COMP-trace revisited: an indirect dependency analysis

Ankelien Schippers, Carl von Ossietzky Universität Oldenburg
ankelien.schippers@uol.de

Abstract
This article discusses long-distance (LD) subject dependencies in English and the well-known COMP-trace effect. I argue that COMP-deletion in subject (LD) dependencies signals the presence of a relative clause structure, rather than a complementizerless clausal complement. I argue that there is no LD extraction as such, but that LD subject questions are derived via strictly local, clause-bound movement that crucially does not cross clause-boundaries. The embedded clause is formally a relative clause, the putatively LD extracted wh-phrase in the matrix clause its head. The construction is related to a much larger group of so-called indirect dependencies, which can be attested in a wide variety of languages, including closely related languages like German, Dutch and Frisian. The crux of the analysis is that the relationship between the wh-phrase in the matrix clause and an empty position in the embedded clause is not derived via movement, but through predication, predicting non-identity effects to occur between the wh-phrase in the matrix clause and the empty position in the embedded clause, in particular with respect to case. I show that such non-identity effects indeed occur and provide supporting evidence for the idea that the embedded clause is formally a relative clause.

1. Introduction

The COMP-trace effect refers to the fact that in English, a complementizer cannot immediately precede a subject trace. In effect, in LD subject questions, complementizers cannot be spelled out, whereas they are optional in case of object LD questions:

(1) Who do you think (*that) t saw Tom?
(2) Who do you think (that) Tom saw t?

Thus, LD subject movement is more restrictive than LD object movement. It turns out that the restrictiveness of LD subject movement is visible in many other languages as well, which has led to the hypothesis that there is a universal constraint against LD subject movement (Rizzi & Shlonsky 2007). Languages resort to various alternative strategies in order to form an LD subject dependency, such as resumption, clausal pied piping or the use of special complementizers. Even though a wide variety of explanations have been offered for the COMP-trace effect, it still remains under active debate in the field and, as pointed out by Pesetsky (2017) "... it has proven frustratingly hard to determine just what kind of phenomenon the complementizer-trace effect is" (Pesetsky 2017: 10). In the current article, the focus is not so much on why subjects are so difficult to extract from embedded clauses, but more on how English deals with this problem. In doing so, it radically departs from virtually all previous analyses of the COMP-trace effect in claiming that subject LD dependencies in English do not involve LD movement proper. As I will propose, they are formed by means of a so-called indirect dependency or scope marking construction. One of the advantages is that this solves the mystery of the alleged absence of scope marking constructions in English, which has been a puzzling issue because scope marking constructions occur in all of English's closest neighbors (German, Dutch, Frisian, Afrikaans). Scope marking, in this respect, is yet another alternative

strategy that can be added to the list of strategies for forming LD subject dependencies in Rizzi & Shlonsky (2007).

The outline of this article is as follows: Section 2 gives an overview of previous analyses of the COMP-trace effect. In section 3, I introduce so-called indirect dependencies/scope marking constructions, which function as an alternative to successive-cyclic LD movement in various languages. In section 4, I propose that this strategy of forming an LD dependency can be attested in English as well, namely in case of LD subject dependencies. The analysis is formally implemented by making use of Adger & Ramchand's (2005) analysis of (LD) wh-questions. In section 5, I sketch how the alternative construction diachronically emerged. Finally, section 6 is devoted to providing empirical evidence for the analysis that I am proposing. In the discussion section, I discuss what consequences the proposed analysis has for our understanding of the COMP-trace effect, and finish with the main conclusions.

2. Analyses of the COMP-trace effect

Analyses of the COMP-trace effect are concerned with two major questions: first of all, what is the cause of the COMP-trace effect (i.e. what makes embedded subjects so difficult to extract?) and secondly, what strategies are employed to legitimately form an LD subject dependency? These two questions are intimately related under the (implicit) assumption that answering the second question will also answer the first, but these questions can in principle also be treated separately. In this section, I gave an overview of current proposals of the COMP-trace effect, before turning to my own analysis. My analysis differs from previous proposals in terms of how LD subject dependencies are syntactically and semantically derived but it doesn't directly answer the question why subjects cannot be extracted in the same way as non-subjects. In this respect, it is compatible with several explanations for the source of the COMP-trace effect. I will return to this issue in the discussion section, where I reevaluate current proposals on the basis of my own analysis.

The traditional syntactic explanation of the COMP-trace effect is the Empty Category Principle (ECP) (Chomsky, 1981; 1986; Lasnik & Saito, 1984; 1992; Rizzi, 1990, see also Pesetsky, 1982, which can be seen as a precursor to this explanation). According to the ECP, traces must be properly governed, either through head government or antecedent government. Under the assumption that nominative subject traces in IP are not properly head governed, they require antecedent government. It is assumed that complementizers block antecedent government. As discussed in Pesetsky (2017), the ECP eventually was not accepted as a satisfactory explanation for the COMP-trace effect in the field. One important reason for this is that the ECP appeared very limited in its scope: it did not apply unproblematically to other non head-governed traces, in particular adjunct traces. Secondly, with the advent of Minimalism, notions such as government and empty categories were eliminated from syntactic theory. This lead to the development of new explanations embedded in the Minimalist framework. These explanations can be divided into two main types of approaches, which are not necessarily mutually exclusive: so-called freezing analyses (Boeckx 2008; Pesetsky & Torrego 2001; Rizzi & Schlonsky 2007 and others) and anti-locality accounts (Ishii 2004; Brillman & Hirsch to appear; Douglas 2017; Bošković 2016 and many others). Freezing analyses assume that subjects have to remain in their argument position in the presence of an overt complementizer. Rizzi & Shlonsky assume there is a Subject Criterion, requiring each clause to have a subject. Once a subject reaches this criterial position, it is frozen in place. When there's no overt complementizer, they assume the CP is reduced and that there is a null complementizer endowed with phi-features immediately dominating the criterial subject position. As such, it is

able to satisfy the Subject Criterion, so that the real subject does not become frozen. Pesetsky & Torrego (2001) assume subjects are frozen for reasons of economy whenever a complementizer is present: they assume that complementizers as well as subjects are able to check an uninterpretable T feature on C. When the complementizer already checks this feature, the subject remains stuck in TP. The account by Boeckx (2008) is similar in vein.

Anti-locality accounts assume that there is a derivational constraint that forbids movement of subjects across complementizers, because this movement step is 'too short', i.e. anti-local. There are different views on what counts as 'too short', but in the context of the COMP-trace effect it basically boils down to the fact that movement has to cross more than one XP boundary. The problem with subject movement is that subjects are relatively high in the sentence structure (i.e. SpecTP). Wh-movement of the subject across a complementizer would involve a movement step from SpecTP to SpecCP (for reasons of successive-cyclicity), which is the immediately dominating XP. This movement step is too short. Within these anti-locality accounts, it is assumed that clauses without a complementizer have a reduced CP (or no CP at all). This way, the offending anti-local movement step is circumvented, explaining why complementizers are not allowed.

Bayer (2005) gives an informational-structural account of the COMP-trace effect. It is similar in vein to freezing accounts in assuming that subjects are (typically) also 'frozen'. However, Bayer does not tie this directly to their status as 'subjects' but to the fact that in most cases (especially in English), they function as topics, and as such cannot be moved higher than SpecFinP (in effect, he argues for a topic freezing effect).[1] The approach is formalized in Bayer & Salzmann (2013). For clauses without a complementizer, it is assumed that they do not involve any LD extraction at all – rather, the alleged matrix clause is analyzed as a parenthetical, so that there is only a local subject wh-dependency:

(3) Who [do you think] saw Tom?

