of the narrow syntax, on the PF branch, as
1464 it makes crucial reference to overtness and to the intonational phrase, a category in the
1465 prosodic hierarchy. And yet, as we argued in section 3.2, core EPP-satisfying operations
1466 like DP movement to Spec-TP must apply in the narrow syntax. If these operations are
1467 to be truly *driven* by the EPP, then we run into problems with our standard architectural
1468 assumptions of modularity and cyclicity: the narrow syntactic portion of the derivation
1469 is supposed to strictly precede the PF branch and not have any access to phonological
1470 information.

1471 We see three potential analytic approaches to this problem. (1) Change our theoretical
1472 assumptions, so that the syntax *does* have access to the relevant phonological informa-
1473 tion; (2) Motivate a reanalysis of EPP-satisfying movement in a way that has its output
1474 depend on PF considerations with having syntactic operations actually make reference
1475 to phonology; (3) Decouple DP movement from the EPP, insisting that while it may be
1476 EPP *satisfying*, it is not EPP *driven*. I.e. syntactic movement occurs for syntactic reasons,
1477 and PF is left to interpret the structures output by syntax, potentially discarding ones
1478 that do not satisfy constraints like the EPP. In the remaining subsections, we will con-
1479 sider each of these approaches in turn but will ultimately argue that a version of the
1480 third ones looks the most promising based on our current understanding. But this must
1481 remain a tentative conclusion, at this stage, and we would like to stress that the choice
1482 among these options is ultimately orthogonal to the argument that the EPP applies at
1483 PF, and even to the specific characterization we have proposed in the form of the OSR.

1484 7.1 Option 1: Phonology in the syntax

1485 We could take the facts surrounding the EPP in languages like English as evidence
1486 against standard architectural assumptions about the grammar, and in favor of a differ-
1487 ent kind of approach to the relationship between syntax and phonology. This could be
1488 a relatively minor adjustment, such that the syntax has limited access to restricted types
1489 of phonological information — e.g. whether or not some syntactic head has any overt
1490 phonology associated with it, but not the specifics of that phonology. An example for

1491 this approach would be Holmberg (2000)'s proposal that the syntax has access to the
1492 presence of a phonological feature matrix on a word, but not the actual contents of that
1493 matrix.

1494 Alternatively, we could go for a more radical break, e.g. having completed phono-
1495 logical representations feed into syntax, or assuming a parallel architecture where syn-
1496 tax and phonology mutually constrain each other. E.g. Richards (2016) argues that the
1497 construction of PF representations already begins in the syntactic component; syntactic
1498 operations can thus be sensitive to and even triggered by certain kinds of phonological
1499 information. Richards explicitly presents this as an alternative to positing purely for-
1500 mal features (like a generalized EPP or 'edge' feature) to trigger movement operations.
1501 The basic support for such an approach comes from a series of correlations he identifies
1502 between the availability of a certain type of movement in a given language and certain
1503 prosodic/phonological properties of the moved material. Whether or not a language
1504 shows EPP effects, e.g., is related to whether or not T is realized as a suffix and plays
1505 a role in stress assignment to verbs in that language. Richards does, however, assume
1506 that phonological information accessible to the syntax is restricted in certain ways: the
1507 aspects of PF that are constructed in the syntax, and which the syntax can thus make
1508 reference to, are the structurally regular parts. Lexically specific information (including
1509 irregularities and specific segmental content) only come in later, and are thus not ac-
1510 cessible to the syntactic portion of the derivation. This plays an important role in his
1511 arguments that what is going on here really is phonological influence on the workings
1512 of the syntactic derivation, rather than the application of post-syntactic filters in a final
1513 phonological representation.

