Extraction from subjects:

Differences in acceptability depend on the discourse function of the construction

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Highlights

This paper compares three kinds of theories for why long-distance dependencies from parts of syntactic subjects can sometimes be unacceptable, across two constructions: wh-questions and relative clauses.

We report five acceptability-rating experiments: three using English materials, and two using French materials.

The results support a discourse-based explanation. We propose a general constraint – the Focus-background conflict constraint – which is proposed to be independent of long-distance dependencies and easy to learn, and which predicts gradient acceptability.

Abstract

In order to explain the unacceptability of certain long-distance dependencies -- termed syntactic *islands* by Ross (1967) -- syntacticians proposed constraints on long-distance dependencies which are universal and purely syntactic and thus not dependent on the meaning of the construction (Chomsky 1977, 2006 a.o.). This predicts that these constraints should hold across constructions and languages. In this paper, we investigate the "subject island" constraint across constructions in English and French, a constraint that blocks extraction out of subjects. In particular, we compare extraction out of nominal subjects with extraction out of nominal objects, in relative clauses and wh-questions, using similar materials across constructions and languages. Contrary to the syntactic accounts, we find that unacceptable extractions from subjects involve (a) extraction in wh-questions (in both languages); or (b) preposition stranding (in English). But the extraction of a whole prepositional phrase from subjects in a relative clause, in both languages, is as good or better than a similar extraction from objects. Following Erteschik-Shir (1973) and Kuno (1987) among others, we propose a theory that takes into account the **discourse status of the extracted element** in the construction at hand: the extracted element is a *focus* (corresponding to new information) in wh-questions, but not in relative clauses. The focus status conflicts with the non-focal status of a subject (usually *given* or discourse-old). These results suggest that most previous discussions of islands may rely on the wrong premise that all extraction types behave alike. Once different extraction types are recognized as different constructions (Croft, 2001; Ginzburg & Sag, 2000; Goldberg, 2006; Sag, 2010), with their own discourse functions, one can explain different extraction patterns depending on the construction.

1. Introduction

A wide range of constructions across many languages – such as wh-questions, relative clauses, topicalization – position a constituent at the front of a clause ("who" in 1b) rather than in its canonical postverbal position ("Bill" in 1a). We use "__" to notate the canonical position of the constituent. This corresponds to what movement-based theories call a gap (Ross, 1967; Chomsky, 1977) but we use it mainly for ease of exposition (see Sag, 2010 for a gapless analysis). The fronted ("extracted") constituent and its canonical position may span across clause boundaries as in (1c).

(1)
a. Mary saw Bill.
b. Who did Mary see __?
c. Who did Jim think that Mary saw __?

However, not all such non local dependencies are acceptable. The constraints on non-local dependencies, referred to as *island constraints,* have been at the center of much debate on the nature of language since the 1960s (Ross, 1967). In this paper, we will focus on the so-called *subject island* constraint as in the wh-question in (2), where extraction from the subject is worse in (2a) than extraction from the object in (2b). The same constraint has also been claimed to be present in relative clauses (Chomsky, 1986, among others) as in (2c).

(2)
a. *Who did [stories about __] terrify John? (Chomsky, 1973, 92b)
b. Who did you hear [stories about __]? (Chomsky, 1973, 86b)
c. *a man who [pictures of __] are on the table (Chomsky, 1986: 31, 61)

The penalty for constructions like (2a) and (2c) has been explained by a general ban on extracting out of a subject: Fronting *who* in (2a) should be impossible because it is the complement of the subject, whereas fronting it is possible in (2b), because it is the complement of the object. The same constraint is supposed to hold in (2c): fronting the relative pronoun *who* is not possible because it is a complement of the subject.

The *Subject island constraint* appears in many syntax textbooks (e.g. Adger, 2002, Uriagereka 2012), even though its empirical as well as theoretical status is far from clear. For English, Ross (1967), who was the first to propose locality constraints, did not suggest that nominal subjects were islands: (3a) involves extraction out of a nominal subject and was not considered as degraded compared to (3b), which shows extraction out of a nominal complement. In a footnote, however, he added that there is a difficulty with preposition stranding (3c), a point which will become important throughout this paper.

(3)
a. Of which cars were [the hoods __] damaged by the explosion?
b. Of which cars did the explosion damage [the hoods __]?
c. *Which cars were [the hoods of __] damaged by the explosion ? (Ross 1967, fn 31)

Following Ross, Chomsky (1973, 1986), focusing on examples with preposition stranding (2), argues that the constraint applies to subjects in general. Comparing extraction out of objects (4a) and subjects (4b), Chomsky (2008) suggests that the acceptability of (3a) comes from the

fact that it is a passive construction, hence not a *true* subject. Contrasting active (4b) and passive (4c), he claimed that only *base* subjects are islands for extraction: subjects of passives (4c) are derived from an object position and can be extracted from:[1]

(4)
a. Of which car did [they find the (driver, picture) __]? (Chomsky 2008, 147)
b. *Of which car did [the (driver, picture) __] cause a scandal? (Chomsky 2008, 147)
c. Of which car was [the (driver, picture) __] awarded a prize ? (Chomsky 2008, 147)

According to the tradition initiated in Chomsky (1973, 1977), the unacceptability of these extraction phenomena are to be explained as general syntactic constraints on a generative system, blocking potential long-distance dependencies. For example, according to the *Subjacency* constraint, long-distance dependencies are disallowed between two positions when there are two or more intervening S or NP syntactic nodes (Chomsky, 1977), or, according to the *Constraint on extraction domain*, one can only extract out of a complement, not out of a subject or an adjunct (Huang, 1982). The motivation for analyzing these phenomena as constraints on syntactic configurations is that the constraints appear to generalize across constructions and hence meanings — such as wh-questions, relative clauses, topicalizations (see Schütze et al., 2015, for a summary of some arguments for this approach). When framed as constraints on extraction, independent of meaning, a classic learnability puzzle results (e.g., Chomsky, 1973; Phillips, 2013): how could a child learn the configurational constraints against examples like (2a) and (2c), but only with exposure to examples of acceptable materials? Hence, many syntacticians assume that they reflect innate, universal constraints on structure building (see Ambridge et al., 2014, for a critical view).

This universalist syntactic view has however been challenged from two perspectives, which have typically been labeled "processing" and "discourse-functionalist" perspectives. First, from the processing perspective, experimental studies starting with Kluender (1991) have argued that sentences with islands may exhibit gradient acceptability and individual variation just like non-island sentences. Under this view, the constraints amount to accumulating cognitive cost associated with processing complex but otherwise grammatical sentences (Kluender & Kutas, 1993; Hofmeister & Sag, 2010; but see Sprouse et al., 2012). This kind of approach attempts to explain why there are counter-examples like (3a), (4c) or (5) (Kluender, 2004; Kravtchenko et al., 2009; Chaves, 2013; Chaves & Dery, 2019).[2]

(5)
a. What were [pictures of __] seen around the globe? (Kluender, 1998, 268)
b. Which problem will [a solution to __] never be found ? (Chaves, 2013, 301)

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[1] Chomsky (2008, 160, fn. 39) acknowledges that this is not sufficient since non agentive subjects are also easier to extract from: *Of which books did the authors __ receive the prize?* Furthermore, Chomsky's proposal that derived subjects would make extraction easier is incompatible with current minimalist analyses that all subjects are derived from a VP internal position (Koopman & Sportiche, 1991), and not just subjects of passive verbs. Finally, it would not explain why (3c) is bad.

[2] Chaves (2013) considers a processing difficulty according to which Subject Island effects are due to probabilistic knowledge about the distribution of gaps: if the correct location of a gap is syntactically, semantically, or pragmatically highly unlikely in that particular utterance, then it is less likely for the sentence to be acceptable (van Schijndel et al., 2014). Because subjects tend to be topics, they are more likely to be pronominal, or simple NPs, and subject-embedded (new) referents are rarer than object-embedded referents. Thus interpreting an extracted element as a complement of the subject is unexpected. According to such an approach, extraction out of subject is not ungrammatical but disfavored.

One of the cognitive / processing factors that many researchers appeal to is a cognitive distance-based constraint, such that longer distance connections between head and dependent are harder to construct, possibly because of a retrieval difficulty at the later end of the connection (e.g., Gibson, 1998, 2000; Lewis & Vasishth, 2005). Such a constraint can explain the relative ease of processing extractions of subjects as in (6a) and (6c) as compared with extractions of objects as in (6b) and (6d) (e.g., Kluender & Kutas, 1993; Fiebach et al., 2001; Paape et al., 2018): the distance between the extracted element and the gap (or between the verb *attack* and its arguments) is shorter for subjects.[3]

(6)
a. The reporter [who __ attacked the senator] admitted the error.
b. The reporter [who the senator attacked __] admitted the error.
c. Who __ attacked the senator?
d. Who did the senator attack __?

However, the difficulty of extraction out of subjects (e.g., 2a,c) is surprising under the distance-based processing perspective. Rather, a locality bias would predict extraction out of subjects to be uniformly easier than extraction out of objects since the distance between the filler (*who, which*) and its complement is shorter in the extraction from the subject than in the extraction from the object (2b), contrary to observation for these cases.

Second, from the functionalist / discourse perspective, some researchers (e.g., Erteschik-Shir, 1973; Kuno, 1987) have argued that semantic and discourse factors can explain the unacceptability of extraction from 'islands' in terms of their felicity in context: island extractions are generally discourse meanings that are not appropriate in most contexts. In these approaches, extraction is not only a syntactic operation: it also affects the discourse status of the extracted element and makes it more salient, where salient means prominent in the discourse. Erteschik-Shir (1973), Takami (1992), Van Valin (1995) and Goldberg (2006) for example assume that subjects may fall into a more general category of *background* constituents, together with adjuncts, and that extraction is only possible for elements which belong to the foreground, or the *potential focus domain*, since it would be pragmatically anomalous to treat an element as backgrounded and discourse prominent at the same time, hence a discourse clash. Goldberg (2006) proposes the constraint in (7):[4]

(7) Backgrounded Constructions are Islands:
Backgrounded constituents may not serve as gaps in filler-gap constructions.
(Goldberg, 2006, 135)

The reduced acceptability of (2a) relative to (2b) would then be a consequence of discourse infelicity because subjects contain by default old or given information, contrary to objects. Such discourse-based approaches predict a subject penalty and can be combined with cognitive (Deane, 1991) or parsing difficulties (Chaves, 2013; Chaves & Dery, 2019; see footnote 2).

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[3] The same argument holds for "linear" distance (the number of intervening words or referential entities) as for "structural" distance (the number of intervening nodes with interfering features between the extracted element and the gap in the syntactic tree; Rizzi, 1990; O'Grady, 1997; Hawkins, 2004).

[4] In order to account for the extraction of the subject as a whole (6c), Goldberg (2006, 2013) considers that extraction is possible for the primary topic and the elements of the potential focus domain: for her, the subject itself is the primary topic and is not backgrounded; only parts of the subjects are backgrounded (see Section 4 for a discussion).

Although we think that discourse-based approaches are on the right track, it is worth noting that the BCI constraint in (7) does not explicitly appeal to discourse infelicity in order to explain island effects. Furthermore, it is surprising that it applies to all extraction constructions alike. Crucially, the questioned element is a focus in wh-questions (Jackendoff, 1972), which is seeking new information. This is not necessarily the case in other constructions such as relative clauses, which add a property to a given entity (Kuno, 1976, 420). In order to test an explicit theory of discourse clash, we propose a new discourse constraint that takes into account the discourse function of the construction:

(8) Focus-background conflict (FBC) constraint:[5]
A focused element should not be part of a backgrounded constituent.

Under this hypothesis, only if a construction puts the extracted element into focus, and if this element belongs to a backgrounded constituent, a discourse clash will occur. This constraint (which we will develop more in the General Discussion) predicts a penalty for extraction out of subjects in the context of wh-questions but not for constructions like relative clauses for instance. Another difference with the syntactic approach is that when the FBC constraint predicts a penalty, the sentence is not ungrammatical (ruled out by the syntax) but simply disfavored as infelicitous (semantically or pragmatically inappropriate in context). This kind of approach also has a natural avenue in handling counterexamples like (5): in (5b), the subject *a solution* is new, not old or backgrounded, contrary to the subject *the driver* in (4b) for instance (see the General discussion for more details).

In order to assess the relative merits of the three competing theories – (1) universalist syntactic approaches; (2) distance-based processing approaches ; and (3) our revised discourse-based approach – two questions are of relevance:
- Do the assumed constraints apply similarly across different constructions within a language?
- Do they apply similarly across languages?

Cross-construction generalization would be an argument against our discourse-based approach (Schütze et al., 2015): if the same constraint holds for constructions as pragmatically different as relative clauses, wh-questions and topicalization, it is doubtful that they result from the discourse function of such constructions. To the best of our knowledge, cross-construction variation has not been investigated empirically, except by Sprouse et al. (2016) who found a difference between wh-questions and relative clauses for extraction out of subject in Italian (see Section 3.1 below).

Similar patterns across languages, on the other hand, are expected under all three types of accounts. Thus, cross-linguistic variation would be a challenge to all of them, unless different language specific properties can be shown to interact in order to explain the observed phenomena. Cross-linguistic variation has indeed been reported for different types of languages, such as Scandinavian (Engdahl, 1982) or Romance languages (9a, Rizzi, 1982), that have been claimed to allow some extractions more easily than English. These differences have sometimes been explained by specific parameters of the languages (such as the *pro drop* parameter by Rizzi (1982) and Stepanov (2007), allowing for subjects to be null or

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[5]   The reverse of this constraint clearly does not hold: A backgrounded/unfocused element can be part of a focused element. For example, a backgrounded element, such as a relative clause can be part of a complement, which is by default part of the focal domain.

postverbal). French is interesting in comparison to English because it is a Romance language like Italian for which extraction out of subjects in RCs has been argued to be possible (9b, Godard, 1988) but closer to English because of the lack of the null-subject / pro-drop option.

(9)
a. Questo autore, di cui so che [il primo libro __] è stato pubblicato recentemente…
   this author of who know.1.SG that the first book has been published recently
('this author, of whom I know that the first book has been published recently') (Rizzi, 1982, 61)
b. C'est un philosophe dont [un portrait __] se trouve au Louvre. (Godard, 1988, 47)
   it is a philosopher of.which a portrait REFL finds in.Le Louvre
('this is a philosopher of whom a portrait is in Le Louvre ')

In any case, there have been few attempts to examine the same structures experimentally across languages using comparable materials and paradigms. Thus it is not clear yet what differences are actually present once these parameters are fully controlled.

In this paper, we address the cross-construction and crosslinguistic variation of the subject island constraint. In a series of controlled experiments, we compare extraction out of nominal subjects with extraction out of nominal objects, in relative clauses (Section 2.2 and 2.3) and wh-questions (Section 2.4), using similar materials across constructions. We also compare the English results to French (Sections 3.2 and 3.3), with parallel materials across languages.

The subject island constraint is interesting because the three theories discussed in this introduction make different predictions. A universalist syntactic theory predicts a general subject penalty across languages and across constructions. A processing based theory (minimizing dependency length) predicts a general subject advantage across languages and across constructions. The FBC constraint (8) predicts a subject penalty for wh-questions, but not for relative clauses, across languages. In the rest of this paper, we will show that there is no general penalty for extraction out of subjects, neither in English nor in French, contrary to expectations of a general subject island constraint. Extraction out of nominal subjects is unacceptable under two conditions:

(i) For PP extraction in wh-questions (Experiments 3 and 5) but not in relative clauses (Experiments 1, 2 and 4), across languages. We will return to the meaning of each construction in the General Discussion.

(ii) For NP extraction with preposition stranding in English (Experiments 2 and 3). While this factor is not central to this paper, we discuss it in section 2.3.

Because the discussion on the subject island in the literature mainly revolves around English data, we will first present empirical data on extraction out of the subject NP in English (Section 2) before turning to a crosslinguistic discussion and present experimental data from other languages, especially in our case from French (Section 3).

The experimental materials and the statistics are available in OSF **https://osf.io/mtngd/**

2 Extracting out of English NP subjects

2.1 Previous experiments evaluating the acceptability of extraction from subject NPs in English

Apart from Jurka (2010), previous experiments that have tested extraction out of nominal subjects have mostly tested extraction of NPs with preposition stranding. This is somewhat at odds with previous research, because the best examples from the literature do not involve preposition stranding, as in (3a,4c). To the best of our knowledge, Jurka (2010) was the first to compare PP and NP extraction experimentally. In an acceptability judgement task, he found no significant difference between subject (10a) and object (10b) with PP extraction (which is sometimes called *pied piping* in the linguistics literature); and a subject penalty only with NP extraction (preposition stranding) (10c,d):

(10)
a. Phil wondered [about which topic] [a documentary __] had swayed the voters last year.
b. Phil wondered [about which topic] Scott had filmed [a documentary __] last year.
c. Phil wondered [which politician] [a documentary about __] had swayed the voters last year.
d. Phil wondered [which topic] Scott had filmed [a documentary about __] last year.
e. A documentary had swayed the voters last year [about this important topic].
f. Scott filmed a documentary last year [about this important topic].

However, Jurka acknowledges that it is unclear whether the "about" PP is a complement of the subject in (10a) or whether it modifies the verb phrase, as in (10e). The same applies to the "about" PP in (10b): it may connect to "documentary" (as intended) or to the verb phrase as in (10f).[6] So PP-extraction out of the subject has not been tested appropriately.

In order to test Chomsky (2008)'s proposal about 'derived' subjects, Polinsky et al. (2013) ran an experiment on embedded questions with preposition stranding with different verbs. They found that subjects of unaccusatives (11a) were easier to extract from than subjects of unergatives (11b) or accusative verbs (11c). However, these results are not easy to interpret because extractions out of subjects in Polinsky et al.'s experiments are not compared to extractions from other sites, so that we do not know whether they are easier or harder than extractions from objects. In addition, the experiment did not include "easy" grammatical or "difficult" or even ungrammatical controls, so that it is difficult to compare the results to acceptable or unacceptable baselines.

(11)
a. Janet wonders what [the conference on __] lasted for a week.
b. Janet wonders what [the conference on __] succeeded for a week.
c. Janet wonders what [the conference on __] ignored the proposals for a week.

Sprouse et al. (2016) evaluated the acceptability of extractions from NP subjects in embedded contexts in English, both in relative clauses (12 a-d) and wh-questions (12e-f). They found that extractions of subjects were rated higher than extractions of objects ("no island" condition; 12a vs. b, 12e vs. f), but that extractions out of subjects were rated lower than

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6   Also the plausibility of the extractions from subject and object position is not controlled: filming a documentary about a topic (the object condition) is probably more plausible than a documentary about some topic swaying voters (the subject condition).

extractions out of objects ("island" condition; 12c vs. d, 12g vs. h), although the difference was only marginally significant for wh-questions.