Bennis (1986) offers a similar type of account for Dutch: He proposes the Empty Presupposition Condition, according to which extraction has to take place from a position that is preceded by presuppositional material. This implies that topics, which are typically presupposed, cannot be extracted.

There are also proposals that have linked the problem with LD subject extraction over complementizers to processing and production consideration. With regards to processing, Hawkins (1999, 2004) propose that the problem with LD subject extraction can be explained according to his Minimize Domain principle. This principle entails that the efficiency and complexity of a structure is determined by the number of words that intervene between related items, such as fillers and gaps and heads and their dependents. With respect to the COMP-trace effect, he proposes that the problem is essentially that complementizers and finite verbs can perform the same job, namely that of constructing the embedded clausal complement of the matrix verb. In case of LD subject extraction, the embedded clause starts with the finite verb; the complementizer is therefore superfluous, only increasing the distance between the extracted phrase and its gap. In case of object LD movement, however, the embedded clause does not start with the finite verb but with the subject. For that reason, pronouncing the complementizer does not come at an additional cost. There are various problems with Hawkin's explanation,

[1] Kiziak (2010) found no supporting evidence for an informational structural account in German. She tested this experimentally by scrambling objects, so that the subject was no longer in the focus domain. However, this did not make the subject/object asymmetry disappear.

however. Firstly, his proposal cannot account for the fact that object LD extraction shows a COMP-effect as well (i.e. in judgement experiments, object LD questions with *that* are also rated significantly lower than those without *that*, cf. Cowart 1997; Schippers 2012a). A more general point of criticism against Hawkins account is that it is not clear which syntactic and semantic relations are relevant to the Minimize Domain Principle, which makes it very difficult to make precise predictions.[2]

McDaniel, McKee, Cowart & Garrett (2015) alternatively proposed that the problem with LD subject extraction is not so much rooted in processing, but rather in production. In language production, a common assumption is that clauses are planned separately. In case of LD subject movement, this has as a result that an embedded clause (a production planning unit on its own) starts with a gap. McDaniel et al. argue that gaps are syntactically highly complex and therefore, that starting a planning unit with a gap taxes the sentence planning system. A way around this is by planning the main and the embedded clause together as one unit. McDaniel et al. argue that complementizer deletion signals such simultaneous planning, which is possible under the assumption that complementizerless clauses are syntactically reduced and more tightly connected to the main clause than clauses with a complementizer.

There are also prosodic accounts of the COMP-trace effect. Kandybowicz (2006; 2008) proposes a prosodic filter that disallows adjacency between a complementizer and a gap when they're at the left edge of the same prosodic phrase (see also Sato & Dobashi 2016 and McFadden & Sundaresan 2017). However, a recent experimental study by Ritchart, Goodall & Garellek (2016) specifically testing this hypothesis found no supporting evidence for such a prosodic constraint. This makes it very unlikely that prosody is the sole factor involved in the COMP-trace effect.

Salzmann, Häussler, Bader & Bayer (2013) propose a purely phonological COMP-trace filter based on experiments in German. As mentioned below, COMP-trace effects disappear when there is an adverbial phrase intervening between the complementizer and the trace (the so-called adverb effect). In an acceptability judgement task, Salzmann et al. showed the adverb effect occurred irregardless of the presence of a trace: a sentential adverb after the complementizer also improved the acceptability of so-called verb projection raising constructions, which like LD subject dependencies have a finite verb immediately adjacent to a complementizer, but crucially lack a subject trace. For this reason, they propose there is no deep syntactic constraint against COMP-trace configurations, but a more superficial phonological requirement that effectively forbids a complementizer – verb sequence. However, as they point out, their analysis runs into problems with English, which has an anti-*that* trace effect in relative clauses.

An important issue that analyses of the COMP-trace effect have to be able to account for are so-called anti-COMP trace effect, which refers to cases where subject extraction does allow (or even requires) the complementizer to be spelled out. There are two different contexts where this is the case: the first case concerns subject relative clauses, the second cases of LD extraction where there is an adverbial phrase in between the complementizer and the trace (i.e. the so-called adverb effect: Bresnan 1977, Culicover 1993). In both cases, deletion of *that* leads to ungrammaticality:

(3) The person *(that) __ met Mary is my friend

[2] See Dros (2018) on this matter. I would like to thank an anonymous Syntax reviewer for drawing my attention to this point.

(4) I asked what Leslie said *(that) in her opinion __ had made Robin give a book to Lee.

The adverb effect is generally difficult to explain under ECP and Freezing accounts of the COMP-trace effect, since it is not clear in what way adverbial phrases are able to license subject traces. Informational-structural accounts, anti-locality accounts, prosodic and phonological accounts on the other hand are generally successful in accounting for this. Similarly, the fact that *that* is allowed in relative clauses does not follow straightforwardly from ECP and Freezing accounts, but is relatively unproblematic for all other accounts (with the exception of Salzmann et al.'s phonological account). What is however problematic for virtually all previous analyses of the COMP-trace effect is that the effect appears to be variable across speakers (Sobin 1987). This variability has no clear geographical delimitation and astonishingly even appears to show variability within individuals: Cowart 2003 shows that judgements on COMP-trace violation in one experimental session are not predictive of the judgement in another session.[3] As I will explain, the analysis I am proposing is able to deal with anti COMP-trace effects as well as speaker variability in the acceptance of COMP-trace violations.

3. Indirect LD dependencies

In many languages, LD movement out of finite clauses is not possible or highly degraded. Such languages use alternative strategies to form LD dependencies, such as resumption or so-called indirect dependencies. Such indirect dependencies are also widely known as 'scope marking' constructions, which can be considered a more theory-neutral term, since it does not presuppose a particular kind of structural analysis. In a scope marking construction, the matrix interrogative CP contains a scope marker, typically the most unmarked wh-phrase in the language, whose only job it apparently is, is to extend the scope of a second wh-phrase in the embedded clause. This lower wh-phrase is considered to be the 'true' wh-phrase, i.e. the one that receives a constituent answer. A German example of this construction is shown in (5) below, the LD movement counterpart is shown in (6). As can be seen by the paraphrases, they receive the same interpretation:

(5) Was meinst du, wen Hans gesehen hat?
What think you who Hans seen has
'Who do you think Hans saw?'

(6) Wen meinst du, dass Hans gesehen hat?
Who think you, that Hans seen has
'Who do you think Hans saw?'

Scope marking constructions occur in a wide variety of languages, including German, Dutch, Frisian, Hungarian, Hindi, Russian, Polish and Hungarian (see Fanselow 2017). In what follows, I will focus on scope marking in German, since this appears to be one of the most-researched languages for this construction, and my own proposal builds on a proposal for German by Felser (2001).

Two main types of analyses have been proposed for scope marking constructions: the Direct Dependency Approach (DDA) and the Indirect Dependency Approach (IDA). The DDA takes

[3] Related to that, it has also been noted that children also frequently accept and produce COMP-trace violations (Thornton 1990; McDaniel et al. 1995).

the similarity in meaning between LD movement and scope marking very serious and assumes that scope-marking constructions are structurally identical to (successive-cyclic) LD questions. In particular, it is assumed that the scope marker and the lower wh-phrase stand in a direct relationship and are part of the same movement chain. This essentially reduces scope marking to a spell-out phenomenon. Several DDAs assume that the lower wh-phrase receives matrix scope at LF though mechanisms like coindexation, LF movement and absorption (Beck & Berman 2000; Brandner; 2000; D'Avis 2000; Höhle 2000; McDaniel 1989; Müller 1997; Pafel 2000; Stechow 2000), whereas in more recent (Minimalist) approaches, scope marking constructions have been analyzed as partial feature movement (Hiemstra 1986; Cheng 2000) or partial feature spell-out (Barbiers et al. 2008; 2010a; 2010b). The DDA faces several problems. Generally speaking, it remains a mystery why an LD movement chain would be spelled out this way: scope-marking constructions do not seem to be motivated by interface requirements (e.g. prosodic or interpretational reasons) and they are not computationally simpler than LD movement constructions. Furthermore, scope marking constructions and LD movement constructions have been claimed to differ in several respects (island sensitivity, matrix predicate restrictions and interpretational differences) which is hard to explain under the assumption that the constructions have virtually identical structural and semantic representations.