1514 One simple advantage of this kind of approach is that it would allow a fairly di-
1515 rect implementation of our central insight about EPP effects: i.e. we can analyze EPP-
1516 satisfying movement as syntactic movement triggered by phonological considerations
1517 without running into a countercyclicity problem. The main concern is that allowing the
1518 syntax access to phonological information goes against a long tradition of work arguing
1519 for and assuming a stricter modular separation. We thus have to be careful that the
1520 changes we make in order to implement the EPP do not have unintended consequences
1521 and undermine prior analyses that depended crucially on that separation. Furthermore,
1522 if our argumentation was on the right track, the kind of access to phonological infor-
1523 mation that Richards (2016) envisages for the syntax might not actually be sufficient.
1524 Ensuring that there is actual overt material in a particular position depends not just on
1525 the structurally regular parts of the phonology, but on specific lexical effects, i.e. the
1526 fact that specific syntactic structures have non-null phonology associated with them. An
1527 interesting question for future research is whether the approach we have pursued here,

1528 in particular the preliminary discussion of ways to approach cross-linguistic variation in
1529 section 6.1, could yield insight into the patterns that Richards discusses, perhaps allow-
1530 ing a reduction in the need for syntactic operations to refer to phonological information.

1531 **7.2 Option 2: Separating the syntax and the phonology of movement**

1532 A second avenue to pursue is to look for a way to split traditional movement operations
1533 into two parts, separating the clearly syntactic and phonological aspects from each other
1534 and distributing them across the appropriate modules. The phonological side would
1535 handle the parts sensitive to phonological information, so that the syntactic side could do
1536 its work independently, but a link would be maintained between the two sides so that they
1537 could still be understood as parts of a single operation. A concrete proposal along these
1538 lines was made by Bobaljik (2002) when presented with a problem strikingly similar
1539 in structure to ours. Bobaljik was concerned with the proper treatment of Holmberg's
1540 Generalization (Holmberg 1999), according to which overt object shift in Scandinavian
1541 is only possible if the main verb raises out of the VP. He argued that the problem with
1542 the blocked configurations is actually a morphophonological one — if the object raises
1543 across the verb, it intervenes and blocks the morphological merger of the verb with
1544 a (tense or participial) suffix realizing a higher functional head. The problem is, this
1545 merger is a PF operation, requiring adjacency rather than a structural syntactic notion,
1546 yet the movement that would get the object into the offending position is syntactic. A
1547 movement operation clearly occurs in the syntax, but whether or not it should apply
1548 depends on information that is only available on the PF branch — a situation entirely
1549 parallel to that with the EPP.

1550 Bobaljik (2002) offers a solution to this problem based on a specific refactoring of
1551 movement, explicitly arguing that it is superior to overgenerate-and-filter approaches
1552 akin to what we will describe in section 7.3. The refactoring depends crucially on the
1553 copy theory of movement (Chomsky 1993, and following), with the appearance of dis-
1554 placement coming from the fact that, normally, only the highest copy is pronounced.⁵¹
1555 Chomsky motivated this proposal as a way to deal with reconstruction effects, which he
1556 argued result when a lower copy is interpreted at LF. Bobaljik simply extends this idea
1557 to the PF branch: just as LF can decide to interpret either a higher or a lower copy, PF
1558 can decide to pronounce either a higher or a lower copy. The various logical combina-
1559 tions of these possibilities yield the typology of interactions between pronunciation and
1560 interpretation laid out in Table 1, including standard movement (high pronunciation,

⁵¹Later developments have refined the copy theory to clarify that it is the same syntactic object that is re-merged in a new position rather than a distinct copy. While this has consequences for how to interpret certain details of Bobaljik's proposal, it does not affect the main thrust, so we will set these issues aside.

1561 high interpretation), reconstruction (high pronunciation, low interpretation) and covert
 1562 movement (low pronunciation, high interpretation). Bobaljik argues that the fourth pos-
 1563 sibility, what he calls ‘Lower Right Corner effects’, with low pronunciation and low
 1564 interpretation, is attested in certain expletive constructions.

Table 1: PF and LF interpretation of copies in Bobaljik (2002)

	Higher copy	Lower copy
Overt Movement	PF, LF	
Reconstruction	PF	LF
Covert Movement	LF	PF
‘Lower Right Corner’		PF, LF