(12)
Relative clauses (Sprouse et al., 2016)
a. object, no island: I voted for the congressman who you think the lobbyist offended __.
b. subject, no island: I voted for the congressman who you think __ offended the lobbyist.
c. object, island: I voted for the congressman who you think the gift from the lobbyist prompted [the rumor about __]. ⌞SEP⌟
d. subject, island: I voted for the congressman who you think [the gift from __] prompted the rumor about bribery.

Wh-questions
e. object, no island: What do you think the gift prompted __? ⌞SEP⌟
f. subject, no island: What do you think __ prompted the rumor? ⌞SEP⌟
g. object, island: Who do you think the gift from the lobbyist prompted [the rumor about __]?
h. subject, island: Who do you think [the gift from __] prompted the rumor about the senator?

These results are suggestive of a subject island penalty, but the materials in these experiments all involve preposition stranding. Moreover, there are a few possible confounding factors across conditions and constructions: (a) different prepositions in subject and object conditions: *about, from*; (b) different nouns in subject and object conditions (e.g., object noun *gift* and event noun *rumor*); (c) differences in animacy (*what, who*) between no island/island conditions for wh-questions; (d) different nouns and verbs in RCs and wh-questions.

Chaves & Dery (2019) tested wh-questions like (13a,b), again with preposition stranding, with inanimate subjects and objects and symmetrical verbs, so that the sentence describes the same situation in subject and object condition. Using an acceptability task, they found that the subject condition was judged much better than ungrammatical controls, and ameliorated during the course of the experiment becoming as acceptable as the object condition by the end of the experiment.

(13)
a. Which committee does [the report of __] supposedly contradict the recommendations of the experts? (*subject condition*)
b. Which committee does the report of the experts supposedly contradict [the recommendations of __] ? (*object condition)*

Overall, we can see that examples of acceptable extraction out of subjects, mostly including PP-extraction, have been discussed in the literature (e.g. by Ross, 1967, and Chomsky, 2008, see Section 1) but these examples have not been properly tested experimentally. Acceptable examples can be found in corpora as in (14) (a,b from Santorini, 2007; Huddleston & Pullum, 2002; Chaves and Dery, 2019) and those seem to be mostly examples with PP-extraction in relative clauses.

(14)
a. . . . a letter, of which [every line __] was an insult (Jane Austen. 1981. *The complete novels.* New York: Gramercy. 84.)
b. that voluminous publication, of which [either the matter or manner __] would not disgust a young person of taste (Jane Austen. 1981. *The complete novels.* New York: Gramercy. 828.)

c. (...) Franzenia has 44 staff working with children, [of whom] [sixteen __] are kindergarten teachers. (*The Guardian*, 20 sept 2016) (Chaves & Dery, 2019, 481)
d. A coalition of US groups including USA Today surveyed 850 women in the film industry of whom [the vast majority __] reported some form of sexual misconduct (*The Guardian*, 21, February, 2018)
e. Doctors diagnosed a rare brain disease for which [the cure __] was radical: the left hemisphere of his brain would have to be surgically removed. (*www.thirteen.org*)

One important factor seems to be that extracting the whole PP complement of a noun is not the same as extracting the NP complement of a preposition. In the following, Experiment 1 will test PP extraction out of subjects and objects in English relative clauses, Experiment 2 will compare extraction of an NP complement of a preposition and PP extraction out of subjects and objects in English relative clauses, and Experiment 3 will test NP and PP extraction out of subjects and objects for English wh-questions. In section 3, we will compare English with French, which only admits PP extraction and not preposition stranding.

2.2 Experiment 1: English Relative clauses: Extracting a PP complement out of an NP subject

Experiment 1 was designed to test the acceptability of extraction of a PP complement out of an English NP subject.

Design and materials

In English, the relativization of the PP complement of a noun comes in two varieties: the relative PP (prep+ *which*) may remain inside the full extracted NP, as in (15a) or be extracted on its own, as in (15b).

(15)
a. This is the sportscar [the color of which] I [love __].
b. This is the sportscar [of which] I love [the color __].

In this experiment, we compare extraction out of the NP (or "PP-extracted"), as in (16a,e), and extraction of the whole NP (or "NP+PP-extraction") as in (16b,f). Independently of the subject-object asymmetry, a complement of a verb has traditionally been thought to be easier to extract than the complement of a noun: syntactic approaches attribute this to a "Complex NP constraint" (Ross 1967), making it difficult to extract part of an NP (Sprouse et al., 2016). For discourse approaches (Erteschik-Shir, 1973, Deane, 1991), this comes from the fact that a dependent of a verb, or of the main clause predicate, is more salient than a dependent of a noun. Thus, (16b) is expected to be more acceptable than (16a) but also (16f) than (16e).

We started with a 2x2 design, crossing grammatical function (subject, object) with extraction-type (NP+PP-extracted, PP-extracted). We included two additional controls to the factor extraction-type, each of which was to be compared to the PP-extracted versions: a coordinated variant, with no extraction (16c, g) as a grammatical control, and an extracted variant with the word *of* missing (16d,h), resulting in an ungrammatical control.[7] There were thus three 2x2

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[7] Note that the ungrammatical controls here, with a single missing function word, consist of a conservative ungrammatical baseline, because they are so close to a grammatical variant. See e.g., Gibson et al. (2013) where it is shown that materials with only a single missing function word are often interpreted as having the function word, consistent with language processing over a noisy-channel. Thus the ungrammatical control

designs underlying our statistical analyses: (i) (subject, object) x (NP+PP-extracted, PP-extracted); (ii) (subject, object) x (coordinated, PP-extracted); and (iii) (subject, object) x (ungrammatical, PP-extracted). In total, this resulted in two grammatical function conditions (subject, object) and four versions of each of these.[8] See Appendix A for the full set of materials.

(16)
a. subject, PP-extracted
The dealer sold a sportscar, of which the color __ delighted the baseball player because of its surprising luminance.
b. subject, NP+PP-extraction
The dealer sold a sportscar, [the color of which] delighted the baseball player because of its surprising luminance.
c. subject, no extraction: coordination
The dealer sold a sportscar, and the color of the sportscar delighted the baseball player because of its surprising luminance.
d. subject, ungrammatical: missing "of"
The dealer sold a sportscar, which the color __ delighted the baseball player because of its surprising luminance.
e. object, PP-extracted
The dealer sold a sportscar, of which the baseball player loved the color __ because of its surprising luminance.
f. object, NP+PP-extraction
The dealer sold a sportscar, [the color of which] the baseball player loved because of its surprising luminance.
g. object, no extraction: coordination
The dealer sold a sportscar, and the baseball player loved the color of the sportscar because of its surprising luminance.
h. object, ungrammatical: missing "of"
The dealer sold a sportscar, which the color __ the baseball player loved because of its surprising luminance.

The experimental materials include non-restrictive relative clauses, in which the head noun is indefinite (e.g., "a sportscar" in (16)), and the relative clause is separated by commas. The reason to start with non-restrictive materials was that the restrictive versions seemed to be slightly more complex to read: the PP could initially mistakenly be read as an argument of the head noun (e.g., "a sportscar of … (a certain type)") thus leading to a temporary garden path. We investigated restrictive RCs in an experiment that is reported in the supplementary materials (Appendix B), where we obtain similar results.

The complement NP in these materials was always headed by an inanimate noun, because relativizing an animate complement would also permit the use of the determiner *whose*,

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here and in all the remaining experiments is a conservative ungrammatical baseline, much better than e.g., a "word salad" baseline like "The dealer sold a sportscar, which of color baseball loved player of its because luminance surprising".

[8]   For expository purposes, we show the location of the extracted grammatical function position with "__". This was not presented to experimental participants.

without extraction out of the NP, and we wanted to avoid a competition effect.[9] Because animacy has been shown to play a role in the subject/object preference in RCs (Gennari & McDonald, 2008; Mak et al., 2006), the head nouns were also inanimate, so as to avoid an animacy mismatch.

In order to compare subjects and objects, we used active transitive verbs, with all verb-argument combinations describing stereotypical scenarios. Because of our use of inanimate nouns as subjects, they were non-agentive. We chose predominantly psychological predicates because they come in reversible pairs (*frighten/fear, please/like*, *delight/love,* etc.). This way, we were able to have the same NP in subject and object positions while keeping the situation much the same.[10]

We also attempted to control for non-syntactic factors that have been shown to be relevant for extracting the complement of a noun independently of its function (Erteschik-Shir, 1981; Kuno, 1987; Takami, 1992; Van Valin, 1986; Kluender, 2004). In particular, we used Chaves (2013)'s proposal for such factors. First, the concept denoted by the (subject or object) noun entails the concept denoted by the extracted noun (e.g., the existence of a *car* entails the existence of a *color*). As a result, we used quality nouns with *of* complements (*aspect, color, price…*) in the noun phrases with the extraction. And second, the extracted noun was selected so that it matters for the predicate's truth value (*loving its color* matters for loving (and possibly buying) the car etc.). This would not be the case e.g, with *forgetting the color of a car*, which bears no straightforward relation with forgetting the car.

In our materials, we chose the preposition *of* for two reasons: it is the most frequent one to introduce complements of nouns, and it cannot extrapose with a transitive verb: *The color delighted the baseball player [of the sportscar]* cannot mean *the color of the sportscar*, so (17a) cannot be argued to be extraction from a postverbal extraposed position. Notice that in our materials the preposition is lexically selected by the noun (*the cost of, the color of*), and cannot be replaced by *about*, contrary to hanging topics (Giorgi & Longobardi, 1991; Jurka, 2010):

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[9] With animate antecedents, English may use *whose*, with no extraction, or *of whom*, with extraction: *I met a man, the son of whom/whose son does not like school*. Hale (2003), in a self-paced reading experiment, shows an advantage for *whose* as a subject (a), vs. as an object (b):
a. The hairdresser, [whose daughter] insulted the beautician's sister, got in an accident.
b. The beautician, [whose sister] the hairdresser's daughter insulted, got in an accident.
[10] Compared to *fear* type verbs, psychological predicates like *frighten (*which we use in subject condition*)* have the (human) experiencer in object position. This has led some linguists to suggest that their subjects are not 'true' subjects but are underlyingly objects (e.g., Belletti & Rizzi, 1988; Landau, 2010), with "movement" of the object to subject position, in contrast with *fear* type verbs. Under this syntactic analysis, our subject-extracted materials would mostly involve underlying objects, and less difficulty according to Chomsky (2008)'s hypothesis (see section 1). We doubt this analysis for several reasons. First, there are several empirical problems with this analysis (Grimshaw, 1990; Pesetsky, 1995): if *frighten* type verbs are not true transitive verbs, then they should not passivize (*I was frightened by the storm*) or allow for reflexives (*He frightened himself in the mirror*). Second, as observed in footnote 1, Chomsky 2008's hypothesis that 'derived' subjects are not constrained is at odds with current standard assumptions in the minimalist syntax program, such as movement of all subjects from a verb-phrase internal position (Koopman & Sportiche, 1991). Third, and most importantly, we will show that relative clauses (Experiments 1, 2 and 4) behave differently than wh-questions (Experiments 3 and 5) with respect to extraction from subject position in these items. These differences cannot be accounted for by an 'underlying' object analysis of the subject of *frighten* type verbs. We therefore put aside such an analysis as theory-internal, and tangential to our questions.
For completeness, we note that only one of the English verbs in our materials was not a psychological predicate for the subject version (*endanger*; see Appendix A), and its ratings were similar to the other items.

(17)
a. ?? The dealer sold the sportscar about which [the color] delighted the baseball player.
b. ?? The dealer sold the sportscar about which the baseball player loved [the color].

We conclude that the PP condition in our experiments involves a syntactic dependency (see Haegeman et al. (2014, 87-88) for similar discussion and conclusion).

In addition to the 24 target materials, there were 24 distractor items in the survey, together with 20 items from an unrelated experiment, all of similar length and complexity as the target sentences.

A simple yes-no comprehension question followed each trial to make sure that participants read the sentences carefully. For example, for (16), the question was "Did the baseball player like the color of the sportscar?". For items in ungrammatical conditions, we ignored participants' answers in calculating comprehension accuracy across materials.

Predictions

We will consider the predictions of the traditional syntactic theory, the distance-based processing account and our discourse-based focus-background conflict constraint. According to the traditional syntactic theory, extraction from the subject (16a) should be rated as worse than extraction from the object (16e), while distance-based processing predicts the reverse pattern. Because a relative clause is not a focalizing construction, the discourse-based theory predicts no subject penalty, with the consequence that extraction out of subject (16a) should not be rated lower than extraction out of object (16e).

PP-extraction vs. extraction of the whole NP: When compared with extraction of a whole NP (16b,f), the syntactic theory predicts an interaction, such that only the extraction from subject should be rated poorly, with the other three conditions rated as acceptable. No such interaction is predicted by either the distance-based or discourse-based theories. All theories are also compatible with a main effect here, such that extraction of the whole NP might be rated as better than extraction of the PP from the NP. Distance-based processing predicts a general subject advantage with (16a) and (16b) rated higher than (16e) and (16f).

PP-extraction vs. controls: When compared with grammatical controls — the coordination controls in (16c,g) — the syntactic theory predicts an interaction, such that only the extraction from subject (16a) should be rated poorly. Finally, when compared with ungrammatical controls — the missing word conditions in (16d,h) — the syntactic theory predicts an interaction, such that only the grammatical extraction from object position (16e) should be rated as acceptable: the other three conditions (16a,d,h) should be rated much lower. The distance-based and discourse-based theories predict no interactions for comparisons with either controls.

Procedure

The procedure was an acceptability rating procedure with the following instructions:

Ratings and comprehension questions for 68 sentences: Please read each sentence, and then answer the question immediately following. Finally rate the sentence for how natural it is.

The naturalness / acceptability ratings were presented as seven choices corresponding to seven radio buttons, with the responses later converted to numbers from 1 to 7 as follows:
1: Extremely unnatural;
2: Unnatural;
3: Somewhat unnatural;
4: Neutral;
5: Somewhat natural;
6: Natural;
7: Extremely natural.

The experiment took approximately 20 minutes to complete.

Participants

We posted surveys for 64 workers on Amazon.com's Mechanical Turk using the Turkolizer software from Gibson et al. (2011). All participants were paid for their participation. Participants were asked to indicate their native language, but payment was not contingent on their responses to this question.

Results

Acceptability judgments of all five experiments presented in this paper were analyzed with maximal linear mixed models (Baayen et al., 2008) using the lme4 package (Bates, 2010) and the lmerTest package (Kuznetsova et al., 2017) for the statistical language R (R Core Development Team, 2014). Recent results have shown that including only random intercepts in linear mixed-effects regressions can be anti-conservative, so we also included random slopes for all fixed effects grouped by participants and items in our model (Barr et al., 2013).

For Experiment 1-3, only data from native English speakers from the United States were analyzed. We also excluded participants with less than 75% accuracy on the questions. These two exclusion criteria left data from 61 participants in Experiment 1 that we used in the analyses below. Figure 1 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data in all conditions, based on the standard error of the condition mean as estimated by the regression.

We first compared the subject and object PP-extractions on their own, by fitting a maximal mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants).[11] Subject-extractions were rated as reliably more acceptable than object-extractions ($\beta = 0.31$; SE = .08; t = 3.94; p < .0001). This is contrary to predictions of the traditional syntactic theory, and expected under the distance-based processing theory. The FBC constraint does not predict a subject penalty but no subject advantage either.

Three 2x2 analyses were also conducted on these data. For each of these, we fit a mixed-effects linear model predicting z-transformed acceptability ratings from sum-coded data for each of the two factors.

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[11] We use z-scores in order to be able to roughly compare English and French experiments, which use two different scales (1-7 in English, 1-10 in French). See section 3.
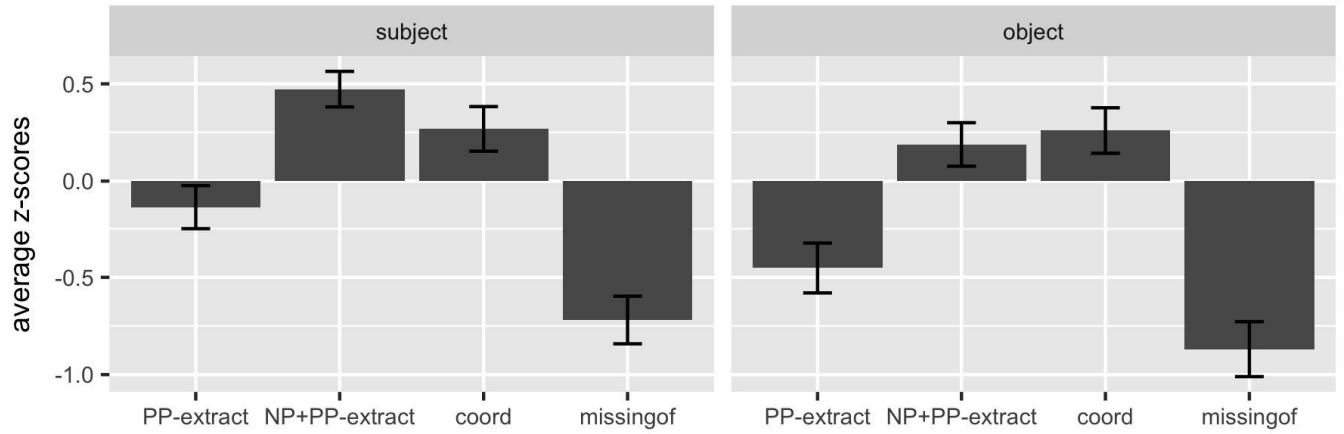
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Figure 1: Condition means and 95% confidence intervals for z-scores of all conditions Experiment 1, based on the standard error of the condition mean as estimated by the regression.

In the first 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with PP-extraction (PP extracted, NP+PP extracted). The results of the model are summarized in Table 1. We observed main effects of grammatical function, such that subjects were rated better than objects. We also observed a main effect of extraction-type such that the NP+PP extracted structures were rated better than the extraction structures. There was no reliable interaction between the factors. These results are not as predicted by the traditional syntactic theory, which predicted an interaction between the factors, such that the PP extraction from subject should be least acceptable. The main effect such that extraction from subjects were rated as more acceptable than extraction from objects is evidence against such a theory.

	β	SE	t	df	p
(Intercept)	0.02	0.06	0.34	45.91	0.733
Grammatical function (subject, object)	0.29	0.06	4.98	26.08	<.0001
Extraction-type (PP, NP+PP)	-0.62	0.08	-8.10	36.97	<.0001
Gram-Func:Extract-type	0.03	0.10	0.27	79.45	0.789

Table 1: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment 1, grammatical function (subject, object) crossed with PP extraction (PP-extracted, NP+PP-extracted).