Such differences are all much easier to explain under the IDA where scope marking structures differ both structurally and semantically from LD movement constructions. The IDA was originally proposed by Dayal (1994; 1996; 2000), based on Hindi but extended to German as well. She proposed that the scope marker originates as the true object of the matrix verb. Having interrogative force of its own, it quantifies over propositions. The embedded clause, in turn, is analyzed as a true wh-question as well. Following standard semantics of wh-questions, questions can be translated into sets of propositions. Dayal argues that the set of propositions represented by the embedded clause functions as the restriction to the set of propositions that the highest wh-phrase quantifies over.

Felser (2001) points out that there are two problems with Dayal's IDA. Firstly, Dayal assumes the embedded clause is adjoined to the matrix clause rather than being a complement. However, Felser gives convincing arguments that in German, this is not the case: pronouns in the embedded clause can be bound by matrix clause arguments, and there's a fairly strict adjacency requirement between the matrix verb and the embedded clause. These facts strongly suggest that the embedded clause is a complement, not an adjunct. Secondly, under Dayal's analysis, the lower CP can also be a yes/no question. For Hindi, this is indeed possible, but the German scope marker does not combine with *yes/no* questions. To overcome these problems, while at the same time retaining the main ingredients of the IDA (base-generation of the matrix wh-phrase in matrix clause object position, indirectly linked to the embedded wh-phrase), Felser proposes the following: the scope marker and the embedded CP together for a complex predicate: the embedded clause predicates over the scope marker, which semantically functions as the subject of predication. The scope marker originates in the matrix VP, specifically in the specifier of VP, and functions as the theme of the matrix verb. The embedded clause is the complement of V, but no longer functions directly as the theme of the matrix verb (but only indirectly in the sense that is predicates over *was*). Since the relation between the scope marker and the embedded clause is now one of predication, the construction formally resembles a relative construction.

Barbiers et al. (2010a) have criticized Felser's analysis. Their issue with her analysis relates to a more general point of criticism to the IDA brought forward by Bayer (1996), namely that

the scope marker *was* can never occur in-situ, not even in a multiple question, where *was* is normally allowed. This is shown in the examples in (7) and (8).

(7) Wer hat was gedacht?
Who has what thought
'Who thought what?'

(8) *Wer hat was gedacht, wen wir anrufen sollten?
Who has what thought who we call should
Intended meaning: 'Who thought we should call who?'

Felser explains this restriction by stating that a wh-phrase that is being modified *in situ* cannot get an interrogative reading (but only an indefinite one). However, Barbiers et al. provide the following counterexample, in which in situ *was* is modified by secondary predicate and can have both an indefinite and an interrogative reading:

(9) Wer hat was roh gegessen?
Who has what raw ate?
Reading A: Who ate something raw?
Reading B: Who ate what raw?

While this shows that Felser's explanation as to why the scope marker cannot stay in situ does not hold, it does not necessarily invalidate the IDA as such.[4] Further argument against the IDA brought forward by Barbiers et al., who focus on scope marking constructions in Dutch, concerns the fact that there are dialects of Dutch where the embedded clause is introduced by a relative pronoun instead of a wh-pronoun:

(10) Wat denk je die ik gezien heb?
What think you REL.PRON I seen have
'Who do you think I saw'

Such variant are indeed difficult to explain under Dayal's approach where the embedded clause is analyzed as an interrogative, but they are not excluded under Felser's analysis in which the embedded clause is formally a relative clause.[5]

[4] The crucial example against the IDA (example 8) is really not as straightforward as it seems. Many German speakers allow multiple wh-questions in which the lower wh-phrase moves to the embedded SpecCP, its scope being extended by a matrix clause true wh-phrase (i.e. not a scope marker). See Fanselow & Ćavar (2001) and McDaniel (1989) on this matter. If a matrix clause wh-phrase is able to extend the scope of a lower, partially moved wh-phrase that way, there is obviously no need for a scope marker. Thus, I believe a more natural explanation for the unacceptability of (8) is the availability of a more economical competitor without a scope marker, i.e. *Wer hat gedacht, wen wir anfrufen sollten* lit.'Who thought who we should call?'*)*

[5] In fact, the question then is more why the embedded clause isn't generally introduced by a d-pronoun. According to Felser, the operator phrase in the embedded CP is spelled out as a w-pronoun because it undergoes concord with the interrogative scope marker. However, there is more logical explanation for the presence of a w-pronoun, since these occur as relative pronouns in German and Dutch when there is no lexical head that can provide the referential identification feature that relative pronouns need, as is the case in free relative clauses. In a scope marking construction, the head of the relative clause structure is the scope marker *was*, a highly underspecified wh-phrase in German which is likely only specified with an operator feature and nothing else. Since the reference of the relative pronoun cannot be picked up by agreement with the relative head, a w-pronoun instead of a d-pronoun is

The existence of a relative-clause type indirect dependency for forming an LD dependency has been proposed for other languages as well. Den Dikken (2009; 2018) applies Felser's analysis to partial wh-movement constructions in Hungarian. Furthermore, he extends the analysis to so-called wh-copy constructions as can be found in languages like German and Dutch. Making use of the idea that the lower and the higher wh-phrase undergo concord, it is actually a small step to adapt Felser's indirect dependency analysis to wh-copying (although she does not do so herself, in fact, for wh-copying, she assumes a direct dependency analysis, cf. Felser 2004). According to Den Dikken (2009), the difference between partial wh-movement and wh-copying is that in the latter case, there is not only concord for interrogative features, but also for the phi-features of the lower wh-phrase.

Koster (2009), contra Barbiers et al. (2008; 2010a; 2010b), proposes an indirect dependency analysis for scope marking constructions in Dutch. His analysis differs from Felser (2001) and Den Dikken (2009; 2018) in that he assumes that the matrix clause contains a concealed cleft, and that the matrix predicate + subject are parenthetical. Under his analysis, there is also no concord between the lower and higher wh-phrase. His analysis is illustrated for the so-called wh-copy construction in (11) below:

(11) [$_{CP}$ Wie is het [~~denk je~~] [$_{CP}$ wie je gezien hebt]]
Who is it think you who you seen have
'Who do you think I have seen'

Particularly relevant for the proposal in this article is an analysis of the *que/qui* alternation in French by Koopman & Sportiche (2014), since the *que/qui* alternation has often been analyzed on a par with the COMP-trace effect. The traditional analysis of this effect assumes that the special complementizer *qui* that is used for LD-questions is a special agreeing complementizer that licenses an embedded subject trace (i.e. it is assumed that the complementizer has undergone agreement with the embedded subject, by which it is spelled out as *qui* rather than *que*). However, Koopman & Sportiche argue that the special *qui* strategy does not involve LD movement proper at all, but that it is symptomatic of the existence of a relative clause-type indirect dependency. For a French subject question like (12) below, they propose the embedded clause is a pseudo-relative clause of which the highest *qui* is the head. The embedded *qui* is thus considered to be a relative pronoun, rather than an agreeing complementizer.

(12) [Qui tu crois [$_{PRSC}$ t_{qui} [qui dort]]
Who you think who sleeps
'Who do you think sleeps?'