1565 This theory deals with problematic interactions between syntax and PF by virtue of
 1566 splitting up traditional movement into two components. First, there is an abstract oper-
 1567 ation in the narrow syntax that associates a syntactic object with an additional structural
 1568 position.⁵² This operates on purely syntactic structures, respects syntactic principles like
 1569 locality and minimality and has no access to phonological information. Then, as part
 1570 of the PF component, there is a procedure that determines which position each syntac-
 1571 tic object should be pronounced in. This operates on a morphophonological structure
 1572 which has access to (at least some) phonological information and follows principles of
 1573 morphophonology rather than syntax. For Holmberg’s Generalization, Bobaljik pro-
 1574 poses that objects with the relevant syntactic properties obligatorily undergo syntactic
 1575 object shift, regardless of where the verb is. The structure shipped to the interfaces then
 1576 has copies in both a high and a low position. At PF, the algorithm applies to determine
 1577 which of these to pronounce. There is a preference to pronounce the highest copy when-
 1578 ever possible, but this can be overridden if the result would be morphophonologically
 1579 ill-formed. In particular, if the higher copy would disrupt the required adjacency be-
 1580 tween the main verb and the higher functional head destined to be its suffix, then the
 1581 lower copy must be pronounced instead. Holmberg’s Generalization is thus not about
 1582 the syntactic movement involved in object shift being blocked, but rather about whether
 1583 that movement is reflected in the resulting pronunciation.

1584 Something entirely analogous can be proposed to deal with our EPP concerns. We
 1585 can assume that A-movement of an appropriate DP occurs obligatorily in the syntax,
 1586 either universally or according to language-specific factors. This is completely standard
 1587 syntactic movement, driven by syntactic features, respecting constituency, locality and
 1588 minimality, and completely blind to phonological information. This yields a structure

⁵²We can think of this as copy + merge, re-merge, internal merge, chain formation or any of a number of other possibilities. For present purposes the differences don’t matter.

1589 with both high and low copies of the moved element, and one of the jobs of PF will
1590 be to determine which of these copies will be pronounced. The algorithm for that de-
1591 termination will operate based on morphophonological structure and be sensitive to
1592 morphophonological information, including, crucially, overtness and prosodic domains,
1593 and will have some version of the OSR built into it. This will ensure that the higher
1594 copy is pronounced and is overt in the relevant cases in languages like English, while in
1595 pro-drop languages, it will allow the lower copy to be pronounced under relevant cir-
1596 cumstances, or for all copies to be silent (pro-drop itself). This solves the countercyclicity
1597 issue in that movement always applies in the relevant contexts, with no reference to the
1598 EPP and indeed no consideration of any phonological information. The EPP itself is
1599 entirely a matter of the PF branch, not doing any actual syntactic work, but rather deter-
1600 mining what to do with the material handed over by the syntax.

1601 At first glance, this alternative looks quite appealing, given that it allows us to ac-
1602 count for the EPP's peculiar combination of syntactic and phonological properties with-
1603 out violating standard assumptions about cyclicity and modularity and without requir-
1604 ing reimplementations of the architecture of the grammar. There are, however, serious
1605 concerns. First, it commits us to a particular understanding of movement, requiring a
1606 version of the copy theory and certain assumptions about the algorithm for determining
1607 which copies to pronounce. These assumptions are popular, but that does not guarantee
1608 that they are harmless. Second, splitting up EPP-satisfying movement into two parts
1609 raises difficult questions about how to deal with expletives, and in particular which part
1610 of the movement they correspond to. We could imagine that expletives are inserted in
1611 the syntax, blocking A-movement, but still yielding a structure that can satisfy the OSR
1612 at PF. But then it is not clear what would trigger the insertion, since the actual force of
1613 the OSR only applies at PF. Alternatively, they could be inserted as a last resort at PF,
1614 directly to satisfy the OSR, but this runs into problems as well. For one thing, the choice
1615 between expletives *it* and *there* in English is determined syntactically, based essentially
1616 on the category of the associate (*there* with DPs and *it* with clauses). It is not phono-
1617 logical, and so it is difficult to see how to implement to the choice if insertion doesn't
1618 happen until PF. For another, if the expletives are only inserted at PF, then we might
1619 expect the associate of expletive *there* to have undergone (covert) A-movement in the
1620 syntax, yet such associates systematically fail to show any evidence of such movement,
1621 e.g. being obligatorily interpreted low. Indeed, as discussed by Butler (2004), there is
1622 reason to think that *there*-insertion has some LF-semantic consequences — something
1623 that a PF-insertion approach would be unable to capture.