In the second 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with extraction (extracted, coordination). The results of the model are summarized in Table 2. We observed a main effect of grammatical function, such that subjects were rated better than objects. We also observed a main effect of extraction-type such that the coordinate structures were rated better than the extraction structures. Furthermore, we observed an interaction, such that the extractions from object were rated as worse than the extraction from subject, with less of a difference in the coordinated versions. These results are not as predicted by the traditional theory: although

there was an interaction between the factors, it is in the opposite direction to that predicted by the traditional syntactic island theory.

	β	SE	t	df	p
(Intercept)	-0.014	0.05	-0.31	37.77	0. 759
Grammatical function (subject, object)	0.16	0.09	2.38	22.24	0.026
Extraction-type (extracted, coord)	-0.56	0.07	-5.84	57.84	<.0001
Gram-Func:Extract-type	0.30	0.12	2.59	34.18	.014

Table 2: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment 1, grammatical function (subject, object) crossed with extraction (extracted, coordination).

In the third 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with grammaticality (extracted, missing-of). The results of the model are summarized in Table 3. We observed a main effect of site, such that subjects were rated better than objects. We also observed a main effect of grammaticality such that the grammatical structures (the extractions) were rated better than the ungrammatical structures (with the missing word). There was no reliable interaction between these two factors. These results are also not as predicted by the traditional syntactic theory, which predicts an interaction between the factors, such that the PP extraction from object should be the only acceptable condition of these four. No such interaction was observed.

	β	SE	t	df	p
(Intercept)	-0.54	0.06	-8.56	51.83	<.0001
Grammatical function (subject, object)	0.23	0.07	3.34	20.31	.003
Extraction-type (extracted, missing-of)	0.50	0.08	6.31	31.02	<.0001
Gram-Func:Extract-type	0.16	0.13	1.18	25.05	0.248

Table 3: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 3 of Experiment 1, grammatical function (subject, object) crossed with grammaticality (extracted, missing-of).

Discussion

Overall, these results show that extractions of PPs from nominal subjects in English relative clauses are judged significantly better than the (conservatively-defined) baseline, contrary to the traditional syntactic theory, which claims they should be at or below the baseline. Rather, if anything, they are better than extractions of PPs from objects. These results are expected under dependency-distance-based processing accounts of long-distance dependencies (e.g., Gibson, 1998; Lewis & Vasishth, 2005). Under a processing explanation, the parser prefers

minimizing dependency length, so subject RCs are easier to process than object RCs. This is what we find in the full-NP condition: the filler gap dependency is longer with object extraction (18a) than with subject extraction (18b). Furthermore, the subject NP intervenes between the extracted object and the gap: in (18b), the subject-verb relation is adjacent but not the verb-object one.

(18)
a. a sportscar [the color of which] [the baseball player] loved __
b. a sportscar [the color of which] __ delighted the baseball player

This is also what we find in the PP-extracted conditions: the filler gap dependency is longer with out of object extraction (18a) than with out of subject extraction (18b). Furthermore, the subject NP intervenes between the filler and the gap (or between the filler and the verb) in (18a).

(19)
a. a sportscar [of which] [the baseball player] loved [the color __]
b. a sportscar [of which] [the color __] delighted the baseball player

These results may also reflect a more general preference for relativizing the subject's possessor, independent of extraction (Keenan & Comrie, 1977). Our discourse-based theory does not predict any difficulty here, neither for extraction out of subject nor out of object but is compatible with effects coming from processing ease.

It has been argued that non-restrictive RCs have a different syntax than restrictive RCs (e.g., Ross, 1967; McCawley, 1988; see Arnold, 2007, for a different view) – perhaps because they have a parenthetical meaning (Espinal, 1991). We therefore ran a further experiment examining English restrictive RCs, which we include in Appendix B in the interest of space. This experiment examines restrictive relative clause versions of the materials in the current experiment, with critical examples as in (20):

(20)
a. subject, PP-extracted
The dealer sold the sportscar of which [the color __] delighted the baseball player because of its surprising luminance.
b. object, PP-extracted
The dealer sold the sportscar of which the baseball player loved [the color __] because of its surprising luminance.

We find the same result in the restrictive version of the experiment as in Experiment 1: extractions from subject are judged better than extractions from object, although the difference here is not quite as strong as for non-restrictive RCs, plausibly because there is some surprisal associated with noun phrases initiated by "the X of …" where the "of" phrase is not the argument of the head noun, but rather is a modifier RC (e.g., Levy, 2008).

2.3 Experiment 2: English Relative clauses involving extraction from an NP in subjects: Comparing the extraction of a PP vs. an NP

Experiment 2 was designed as a replication of Experiment 1, with one change. In Experiment 2, most of the conditions were the same as in Experiment 1 (16), but we replaced the NP+PP-extraction conditions with extraction conditions where a preposition is stranded, as in (21):

(21)
a. subject, P-stranded
The dealer sold a sportscar, which [the color of __] delighted the baseball player because of its surprising luminance.
b. object, P-stranded
The dealer sold a sportscar, which the baseball player loved [the color of __] because of its surprising luminance.

Here we sought to replicate others' earlier results showing that extractions from objects are rated better than extractions from subjects (Polinsky et al., 2013; Sprouse et al., 2016; Chaves & Dery, 2019) with preposition stranding.

It is worth noting that, in these configurations, it is the NP object of the preposition which is extracted. In (21), we are not directly comparing the complement of a subject and the complement of an object: we are comparing the extraction of two prepositions' complements.

We kept the same conditions for grammatical (coordinated versions) and ungrammatical controls (missing *of* versions). In order to keep the set of conditions exactly parallel to the wh-question experiment to come in Experiment 3, we removed the NP+PP extraction variants (16b) and (16f) (because wh-questions do not allow these variants).

The comprehension question following each trial was the same as in Experiment 1. For example, for (21), the question was "Did the baseball player like the color of the sportscar?".

Predictions

For the six conditions that are being replicated — (subject, object) x (PP-extraction, coordination, ungrammatical) — the predictions are exactly as in Experiment 1. Finally, for the 2x2 analysis crossing grammatical function (subject, object) and extraction-type (PP-extraction, P-stranded), the traditional syntactic theory predicts a main effect, such that extraction from subject should be rated worse than extraction from object. Critically, no interaction is expected, such that extraction from subject for PPs might be better than extraction from subject for the P-stranded versions. The distance-based processing theory predicts a subject advantage. Our discourse-based theory does not predict any penalties, neither for extraction out of subject, nor for extraction out of objects.

Procedure

The procedure was identical to that for Experiment 1.

Participants

We posted surveys for 128 new workers on Amazon.com's Mechanical Turk using the Turkolizer software from Gibson et al. (2011). All participants were paid for their participation. Participants were asked to indicate their native language, but payment was not contingent on their responses to this question.

Results

Only data from native English speakers from the United States were analyzed. We also excluded participants with less than 75% accuracy on the questions, and disregarded their answers following items in ungrammatical conditions. These two exclusion criteria left data from 107 participants in Experiment 2 that we used in the analyses below. Figure 2 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data, based on the standard error of the condition mean as estimated by the regression.

As in Experiment 1, we first compared the subject and object PP-extractions on their own, by fitting a maximal mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants). As in Experiment 1, subject-extractions were rated as reliably more acceptable than object-extractions ($\beta = 0.15$; SE = .06; t = 2.64; p = .011). We also compared the subject and object P-stranded extractions on their own. In contrast to the PP extractions, P-stranded NP extractions were rated as much better from objects than from subjects ($\beta = 0.39$; SE = .09; t = 4.11; p < .001). Three 2x2 analyses were also conducted on these data. For each of these, we fit a mixed-effects linear model predicting z-transformed acceptability ratings from sum-coded data for each of the two factors.
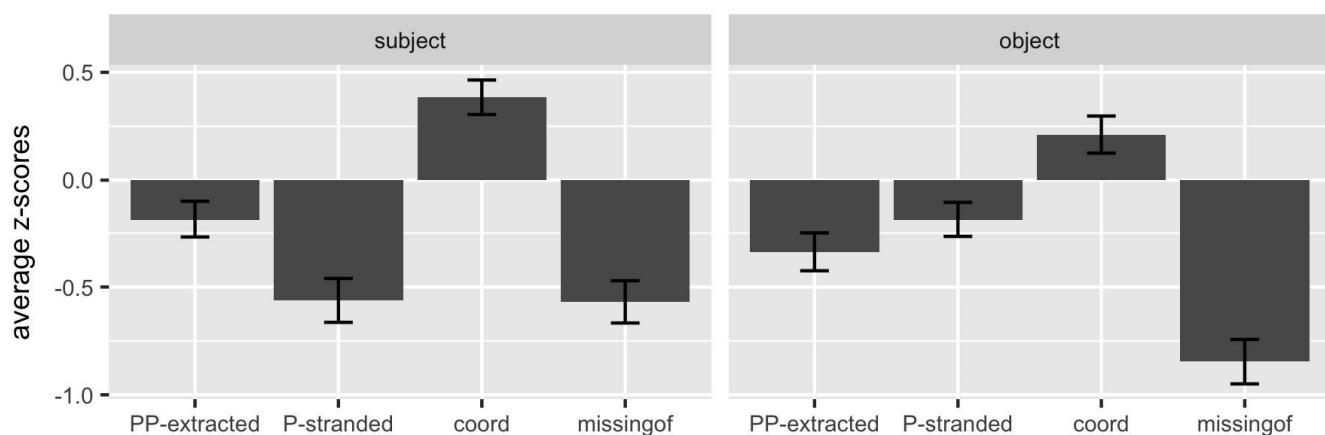

Figure 2: Condition means and 95% confidence intervals for z-scores of all conditions Experiment 2, based on the standard error of the condition mean as estimated by the regression.

In the first 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with extraction-type (PP-extracted, P-stranded). The results of the model are summarized in Table 4. We observed a main effect of extraction type, such that PP extractions were rated better than P-stranded extractions. We also observed a marginal effect of grammatical function, such that P-stranded extraction from object was rated marginally better than extraction from subject. This effect was predicted by the traditional syntactic theory, but it is difficult to interpret as support for that theory in light of the strong interaction, showing that the grammatical function effects are reversed for PP-extracted versions (where subject extractions are preferred) and P-stranded versions (where object extractions are preferred).

	β	SE	t	df	p
(Intercept)	-0.32	0.04	-7.93	48.14	<.0001
Grammatical function (subject, object)	-0.12	0.06	-2.02	22.43	0.055
Extraction-type (PP-extracted, P-stranded)	-0.11	0.06	-2.07	46.02	0.044
Gram-Func:Extract-type	-0.53	0.09	-5.85	124.8	<.0001

Table 4: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 3 of Experiment 2, grammatical function (subject, object) crossed with extraction type (PP-extracted, P-stranded).

In the second 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with extraction (PP-extracted, coordination). The results of the model are summarized in Table 5. We observed a main effect of grammatical function, such that subjects were rated better than objects. We also observed a main effect of extraction-type such that the coordinate structures were rated better than the extraction structures. Unlike Experiment 1, we observed no reliable interaction. These results are not as predicted by the traditional syntactic theory: the syntactic theory predicts an interaction such that all extractions out of subject should be rated poorly with no such effect for coordinations. We see no such interaction, and instead we see a main effect such that extractions from subjects were generally rated better.

	β	SE	t	df	p
(Intercept)	-0.05	0.04	-1.40	30.11	0.173
Grammatical function (subject, object)	0.16	0.05	3.47I	31.98	0.002
Extraction-type (PP-extracted, coord)	-0.56	0.10	-5.58	34.10	<.0001
Gram-Func:Extract-type	-0.01	0.11	-0.10	24.94	.923

Table 5: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment 1, grammatical function (subject, object) crossed with extraction (PP-extracted, coordination).

In the third 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with grammaticality (PP-extracted, ungrammatical). The results of the model are summarized in Table 6. The results were very similar to those from Experiment 1. First, we observed a main effect of site, such that subjects were rated better than objects. We also observed a main effect of grammaticality such that the extractions were rated better than the ungrammatical structures (with the missing word). There was no reliable interaction between these two factors. Again, these results were not as predicted by the traditional syntactic theory.

	β	SE	t	df	p
(Intercept)	-0.48	0.05	-9.51	54.54	<.0001
Grammatical function (subject, object)	0.22	0.05	4.60	102.1	<.0001
Grammaticality (PP-extracted, missing-of)	-0.44	0.06	-7.79	46.77	<.0001
Gram-Func:Grammaticality	0.12	0.09	1.31	51.24	0.198

Table 6: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment 2, grammatical function (subject, object) crossed with grammaticality (PP-extracted, missing-of).

Discussion

Experiment 2 replicated the results from Experiment 1. In particular, we again find that extracting a PP from a subject is judged significantly better than the (conservatively defined) baseline, contrary to the traditional syntactic theory, which claims it should be at or below the baseline. Indeed, this extraction appears to be better than a corresponding extraction from an object.

In addition, we observed that extractions from subjects that leave a preposition stranded are much worse than corresponding preposition stranded extractions from objects. This result replicates previous results showing that extractions from objects are rated better than extractions from subjects (Polinsky et al., 2013; Sprouse et al., 2016, Chaves & Dery, 2019).

It is an open question as to why extractions from subjects are worse than extractions from objects, in preposition-stranding situations. Traditional syntactic theories may argue that subjects are sensitive to the category being extracted, and consider them as *weak islands* (Bianchi & Chesi, 2014), like wh-islands. Contrary to *strong* islands, *weak* islands are supposed to be syntactically selective, and to allow extraction of a complement more easily than of an adjunct (Kluender, 1998; Szabolcsi, 2006). But we found a different pattern in our experiments, namely that extraction of a PP complement of a subject noun was easier than that of an NP complement of a preposition (inside a subject). Furthermore, the existence of a "weak island" would not explain why NP extraction is possible when the subject is an infinitive or a gerund, as in the following attested examples:

(22)
a. They amounted to near twenty thousand pounds, which [to pay __] would have ruined me. (Benjamin Franklin, William Temple Franklin & William Duane. 1834. Memoirs of Benjamin Franklin) (Santorini, 2007)
b. In his bedroom, which [to describe __ as small] would be a gross understatement, he has an audio studio setup. (http://pipl.com/directory/name/Frohwein/Kym, retrieved 21 February 2012) (Chaves, 2013, 303)
c. [...] phenomena which [to understand __] would take an amount of information processing beyond at least our current limit. (meatingofminds.blogspot.com, July 1st, 2012) (Chaves & Dery, 2019, 481)
d. [...] the Joker is a fascinating character who [spending time with __] is a treat. (pgcooper1939.wordpress.com, July 17th 2012) (Culicover & Winkler, in prep)

Moreover, not all NP extractions out of nominal subjects are unacceptable (5).
Note that locality-based sentence processing theories such as Gibson (1998) and Lewis &
Vasishth (2005) do not predict this pattern, because the subject position is closer than the
object position to the extracted element. One possibility for why P-stranding is worse from
subject position than from object position is that "the grammatical function of the fronted
phrase PP is clearer from the onset than if NP were fronted, given the presence of the
preposition: there are fewer potential gap sites that are consistent with the extracted
constituent, aiding processing and improving acceptability" (Chaves, 2013; Chaves & Dery,
2019, 481). Another hypothesis is that the difficulty in extracting from a preposition-stranded
subject is due to the fact that most cases of P-stranding occur post-verbally in English: NP
extractions from nominal subjects are very rare, and hence difficult to process based on
syntactic surprisal (Hale, 2001; Levy, 2008; Chaves, 2013). But extraction from a nominal
subject can be saved if a full prepositional phrase is extracted because the preposition is
lexically associated with the head which it extracts from, so that the PP can be expected
(meaning it is less surprising). Only certain nouns will allow PP-extractions headed by "of" or
"to", etc. When the extracted element is an NP, there is no such lexical marking to make an
extraction more predictable: it can be a subject, it can be an object, it can be the complement
of a preposition. The preposition "of", for example doesn't narrow the class of NPs that
follow it. It could be a name, a count noun, a mass noun, an animate noun or an inanimate
noun. But a PP is more restricted in the type of head that can mark it: not all nouns take "of"
or "to" complements. The combination of these two factors makes extraction of a PP from a
subject possible, because it is lexically selected, but not as acceptable for an NP because it is
rare before a verb and not lexically marked.

A further experiment, including the conditions of Experiment 1 with the exception that the PP
extraction condition is replaced with P-stranded extraction condition, can be found in
Appendix C. The results from this experiment replicate the results from Experiments 1 and 2.

2.4 Experiment 3: Extraction out of English NP subjects: Wh-questions

Because our discourse-based theory predicts a difference across constructions, we now turn to
wh-questions. Unlike relative clauses, extraction from subject should lead to a discourse clash
in wh-questions, making it less acceptable than extraction out of object. Like relative clauses,
English wh-questions seem to allow at least two varieties: an extracted NP and preposition
stranding (23a) or an extracted PP (23b), in a more formal register (Huddleston & Pullum,
2003). But unlike relative clauses, fronting a complex NP with a wh-complement (the NP+PP
extraction condition in Experiment 1) is unacceptable in wh-questions (23c). We therefore
investigated only materials like (23a,b).

(23)
a. [Which sportscar] did the baseball player love the color of __?
b. [Of which sportscar] did the baseball player love the color __?
c. * [The color of which sportscar] did the baseball player love __?

Design and materials

Experiment 3 investigated materials like those from Experiment 2, but in wh-questions as in
(24):

(24)
a. subject, PP-extracted
Of which sportscar did the color __ delight the baseball player because of its surprising luminance?
b. subject, P-stranded
Which sportscar did the color of __ delight the baseball player because of its surprising luminance?
c. subject, no-extraction
Did the color of the sportscar delight the baseball player because of its surprising luminance?
d. subject, ungrammatical: missing "of"
Which sportscar did the color delight the baseball player because of its surprising luminance?
e. object, PP-extracted
Of which sportscar did the baseball player love the color __ because of its surprising luminance?
f. object, P-stranded
Which sportscar did the baseball player love the color of __ because of its surprising luminance?
g. object, no-extraction
Did the baseball player love the color of the sportscar because of its surprising luminance?
h. object, ungrammatical: missing "of"
Which sportscar did the baseball player love the color because of its surprising luminance?

Here, we started with a 2x2 design, crossing grammatical function (subject, object) with extraction-type (PP-extracted, P-stranded). As in Experiment 1 and 2, we included two additional controls to the factor extraction-type: a variant, with no extraction, which is a grammatical control; and an extracted variant with the word "of" missing, resulting in an ungrammatical control. This resulted in two conditions for grammatical function (subject, object) with four versions of each.