Intriguingly, Koopman & Sportiche point to an observation by McCawley (1998) that in English, all cases of subject zero relative clauses (more commonly known as subject contact clauses) also involve pseudo-relatives. According to them [… the involvement of *that*-deletion in English *that*-t effect and the parallel involvement of special *qui* in French parallel cases is intriguing] (Koopman & Sportiche 2014: 93). In other words, what they are suggesting is that English LD subject questions may also involve a relativization strategy, i.e. an indirect

required. In short, the kind of relative pronouns that are expected to occur in scope marking constructions are those that are used in free relatives. This explains why d-pronouns also occasionally show up, since there is speaker variation in the use of d- vs. w-pronouns in free relatives in German and Dutch, with d-pronouns being the more archaic form (for the situation in Dutch dialects, see Barbiers et al. 2004, map 90b).

dependency. The analysis that I am proposing below for English LD subject questions takes up on this idea by given a formal analysis and by providing supporting empirical evidence for it.

A final type of IDA proposal that is relevant to the analysis that I will propose concerns Adger & Ramchand (2005). They propose that all wh-questions (including LD questions) in (Scottish) Gaelic are actually based on relative clauses. Evidence for this comes from the fact that wh-questions in Scottish Gaelic feature the relative complementizer *a*, instead of the interrogative complementizer *an* that is used for yes/no questions. This relativizing complementizer is also used in cleft structures. Adger & Ramchand then continue to propose that wh-questions in Gaelic are really concealed clefts, with the copula + pronoun cluster deleted. In this respect, their analysis is very similar to that of Dutch scope marking constructions by Koster (2009), but unlike Dutch, there is independent evidence that the copula + pronoun can indeed be deleted in Scottish Gaelic wh-questions. In Adger & Ramchand's proposal, all wh-questions, including local wh-questions, are derived from relative clauses. Their analysis is illustrated in (13) (their example (17):

(13) copula [*wh*-phrase] [relative clause]

Ø	dè am program	a	bha	thu	ag	èisdeachd	ris
	Which the program	c-rel	were	you	listening	yesterday	with

'Which program were you listening to yesterday?'

Adger & Ramchand assume that the wh-phrase is base generated as the focus of the (concealed) cleft, and that the embedded clause is predicating over it. The structure in (13) can be roughly semantically translated as 'Which program has the property that you were listening to it?'. There is no actual trace (or, in minimalist term, copy) in the lower position, but a phonologically silent pronominal (*pro*) that acts as a variable. Syntactically, this is formalized by assuming that the relative complementizer bears a predicate abstraction feature [Λ] and an identification feature [ID:DEP], that ensures the complementizer agrees with a matching pronominal (the lower *pro*, which has an unvalued [ID:] feature). In LD dependencies, lower C's also have to enter into this agree relation, which explains why intermediate complementizers in LD dependencies have to be the relativizing one (*a*) instead of the standard embedding complementizer *gun*.

(14)

Dè	*a*	thuirt	sibh	*a/*gun*	sgrìobh	i?
What	C-REL	say-PAST	you	C-REL/that	write-PAST	she

'What did you say that she wrote?'

This makes their analysis highly comparable to the other IDAs discussed in this section. Recently, Brandner & Bucheli Berger (2018) have adapted this analysis for cases of LD dependencies in Alemannic and other varieties of German.

Summarizing the discussion in this paragraph, the IDAs sketched above all share a number of striking similarities: the dependency between a wh-phrase and the position where it is interpreted is not derived via movement but through predication. The embedded CP therefore formally resembles a relative clause. Since these analyses have been independently proposed for typologically different languages, it strongly suggests we are dealing with a cross-linguistically productive strategy for forming an LD dependency. As I will argue, this strategy is also attested in English, in particular in case of LD subject extraction, where it functions as a work-around for LD subject extraction proper.

4. English LD subject questions as indirect dependencies

The analysis for English that will be proposed here makes use of the various ingredients of the IDAs discussed in the previous paragraph. The structural analysis for English is very similar to the analyses presented in the previous section, specifically those of Felser (2001), Den Dikken (2009; 2018) and Koopman & Sportiche (2014). The formal implementation is achieved by using Adger & Ramchand's (2005) analysis. I will therefore take some time to comment on their proposal in some more detail. Adger & Ramchand propose that A'-dependencies can be derived in two ways, namely via base generation or movement (or a combination thereof). They point out that under current minimalist assumptions, the syntactic operation Move is parasitic on Agree and both operations are subject to locality, making it difficult to distinguish between the two. An A'-dependency can either be the result of base generating an operator and a variable in different positions, after which they undergo Agree, or it can be the result of movement, which likewise results in an operator-variable dependency. The only diagnostic by which they can be told apart is that movement results in identity effects, whereas Agree gives rise to non-identity effects. The features that they make use of in their analysis are the following:

- A feature interpreted as predicate abstraction, [Λ].
- A feature interpreted as a variable, [ID]. This feature needs to be valued so that a referent can be identified. It can either be valued [ID:DEP], in which case identification takes place by being associated with a predicate abstraction operator, or it can be valued [ID:Φ], in which case identification takes place by an assignment function determined by the context (or binding theory), consistent with the Φ-features.

In their analysis, wh-dependencies result in a syntactic object of the form [Λ ….. ID] (either through movement or Agree), which the semantic interface interprets as lambda abstraction. Furthermore, they assume that features can occur more than once, but are interpreted only once (Interpret Once Under Agree, IOA for short).

Equipped with these tools, we can now turn to the analysis of LD subject dependencies in English. Adopting an IDA, I propose the embedded clause in an English subject LD dependency is formally a relative clause, which predicates over the scope marker (SM). The scope marker itself is merged as the object of the matrix VP, the embedded clause as its complement (i.e. they form a complex DP).[6]

(15) $[_{CP}\ [_{VP}\ V\ [_{DP}\ SM\ [_{CP}\ RelPr\ ....\ ]]]]$

It is well known that in English (contrary to German), relative clauses can be introduced by zero relative pronouns, although this option is not commonly used for subject relatives. I propose that this zero-relativization strategy is used in case of LD subject questions, and will explain in section 5 why this strategy is productively used in LD subject dependencies but not (necessarily) in local subject relatives.

[6] This analysis may seem at odds with the fact that the verbs that generally show up in subject LD dependencies are those that typically select propositional complements, not individual denoting ones. However, in the analysis proposed here, the scope marker has a purely syntactic function and has no referential properties of its own. Furthermore, as will become apparent later on, although the scope marker copies over the referential features of the lower wh-phrase, they are not interpreted in the scope marker's base position. This, I propose, makes a propositional reading of the SM + relative clause possible. See also Koopman & Sportiche (2014) who propose that this is also the case for *qui*-clauses in French LD subject dependencies.

Adger & Ramchand propose that relative pronouns (like *who*) in English are endowed with both an [ID:Φ] and a [Λ] feature. I assume that null relative pronouns do not featurally differ from their overt counterparts, with which they can often occur in free variation. Under these assumptions, the embedded clause of an LD question like *Who do you think saw Tom?* has the following representation, where the null relative pronoun is indicated by *pro*:

(16) … [$_{CP}$ *pro* saw Tom]
[Λ, ID:Φ]

Once the embedded (relative) clause is built, it merges with the scope marker. Scope markers are typically the most unmarked wh-phrases languages have at their disposal. It makes sense to assume that they are therefore featurally underspecified, only carrying an operator feature (a Λ-feature, in Adger & Ramchand's term). Because it is an operator, it needs to be associated with a variable, in this case the lower *pro*. Formally, this can be implemented by assuming the scope marker (SM) has an unvalued [ID:] feature, which results in the scope marker undergoing Agree with the relative pronoun in the embedded clause, copying its [ID:Φ] feature.