1624 Third, and perhaps most importantly, this option decouples the EPP from the actual
1625 triggering of A movement, and yet maintains a connection between the two by actually

1626 enforcing the EPP in the deletion of copies created by that movement. The EPP has
1627 nothing to do with the syntactic operation that initiates movement, just in presupposing
1628 that it will have happened. This means that we need to couple the Bobaljik story with an
1629 independent theory of what triggers A-movement of a DP to Spec-TP. Standard theories
1630 might do this in terms of a version of the EPP, but of course that possibility is not avail-
1631 able to us, as we have moved the EPP to PF. Clearly we do not want to posit a distinct
1632 syntactic EPP in addition to our PF EPP, lest we run the risk of an infinite regress of EPPs.
1633 We could instead adopt a version of the proposals by Bošković (2007) and Bjorkman and
1634 Zeijlstra (2014) discussed earlier, whereby movement is forced by c-command require-
1635 ments on Agree operations, or Sigurðsson (2010)'s theory of NP-movement driven by
1636 person computation. The problem is that, in order for the general approach to work
1637 here, the syntactic movement operation will have to be general, perhaps even universal,
1638 so that the various copies are available for the language-specific rules for copy deletion to
1639 make their selection and yield EPP effects in the languages that have them. This would
1640 lead us to expect that languages without the EPP would still have the A-movement, just
1641 without the requirement that the highest copy be pronounced. However, in many such
1642 cases, evidence that movement has taken place at all, even at a covert level, is distinctly
1643 lacking. For example, Wurmbrand (2006) has argued that in a number of relevant cases
1644 in German, no movement has happened at all, since the higher position cannot be inter-
1645 preted at LF either, and Cable (2012) argues convincingly that A-movement is optional
1646 in Dholuo, and that nothing like covert movement has taken place in cases where the
1647 subject surfaces in a low position. Of course, Bobaljik (2002)'s approach does have a way
1648 to deal with such cases, by saying that movement has occurred, but with the lower copy
1649 being privileged at both PF and LF (i.e. the Lower Right Corner effect). However, it then
1650 becomes mysterious why PF and LF should so frequently pattern together in these cases.
1651 An analysis where movement simply hasn't happened, because there is no universal DP
1652 movement, becomes more attractive.

1653 **7.3 Option 3: Overgenerate and filter**

1654 The third possibility is in fact the general recourse available in cases where we want later
1655 stages of the derivation to constrain earlier ones without technically introducing any
1656 look-ahead. The broad idea is that the syntax is set up to create an array of structures
1657 according to its own principles. These are then interpreted by a restrictive PF component,
1658 and some of the structures coming from the syntax are filtered out because they cannot
1659 meet restrictions placed at the interface. At least some 'ungrammatical sentences' then
1660 correspond to structures that are well-formed from the perspective of the syntax, but

1661 are ruled out for PF reasons. In the case of the EPP, we could assume that operations
1662 like A-movement and expletive insertion apply in various combinations, in accordance
1663 with syntactic principles, yielding an array of structures with DPs, expletives and other
1664 elements appearing in a variety of positions. A series of PF constraints, including our
1665 version of the EPP in the form of the OSR, would then filter out some of these structures,
1666 leaving only those which have successfully satisfied the requirements of both syntax and
1667 phonology as grammatical. DP movement to subject position would then not be driven
1668 in any sense by the EPP, but would happen to frequently be part of derivations that yield
1669 EPP-satisfying structures.

1670 Consider how this would resolve our problems with countercyclicity. We can retain
1671 the architectural assumption that the syntax precedes PF and has no access to phonolog-
1672 ical information. As far as the syntax is concerned, there is no EPP, just the options of
1673 moving something to Spec-TP or not, inserting an expletive or not, all of which will in
1674 fact be pursued in different derivational paths as far as they are syntactically licit. The
1675 phonological component then eliminates (among others) those structures where there is
1676 an IntP with a left edge that has no overt material (as per the OSR). What survives are the
1677 structures where expletive insertion or movement of a subject to Spec-TP, or something
1678 else that fills the edge with overt material, happen to have taken place in the relevant
1679 clause types, but there is no sense in which those operations were actually triggered in
1680 order to satisfy the EPP.⁵³