As in Experiment 1 and 2, we added a comprehension question after every sentence to make sure that participants read the materials. Because the target materials were questions themselves (not declarative statements as in the materials for Experiments 1 and 2), we could not use the same comprehension questions (asking about what was being stated), since nothing is stated in a question. Consequently, the comprehension questions here consisted of simple yes-no questions about a topic that was mentioned in the target materials (e.g., "Is this sentence relevant to a baseball player?" for (24)). For items in ungrammatical conditions, we ignored participants' answers in calculating a participant's accuracy across materials.

Additionally, there were 20 items from an unrelated experiment, and 24 distractor items, all of which were questions. The full set of materials is provided in Appendix D.

Predictions

As for Experiments 1 and 2, we consider predictions from the syntactic, processing and discourse-based theories. According to the traditional syntactic theory, both NP and PP extractions from the subject (24a,b) should be rated as worse than corresponding extractions from the object (24e,f). When compared with grammatical controls — the yes-no questions in (24c,g) — the syntactic theory predicts an interaction, such that only the extraction from subject should be rated poorly. Finally, when compared with ungrammatical controls — the

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missing word conditions in (24d,h) — the syntactic theory predicts an interaction, such that only the grammatical extraction from object (24e) should be rated as acceptable: the other three conditions should be rated much lower. In contrast, the processing theory predicts a subject advantage, since subject extraction minimizes dependency length. Our discourse-based theory, on the other hand, predicts that the extraction condition should be rated lower for the subject versions, since wh-questions put the extracted element into focus.

Procedure

The procedure was an acceptability rating procedure similar to the one described for Experiments 1 and 2, but with the proviso that participants were asked to rate questions rather than declarative sentences:

Instructions: There are 68 sentences here, each of which is a question. Please read each question, and then answer the question immediately following. Finally rate the original question for how natural it is.

Participants

We posted surveys for 64 workers on Amazon.com's Mechanical Turk using the Turkolizer software from Gibson et al. (2011). All participants were paid for their participation. Participants were asked to indicate their native language, but payment was not contingent on their responses to this question.

Results

Only data from native English speakers from the United States were analyzed. We also excluded participants with less than 75% accuracy on the comprehension questions. These two exclusion criteria left data from 60 participants in Experiment 3 that we used in the analyses below. Figure 3 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data, based on the standard error of the condition mean as estimated by the regression.

As in the previous experiments, we first compared extractions out of subjects and objects on their own, for the P-stranded versions (the ones that seem best), by fitting a maximal mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants). Similar to the results from Experiment 2, P-stranded subject-extractions were rated as reliably less acceptable than P-stranded object-extractions (β = 1.13; SE = .10; t = 11.6; p < .001). We also compared the PP-extracted versions directly. There, unlike for the relative clause structures, we found that the subject-extractions were rated as reliably less acceptable than object-extractions (β = 0.32; SE = .08; t = 3.88; p = .002).

Three 2x2 analyses were then conducted. For each of these, we fit a mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants) from sum-coded data for each of the two factors.
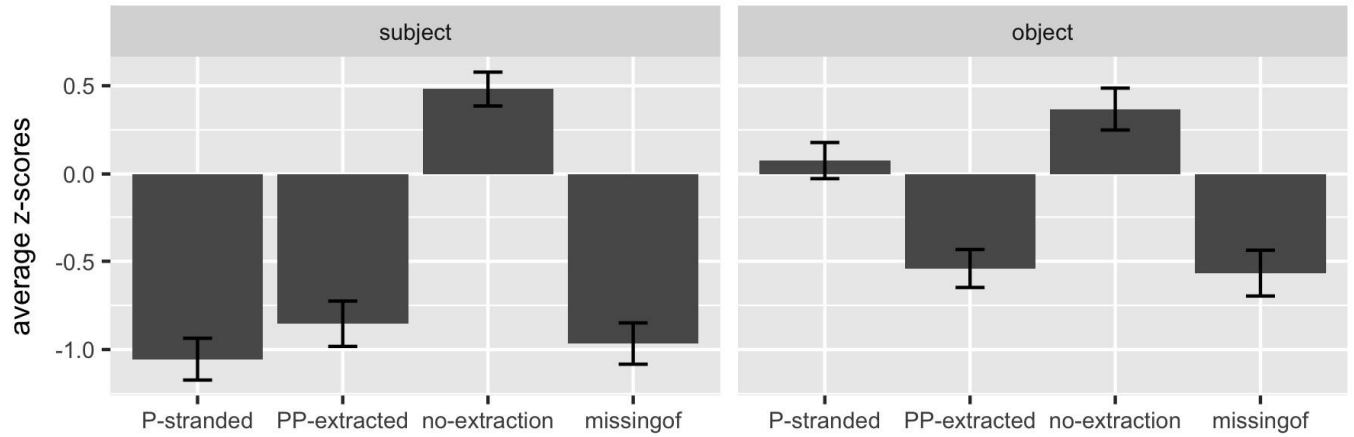
Figure 3: Condition means and 95% confidence intervals for z-scores of all conditions in Experiment 3, based on the standard error of the condition mean as estimated by the regression.

In the first 2x2 analysis of Experiment 3, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with category (NP with P-stranding, PP). The results of the model are summarized in Table 7. We observed a main effect of grammatical function such that the extractions out of objects were rated better than the extractions out of subjects, a main effect of category, such that NP extractions were rated as better than PP extractions, and an interaction, such that the object-extracted NPs (with P-stranding) were rated the best of the four conditions.

	β	SE	t	df	p
(Intercept)	-0.59	0.05	-12.12	381	<.0001
Grammatical function(subject, object)	-0.72	0.07	-9.85	381	<.0001
Extraction-type (PP-extracted, P-stranded)	-0.21	0.09	-2.44	381	.02
Gram-Func:Extract-type	0.81	0.12	6.90	381	<.0001

Table 7: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment 3, grammatical function (subject, object) crossed with category (NP, PP).

In the second 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with extraction (P-stranded, no-extraction), for the NP-extractions. The results of the model are summarized in Table 8. We observed a main effect of extraction such that the non-extracted structures were rated better than the extracted structures, a main effect of grammatical function, such that object conditions were rated better than subject conditions, and an interaction between the two, such that the subject-extracted structures were rated as much worse than the other three conditions. Again, this was as predicted by the traditional syntactic theory as well as by the discourse based theory but it is incompatible with a distance-based processing theory.

	β	SE	t	df	p
(Intercept)	-0.03	0.06	-0.62	381	.543
Grammatical function (subject, object)	-0.50	0.08	-6.24	381	<.0001
Extraction (P-stranded, no-extraction)	-0.91	0.08	-11.4	381	<.0001
Gram-Func:Extraction	-1.26	0.13	-9.54	381	<.0001

Table 8: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment 3, grammatical function (subject, object) crossed with extraction (extracted, no-extraction).

In the third 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with grammaticality (P-stranded, missing-of), again, for the NP-extractions only. The results of the model are summarized in Table 9. We observed a main effect of grammaticality such that the extraction structures were rated better than the ungrammatical structures; a main effect of grammatical function such that object conditions were rated better than subject conditions, and an interaction between the two, such that the P-stranded object-extraction was rated as much better than the other three conditions. This was as predicted by the traditional syntactic island theory and our discourse based theory but not by the distance-based processing theory.

	β	SE	t	df	p
(Intercept)	-0.62	0.06	-11.35	381	<.0001
Grammatical function (subject, object)	-0.76	0.07	-10.98	381	<.0001
Grammaticality (extracted, missing-of)	0.27	0.08	3.65	381	<.0001
Gram-Func:Grammaticality	-0.73	0.14	-5.30	381	<.0001

Table 9: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 3 of Experiment 3, grammatical function (subject, object) crossed with extraction (extracted, missing-of).

Discussion

In Experiment 3, we see that in wh-questions, extraction of an NP or PP from subject is rated as less acceptable than extraction from object. For the P-stranded NP extractions, these results are similar to the results from Sprouse et al. (2016) for similar materials. This had been the main evidence that proponents of a subject-island constraint put forward, with respect to English. Critically, these results differ fundamentally from the results of Experiments 1 and 2, on relative clauses, where it was shown that extraction of a PP from a subject is more acceptable than extraction from an object .

We have therefore shown a difference between extraction phenomena in relative clauses (as in Experiments 1 and 2) and wh-questions (as in Experiment 3). Note that a processing theory which favors shorter distance dependencies over longer distance ones (e.g., Gibson, 1998; Lewis & Vasishth, 2005) would favor extractions from subjects over those from objects, no matter what the construction. So any distance-based processing hypothesis cannot explain the difference in acceptability between RCs on the one hand and wh-questions on the other.

Our discourse-based theory, which takes into account *the discourse function of the construction* (8) accounts for the acceptability of PP extraction out of subjects in relative clauses (Experiment 1) and the reduced acceptability of PP extraction out of subjects in wh-questions (Experiment 3). Under the Focus Background Conflict constraint (8), extraction out of subjects in questions is less acceptable because of the conflict between the discourse function of the extracted element – a focus – and the domain which it is extracted from, a backgrounded subject. Crucially, relative clauses do not fall under this constraint since relativization does not put the relativized element into focus. Therefore, the FBC predicts extraction out of subjects in relative clauses to be more acceptable than in wh-questions. We will spell out the consequences of this approach in more detail in the General Discussion.

The FBC constraint predicts the cross-construction differences that we established for English to hold cross-linguistically. To test this hypothesis, we will apply our experimental paradigm to a language that has been claimed to be different from English.

3 Extracting out of subjects in French

Relativizing out of a nominal subject has been reported to be acceptable in Italian (Rizzi, 1982), Spanish (Torrego, 1984) and French (Godard, 1992; Sag & Godard, 1994). However, we claim that some of the crosslinguistic variation has been exaggerated, since different constructions were compared such as NP extraction in English and PP extraction in Italian in Sprouse et al. (2016). Part of the difficulty of extracting out of subjects is due to preposition stranding in English as we have shown in the previous section, in particular for relative clauses. Romance languages do not allow preposition stranding, with the consequence that only PP extraction out of subjects can be tested in Romance languages. Most Romance languages allow for null subjects, which has been argued to be a relevant feature of these languages explaining why extraction out of subjects is allowed (Rizzi, 1982, Stepanov 2007). For the current study, we chose French, which is closer to English in this respect, and does not allow for null subjects. We thus tested French RCs and wh-questions. The major result of these experiments is that we did not find crosslinguistic differences as they have been reported in earlier work (cf. Sprouse et al., 2016).

3.1 Previous work on Italian and French

3.1.1 Extracting out of Italian subjects

Rizzi (1982: 61) claims there is no subject island constraint in Italian (see example 9a in Section 1), and relates this observation to the *pro-drop* parameter (if the subject may be dropped or freely postposed, the subject position is less constrained than in English). Sprouse et al. (2016) tested Italian subject-islands experimentally using an acceptability judgment task. They found an island effect for wh-questions, but not for relative clauses: extraction out of object (25g) was easier than extraction out of subject (25h) in questions; extraction out of

subject (25d) was easier than extraction out of object (25c) in relative clauses. They compared extraction out of subjects or objects to direct extraction of subjects (25b,f) or objects (25a,e). While ungrammatical distractors were presented in the experiment, they were not included in the experimental design so that it was not possible to determine how the different extraction cases fare in comparison to clear cases of ungrammaticality.

(25) Italian wh-questions (Sprouse et al., 2016)
a. Chi pensi che il quadro raffiguri __?
   who think.2.SG that the painting portrays
('Who do you think that the painting portrays?)
b. Chi pensi che __ abbia dipinto il quadro?
   who think.2.SG that has painted the painting
('Who do you think has painted the painting?')
c. Di chi pensi che [il quadro di Maria] raffiguri la nascita __?
   of who think.2.SG that the painting of Maria depicts the birth
('Of whom do you think that the painting of Maria depicts the birth?')
d. Di chi pensi che [il quadro __] raffiguri la nascita di Venere?
   of who think.2.SG that the painting depicts the birth of Venus
('Of whom do you think the painting depicts the birth of Venus?')
      Italian relative clauses
e. Ho incontrato il giornalista che pensi che il direttore abbia fatto licenziare __.
   have.1.SG met the journalist that think.2.SG that the director has made fire
('I met the journalist that you think that the director fired.')
f. Ho incontrato il giornalista che pensi che __ abbia fatto arrabbiare il direttore.
   have.1.SG met the journalist that think.2.SG that has made angry the director
('I met the journalist that you think pissed off the director.')
g. Ho incontrato il giornalista del quale pensi che [l'articolo del direttore] abbia causato [il licenziamento __].
   have.1.SG met the journalist of who think.2.SG that the article of.the director has caused the firing
('I met the journalist of whom you think the director's article has caused the firing.')
h. Ho incontrato il giornalista del quale pensi che [l'articolo __] abbia causato il licenziamento del direttore.
   have.1.SG met the journalist of who think.2.SG that the article has caused the firing of.the director
('I met the journalist of whom you think that the article caused the firing of the director.')

Sprouse et al. focus on syntactic explanations of the apparent cross-linguistic differences, and speculate that Italian relative clauses may have a different syntactic structure than wh-questions. One possibility that they entertain is that DPs may be bounding nodes for Italian wh-questions and not for relative clauses, different from English where DPs would be bounding nodes in both cases. As the authors point out, these results strongly challenge current syntactic theories of island constraints.

It is important to note, however, that Sprouse at al. tested extraction of NP complements in English with preposition stranding, and extraction of PP complements in Italian. It is striking that their results on Italian relative clauses and questions strongly resemble the results on English RCs and wh-questions (with extracted PPs) reported in the previous section. Based on these results, we suggest that the difference between RCs and questions that Sprouse et al.

found in Italian are not the consequence of a specific property of Italian grammar, but of discourse functions that are specific to the two constructions at stake. These discourse constraints would be predicted to work similarly across languages.

3.1.2 Previous work on French

Similar to Italian, French has been claimed to be an exception to the nominal subject-island constraint (see example 9b) (Godard, 1988; Sag & Godard, 1994). Contrary to Italian, however, this cannot be related to a special status of the subject position (the *pro-drop* parameter, Rizzi, 1982), since French, unlike other Romance languages, does not allow null pronominal subjects.

In a corpus study, Abeillé et al. (2016) found that a large majority of *dont* (of-which) relativizations were extractions out of subjects (26a) compared to relativization out of objects (26b) in both written (French TreeBank, FTB; Abeillé et al., 2003, 2019) and spoken corpora (*Corpus de Français Parlé Parisien des années 2000*, CFPP2000; Branca-Rosoff et al., 2012).

(26)
a. Les premiers étaient des coopératives dont [les membres __] exploitaient sous forme privée des lopins de terre. (FTB)
   the first were some cooperations of.which the members exploited under form private some parts of land
('The first ones were cooperations of which the members exploited on a private basis some land parts')
b. c'est un peu le quartier village dont tu connais [tous les commerçants __] (CFPP2000)
   it is a bit the neighborhood village of.which you know all the shopkeepers
('it's like the community neighborhood of which you know all the shopkeepers')

Tellier (1990) argued that the acceptability of extraction out of French subjects is a peculiarity of *dont*, which she analyses as a complementizer (see also Godard, 1988). She claims that extraction out of subjects is not allowed with true relative pronouns, such as *de qui* ('*of whom*'). However, Abeillé & Winckel (2020) provide counter-examples to this claim. In a corpus of texts from contemporary French (Frantext, *www.frantext.fr*), they found that extraction out of subjects in *de qui* RCs are more frequent (27a) than out of objects (27b). Like for *dont* RCs (26a), the examples with subject extraction usually involve non-agentive subjects, and allow for transitive verbs (e.g., *avoir* 'have' in (27a)). They also ran an experiment similar to the ones presented here and found no subject penalty for *de qui* RCs.

(27)
a. […] un des responsables, de ses amis, de qui [le père __] a ses entrées dans la police (Garat, 2010)
   one of.the accountable of his friends of who the father has connections with the police
'one of the persons in charge, a friend of his, of whom the father __ has connections with the police'
b. […] une femme solitaire, de qui on ne voyait que [le dos __]. (ibid)
   a woman solitary of who one NEG saw only the back
'a solitary woman, of whom one only saw the back __'

In order to compare English and French in the most controlled way, we ran two experiments on French, using highly similar materials, one on relative clauses (with inanimate antecedents and *dont*), one on wh-questions (with *de quel*+noun).

As pointed out by a reviewer, *dont* also permits gapless RCs, with a resumptive pronoun (28) (Godard, 1988; Tellier, 1990).[12] *Dont* could thus introduce an aboutness topic, so that in a sentence like (28b), the definite NP *la couleur* ('the color') is interpreted as linked anaphorically to the antecedent *une voiture* ('a car'), without a syntactic extraction, like in (28c). However, if this analysis could be applied to our materials, the insertion of a possessive determiner (*sa* 'its'*)* as in (28d), in a relative clause with *dont*, should be grammatical, but it is not (28e) in standard French.[13]

(28)
   a. une difficulté dont Paul est certain qu'il la résoudra (Godard 1988:24)
       a difficulty of.which Paul is sure that he it will.resolve
      'a difficulty of-which Paul is sure that he will-solve it'
   b. Paul a une voiture dont la couleur enchante Marie.
      'Paul has a car of-which the color delights Marie'
   c. Paul a une voiture, et la couleur enchante Marie.
       'Paul has a car, and the color delights Marie.'
   d. Paul a une voiture, et sa couleur enchante Marie.
      'Paul has a car, and its color delights Marie.'
   e. *Paul a une voiture dont sa couleur enchante Marie.
      'Paul has a car of-which its color delights Marie'

We conclude that coindexing relationships across *dont* are not anaphoric in our materials, and that *dont* corresponds to the extraction of the PP complement of the noun in our materials (*la couleur de la voiture* 'the color of the car').

3.2 Experiment 4: Extraction out of French NP subjects: Relative clauses

Experiment 4 was designed as a parallel study to Experiments 1 and 2 on English to test the acceptability of relativizing a *de*-complement out of a French NP subject.

Design and materials

The experiment on French relative clauses had materials that were mostly translation equivalent to the English materials for Experiment 1, with *dont* instead of *of which* (29a). The

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[12]   As pointed out by (Godard, 1988), the resumptive pronoun must be embedded in a complement clause inside the RC: * *une difficulté dont Paul la résoudra* ('a difficulty of-which Paul will-solve it'). But our French materials (see below) are similar to the English ones, and do not involve this kind of embedding.