Agree

(17) SM [*pro* saw Tom]
[Λ, ID:Φ] [Λ, ID:Φ]

Once the matrix clause is built, the scope marker moves to the matrix SpecCP in order to obtain matrix scope. Movement, under minimalist assumptions, results in copying, so that we eventually end up with a representation as in (18):

Move Agree

(18) [$_{CP}$ SM do you [$_{VP}$ think SM [$_{CP}$ *pro* saw Tom]
[Λ, ID:Φ] [Λ, ID:Φ] [Λ, ID:Φ]

Under Adger & Ramchand's assumption that features in Agree relations are interpreted only once, the Λ-feature is interpreted at the top of the dependency and [ID:Φ] feature at the bottom. Note that although the Φ-features are interpreted at the bottom of the chain, they are spelled out at the top of the chain, i.e. on the scope marker. This follows under standard assumptions that copies are only spelled out only once. Thus, due to the agreement between the scope marker and the null relative pronoun, the scope marker may end up looking like a 'real' wh-phrase, i.e. *who*, but it is not *who* that merges in object position of the matrix verb. At the interfaces, the dependency in question will therefore have the following representation:

(19) [$_{CP}$ Who do you [$_{VP}$ think ~~SM~~ [$_{CP}$ *pro* saw Tom]
[Λ, ~~ID:Φ~~] [~~Λ, ID:Φ~~] [~~Λ,~~ ID:Φ]

In effect, the semantics of the construction will virtually be identical to an LD wh-question, since the result is an LD variable-operator chain. However, structurally, we are dealing with an indirect dependency. The LD chain is not established via LD movement, but via Agree. Since

the scope marker and the lower wh-phrase stand in Agree relation, non-identity effects are predicted to occur. As I will show in section 6.1, this indeed seems to be the case.

Before turning to this matter, section 5 will deal with a remaining question that needs to be answered, namely why subject contact clauses have such a limited distribution in present-day English for local subject relatives, but are still productively used in LD dependencies. I propose that this can be explained by looking at the diachrony of the constructions involved.

5. On the diachrony of COMP-trace and contact clauses

It is well-known that English did not always have a COMP-trace effect. At least in Old English, it appears to be absent (Allen 1980; Bergh & Seppänen 1994). According to Jackson (2006), the COMP-trace effect became active somewhere between 1100 and 1400. Bergh & Seppänen conducted a corpus study using the Helsinki Corpus of English texts and date the specific turning point to the first half of the 13th century. At that point, the need for an alternative strategy arose. I have proposed that this alternative strategy consisted of forming an indirect dependency, involving a type of relative-clause structure. Since the embedded CP in subject LD dependencies is typically zero (i.e. does not contain any overtly spelled out material), I suggested that the embedded clause is a type of contact relative clause. As I pointed out, however, the problem with this assumption is that subject contact clauses have a very limited distribution, not only in terms of the contexts in which they occur, but also in terms of speaker variation. Subject contact clauses have been reported to occur in specific varieties of English, including Appalachian English (Wolfram & Christian 1976), Ozark English (Elgin & Haden 1991), African American English (Green 2002), Newfoundland English (Clarke 2004), Hiberno English (Doherty 2000), Dorset English (Van den Eynden 1992) and Belfast English (Henry 1995).[7] However, subject LD dependencies without a complementizer occur in all varieties of English. From a synchronic point of view, this is a paradoxical situation. But in order to understand the synchronic situation, it is necessary to take the diachronic development into account. During the time the COMP-trace effect arose (first half of the 13th century), subject contact clauses were much more frequent than they are in present day English: in fact, they were more frequent for subject than for object relatives (Dekeyser 1986). There appeared to be quite some variation in their distribution across speakers, which according to Dekeyser is not only 'dialectally, but also stylistically and even idiolectally determined' (DeKeyser 1986:110). Dekeyser (1990) states that subject contact clauses mainly seem to occur in works of a colloquial nature, but are absent from (formal) Latinate registers. In other words: subject contact clauses were a wide-spread phenomenon of the English language at the time the COMP-trace effect emerged, not confined to specific dialects. It is plausible to assume a grammaticalization process in which LD subject dependencies were no longer formed by means of successive-cyclic LD movement, but by means of an indirect dependency along the lines I have sketched above, and that subject contact clauses served as the basis for this indirect dependency. This means that in their original relative clause use, subject contact clauses became decreasingly productive, whereas they remained to be used productively in LD subject dependencies.

In the dialects that still use subject contact clauses in their original relative clause use, they appear to be predominantly limited to focus constructions. Of interest in this respect is the specific parallel Van der Auwera (1987) draws between *that*-deletion in subject contact clauses and subject LD constructions. He argues that what they have in common is that they all involve

[7] Wolfram & Christian (1976) and Lambrecht (1988) suggest the construction is even more widespread and can also be attested in (educated) speakers of standard varieties of English. In that sense, it could be argued to be a feature of colloquial, spoken English in general.

cases of 'pragmatic focalization'. Prince (1981) likewise suggests that contact clauses are a strategy to keep strongly novel or informative material out of subject position. Recall in this context that information-structural accounts of the COMP-trace effect argue that the real problem with LD subject extraction concerns the fact that subjects (especially in English) typically function as topics. This idea has been worked out in detail by Bayer & Salzmann (2013), who argue that only constituents that can be focused (i.e. can be used contrastively) can undergo LD movement. Since subjects in English are typically topics and therefore non-contrastive/non-focused, it follows that they cannot be LD-moved. This could explain why subject contact clauses are used to form LD subject dependencies, if, as van der Auwera and Prince suggests, they are a way of focusing the subject.

In sum, what I have proposed in this section is that the diachronic account plausibly explains why contemporary speakers of English do not necessarily need to have subject contact clauses in their grammar as a productive relativization strategy in order to be able to use this construction to form LD subject dependencies. Furthermore, I have given arguments as to why subject contact clauses are specifically suited as a strategy to form an LD subject dependency.

6. Supporting evidence

Under the analysis proposed here, that subject LD dependencies are not created by means of LD movement, but by means of a relativization strategy, it is predicted that they demonstrate features that are in accordance with such a structural analysis but incompatible with a standard LD movement analysis. Firstly, in terms of Adger & Ramchand, we expect non-identity effects to occur, i.e. the matrix wh-phrase should be able to have features that are not identical to the properties of the embedded subject position. I contend that this is indeed the case, specifically that the matrix wh-phrase can carry case-features that are in apparent conflict with its syntactic function in the embedded clause. Secondly, I will point out that there are various sources of evidence suggesting that the embedded clause in a subject LD dependency is formally a relative clause. In doing so, I will be able to account for several puzzling phenomena surrounding the COMP-trace effect, namely the existence of anti-COMP trace effects and the variability of the effect.

6.1. Apparent case mismatches: 'Subject whom'

A peculiar phenomenon in English is that (putatively) LD extracted subjects sometimes show up in the objective form *whom*, rather than *who,* in other words, the matrix wh-phrase carries case features that do not match those of the alleged gap site. This is by no means a recent development: the OED gives the earliest example from the 11th century (Whom 2019). The occurrence of subject-*whom* has been discussed in a variety of works, both purely descriptive in nature as well as in formal works. Below is an example from the Corpus of Contemporary American English (COCA, Davies 2008)[8]:

(20) Whom do you think better understands the needs and problems of people like you?