1681 It should be clear that this has a fair amount in common with the second option we
1682 just discussed. In both, the concerns of syntax and phonology are separated, with each
1683 module proceeding according to its own principles and concerns. Furthermore, the ac-
1684 tual application of the EPP is firmly in the PF component, applying to the output of the
1685 syntax, and it is in effect choosing among different options that the syntax has presented
1686 to it. The crucial differences are in the nature of the choice presented by the syntax and
1687 in the consequences of the choice the phonology makes. In the second approach, the
1688 syntax presents a single output structure, in which movement has taken place, meaning
1689 that a single DP has copies in two (or more) positions. The phonology simply pro-
1690 cesses this structure further by choosing which of these positions to pronounce. In the
1691 overgenerate-and-filter approach, the syntax presents multiple output structures, some
1692 where movement has taken place, and others where it hasn't. The phonology is then not
1693 just processing the structures, but choosing among them, and filtering some of them out

⁵³This could shed some light on why, in a language like Dholuo, where a descriptive surface EPP in the sense we have been describing here does not seem to apply, there is still clear evidence for (optional) A-movement of subjects, as argued by Cable (2012). In our terms, for reasons that we would still need to explain, the OSR does not apply to require an overt subject in the edge in TP in such languages, but this is simply orthogonal to A-movement, which occurs independently when triggered by other factors.

1694 — this is just an overgenerate-and-filter approach.

1695 Unsurprisingly, then, the overgenerate-and-filter approach faces some of the same
1696 challenges as Bobaljik’s, but avoids others. First, the issues with expletives do not arise.
1697 We can assume that expletive insertion, which is sensitive to the category of the asso-
1698 ciate and has some LF effects, occurs in the syntax. There will also, however, be similar
1699 derivations in which no insertion has taken place, and it will be partly the job of PF to
1700 decide among these, choosing the structures with expletives in cases where the alterna-
1701 tive would violate the EPP. Second, just as with the Bobaljik-style approach, the question
1702 of what triggers A-movement needs to be tackled, since the actual operation of the EPP
1703 occurs at PF and not in the syntax. Essentially the same options are open and we simi-
1704 larly want to avoid reintroducing a syntactic EPP (in addition to our phonological one).⁵⁴
1705 There is a crucial difference, though, in the status of structures without overt movement.
1706 As noted above, under the Bobaljik-style approach, these must be analyzed, at least in
1707 cases where they alternate with overt movement structures, as involving covert move-
1708 ment. The overgenerate-and-filter approach is not obliged to do this, and can instead
1709 see them as instances where movement simply has not applied, which greatly simplifies
1710 matters. A related point is that the overgenerate-and-filter approach is more amenable
1711 to the possibility that, at least in some cases, movement isn’t typically feature-driven,
1712 but rather something like a revival of GB-era Move α is appropriate.

1713 However exactly the syntactic movement is implemented, the idea in all of this is
1714 to actually decouple the OSR and ultimately the EPP from syntactic movement entirely.
1715 This is consistent with our considerations in section 6.1 regarding cross-linguistic vari-
1716 ation, and with the kind of evidence discussed in 6.2, where non-subject elements that
1717 clearly have not undergone DP movement find themselves in the right position and
1718 satisfy the EPP. There is no sense in which the phonological constraints drive syntac-
1719 tic movement, or in which syntactic processes need access to phonological information.
1720 Rather, structures without a particular kind of syntactic movement are generally filtered
1721 out, because they yield a configuration that violates a phonological constraint, unless
1722 some other factor — like expletive-insertion or PP/adverbial-fronting — happens to
1723 provide an alternative way to satisfy the phonological constraint. The appearance of
1724 countercyclicity or a violation of modularity principles is thus an illusion.

⁵⁴It might seem like our need for something to trigger DP movement independent of the phonological EPP brings us into the same trouble that we described for Landau (2007) in section 3.3. The difference is that Landau’s [P] feature, which implements the EPP, is directly parasitic on some syntactic feature, like Case or ϕ , which causes problems because EPP effects don’t seem to be reducible to any single such feature. For us, the EPP in the form of PROS is completely independent of DP movement. DP movement is one way to create structures that might satisfy the EPP, but there are others as well. Thus we don’t make obviously incorrect predictions about correlations between e.g. Case and subject positions.

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