[13]   The analysis of (28a) is controversial. While Tellier (1991) argues for a gapless analysis, Godard (1988) argues there is a syntactic dependency between the antecedent and the pronoun, since such RCs can be coordinated with gap RCs (*une difficulté dont il est clair qu'il faut parler _ et qu'on la résoudra* 'a difficulty of-which it is clear that we must talk _ and that we will solve it'), and show some locality constraints (**une difficulté_i dont [s'il est probable qu'on la_i résoudra] nous pourrions continuer à avancer* 'a difficulty of-which if it is likely that we will resolve it, we could continue to move forward*)* (Abeillé & Godard, 2007). Abeillé & Godard propose a unitary analysis in which *dont* always binds a *de*-PP gap (see also Sag & Godard, 1994): *une difficulté dont_i Paul est certain __i qu'il la_i résoudra.*

conditions of Experiment 4 were parallel to the conditions of Experiment 1, except that the NP+PP-extraction variant as in (16b), is not permitted in French (29b). As already noted, a version with the preposition stranded is not possible either (29c).

(29)
a. Voici la décapotable dont j'aime [la couleur __].
    there the convertible of.which I like the color
'This is the convertible of which I like the color.'
b. *Voici la décapotable [la couleur dont / de laquelle] j'aime.
    there the convertible the color of.which /of which.FEM I like
'This is the convertible the color of which I like.'
c. *Voici la décapotable que j'aime [la couleur de __].
    there the convertible that I like the color of
'This is the convertible which I like the color of .'

As in Experiment 1, we included a grammatical control (coordination without extraction) and an ungrammatical control (*que* instead of *dont,* equivalent to the *missing "of"* condition). There were thus two 2x2 designs: (i) grammatical function (subject, object) crossed with extraction (coordinated, PP-extracted); and (ii) grammatical function (subject, object) crossed with grammaticality (ungrammatical, PP-extracted). In total, this resulted in two conditions for grammatical function (subject, object) and three versions of each of these.

The materials were as close as possible to the English materials, except that present tense was more natural in French. Also, in French, there is no preference for a non-restrictive use of *dont* RCs, and no potential for temporary ambiguity confusion (unlike in English), so we investigated restrictive RCs directly.

As in English, we used transitive non-agentive psychological verbs in reversible pairs (*effrayer/craindre* 'frighten'/'fear')[14] and inanimate nouns with inanimate *de* complements, so that the same nouns could be used for subjects and objects. A yes-no question followed each trial. For example, for (30), the question was ("Est-ce que la voiture est de couleur mate?" 'Is the car a dull color?'). For items in ungrammatical conditions, we ignored participants' answers in calculating comprehension accuracy across materials. See Appendix E for the full set of materials.

(30)
a. subject, PP extracted
Le concessionnaire a une décapotable dont la couleur __ enchante le footballeur à cause de sa luminosité.
    the dealer has a convertible of.which the color delights the football.player at cause of its luminance
('The dealer has a convertible of which the color delights the football player because of its luminance.')

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14   As discussed in fn. 11, some authors have claimed that *frighten* type verbs are not truly accusatives, and that the subject is an underlying object (Belletti & Rizzi, 1988). However, many French linguists have argued that such verbs have true subjects (Legendre, 1989; Ruwet, 1993 a.o.) and do not behave like 'unaccusative' verbs: they take *avoir* ('have') auxiliaries, they do passivize (*J'ai été effrayé par ces nouvelles* 'I have been frightened by these news'). Attested examples with a reflexive can also be found: *je m'enchante moi-même qu'il m'ait été donné [...] une telle sensibilité à la beauté* 'I delight myself that I have been given such a sensibility toward beauty' (http://www.dedefensa.org/article/toutes-les-forets-du-monde).

b. subject, no extraction: coordination
Le concessionnaire a une décapotable, et sa couleur enchante le footballeur à cause de sa luminosité.
   the dealer has a convertible and its color delights the football.player at cause of its luminance
('The dealer has a convertible, and its color delights the football player because of its luminance.')
c. subject, ungrammatical: *que*
Le concessionnaire a une décapotable que la couleur enchante le footballeur à cause de sa luminosité.
   the dealer has a convertible that the color delights the football.player at cause of its luminance
('The dealer has a convertible that the color delights the football player because of its luminance.')
d. object, PP extracted
Le concessionnaire a une décapotable dont le footballeur adore la couleur __ à cause de sa luminosité.
   the dealer has a convertible of.which the football.player loves the color at cause of its luminance
('The dealer has a convertible of which the football player loves the color because of its luminance.')
e. object, no extraction: coordination
Le concessionnaire a une décapotable, et le footballeur adore sa couleur à cause de sa luminosité.
   the dealer has a convertible and the football.player loves its color at cause of its luminance
('The dealer has a convertible, and the football player loves its color because of its luminance.')
f. object, ungrammatical: *que*
Le concessionnaire a une décapotable que le footballeur adore la couleur à cause de sa luminosité.
   the dealer has a convertible that the football.player loves the color at cause of its luminance
('The dealer has a convertible that the football player loves the color because of its luminance.')

In addition to the 24 target materials, we included 24 distractor items from an unrelated experiment, all of similar length and complexity as the target sentences, and also followed by a simple yes-no comprehension question.

Predictions

Parallel to the English Experiments in Section 2, we consider the predictions of syntactic, distance-based and discourse-based theories.

According to the syntactic island theory, extraction from the subject (30a) should be rated worse than extraction from the object (30d). On the other hand, our discourse-based hypothesis predicts no differences in extraction acceptability. The distance-based processing theory predicts a general subject processing advantage.

When compared with grammatical controls — the coordination controls in (30b,e) — the syntactic theory predicts an interaction, such that only extraction from subject should be rated

poorly. A distance-based processing theory predicts an interaction because extraction from objects should be rated less acceptable (because of the general subject processing advantage). Our discourse-based proposal predicts no interaction effects for relative clauses.

Finally, when compared with ungrammatical controls — the incorrect relative word *que* in (30c,f) — the syntactic theory predicts an interaction, such that only the grammatical extraction from object position (30e) should be rated as acceptable: the other three conditions (30a,c,f) should be rated much lower. The distance-based processing theory predicts a grammaticality effect as well as an interaction with an advantage for extraction out of subjects in the grammatical constructions. Our discourse-based hypothesis on the other hand predicts no interaction effect in relative clauses but predicts a main effect of grammaticality: extractions out of NPs (30a,d) should both be better than their ungrammatical controls.

Procedure

Participants were given similar instructions as for Experiment 1, but in French, and using a 10 point scale rather than a 7 point scale.[15] The experiment took approximately 20 minutes to complete. All experiments on French were run on the Ibex Farm platform (Drummond, 2010).

Participants

We recruited 54 participants on the R.I.S.C. website (http://experiences.risc.cnrs.fr/) and on social media (e.g. Facebook). Participation was voluntary and participants were not paid. All participants gave their written consent.

Results

Only data from native and monolingual speakers 18 years old and older, having spent their childhood in France, were analyzed. Participants who had not provided judgments for all sentences and/or correctly answered less than 75% of the comprehension questions, were excluded. After exclusion of 6 participants, we analyzed the data from 48 participants, 37 women and 11 men, 19 to 79 years old (mean age: 35.38, SD= 15.64). Figure 4 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data, based on the standard error of the condition mean as estimated by the regression.

We first compared the subject and object extractions on their own, by fitting a maximal mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants). Extractions from subjects were rated as marginally more acceptable than extractions from objects ($\beta = 0.15$; SE = .08; t = 1.96; p = .0623). This is predicted by the distance-based processing theory, contrary to the prediction of the syntactic island theory, and compatible with the discourse-based hypothesis.

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[15]   French speakers are generally more comfortable with a 10-point scale, since it is used in the French school system.
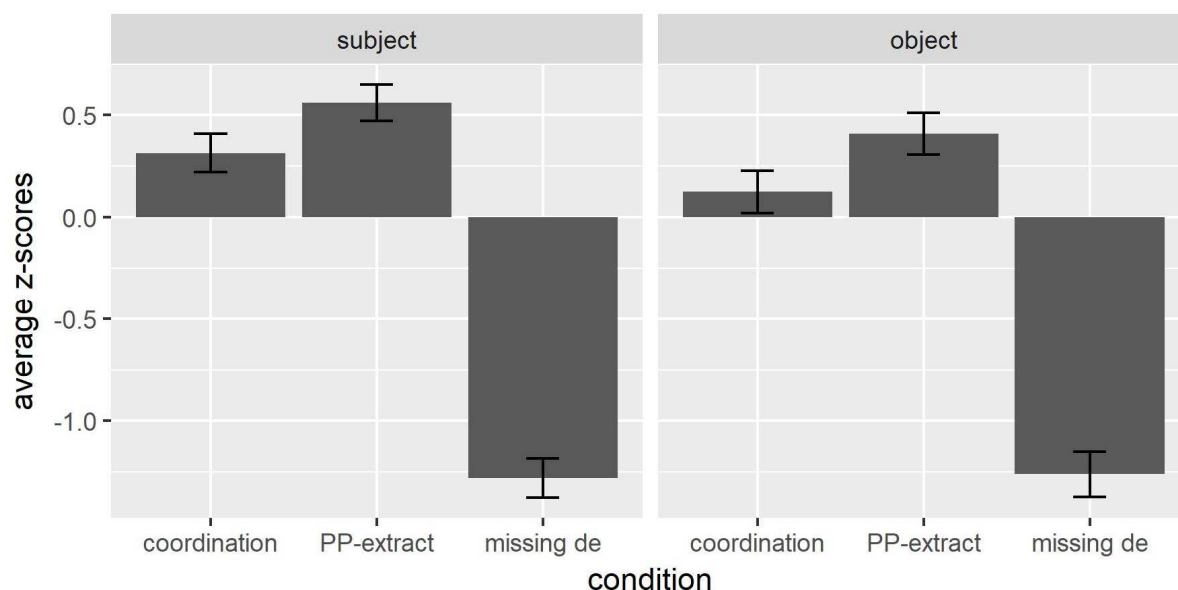
Figure 4: Condition means and 95% confidence intervals for z-scores of all conditions of Experiment 4, based on the standard error of the condition mean as estimated by the regression.

Two further 2x2 analyses were also conducted on these data, similar to those run for the English experiments. For each of these analyses, we fit a maximal mixed-effects linear model predicting z-transformed acceptability ratings from sum-coded data for each of the two factors.

In the first 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with extraction-type (extracted, coordination). The results of the model are summarized in Table 10. We observed a main effect of grammatical function, such that subjects were rated better than objects. We also observed a main effect of extraction-type such that the extraction structures were rated better than the non-extracted coordinate structures. There was no reliable interaction between these two factors. These results are not as predicted by the traditional syntactic island theory: there was no interaction between the factors in disfavor of extractions out of subjects. Furthermore, the main effect of grammatical function — such that extractions from subjects were rated as more acceptable than extractions from objects — is evidence against such a theory. The results are however expected by the distance-based processing theory and in line with our discourse-based theory.

	β	SE	t	df	p
(Intercept)	0.349	0.045	7.800	28.8	<.0001
Grammatical function (subject, object)	0.170	0.057	2.940	25.26	<.01
Extraction-type (extracted, coordination)	0.267	0.060	4.465	37.89	<.0001
Gram-Func:Extract-type	-0.022	0.104	-0.214	52.04	0.832

Table 10: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment 4, grammatical function (subject, object) crossed with extraction-type (extracted, coordination).

In the second 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with grammaticality (extracted, ungrammatical). The results of the model are summarized in Table 11. We observed a main effect of grammaticality such that the grammatical structures (the extractions) were rated better than the ungrammatical structures (with the inadequate relative word *que*), but no effect of grammatical function. There was no reliable interaction between these two factors. Like in the English experiments, these results are not as predicted by the traditional syntactic island theory, which predicts an interaction between the factors, such that the extraction from object should be the only acceptable condition. No such interaction was observed. The main effect of grammaticality shows that participants were sensitive to grammaticality violations. Both the absence of interaction and the main effect of grammaticality are in line with the discourse-based hypothesis.

	β	SE	t	df	p
(Intercept)	-0.395	0.038	-10.437	29.3	<.0001
Grammatical function (subject, object)	0.071	0.073	0.971	23.85	.341
Grammaticality (extracted, ungramm.)	-1.758	0.091	-19.285	47.62	<.0001
Gram-Func:Grammaticality	-0.160	0.110	-1.457	26.91	0.157

Table 11: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment 4, grammatical function (subject, object) crossed with grammaticality (extracted, ungrammatical).

Discussion

As in Experiments 1 and 2, which investigated extracted PPs in English relative clauses, we find a preference for the extraction out of subject over extraction out of object, though only marginally so. Importantly, there was no evidence for a penalty for extraction out of subject. Interestingly, our data on French RCs also replicates Sprouse et al.'s (2016) result for Italian RCs (with a *di* complement), which they considered an unresolved challenge for current syntactic theories. These data clearly show that crosslinguistic differences concerning the extraction out of subjects in RCs have been exaggerated. Across the three languages, when comparable extractions are studied, the preference pattern is roughly the same: Extraction of PP-complements out of subjects is slightly easier than extraction out of objects. As discussed following Experiment 1, this preference is compatible with a processing explanation (e.g., Gibson, 1998; Lewis & Vasishth, 2005) where the parser prefers minimizing dependency length.

These French data are obviously not compatible with a ban on extraction out of subjects. They are, however, compatible with the focus-background conflict constraint (8). Relativization, unlike wh-questions, does not assign a specific discourse status to the extracted element. The relativized element can thus depend on the subject or the object, without discourse infelicity.

Contrary to English, we found a similar subject preference in sentences with coordinations (no extraction). We also found that these non-extracted grammatical controls were rated

worse than extracted items. We speculate that these differences can be explained by the fact that we used a possessive determiner (30b,e) in the French coordinated versions, while the complement of the noun was repeated in English (16c,g). The French possessive determiner might lead to a local ambiguity in being interpreted as referring to the head noun (as intended) or to the subject of the main clause. This latter ambiguity was not present in English Experiments 1 and 2 where the *of*-complement was repeated.

3.3 Experiment 5: Extraction out of French NP subjects: Wh-questions

Experiment 5 was designed as parallel to English Experiment 3 to test the acceptability of extraction of a *de*-complement out of a subject in direct questions.

Design and materials

The conditions in Experiment 5 were parallel to the ones in Experiment 3, except that we only presented sentences with PP-fronting (31a), since French does not permit preposition stranding (31b).

(31)
a. De quelle décapotable est-ce que le footballeur adore [la couleur __]?
   of which convertible is-it that the football.player loves the color
'Of which convertible does the football player love the color?'
b. * Quelle décapotable est-ce que le footballeur adore [la couleur de __]?
   which convertible is-it that the football.player loves the color of
'Which convertible does the football player love the color of?'

As in English Experiment 3, we included a grammatical control (a yes-no question without extraction) and an ungrammatical control (the preposition *de* was missing). There were thus two 2x2 designs: (i) grammatical function (subject, object) crossed with extraction (PP-extracted, no extraction); and (ii) grammatical function (subject, object) crossed with grammaticality (ungrammatical, PP-extracted). In total, this resulted in two conditions for grammatical function (subject, object) and three versions of each of these. Several question types are allowed in French, and we chose to use the interrogative form with *est-ce que* in order to avoid subject-verb inversion.

The materials were as close as possible to the English materials, with the same minor differences as in Experiment 4 (present tense instead of past tense). The nouns and verbs were the same as in Experiment 4 (see Appendix F for the full set of materials).

(32)
a. subject, PP extracted
De quelle décapotable est-ce que la couleur __ enchante le footballeur à cause de sa luminosité?
   of which convertible is-it that the color delights the football.player at cause of its luminance
'Of which convertible does the color delight the football player because of its luminance?'
b. subject, no extraction
Est-ce que la couleur de la décapotable enchante le footballeur à cause de sa luminosité?
   is-it that the color of the convertible delights the football.player at cause of its luminance
'Does the color of the convertible delight the football player because of its luminance?'

36

c. subject, ungrammatical: missing *de*
Quelle décapotable est-ce que la couleur enchante le footballeur à cause de sa luminosité?
   which convertible is-it that the color delights the football.player at cause of its luminance
'Which convertible does the color delight the football player because of its luminance?'
d. object, PP extracted
De quelle décapotable est-ce que le footballeur adore la couleur __ à cause de sa luminosité?
   of which convertible is-it that the football.player loves the color at cause of its luminance
'Of which convertible does the football player love the color because of its luminance?'
e. object, no extraction
Est-ce que le footballeur adore la couleur de la décapotable à cause de sa luminosité?
   is-it that the football.player loves the color of the convertible at cause of its luminance
'Does the football player love the color of the convertible because of its luminance?'
f. object, ungrammatical: missing *de*
Quelle décapotable est-ce que le footballeur adore la couleur à cause de sa luminosité?
   which convertible is-it that the football.player loves the color at cause of its luminance
'Which convertible does the football player love the color because of its luminance?'

An assertion followed each of the items to which a yes/no answer was expected. For example, the item in (32) was followed by "*La voiture en question est de couleur mate.*" ('The color of the car is dull.').

In addition to the 24 target materials, we included 32 distractor items from an unrelated experiment. All of these distractors were questions, of similar length and complexity as the target sentences, and they were followed by a comprehension sentence.

Predictions

According to the traditional syntactic theory, extraction from the subject (32a) should be rated as worse than extraction from the object (32d). If we compare the extraction conditions with grammatical controls — the yes-no question controls in (32b,e) — the traditional syntactic theory predicts an interaction, such that only the extraction from subject should be rated poorly. Finally, when compared with ungrammatical controls — the missing word conditions in (32c,f) — the syntactic theory predicts an interaction, such that only extractions from object (32d) should be rated as more acceptable: the other three conditions should be rated much lower. On the other hand, the distance-based processing theory predicts a subject advantage. Because of the focus status of the extracted element in wh-questions, the discourse-based theory predicts a subject penalty, but not necessarily an interaction with the ungrammatical controls.

Procedure

Participants were given similar instructions as for Experiment 3, but in French, and used a 10 point scale rather than a seven point scale. The experiment took approximately 20 minutes to complete.

Participants

We recruited 54 participants on the R.I.S.C. website (http://experiences.risc.cnrs.fr/) and on social media (e.g. Facebook). Participation was voluntary and participants were not paid. All participants gave their written consent.

Results

Only data from native and monolingual speakers 18 years old and older, having spent their childhood in France, were analyzed. Participants who had not provided judgments for all sentences and/or answered less than 75% of the comprehension sentences correctly were excluded. After exclusion of 7 participants, we analyzed the data from 47 participants, 32 women and 15 men, 18 to 76 years old (mean age: 38.23, SD= 16.89). Figure 5 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data, based on the standard error of the condition mean as estimated by the regression.

Figure 5: Condition means and 95% confidence intervals for z-scores of all conditions in Experiment 5, based on the standard error of the condition mean as estimated by the regression.