Such uses of *whom* are often considered to be cases of hypercorrection (cf. Schepps 2010). If that is the case, a reasonable expectation would be that the frequency of hypercorrect *whom* is lower than the frequency of correct uses of *whom,* i.e. in cases where the wh-phrase

[8] The COCA contains more than 600 million words of contemporary American English from 1990-2019. It contains 20 million words for each year, equally divided over the genres spoken, fiction, popular magazines, newspapers, and academic texts.

unambiguously corresponds to an embedded object gap. Therefore, I investigated how often *whom* is used in LD-constructions with the matrix verb *think* and *say* + a pronominal subject in the COCA (excluding cases where *whom* is the complement of a preposition). For practical reasons, I focused on wh-questions and relatives. For wh-questions (Table 1), *whom* is quite rare and only attested with *think*, but for relatives (Table 2) it is rather frequent. For wh-questions as well as LD-relatives with *think*, there are no significant differences in the use of *whom* and *who* in subject vs. object extractions, which means that the (putative) wh-subject is overtly case marked for object case just as often as true objects. For LD-relatives with *say*, however, *whom* even occurs more frequently in subject than object relatives [X^2 (1, N = 600) = 15.39, $p < 0.001$].

	Subject	**Object**
Who	415	530
Whom	8	4

Table (1): LD Wh-questions with think

Verb	***think***		***say***	
Argument	**Subject**	**Object**	**Subject**	**Object**
Who	529	444	222	314
Whom	43	27	43	21

Table (2): LD-relatives with think and say

Concluding, *whom* is used just as often (and sometimes more often) for subjects as for objects in LD constructions. This makes it very unlikely that we are dealing with a form of hypercorrection. The results furthermore show that subject *whom* seems to occur more frequently in the context of relativization than wh-questions. The latter has also been noted by Huddleston & Pullum (2002).

Various explanations have been offered for the occurrence of subject-*whom*. Kayne (1980) proposes that the matrix verb assigns accusative case during an intermediate movement step in the embedded CP. There are two problems with this analysis: first, the embedded SpecCP is an A'-position, which is normally not a position in which case is assigned. Secondly, it raises the question what happens with the nominative case of the embedded clause (which is either not assigned, or overwritten). Kayne (2005) and Armstrong & Mackenzie (2012) alternatively propose that the construction in question is a special case of Exceptional Case Marking (ECM). However, this still does not explain what happens with the nominative case of the embedded clause: since the embedded clause is finite, it should assign nominative case. After all, this is the reason why ECM is only considered to occur with subjects of non-finite clauses. Furthermore, *think*, by far the most frequent verb in LD dependencies (cf. Dąbrowska 2008; Schippers 2012a) is not an ECM verb (at least not in the sense in which it is typically used in LD contexts, i.e. as a mental activity). I therefore conclude that these explanations are unsatisfactory.

Under the indirect dependency analysis proposed here, however, the facts follow naturally. Under this analysis, the highest wh-phrase in subject LD dependencies is syntactically a matrix clause object. Thus, it follows that it receives accusative case and can therefore be spelled out as *whom*. English is in this respect no different from other languages with indirect dependencies that are able to morphologically mark case on wh-pronouns. In Hungarian, scope-marking constructions also show up with accusative case-marking on the highest wh-phrase (cf. Horvath

1997) – this was one of the major motivations to analyze this construction as an indirect dependency. Interestingly, it has also been noted that in German, the highest wh-phrase in an LD subject question can unexpectedly show up in the accusative (Blatz 1896):

(21) Wen lesen wir, daß dem Moses erschienen ist?
Who.ACC read we that the.DAT Moses appeared is
'Who do we read appeared to Moses?'

Jack Hoeksema (p.c.) provides the following Dutch example from a 19th century translation of Dickens' 'Great Expectations':

(22) Wie-n hadt ge verwacht dat u bedanken zou, lieve?
Who-ACC have you expected that you thank would, love?
'Who did you expect to have thanked you, my love?`

Finally, Koopman & Sportiche (2014) claim that in LD subject relatives in certain southern dialects of Dutch, the highest relative pronoun surfaces as accusative *dat*, rather than nominative *die*. In sum, the English phenomenon illustrated in (20) does not stand on its own: it shares this with indirect dependencies in several other languages as well. As I have argued, such non-identity effects are exactly what is to be expected under an analysis in which the dependency between the empty position in the embedded clause and the wh-phrase in the matrix clause is created by means of Agree, rather than movement. In sum, the long-standing puzzle of subject *whom* in LD questions not only receives an explanation under the current analysis, but is actually predicted by it.

6.2 Anti *COMP*-trace effects

At the end of section 2, it was pointed out that English has three different situations in which there appears to be an 'anti' COMP-trace effect: with local subject relatives, with sentential adverbials, and finally, with respect to the speaker variability that apparently exists between (and within) speakers. All of these issues can be accounted for under the analysis proposed here.

Under standard analyses of the COMP-trace effect, such as the ECP, subject traces that are immediately preceded by a complementizer are always problematic, also when the subject has only been locally moved. However, there are good reasons to assume that local subject dependencies behave differently from non-local ones: crosslinguistically, they have quite opposite degrees of acceptability. This has recently been emphasized by McDaniel et al. (2015), who argue that gaps in embedded clauses show a mirror asymmetry with respect to the Accessibility Hierachy (Keenan & Comrie 1977): for within-clause movement, subject gaps are more accessible than object gaps, but for across-clause movement, the opposite holds. Furthermore, as McDaniel et al. point out, languages differ in the extent to which they permit gaps in embedded clauses at all: in other words, local gaps are more accessible than non-local gaps. Thus, Keenan & Comries accessibility hierarchy can be extended as in (23) below, which I will therefore call the 'Extended Accessibility Hierarchy'.

(23) Extended Accessibility Hierarchy:
a. Local gaps > non-local gaps
b. Accessibility for local gaps: subject > direct object > indirect object/oblique > genitive.

c. Accessibility for non-local gaps: object > subject

From this, it follows that local subject gaps are most accessible but non-local subject gaps least accessible. Interestingly, with respect to the relativization options for contact clauses, Dekeyser (1986) notes that they diachronically moved down the accessibility hierarchy (meaning they became increasingly specialized for *less* accessible gaps). If we now apply this to the extended accessibility hierarchy above, it follows that (in the standard language) they are no longer used for local subject relatives (except for the dialects in which they survived in very specific contexts, predominantly focus construction), but figure prominently in the formation of non-local subject dependencies.

The second problem I mentioned (the so-called adverb effect) has posed a problem for many previous analyses of the COMP-trace effect. Under the current analysis, however, this restriction can be explained, since this is a feature LD subject dependencies share with relative contact clauses. That is, subject contact clauses also do not allow adverbial phrases in between the head and the relative clause (examples below from Doherty 2000: 84):

(24) a. That's the girl *(who) just yesterday was talking about you.
b. John is the guy *(who) at the potluck got really drunk
c. It was Mary *(who) this morning got drunk

This is a striking correspondence between subject contact clauses and LD subject questions, which seems to have gone unnoted before.

Finally, it has been noted that there are speakers that apparently allow COMP-trace violations. Armstrong & Mackenzie (2012) cite several examples from the COCA, of which (25) is one example.

(25) What do we know that happened on November 24th, 1997, when the first report came in?