As in the previous experiments, we first compared the subject and object extractions on their own, by fitting a maximal mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants). Extractions out of objects were rated as reliably more acceptable than extractions out of subjects (β = -0.49; SE = .11; t = -4.55; p < .0001). These results are in line with predictions of the syntactic theory and those of the discourse-based proposal.

Two further 2x2 analyses were conducted on these data. For each of these, we fit a maximal mixed-effects linear model using sum-coding for each of the fixed factors.

In the first 2x2 analysis, we fit a model for grammatical function (subject, object) crossed with extraction-type (extracted, no-extraction). The results of the model are summarized in Table 12. We observed a main effect of extraction-type, such that the structures without extraction were rated better than the structures with extraction, and a main effect of grammatical function, such that object conditions were rated overall better than subject conditions. As in English, we also found an interaction: while extraction out of objects was more acceptable than extraction out of subjects, in the yes-no question (without extraction) the subject condition was rated slightly better than the object condition (β = -0.175 ; SE = 0.058 ; t = -3.022 ; p<.005). This interaction was predicted by the traditional syntactic theory

and by the discourse-based proposal but not by the distance-based processing theory.

	β	SE	t	df	p
(Intercept)	-0.402	0.033	12.279	32.12	<.0001
Grammatical function (subject, object)	-0.185	0.069	-2.674	40.62	<.05
Extraction-type (extract., no-extract.)	0.850	0.088	9.645	46.74	<.0001
Gram-Func:Extract-type	0.613	0.123	4.978	34.48	<.0001

Table 12: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment 5, grammatical function (subject, object) crossed with extraction-type (extracted, no-extraction).

In the second 2x2 analysis, we fit a model for grammatical function (subject, object) crossed with grammaticality (extracted, ungrammatical). The results of the model are summarized in Table 13. We observed a main effect of extraction type such that the extraction structures were rated better than the ungrammatical structures; a main effect of grammatical function, such that object-extractions were rated better than subject-extractions, and an interaction between the two such that the object-extraction was rated as much better than the other three conditions. This interaction is as predicted by the traditional syntactic theory and by the discourse-based proposal, but the syntactic theory predicts extraction out of subject to be like ungrammatical controls, contrary to the results (see model in Table 13).

	β	SE	t	df	p
(Intercept)	-0.459	0.026	-17.715	46.18	<.0001
Grammatical function (subject, object)	-0.330	0.066	-4.995	33.49	<.0001
Grammaticality (extracted, ungram)	-0.868	0.095	-9.120	44.41	<.0001
Gram-Func:Grammaticality	0.316	0.133	2.384	34.02	<.05

Table 13: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment 5, grammatical function (subject, object) crossed with grammaticality (extracted, ungrammatical).

We compared the extraction out of subject with the subject ungrammatical condition by fitting a maximal mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants). Extractions out of subjects were rated as reliably more acceptable than the ungrammatical controls ($\beta = -0.71$; SE = .10; t = -6.96; p < .0001). These results are not predicted by the syntactic theory, nor by the (distance-based) processing theory, but are compatible with our discourse-based theory.

Discussion

As in English, questions without extraction (yes-no questions) were rated as more acceptable than ones with extraction, while the extraction conditions were rated more acceptable than ungrammatical controls. In the non-extracted condition, the subject version was judged more acceptable, as it was the case in English questions.

The data on French wh-questions also confirm the differences between relative clauses and wh-questions that were established in the experiments on English (Experiments 1, 2 and 3): We observed that out of object questioning is rated as more acceptable than out of subject questioning, as in English, and both are rated significantly better than ungrammatical controls. The difference between these constructions is predicted by the FBC constraint (8). The lack of a subject penalty in relative clauses is thus not a specific property of either language, or of French *dont*.

Contrary to English (Experiment 3), PP extraction out of subjects was rated significantly better than ungrammatical controls in French wh-questions. The same crosslinguistic difference holds for PP extraction out of object as seen in Experiment 3. As observed by Huddleston & Pullum (2003:629), P-stranding (*What are you asking for* ?) is preferred over PP questioning of complements (?*For what are you asking* ?) in general.[16] This is not the case for French which does not have the PP vs. P-stranding alternative.

Apart from this difference, the results from the two French experiments taken as a whole are very similar to the results from the corresponding English experiments: extraction of PP out of subject is rated better than out of object with relative clauses, but rated worse in wh-questions. As a result, the subject-island penalty cannot be maintained as a general syntactic constraint.

4 General Discussion

4.1 Crosslinguistic and cross-construction variation

Contrary to the claim from the syntactic literature that extractions from subjects should be impossible (the 'subject island' constraint), we found that extraction out of subjects can be rated as well as grammatical controls, in English and French, and can be better than extraction out of objects. Island constraints have been claimed to be independent of the construction involved (Chomsky 1977, Schütze et al. 2015). In our English experiments (Experiments 1 to 3), we found that extraction of the complement of a noun is sensitive to the *construction type*: in relative clauses, PP extractions out of the subject are preferred over PP extractions out of the object in English (Experiments 1, 2); but in wh-questions, PP extractions out of the subject are dispreferred to extractions out of the object (Experiment 3). We found the same contrasts in French (Experiments 4 and 5). In English, we also found an interaction with the category being extracted: NP extraction (with preposition stranding) is disfavored in the subject condition both in relative clauses and in wh-questions.

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[16] In a corpus study of contemporary British English (ICE-GB, 1 M words, written and spoken), Hoffmann (2005, 2008) found a preference for P-stranding in wh-questions (96% P-stranding in direct wh-questions), but not in relative clauses (86% PP extraction vs 14% P-stranding in finite wh-relative clauses). The relationship between frequency and acceptability is not a simple issue, since unseen sentences (with zero frequency) can be fully acceptable (Featherston, 2005). However, if one considers the frequency of constructions, independently of lexical frequency and sentence length, frequency shows a positive correlation with acceptability judgements (Keller, 2000; Lau et al., 2017).

On the other hand, we found very little crosslinguistic variation. Romance languages have been claimed to differ from English with respect to the relevance of island constraints (Rizzi, 1982). Consistent with this claim, Sprouse et al. (2016) observed that Italian permits extraction out of subjects in relative clauses but not in wh-questions. But our results suggest that the putative difference between English and Italian comes from testing different constructions across languages: NP extraction in English, PP extraction in Italian. Once PP extractions are compared, English, French, and Italian all behave the same, with a preference for extraction out of subjects in relative clauses, and a preference for extraction out of objects in wh-questions. We suggest that for English, the penalty for extraction out of subjects found in previous experiments on relative clauses is the consequence of a difficulty arising from preposition stranding.[17] Once this difference in extraction type is controlled for, languages show very similar patterns for each of the constructions investigated here.

These results also shed light on the nature of island constraints. Crosslinguistic variation has been problematic for all approaches of islands so far (unless it can be related to independent language differences such as for example the English specific possibility of P-stranding), and the lack of cross-construction variation has been taken as an argument against discourse-based approaches (Schütze et al., 2015). Our results show that, as far as nominal subjects are considered[18], crosslinguistic variation is overestimated and cross-construction variation underestimated.

Let us consider how these results bear on syntactic theories first. Generative theories in the Chomskyan tradition (e.g., Chomsky, 1973, 1977, 1981; Chomsky & Lasnik, 1993; Chomsky, 1995; Boeckx, 2006 a.o.) adopt a view that nominal subjects block all kinds of extraction, contrary to nominal objects. While different analyses have been proposed in such approaches, trying to derive the subject island from more general principles (e.g., the *freezing theory* of Wexler & Culicover (1980), the *Constraint on Extraction Domain* of Huang (1982), the *edge condition* of Chomsky (2008), or the *argument condition* of Haegeman et al. (2014)) all rely on positions in syntactic configurations. Because extraction in wh-questions and extraction in RCs fall into the same general category of wh-movement (Chomsky, 1977), they cannot explain the contrast we find between relative clauses and wh-questions.

Processing theories that are based on minimizing dependency length (Gibson, 1998; Lewis & Vasishth, 2005) differ from syntactic theories in being able to handle cases of gradient acceptability. Such factors may explain why extraction out of subjects may actually be preferred in relative clauses (our Experiments 1, 2, and 4). But for Subject-Verb-Object languages, they predict that extraction out of subjects should always be easier than extraction out of objects. They cannot explain the contrast we have found between relative clauses and wh-questions either. They would predict similar effects across constructions like syntactic approaches.[19] We thus conclude that neither syntactic nor processing theories of islands can explain the cross-construction differences that we found.

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17   We thank a reviewer for pointing out that the same contrast seems to hold with other complements than *of*. Further experiments are needed but it seems that they show the same difference between PP and NP extraction with RCs (Abeillé et al. 2019):
a. This is the cave [to which] [the passageway __] contained many cobwebs.
b. ?? This is the cave [which] [the passageway to __] contained many cobwebs.

18   We do not claim that extraction should be easy out of sentential subjects, but that if there is a difficulty (Ross 1967, Philips 2006, Goldberg 2013), it is not a syntactic constraint on the subject itself, since it does not apply to nominal subjects.

19   Hofmeister et al. (2013) and Chaves (2013) propose that interpreting an extracted element as a

4.2 Consequences of the discourse-based theory

The discourse-based approach in (8) on the other hand, is more promising, because it can take into account the meaning of the extraction construction (Ginzburg & Sag, 2000; Sag, 2010). If a construction puts an extracted element into focus, it should be appropriate when this element belongs to the focal domain, and less so if this element is part of the background (Erteschik-Shir, 1973, Ambridge & Goldberg, 2008; Goldberg, 2013). Because the definition of these discourse notions is sometimes a bit vague and may vary from one author to another, we first try to make them more precise here.

We follow Krifka (1992) and Jacobs (2001), who draw a four-way distinction between *topic-comment* and *background-focus*. Leaving aside presuppositions, we assume that the content of most utterances can be divided between a topic (a given entity that the utterance is about) and a comment (the properties or predicates applied to this entity). Subjects are typically reserved for topic continuity rather than for introducing new referents (Chafe, 1994; Kuno, 1972; Lambrecht, 1994). They are more often pronominal or definite NPs. In (33a), the subject is the topic, and the VP is the comment. A test for being the sentence topic is to use a 'speaking of' adjunct (Kuno, 1976; Reinhart, 1981): in a neutral context, it applies to the subject better than to the complement (33b,c). In what follows, we use # to indicate semantic or pragmatic anomaly (infelicity), as opposed to * which indicates ungrammaticality (syntactic ill-formedness).

(33)
a. [The football player]$_{topic}$ [liked the color of the car]$_{comment}$.
b. Speaking of the football player, he liked the color of the car.
c. # Speaking of the color of the car, the football player liked it.

Inside a discourse, an utterance also adds new information (the focus) to what is already known (the background). The focus/background distinction depends on the way information is updated in the text or dialog. In a simple sentence in a null context, a definite subject is likely to be part of the background, and the VP to bring new information. In a context where the question under discussion (QUD) is "What did the football player like ?", the focus is "the color of the car" (34a); in a context where the QUD is "How did the football player react ?", the focus is "liked the color of the car" (34b). But in another context, where the subject is accented and contrasted with a set of alternatives (e.g., a baseball player and a football player looking at a car in the context), it can be both topic and focus (34c) (Büring 1997).

(34)
a. [The football player liked]$_{background}$ [the color of the car]$_{focus}$.
b. [The football player]$_{background}$ [liked the color of the car]$_{focus}$.
c. [*The football player*]$_{focus}$ [liked the color of the car]$_{background}$.

A test for being part of the focal domain (Van Valin, 1995) is that an element can be targeted by sentential negation (Erteschik-Shir, 1973). In a neutral context, it is more felicitous to negate (part of) the object than (part of) the subject (35a,b). In a contrastive context, with stress on the subject, the subject can be negated (35c).

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complement of the subject is unexpected, because subjects tend to be topics, they are more likely to be pronominal, or simple NPs. This does, however, not provide a straightforward explanation of the contrast we find between RCs and wh-questions.

(35)
a.　　　– The football player liked the color of the car.
　　　　– No, the size of the car.
b.　　　– The football player liked the color of the car.
　　　　– # No, the baseball player.
c.　　　– *The football player* liked the color of the car.
　　　　– No, *the baseball player*.

For our purposes, we limit ourselves to *focus* (or new information), *background* (old or given information) and *topic* (what the sentence is about). Following Lambrecht (1994, 2000), Webelhuth (2007) and others, we assume that:

1. The preverbal constituent (the subject) is usually the topic of the sentence.
2. By default, topics are discourse familiar and unfocused.
3. The postverbal constituent (the complement) is usually part of the focus.

Our experimental results, which show that relative clauses (Experiment 1, 2 & 4) do not obey the same constraints as wh-questions (Experiments 3 & 5), confirmed the FBC constraint in (8), repeated here:

(36) *Focus-background conflict* (FBC) constraint
　　　A focused element should not be part of an unfocused / backgrounded constituent.

Crucially, the extracted element is a focus in wh-questions (Jackendoff, 1972), which is seeking new information, but not in relative clauses, which add a property to a given entity (Kuno, 1976, p. 420). Assuming the complement is part of the focal domain, the whole complement can be questioned (37a), but also parts of it, extracting a complement of the complement (37b). Assuming the subject is backgrounded, questioning part of the subject leads to a discourse status clash (37c).

(37)
a. [Which car] did the football player like __?
b. [Of which car] did the football player like [the color __]?
c. # [Of which car] did [the color __] delight the football player?
d. [Which car] delighted the football player ?

In wh- questions, the wh- word is a variable (x), expecting an answer to be specified. The content of (37b) is 'the football player liked the color of x car', with 'the football player' as topic and (part of) background, and 'the color of x car' as part of focus. The content of (37c) is 'the color of x car delighted the football player', with 'the color of x car' as both topic and (part of) background, and 'the football player' as part of focus. Hence in (37c) x should be both focused and part of a backgrounded constituent, resulting in a semantic or pragmatic anomaly.

Notice that the FBC constraint does not apply to constituents that would be backgrounded by default as a whole: a wh-question will put them into focus, and the constraint will only check that they do not belong to another backgrounded constituent. It is perfectly felicitous to question the subject as a whole (37d), since it is a dependent of the verb, which is part of the focal domain. The FBC constraint just makes it infelicitous to extract and focus part of a

subject if it is a backgrounded constituent. This means, we don't need additional stipulations to allow for subject questions (in contrast to e.g., Goldberg, 2006, 2013, who defines nominal subjects as 'primary topics' and states that they are not part of the background).

This line of explanation, if correct, does not constrain relative clauses, with the result that both (38a) and (38b) are possible. Relativization serves a different function: it abstracts over an argument to turn a clause into a property that can apply to an entity (the antecedent), which can have any discourse status in the matrix clause (Kuno, 1976). As such, a relative clause may make the head noun more salient, for further pronoun resolution, for example, but it does not assign a special discourse status to it in the matrix clause.[20] Inside the relative clause itself, the extracted element is not a focus either: it can be a relative pronoun (*which*), which acts as a pronominal variable and is thus referential, but there can also be just a (non referential) complementizer (*that* in English, *dont* in French) or nothing (*the man I saw*).

(38)
a. The seller presented a car [of which [the color __] delighted the football player].
b. The seller presented a car [of which the football player liked [the color __]].

Independent evidence for the FBC constraint is provided by a long-noted set of previously puzzling findings from the literature: the graded nature of the felicity of extraction of noun complements. For example, the preference for indefinites when questioning the complement of a noun (Erteschik-Shir, 1973; Davies & Dubinsky, 2003; see Keller, 2000, for experimental evidence) follows from (36) directly: because indefinite NPs introduce new entities (unlike definite NPs), the questioned element is more likely to belong to the focal domain in (39a) than in (39b), which results in (39a) being more acceptable than (39b):

(39)
a. Which actress did you buy [a picture of __]?
b. # Which actress did you buy [that picture of __]?
c. That is the actress who I bought [a / that picture of __].

The oddness of examples like (39b) has always been a puzzle for island-based theories of extraction constraints: (39b) involves no syntactic islands, and yet it is not as acceptable as (39a). The difference between the two follows naturally from the FBC constraint. Furthermore, as noted by Grosu (1981), the same contrast does not appear with relative clauses as shown in (39c). This is as predicted by the FBC constraint, because the extraction in (39c) is in a relative clause, which does not involve a focused element, so the FBC does not apply.

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[20] As noted by a reviewer, this does not imply that relative clauses themselves are not constrained. Assuming relative clauses are themselves backgrounded, the FBC discourse constraint makes it difficult to question out of them (a). We acknowledge that relativization is also difficult (b), and this may be the case because relative clauses are adjuncts (under syntactic theories), or because such examples involve two extractions (under processing theories). Note that such extractions are better with presentational relative clauses which are not backgrounded (c) (Erteschik-Shir & Lappin, 1979). Such cases exist in French too (d) and such relative clauses have been analysed as complements of the main verb (Koenig & Lambrecht, 1999).
a. # Which book do you know someone [who read _] ?
b. ? This is a book [which I know someone [who read _]].
c. This is the kind of weather [that there are many people [who like _]].
d. C'est un endroit [où il y a beaucoup de gens [qui vont _]].
'This is a place where there are many people who go.'

The FBC constraint also makes predictions about the acceptability of wh-questions depending on the discourse status of the subject. Because a subject can be both a topic and a (contrastive) focus, the felicity of sentences such as (40a), for example, can be improved. That is, the FBC constraint predicts that the felicity of extraction out of a subject in wh-questions should improve when the subject is focalized. One way of focusing a subject in written materials is putting it in italics. This seems to make the question better (40b), as predicted by the FBC constraint.

(40)
a. *Of which car did [the driver _] cause a scandal? (Chomsky, 2008, 147)
b. Of which car did [the *driver* __] cause a scandal?

Another prediction of the FBC constraint is that questioning the complement of the subject will improve when the subject is not a sentence topic. This may explain some of the examples of extractions from subjects in wh-questions from the literature that have been suggested to be acceptable such as (41a). Some types of sentences (like *It rained.*) do not have a referential subject which can serve as a pre-established topic, and are usually considered as 'all focus' (Kuroda, 1976; Ladusaw, 1994), providing only new information. This may be the case in (41a,b), since the subject does not pass the 'speaking of' test (Kuno, 1976; Reinhart, 1981) for topichood (41c). In that case, the whole sentence is the focal domain ('a solution to x problem will never be found') and includes the subject. Hence, questioning the complement of such a subject may result in greater acceptability of (41a), compared to (41d).[21] In (41d,e), on the other hand, the subject is a topic and passes the 'speaking of' test (41f).

(41)
a. Which problem will [a solution to __] never be found ? (Chaves, 2013, 301)
b. A solution to this problem will never be found.
c. # Speaking of a solution to this problem, it will never be found.
d. # [Which car] did [the color of __] delight the football player?
e. The color of the car delighted the football player.
f. Speaking of the color of the car, it delighted the football player.

A further prediction of the FBC constraint concerns *it*-clefts like (42). In an it-cleft, the clefted element is put into focus, comparing it to other members of a set of alternatives (Prince, 1978). Thus the FBC constraint predicts that it-clefts should behave like wh-questions, and hence show a subject penalty. Thus this constraint predicts a contrast between (42a) and (42b) for English and (42c) and (42d) for French, such that extraction out of the backgrounded subject results in discourse infelicity. We find these judgments, but experimental work is needed to test them rigorously (Abeillé et al. 2019).

(42)
a. # It is this sportscar of which [the color __] delighted the football player.

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[21] Notice that (41a) is a case of P-stranding. As pointed out in detail in the discussion of Experiment 2 (Section 2.3), processing factors disfavor P-stranding out of subject (Kluender & Kutas, 1993, Van Valin, 1995, and Chaves, 2013, Chaves & Dery, 2019). If extraction of an NP from the subject is not expected and thus surprising, the noun *problem* in (41a) is a highly predicted complement of the noun *solution*, hence with low surprisal. The same may apply for the *disease/vaccine* pair in example (i). In our experimental materials, on the other hand (the cost of an apartment, the beauty of the flowers), we didn't use noun-complement collocations, with the consequence that the extracted noun would not predict the subject noun, resulting in lower acceptability in our materials.
(i) Which disease did [the vaccine for __] suddenly stop working? (Chaves & Dery, 2019, 483)

b. It is this sportscar of which the football player loved [the color __].
c. # C'est cette décapotable dont [la couleur __] enchante le footballeur.
it is this convertible of.which the color delights the football player
'It is this convertible of which the color delights the football player.'
d. C'est cette décapotable dont le footballeur adore [la couleur __].
it is this convertible of.which the football player loves the color
'It is this convertible of which the football player loves the color.'

It is worth noting that the FBC constraint as formulated is not specific to extraction, contrary to syntactic island constraints, and to Goldberg's constraint on backgrounded constructions (7). Thus it should have potentially interesting consequences independently of extraction. We consider here "focus" as foreground or new information, but it is related to prosodic "focus". Under "focus projection" theories (Selkirk, 1984, 1995), accenting an argument licenses accenting of its head, and accenting a head licenses accenting of the phrase. Under such a view, having an accented complement of a subject noun, which is by default unaccented, should be disfavored (43a). Accenting the whole subject (43b), the whole object (43c) or the complement of the object (43c), is fine. Clearly, experimental work is needed here to evaluate these predictions.

(43)
a. ? The color *of the blue car* delighted the football player.
b. *The color of the blue car* delighted the football player.
c. The football player loved *the color of the blue car.*
d. The football player loved the color *of the blue car.*

Importantly, because prosodic stress is gradient, we hypothesize that the FBC constraint is also likely to be gradient (Ambridge and Goldberg, 2008 also proposed that backgroundedness is gradient). Thus a gradient extension of (8)/(36) is presented in (44), although a gradient discourse model is outside the scope of this paper.

(44) The more focused an element, the more focused the constituent it is part of.

Thus, the more focused an element, the less acceptable it is as part of an unfocused / backgrounded constituent, and the more backgrounded a constituent is, the less it accepts a focused element. For example, this explains the contrast between (40a) and (40b): the subject 'the driver' is not stressed in (40a) and thus backgrounded, while it is stressed in (40b) hence less backgrounded: focussing the complement 'of which car' with a wh-question is thus easier in (40b) than in (40b).

On a more general note, our FBC constraint does not fall under the criticism of Hofmeister & Sag (2010, 406) who consider syntactic 'island' constraints 'arbitrary in the sense that they bear no relationship to other constraints, emanate from no general principles of language' and 'offer little insight into anything about language or cognition, except islands themselves.'

A remaining puzzle is how the FBC constraint might be acquired. We hypothesize that the knowledge underlying this constraint is general, applying not only in language, but also in other areas of cognition such as vision and social interaction where a distinction of foreground and background is relevant. The FBC constraint may be seen as an application of knowledge of the relationship between foreground and background more generally in terms of language. Thus the learning problem may fall outside of language.

5 Conclusions

Our experiments show that it may actually be easier to extract out of a subject than out of an object, contrary to previous theories of islands, either syntactic or functional, at least for PP extractions in relative clauses. We show that such extractions are sensitive to syntactic and non-syntactic factors such as the category of the extracted element (PP or NP) and the construction type (relative clause or wh-question). We found the same cross-construction difference in English and in French.

These results confirm the importance of testing syntactic hypotheses with controlled experiments (Kluender 1991; Gibson & Fedorenko, 2010, 2013). In this respect, it is important to test similar materials across languages, and across constructions, if one wants to draw conclusions on crosslinguistic or cross-construction variation. Of particular relevance here, Sprouse et al. (2016) noted a difference between Italian and English island structures, but the materials that were being compared were different: PP-extraction cases in Italian vs. P-stranded versions in English. When we compared more similar materials in French and English (all with PP-extraction), we found no relevant cross-language differences, and the results match the Italian results from Sprouse et al. (2016).

We conclude that the notion of *subject island* that would apply to any kind of subject and any kind of unbounded dependencies cannot be maintained. As a consequence, there is no need to posit a purely syntactic constraint on subjects, nor to complexify syntactic theory in order to derive such a constraint. The potential difficulties with extracting certain complements of certain subjects need other explanations. Taking inspiration from previous discourse-based approaches to island phenomena, we propose the focus-background conflict constraint, which constrains constructions whose meanings involve focused elements, such as wh-questions, but not relative clauses. If the constraint is based on the discourse status of the extracted element (new or focus in wh-questions, but not in relative clauses) and takes into account the discourse function of the construction, we claim that (a) it should be universal; and (b) it should apply to other focalizing constructions such as it-clefts.

More generally, we conclude that the attempt to explain constraints on extraction via syntactic principles may be on the wrong track, and that more general discourse coherence principles may explain the differences between constructions. Once the discourse function of these constructions is taken into account, these constraints may fall under more general cognitive principles and become learnable.

Acknowledgements

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Appendix A: Materials for Experiment 1

Non restrictive relatives, PP extraction

1. subject, PP-extracted
The company organized some activities, of which certain aspects may endanger their employees' health.
subject, insitu
The company organized some activities, certain aspects of which may endanger their employees' health.
subject, ungrammatical: missing "of"
The company organized some activities, which certain aspects may endanger their employees' health.
subject, noextraction:coordination
The company organized some activities, and certain aspects of the activities may endanger their employees' health.
object, PP-extracted
The company organized some activities, of which many employees may fear certain aspects for their health.
object, insitu
The company organized some activities, certain aspects of which many employees may fear for their health.
object, ungrammatical: missing "of"
The company organized some activities, which certain aspects many employees may fear for their health.
object, noextraction:coordination
The company organized some activities, and many employees may fear certain aspects of the activities for their health.

2. subject, PP-extracted
The newspaper unveiled a university ranking, of which the credibility concerned the teacher union intensely.
subject, insitu
The newspaper unveiled a university ranking, the credibility of which concerned the teacher union intensely.
subject, ungrammatical: missing "of"
The newspaper unveiled a university ranking, which the credibility concerned the teacher union intensely.
subject, coordination
The newspaper unveiled a university ranking, and the credibility of the ranking concerned the teacher union intensely.
object, PP-extracted
The newspaper unveiled a university ranking, of which the teacher union had questioned the credibility intensely.
object, insitu
The newspaper unveiled a university ranking, the credibility of which the teacher union had questioned intensely.
object, ungrammatical: missing "of"
The newspaper unveiled a university ranking, which the credibility the teacher union had questioned intensely.
object, no extraction:coordination
The newspaper unveiled a university ranking, and the teacher union had questioned the credibility of the ranking intensely.

3. subject, PP-extracted
We walked through a desert, of which the splendor bewitched my children at every step.
object, PP-extracted
We walked through a desert, of which my children enjoyed the splendor at every step.

4. subject, PP-extracted
The realtor showed an apartment, of which the price surprised the young couple because it was so high.
object, extracted
The realtor showed an apartment, of which the young couple disliked the price because it was so high.

5. subject, PP-extracted
The administrator assigned an office, of which the size disappointed the new employee because it was smaller than a closet.
object, PP-extracted
The administrator assigned an office, of which the employee disliked the size because it was smaller than a closet.

6. subject, PP-extracted
The florist arranged some flowers, of which the beauty delighted many attendees at the funeral procession.
object, PP-extracted
The florist arranged some flowers, of which many attendees admired the beauty at the funeral procession.

7. subject, PP-extracted
The archeologist arrived at a pyramid, of which the height impressed all visiting kings in ancient times.
object, PP-extracted
The archeologist arrived at a pyramid, of which all visiting kings admired the height in ancient times.

8. subject, extracted
The dealer sold a sportscar, of which the color delighted the baseball player because of its surprising luminance.
object, extracted
The dealer sold a sportscar, of which the baseball player loved the color because of its surprising luminance.

9. subject, PP-extracted
The customers ordered a meat dish, of which the smell disgusted the new waiter because he was a vegetarian.
object, extracted
The customers ordered a meat dish, of which the new waiter hated the smell because he was a vegetarian.

10. subject, PP-extracted
The building design included a window frame, of which the shape confounded the contractor because of its irregularity.
object, PP-extracted
The building design included a window frame, of which the contractor disliked the shape because of its irregularity.

11. subject, PP-extracted
UPS delivered a shipment, of which the weight shocked the truck driver because it didn't look like much initially.
object, PP-extracted
UPS delivered a shipment, of which the truck driver underestimated the weight because it didn't look like much initially.

12. subject, PP-extracted
Google presented an innovation, of which the originality amazed my colleagues for no reason.
object, PP-extracted
Google presented an innovation, of which my colleagues applauded the originality for no reason.

13. subject, PP-extracted
The tour group walked beside a canyon, of which the depth impressed the guide when he dropped a rock into it.
object, PP-extracted
The tour group walked beside a canyon, of which the guide probed the depth when he dropped a rock into it.

14. subject, PP-extracted
The construction workers built a scaffolding, of which the stability concerned the homeowners until the supervisor demonstrated that it was safe.
object, PP-extracted
The construction workers built a scaffolding, of which the homeowners questioned the stability until the supervisor demonstrated that it was safe.

15. subject, PP-extracted
The gardner cultivated some flowers, of which the color pleases the older residents especially in the morning.
object, extracted
The gardner cultivated some flowers, of which the older residents loved the color especially in the morning.

16. subject, PP-extracted
The contractor tried to restore a building, of which the fragility terrified the neighbors because they could see it was close to collapsing.
object, PP-extracted

The contractor tried to restore a building, of which the neighbors sensed the fragility because they could see it was close to collapsing.

17. subject, PP-extracted
The real estate agent advertised a condo, of which the cost worried the first-time buyers because they had a limited income.
object, PP-extracted
The real estate agent advertised a condo, of which the first-time buyers criticized the cost because they had a limited income.

18. subject, PP-extracted
The nineteenth-century baker invented a recipe, of which the simplicity enchanted many apprentices for decades.
object, PP-extracted
The nineteenth-century baker invented a recipe, of which many apprentices appreciated the simplicity for decades.

19. subject, PP-extracted
The politician told a story, of which the charm astonished his political opponents because he was usually confused when he spoke.
object, PP-extracted
The politician told a story, of which his political opponents appreciated the charm because he was usually confused when he spoke.

20. subject, PP-extracted
The Chinese developed a missile, of which the precision worried the Koreans after the unsuccessful talks.
object, PP-extracted
The Chinese developed a missile, of which the Koreans feared the precision after the unsuccessful talks.

21. subject, PP-extracted
The company hosted a reception, of which the magnificence impressed the media on the local news.
object, PP-extracted
The company hosted a reception, of which the local media discussed the magnificence on the local news.

22. subject, PP-extracted
The explorers discovered a diamond, of which the clarity dazzled the traders because of its brilliance.
object, PP-extracted
The explorers discovered a diamond, of which the traders admired the clarity because of its brilliance.

23. subject, PP-extracted
The doctors ran a private practice, of which the cleanliness impressed the clients when they entered the room.
object, PP-extracted
The doctors ran a private practice, of which the clients noticed the cleanliness when they entered the room.

24. subject, PP-extracted
The secretary examined some files, of which the neatness impressed the lawyers during the case.
object, PP-extracted
The secretary examined some files, of which the lawyers appreciated the neatness during the case.

Appendix B

Experiment B1: Restrictive relative clauses: Extracting a PP complement out of an NP subject

The results of Experiment 1 show that relative clause extraction of a full PP is easier to process for extraction out of subjects than out of objects. The RC materials in Experiment 1 all involved non-restrictive RCs. In Experiment B1, we investigated restrictive RC variants materials, with no commas setting off the RCs.

Design and materials

Experiment B1 investigated restrictive RC variants of the materials in Experiment 1, in which the head noun was definite (e.g., "the sportscar" in (b1)), with no comma setting off the relative clause.

(b1)
a. subject, PP-extracted
The dealer sold the sportscar of which the color delighted the baseball player because of its surprising luminance.
b. subject, NP+PP-extracted
The dealer sold the sportscar the color of which delighted the baseball player because of its surprising luminance.
c. subject, no extraction: coordination
The dealer sold the sportscar and the color of the sportscar delighted the baseball player because of its surprising luminance.
d. subject, ungrammatical: missing "of"
The dealer sold the sportscar which the color delighted the baseball player because of its surprising luminance.
e. object, PP-extracted
The dealer sold the sportscar of which the baseball player loved the color because of its surprising luminance.
f. object, NP+PP-extracted
The dealer sold the sportscar the color of which the baseball player loved because of its surprising luminance.
g. object, no extraction: coordination
The dealer sold the sportscar and the baseball player loved the color of the sportscar because of its surprising luminance.
h. object, ungrammatical: missing "of"
The dealer sold the sportscar which the color the baseball player loved because of its surprising luminance.

There was a yes-no question following each trial. For example, for (2), the question was "*Did the baseball player like the color of the sportscar?*". In addition to 24 target materials, there were 24 distractor items in the survey, together with 20 items from an unrelated experiment, all of similar length and complexity as the target sentences.

Procedure

The procedure was the same acceptability rating procedure as described for Experiment 1.

Participants

We posted surveys for 128 workers on Amazon.com's Mechanical Turk using the Turkolizer software from Gibson et al. (2011).[22] All participants were paid for their participation.

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[22] We ran a preliminary version of this survey with 32 participants, and observed that the effect size seemed smaller than for the materials in Experiment 1, so we ran twice as many participants in Experiment B1.

Participants were asked to indicate their native language, but payment was not contingent on their responses to this question.

Results

Only data from native English speakers from the United States were analyzed. We also excluded participants with less than 75% accuracy on the questions. These two exclusion criteria left data from 110 participants in Experiment B1 that we used in the analyses below. Figure B1 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data, based on the standard error of the condition mean as estimated by the regression.

We first performed a t-test comparing the subject and object extractions on their own. Subject-extractions were rated as reliably more acceptable than object-extractions ($\beta = 0.13$; SE = .06; t = 2.15; p = .044). Three 2x2 analyses were also conducted on these data. For each of these, we fit a mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants) from sum-coded data for each of the two factors.
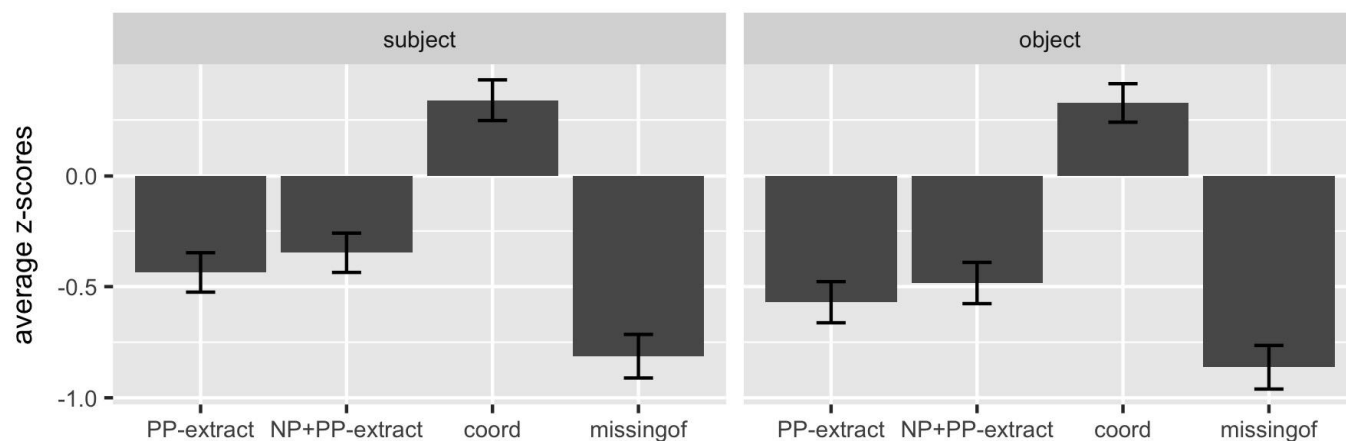

Figure B1: Condition means and 95% confidence intervals for z-scores of all conditions Experiment B1, based on the standard error of the condition mean as estimated by the regression.

In the first 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for extraction-site (subject, object) crossed with extraction (PP, NP+PP). The results of the model are summarized in Table B1. We observed a main effect of site, such that subjects were rated better than objects, but no other reliable effects.

	β	SE	t	df	p
(Intercept)	-0.46	0.05	10.01	35.76	<.0001
Grammatical function (subject, object)	0.13	0.05	2.80	61.47	.007
Extraction-type (PP-extracted, NP+PP-extracted)	-0.09	0.07	-1.24	45.38	0.221

	β	SE	t	df	p
Gram-Func:Extract-type	0.01	0.09	0.09	41.94	0.928

Table B1: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment B1, extraction-site (subject, object) crossed with extraction-type (PP-extracted, NP+PP-extracted).

In the second 2x2 analysis of Experiment B1, we fit a model predicting z-transformed acceptability ratings for extraction-site (subject, object) crossed with extraction (extracted, coordination).[23] The results of the model are summarized in Table B2. We observed a main effect of extraction-type such that the coordinate structures were rated better than the extraction structures, but no other effects were reliable.

	β	SE	t	df	p
(Intercept)	-0.08	0.05	-1.80	25.16	0.083
Grammatical function (subject, object)	0.08	0.06	1.36	28.86	0.184
Extraction-type (extracted, coord)	-0.84	0.08	-10.64	23.35	<.0001
Gram-Func:Extract-type	0.12	0.10	1.14	28.73	0.263

Table B2: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment B1, extraction-site (subject, object) crossed with extraction (extracted, coordination).