Sobin (1987), who carried out an acceptability judgment task, ties this to speakers of American English from the Midwest. However, an acceptability judgment task from Cowart (2003) showed that the phenomenon is much more variable than that. First of all, Cowart found no evidence that the phenomenon was mainly a feature of participants from the Midwest. Furthermore, Cowart retested the participants in a second experimental run a week or more after the first run. Out of 801 speakers, 190 speakers were classified as lacking a *that*-trace effect in one round of the experiment, but having it in the other.[9] Furthermore, the way a participant was classified in round one was a poor predictor of how s/he behaved on round two. The fact that some speakers appear to allow *that*-trace violations is problematic for virtually all previous analyses of the COMP-trace effect, but the fact that it is apparently even variable within a single

[9] In the experiment, there were four conditions: subject and object LD wh-questions with and without *that*. Speakers were classified as having or not having a *that*-trace effect according to the degree to which they had an idealized *that*-trace effect (which is a pattern in which LD subject questions with *that* were rated lower than the other three conditions, which in turn should pattern together). The patterns of the individual participants were correlated with this idealized model and if the correlation was $r \leq 0.4$, they were classified as not having a *that*-trace effect.

speaker is something no previous analysis is able to account for.[10] Under the analysis that I am proposing here, however, this can be accounted for. If the embedded clause is formally a relative clause, it should be possible to introduce it with relative pronouns/*that* in addition to the zero-relativization option. The only issue to be accounted for is why the zero-relativization option is the most frequent one. I propose that this option is simply less optimal, but not excluded. First of all, it is commonly assumed that relative clauses introduced by *that* or an overt relative pronoun are structurally more complex. Particularly, it has been proposed that they involve a less articulated CP domain than clauses introduced by *that* or a wh-pronoun. This is achieved by assuming the clause is either truncated or that the CP domain is unsplit. Here, I am following Douglas (2017) who proposes that contact clauses have an unsplit CP with a single C head that is occupied by a null complementizer, whereas clauses introduced by *that* or a wh-phrase have split the CP into a ForceP and a FinP. ForceP is occupied by either the complementizer or a relative pronoun. Applied to LD subject questions, this means that they have the following structure:

(25) a. [$_{CP}$ Who do you [$_{VP}$ think [~~SM~~ [$_{CP}$ *pro* [$_{TP}$ saw Tom]]]]]
b. [$_{CP}$ Who do you [$_{VP}$ think [~~SM~~ [$_{FORCEP}$ *pro* that [$_{FINP}$ [$_{TP}$ saw Tom]]]]]

A common assumption is that *that*-relatives, just like contact relatives, involve movement of a silent operator to turn the proposition into a predicate. Thus, when they are used to form LD subject dependencies, the analysis works pretty much the same as with a contact clause featuring a null operator, the only difference being that the CP has a more articulated structure with a ForceP that hosts *that* in its head position, and the silent operator in its Spec position. It is an option that is made available by the grammar, but since there is a simpler alternative available, it makes sense that this is the preferred and most frequent option and the one that became grammaticalized. However, the optionality disappears as soon as an adverb is adjoined to the embedded CP. Douglas (2017), following Rizzi (2001; 2004), proposes that sentential adverbs are situated in ModP, a projection in between FinP and ForceP. In other words, adverbial adjunction is symptomatic of a split CP, in which case it becomes obligatory that it is filled (with either *that* or a wh-pronoun). [11] This predicts that in addition to *that*, it should also be possible to introduce the embedded clause of a subject LD dependency with a wh-pronoun. There is indeed evidence that this is possible, too, as will be shown in the next section. The idea that relative clauses introduced by *that* or *wh* are structurally more complex and therefore less preferred fits in well with the extended accessibility hierarchy introduced above. Positions that are least accessible will prefer simpler relativization strategies, and as I have argued, contact clauses plausibly are the least complex relativization strategy. That explains their predominance in the least accessible position, namely embedded subject gaps. However, other relative clause types are not necessarily excluded by the grammar as such.

6.3 Intermediate wh-pronouns

It appears to be the case that LD subject dependencies sometimes also feature a wh-pronoun in

[10] With 'variable' I do not mean the standard variability in ratings that can be observed in judgement experiments (i.e. the fact that there will always be a certain degree of random variation in how items from the same condition are judged by the same participant). What is meant is that their relative patterns of mean judgments was significantly different between sessions.

[11] What seems to be excluded is filling ForceP with a null operator, in other words, with adverbial adjunction, the ForceP must always contain spelled out material.

the embedded CP. The following examples from the COCA are cited in Armstrong & Mackenzie (2012:52):

(26) Could you just talk to us about who you think who is to blame, sir?
(27) And then the other third who I think who are people -- they're here, as my wife and I are here, for a real spiritual purpose.
(28) They want to give taxes to people ø they say who need it […]
(29) […] and the one ø we believe who jumped from the roof was agent – was an agent.
(30) The -- the person ø the police believe who is the murderer walks scotfree.
(31) He did not play to that element of the party that I suppose who had been line [sic] with Pat Buchanan before he left.

Such cases have sometimes been explained as reflexes of successive-cyclic movement, where for one reason or the other, an intermediate copy has been spelled out.[12] However, such an analysis runs into various serious problems, as explained in Den Dikken (2009; 2018), Koster (2010) and Schippers (2012b). These authors do not specifically address copy constructions in English, but focus on German and Dutch, where these constructions are more commonly attested and have been analyzed as (partial) copy spell-out (cf. Barbiers et al. 2008; 2010a,b; Boef 2013; Felser 2004 and Hiemstra 1986). The major problems with a multiple copy spell-out analysis are that (a) the alleged copies can only be spelled out in SpecCP, not in other intermediate landing sites or in their base position, (b) spelling out multiple copies (as in 26 and 27) would create linearization problems, and (c) that complex wh-phrases cannot occur in medial positions (i.e. there is an apparent restriction against copying 'complex' wh-phrases, by which it must also be noted that it is unclear what counts as 'complex'). In fact, it appears to be the case that the only wh-phrases allowed in 'copy construction' in German and Dutch are those that are also allowed to occur in free relatives, which is in line with an indirect dependency analysis. More generally, the idea that successive-cyclic movement targets intermediate CPs has been criticized. In fact, many if not most of the arguments in favor of successive-cyclic movement through SpecCP are amenable to other explanations (see, e.g. Boeckx 2008b).

Under the current proposal, however, it follows that examples like (26) – (31) would be licensed. They basically receive the same analysis as the LD subject dependencies introduced by *that*: they are relative clauses with a split CP, which means they have a ForceP where instead of *that*, a relative pronoun is spelled out. The derivation of an LD question with a relative pronoun in the embedded clause is in (32) below:

(32) $[_{CP}$ Who do you $[_{VP}$ think $[$~~SM~~ $[_{FORCEP}$ who Force^{o} $[_{FINP}$ $[_{TP}$ saw Tom]]]]]

Summarizing, under the hypothesis that the embedded clause in an LD subject dependency is really formally a relative clause, it follows that it can be introduced by other relative clause introducers as well, i.e. *that* or a wh-pronoun. However, this results in a structurally more

[12] Alternatively, as an anonymous reviewer points out, the cases in (26-31) can be explained as production errors. An informal survey of the COCA shows that such examples indeed predominantly come from the spoken data of the corpus, but that in itself does not tell us whether we are dealing with errors, merely that the phenomenon appears to be predominantly a feature of spoken language. Armstrong & Mackenzie, who cite these examples and who are both native speakers of English, strongly oppose to the view that the examples in question are errors. The anonymous reviewer furthermore suggests that at least some of the examples could involve parenthetical insertion into a local A'-dependency, in which case they would not form positive evidence in favor of the indirect dependency analysis I have proposed.

complex construction and therefore a less optimal option. From a diachronic perspective, it could be argued that this option therefore was not a likely candidate to become grammaticalized, Importantly, however, they are not options ruled out by the grammar, and therefore do occasionally show up. In the following section, another situation in which LD questions introduced by *that* or a relative pronoun can be attested will be discussed, namely child language acquisition.

6.4 Language acquisition

In light of the previous two paragraphs, it is very interesting to note that it has been reported that children acquiring English produce LD subject questions in which the embedded clause is either introduced by *that* or a wh-pronoun, and furthermore, that there appears to be a correlation between these two phenomena (cf. Thornton 1990; McDaniel et al. 1995). Thornton elicited LD question in children and found that 9 out of 20 children frequently produced wh-copy construction and sometimes also partial wh-movement constructions. She also noted that these same children often appeared to violate the COMP-trace filter. McDaniel et al. pursued this issue further by carrying out a grammaticality judgment experiment with children. The experiment included wh-copy constructions as well as partial wh-movement constructions and COMP-trace violations. It turned out that all children accepting medial wh-phrases also accepted COMP-trace violations, but not the other way around. Interestingly, McDaniel et al. explain this by assuming that children treat the embedded CP structurally as a relative clause by proposing they lack Rizzi's 1990 [pred] feature that distinguishes a relative from a non-relative clause. Thornton (1990), on the other hand, explains the correlation by assuming the constructions involve spec-head complementizer agreement (see van Kampen 1997, 2010 for a similar analysis for Dutch medial wh-questions in child language. Van Kampen (2010) also draws a specific parallel between medial *wh* and relative clauses but analyzes medial wh-questions as direct dependencies). Under the analysis proposed in this paper, this peculiar parallel between LD dependencies and relative clauses follows straightforwardly, since the embedded clause is formally a type of relative clause.[13] Finally, note that the proposal presented here is also able to account for the fact that English children produce partial wh-movement constructions, too: these can be analyzed as the same kind of indirect dependencies, but without phi-feature agreement between the scope marker and the lower wh-phrase (i.e. they can be analyzed along the lines of Felser's German partial wh-movement questions).

7. Discussion

Under the current analysis of the COMP-trace effect, *that* deletion signals the presence of a contact relative clause, which in turn motivates an IDA for subject LD dependencies in English. At this point, we can return to the *why* question of the COMP-trace effect: why are subjects hard to extract? In principle, the analysis proposed here is compatible with virtually any explanation for the COMP-trace effect that has been offered. However, I have pointed out that the involvement of contact relative clauses is suggestive of the nature of the COMP-trace effect. First of all, there is the parallel originally drawn by Van der Auwera (1984) between subject

[13] In light of the claim put forward in the previous paragraphs that embedded clauses that are introduced by *that* or a wh-pronoun are structurally more complex, it may come as a surprise that this is an option that children use instead of the simpler option with a null operator. However, this only would be problematic if it is the case that children have the same representations as adults of the different types of relative clauses in question. For example, it is very plausible that they start out with either an unsplit CP or a split CP, but not both. In effect, zero-relative clauses would not be structurally more complex than relative clauses introduced by *that* or a relative pronoun.

contact clauses and the COMP-trace effect. Recall that he argues that they are both strategies to focalize a subject. This fits in well with information-structural accounts that reformulate the problem with LD subject extraction as a topic freezing effect. Secondly, there is the role that contact relative clause play in term of accessibility, i.e. the fact that they are used for less accessible gaps. Unfortunately, a lot of mystery surrounds the accessibility hierarchy itself, in other words, it is still being debated what it is exactly that makes certain gaps less accessible than others. McDaniel et al. propose one overarching principle that can explain the hierarchy for local as well as non-local gaps (which they dub the 'mirror asymmetry'), namely production considerations. These make opposite predictions for local vs. non-local gaps. With local gaps, from a production perspective, it is more optimal to have a displaced constituent close to the gap, which makes subject gaps more accessible than non-subject gaps. With non-local gaps, however, matters are different because they are located in a different clause. A clause is a planning unit on its own, and starting it with a gap is highly complicated in terms of sentence planning.

There are various advantages in viewing the COMP-trace effect in terms of accessibility along the lines of the proposal by McDaniel et al. First of all, it defines the COMP-trace effect (and the inextractibility of subjects more generally) in terms of markedness, rather than an absolute syntactic constraint. This is particularly welcoming in light of the fact that there are languages that do appear to allow LD subject extractions across complementizers. German and Dutch are notable examples of this. However, it is also clear that at least for German, the same kind of relative patterns of acceptability obtain as in English: subject LD questions are rated significantly worse than object LD questions. In Dutch, matters are more complex, as acceptability judgment tasks do not show clear subject/object asymmetries (Schippers 2007; Strik 2008). However, a production task by Jordens (1991) showed a strong preference for producing object LD questions instead of subject LD questions. Thus, it might be that the asymmetry is more subtle here, and only reflected in production experiments (and possibly also more sensitive online processing measures). The fact that COMP-trace violations in German and Dutch are not necessarily fatal, but still dispreferred, is difficult to explain under syntactic accounts of the COMP-trace effect. However, if LD subject extraction across a complementizer is simply the most marked construction to produce in terms of accessibility, it follows that languages will tend to avoid it, but not necessarily exclude it.

Another advantage of McDaniel et al.'s proposal is that it does not tie the problem with subject extraction to the notion of 'subject' specifically. It predicts that any gap at the beginning of a clause is problematic. There is indeed evidence that this is the case. First of all, postverbal subjects do not show a COMP-trace effects. Secondly, there is evidence that any constituent that leaves a trace at the beginning of a clause creates a COMP-trace effect. In English, locative inversion also incurs a COMP-trace effect (Bresnan 1977). And for German, Bayer & Salzmann (2013) argue that any trace that is in a (high) topic position can incur a COMP-trace effect.[14]

The idea that the COMP-trace effect is really a matter of accessibility, and that English uses scope marking for the least accessible position (clause-initial gaps) also fits in well with what is crosslinguistically observed. Scope marking constructions like partial wh-movement are only used for non-local gaps. Some languages use them for all non-local gaps (e.g. German, Hungarian), whereas others use them for the least accessible non-local gaps. Examples of the latter languages would be English, but also French, if one adopts Koopman & Sportiche's

[14] Possibly, this could explain why Verb Projection Raising (VPR) shows an adverb effect, suggesting it should be treated on a par with COMP-trace effect (Salzmann et al. 2013). A common analysis of this phenomenon is that it involves rightward movement, which results in a clause-initial gap.

indirect dependency analysis for the que/qui alternation.[15] In sum, languages simply differ in where they make the cut-off point on the extended accessibility hierarchy.

8. Conclusion

In this paper, I have argued for a re-evaluation of the COMP-trace effect in English. The specific proposal is that LD subject dependencies in English are not formed by means of LD movement, but by a type of indirect dependency. The strategy in question involves base-generation of a scope marker in the matrix clause object position. The embedded clause is formally a relative clause that predicates over this scope marker. Indirect dependencies are used in many other languages as well, including some of English's closest neighbors, and they are used for gaps that are particularly difficult in terms of accessibility, namely non-local gaps. Of all non-local gaps, subject gaps are the most problematic. While it is still under current debate, the problem with embedded subject gaps could likely be reduced to their clause-initial position and not to the notion of 'subject' directly.

Acknowledgments

This research was made possible by a personal research grant of the Deutsche Forschungsgemeinschaft (DFG). Many people have contributed to the ideas presented in this paper in one way or the other. I therefore apologize beforehand if I forget to mention people. I would like to specifically thank (in alphabetical order): Ellen Brandner, Jack Hoeksema, Hilda Koopman, Dana McDaniel, Luigi Rizzi and Dominique Sportiche, the participants of the Séminaire de Recherche en Linguistique at the University of Geneva, the audiences of the Workshop on long-distance dependencies (4-5 Oct. 2018, Berlin), and the workshop Recent Issues in the Syntax of Questions (8-10 Oct. 2018, Konstanz), as well as two anonymous *Syntax* reviewers.

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[15] Norwegian could possibly also be added to this list. In this language, subject LD dependencies, but not non-subject LD dependencies are introduced by the relative clause particle *som*. Brandner & Bucheli-Berger (2018) suggest that this signals the presence of an indirect dependency. In the Allemanic data that Brandner & Bucheli-Berger present, subject/non subject asymmetries are also present: with subject LD questions, speakers more frequently accept embedded clauses introduced by the relative particle *wo* than the complementizer *dass*, whereas this is not the case for non-subject LD dependencies.

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