In the third 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for extraction-site (subject, object) crossed with grammaticality (extracted, ungrammatical). The results of the model are summarized in Table B3. We observed a main effect of grammaticality such that the grammatical structures (the extractions) were rated better than the ungrammatical structures (with the missing word). There were no other reliable effects.

	β	SE	t	df	p
(Intercept)	-0.67	0.06	-12.1	52.84	<.0001
Grammatical function (subject, object)	0.09	0.06	1.67	31.95	.105
Extraction-type (extracted, ungrammatical)	0.34	0.05	6.47	69.47	<.0001
Gram-Func:Extract-type	0.08	0.09	0.83	24.75	0.412

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[23]   This model did not converge with slopes for interaction terms, so those were removed.

Table B2: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment B1, extraction-site (subject, object) crossed with grammaticality (extracted, ungrammatical).

Discussion

The results from Experiment B1 are similar to those from Experiment 1, in that extractions from subjects are rated better than extractions from objects. Overall, the ratings of the restrictive RCs were lower than for the non-restrictive RCs in Experiment 1 (especially the NP+PP extracted RCs) but the NP+PP extracted RCs were rated as much better than the ungrammatical controls, and not as well as the coordination structures, similar to Experiment 1. Like Experiments 1 and 2, these results offer no support for the traditional syntactic island proposal regarding extractions from subjects.

Appendix C

Experiment C1: Non-restrictive relative clauses: Extracting an NP complement out of an NP subject, stranding a preposition

Previous investigations of the acceptability of materials with phrases extracted from a subject NP always stranded the preposition in English (Polinsky et al. 2013, Sprouse et al. 2016). We therefore examined the effect of preposition stranding on our materials from Experiment 1.

This experiment was actually run before Experiment 2 was run, which also investigated extractions from subjects with stranded prepositions. The results here are very similar to the results from Experiment 2. We report these results for completeness.

Design and materials

Experiment C1 investigated non-restrictive RC materials like those in Experiment 1, but where the extracted conditions involved extracted NPs with stranded prepositions, as in (c1-a) and (c1-e):

(c1)
a. subject, P-stranded
The dealer sold a sportscar, which the color of delighted the baseball player because of its surprising luminance.
b. subject, in-situ
The dealer sold a sportscar, the color of which delighted the baseball player because of its surprising luminance.
c. subject, noextraction:coordination
The dealer sold a sportscar, and the color of the sportscar delighted the baseball player because of its surprising luminance.
d. subject, ungrammatical: missing "of"
The dealer sold a sportscar, which the color delighted the baseball player because of its surprising luminance.
e. object, P-stranded
The dealer sold a sportscar, which the baseball player loved the color of because of its surprising luminance.
f. object, in-situ
The dealer sold a sportscar, the color of which the baseball player loved because of its surprising luminance.
g. object, noextraction:coordination
The dealer sold a sportscar, and the baseball player loved the color of the sportscar because of its surprising luminance.
h. object, ungrammatical: missing "of"
The dealer sold a sportscar, which the color the baseball player loved because of its surprising luminance.

The same yes-no questions and distractor items were included in this experiment as in Experiment 1.

Procedure

The procedure was the same acceptability rating procedure as for Experiments 1 and 2.

Participants

We posted surveys for 64 workers on Amazon.com's Mechanical Turk using the Turkolizer software from Gibson et al. (2011). All participants were paid for their participation. Participants were asked to indicate their native language, but payment was not contingent on their responses to this question.

Results

Only data from native English speakers from the United States were analyzed. We also excluded participants with less than 75% accuracy on the questions. These two exclusion criteria left data from 58 participants in Experiment C1 that we used in the analyses below. Figure C1 depicts condition means and 95% confidence intervals for z-scores of all conditions for the remaining data, based on the standard error of the condition mean as estimated by the regression.

We first performed a t-test comparing the subject and object extractions on their own. Object-extractions were rated as reliably more acceptable than subject-extractions ($\beta = 0.47$; SE = .09; t = 5.10; p < .001). Three 2x2 analyses were also conducted on these data. For each of these, we fit a mixed-effects linear model predicting z-transformed acceptability ratings (means and standard deviations estimated within participants) from sum-coded data for each of the two factors.
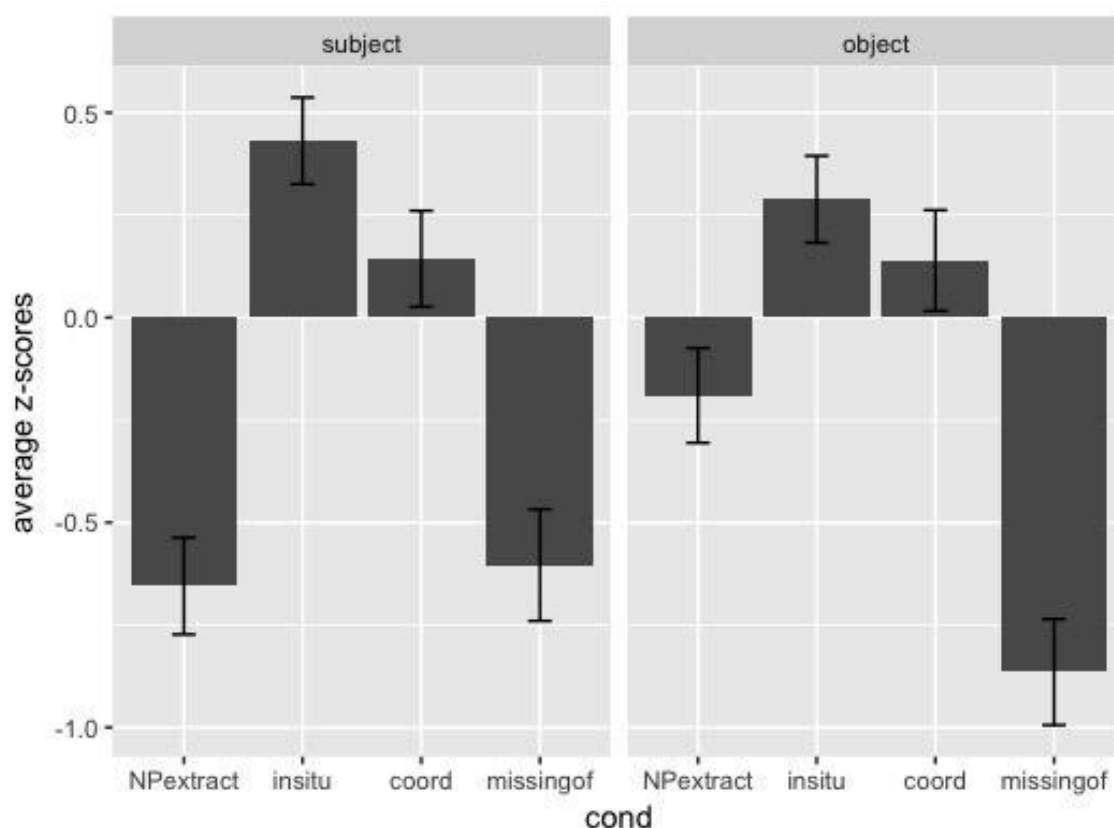

Figure C1: Condition means and 95% confidence intervals for z-scores of all conditions Experiment C1, based on the standard error of the condition mean as estimated by the regression.

In the first 2x2 analysis of Experiment C1, we fit a model predicting z-transformed acceptability ratings for extraction-site (subject, object) crossed with extraction (PP, NP+PP). The results of the model are summarized in Table C1. We observed a main effect of extraction-type such that the NP+PP structures were rated better than the PP extraction structures, a main effect of extraction, such that object-extractions were rated as better than subject-extractions, and an interaction, such that this effect was strongest in the subject-extracted conditions.

	β	SE	t	df	p
(Intercept)	-0.03	0.05	-.64	30.25	.524
Grammatical function(subject, object)	-0.16	0.07	-2.19	23.24	.039
Extraction-type (extracted PP, extracted NP+PP)	-0.78	0.08	-10.26	38.27	<.0001
Gram-Func:Extract-type	-0.61	0.12	-5.00	31.74	<.0001

Table C1: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 1 of Experiment C1, extraction-site (subject, object) crossed with extraction (PP, NP+PP).

In the second 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for extraction-site (subject, object) crossed with extraction (extracted, coordination). The results of the model are summarized in Table C2. We observed a main effect of extraction type such that the coordinate structures were rated better than the extraction structures; a main effect of extraction site, such that object-extractions were rated better than subject-extractions, and an interaction between the two, such that the subject-extraction was rated as much worse than the other three conditions.

	β	SE	t	df	p
(Intercept)	-0.14	0.05	-2.71	26.86	.012
Grammatical function (subject, object)	-0.24	0.08	-2.84	23.39	.009
Extraction-type (extracted, in-situ)	-0.55	0.07	-7.88	24.09	<.0001
Gram-Func:Extract-type	-0.46	0.12	-3.72	51.20	<.0001

Table C2: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment C1, grammatical function (subject, object) crossed with extraction (extracted, coordination).

In the third 2x2 analysis, we fit a model predicting z-transformed acceptability ratings for grammatical function (subject, object) crossed with grammaticality (extracted, ungrammatical). The results of the model are summarized in Table C3. We observed a main effect of grammaticality such that the grammatical structures (the extractions) were rated better than the ungrammatical structures (with the missing word), and an interaction between extraction-site and grammaticality, such that the grammatical object-extraction was rated as much better than the other three conditions.

	β	SE	t	df	p
(Intercept)	-0.58	0.06	-10.3	44.68	<.0001
Grammatical function (subject, object)	-0.10	0.07	-1.39	30.64	.175
Extraction-type (extracted, ungrammatical)	0.32	0.08	4.01	28.24	.0005
Gram-Func:Extract-type	-0.73	0.13	-5.69	48.32	<.0001

Table C3: Regression coefficients, standard errors, and t values for z-transformed ratings in analysis 2 of Experiment C1, grammatical function(subject, object) crossed with grammaticality (extracted, ungrammatical).

Discussion

The results of this experiment show that extractions from objects are preferred to extractions from subjects in relative clauses when the extracted element is an NP, stranding a preposition behind.

Appendix D: Materials for Experiment 2

1.
subj_extractedPP: Of which activities did certain aspects endanger the employees' health?
subj_extractedNP: Which activities did certain aspects of endanger the employees' health?
subj_noextract: Did certain aspects of the company's activities endanger the employees' health?
subj_ ungrammatical:missingof: Which activities did certain aspects endanger the employees' health?
obj_extractedPP: Of which activities did many employees fear certain aspects for their health?
obj_extractedNP: Which activities did many employees fear certain aspects of for their health?
obj_noextract: Did many employees fear certain aspects of the company's activities for their health?
obj_ungrammatical:missingof: Which activities did many employees fear certain aspects for their health?

2.
subj_extractedPP: Of which university ranking did the credibility concern the teacher union intensely?
subj_extractedNP: Which university ranking did the credibility of concern the teacher union intensely?
subj_noextract: Did the credibility of the university ranking concern the teacher union intensely?
subj_ ungrammatical:missingof: Which university ranking did the credibility concern the teacher union intensely?
obj_extractedPP: Of which university ranking did the teacher union question the credibility intensely?
obj_extractedNP: Which university ranking did the teacher union question the credibility of intensely?
obj_noextract: Did the teacher union question the credibility of the university ranking intensely?
obj_ ungrammatical:missingof: Which university ranking did the teacher union question the credibility intensely?

3.
subj_extractedPP: Of which desert did the splendor bewitch my children at every step?
obj_extractedPP: Of which desert did my children enjoy the splendor at every step?

4.
subj_extractedPP: Of which apartment did the price surprise the young couple because it was so high?
obj_extractedPP: Of which apartment did the young couple dislike the price because it was so high?

5.
subj_extractedPP: Of which office did the size disappoint the new employee because it was smaller than a closet?
obj_extractedPP: Of which office did the employee dislike the size because it was smaller than a closet?

6.
subj_extractedPP: Of which flowers did the beauty delight many attendees at the funeral procession?
obj_extractedPP: Of which flowers did many attendees admire the beauty at the funeral procession?

7.
subj_extractedPP: Of which pyramid did the height impress all visiting kings in ancient times?
obj_extractedPP: Of which pyramid did all visiting kings admire the height in ancient times?

8.
subj_extractedPP: Of which sportscar did the color delight the baseball player because of its surprising luminance?
obj_extractedPP: Of which sportscar did the baseball player love the color because of its surprising luminance?

9.
subj_extractedPP: Of which meat dish did the smell disgust the new waiter because he was a vegetarian?
obj_extractedPP: Of which meat dish did the new waiter hate the smell because he was a vegetarian?

10.
subj_extractedPP: Of which window frame did the shape confound the contractor because of its irregularity?
obj_extractedPP: Of which window frame did the contractor dislike the shape because of its irregularity?

11.

subj_extractedPP: Of which shipment did the weight shock the truck driver because it didn't look like much initially?
obj_extractedPP: Of which shipment did the truck driver underestimate the weight because it didn't look like much initially?

12.
subj_extractedPP: Of which innovation did the originality amaze my colleagues for no reason?
obj_extractedPP: Of which innovation did my colleagues applaud the originality for no reason?

13.
subj_extractedPP: Of which canyon did the depth impress the guide when he dropped a rock into it?
obj_extractedPP: Of which canyon did the guide probe the depth when he dropped a rock into it?

14.
subj_extractedPP: Of which scaffolding did the stability concern the homeowners until the supervisor demonstrated that it was safe?
obj_extractedPP: Of which scaffolding did the homeowners question the stability until the supervisor demonstrated that it was safe?

15.
subj_extractedPP: Of which flowers did the color please the older residents especially in the morning?
obj_extractedPP: Of which flowers did the older residents love the color especially in the morning?

16.
subj_extractedPP: Of which building did the fragility terrify the neighbors because they could see it was close to collapsing?
obj_extractedPP: Of which building did the neighbors sense the fragility because they could see it was close to collapsing?

17.
subj_extractedPP: Of which condo did the cost worry the first-time buyers because they had a limited income?
obj_extractedPP: Of which condo did the first-time buyers criticize the cost because they had a limited income?

18.
subj_extractedPP: Of which recipe did the simplicity enchant many apprentices for decades?
obj_extractedPP: Of which recipe did many apprentices appreciate the simplicity for decades?

19.
subj_extractedPP: Of which story did the charm astonish the audience because the novice politician was usually confused when he spoke?
obj_extractedPP: Of which story did the audience appreciate the charm because the novice politician was usually confused when he spoke?

20.
subj_extractedPP: Of which missile did the precision worry the Koreans after the unsuccessful talks?
obj_extractedPP: Of which missile did the Koreans fear the precision after the unsuccessful talks?

21.
subj_extractedPP: Of which company reception did the magnificence impress the media on the local news?
obj_extractedPP: Of which company reception did the local media discuss the magnificence on the local news?

22.
subj_extractedPP: Of which diamond did the clarity dazzle the traders because of its brilliance?
obj_extractedPP: Of which diamond did the traders admire the clarity because of its brilliance?

23.
subj_extractedPP: Of which private practice did the cleanliness impress the clients when they entered the room?
obj_extractedPP: Of which private practice did the clients notice the cleanliness when they entered the room?

24.

subj_extractedPP: Of which files did the neatness impress the lawyers during the case?
obj_extractedPP: Of which files did the lawyers appreciate the neatness during the case?

Appendix E: Materials for Experiment 3 (French)

1.
subj_extractedPP: L'entreprise organise des activités dont certains aspects menacent la santé des employés.
subj_noextract:coordination: L'entreprise organise des activités, et certains de leurs aspects menacent la santé des employés.
subj_ungrammatical :que: L'entreprise organise des activités que certains aspects menacent la santé des employés.
obj_extractedPP: L'entreprise organise des activités dont les employés craignent certains aspects pour leur santé.
obj_noextract:coordination: L'entreprise organise des activités, et les employés craignent certains de leurs aspects pour leur santé.
obj_ungrammatical:que: L'entreprise organise des activités que les employés craignent certains aspects pour leur santé.

2.
subj_extractedPP: Les journaux annoncent un classement dont l'impact inquiète les enseignants pour leur université.
subj_noextract:coordination : Les journaux annoncent un classement, et son impact inquiète les enseignants pour leur université.
subj_que: Les journaux annoncent un classement que l'impact inquiète les enseignants pour leur université.
obj_extractedPP: Les journaux annoncent un classement dont les enseignants redoutent l'impact pour leur université.
obj_noextract: Les journaux annoncent un classement, et les enseignants redoutent son impact pour leur université.
obj_ungrammatical :que: Les journaux annoncent un classement que les enseignants redoutent l'impact pour leur université.

3.
subj_extractedPP: Nous traversons un désert dont la splendeur émerveille mes enfants à chaque pas.
obj_extractedPP: Nous traversons un désert dont mes enfants apprécient la splendeur à chaque pas.

4.
subj_extractedPP: L'agent immobilier présente un appartement dont le prix surprend le jeune couple, parce qu'il est bien trop élevé.
obj_extractedPP: L'agent immobilier présente un appartement dont le jeune couple discute le prix, parce qu'il est bien trop élevé.

5.
subj_extractedPP: Le directeur a aménagé un bureau dont la taille déçoit le nouvel employé, parce qu'il ressemble à un placard.
obj_extractedPP: Le directeur a aménagé un bureau dont le nouvel employé critique la taille, parce qu'il ressemble à un placard.

6.
subj_extractedPP: Il y a des fleurs dont la beauté réconforte la famille pendant l'enterrement.
obj_extractedPP: Il y a des fleurs dont la famille admire la beauté pendant l'enterrement.

7.
subj_extractedPP: On arrive alors au pied d'une pyramide dont la hauteur impressionne les visiteurs pendant leur voyage.
obj_extractedPP: On arrive alors au pied d'une pyramide dont les visiteurs admirent la hauteur pendant leur voyage.

8.
subj_extractedPP: Le concessionnaire a une décapotable dont la couleur enchante le footballeur à cause de sa luminosité .
obj_extractedPP: Le concessionnaire a une décapotable dont le footballeur adore la couleur à cause de sa luminosité.

9.

subj_extractedPP: Le client commande une grillade dont l'odeur indispose le nouveau serveur, parce qu'il est végétarien.
obj_extractedPP: Le client commande une grillade dont le nouveau serveur déteste l'odeur, parce qu'il est végétarien.

10.
subj_extractedPP: L'architecte a conçu une fenêtre dont la forme trouble le maçon, parce qu'elle n'est pas parfaitement symétrique.
obj_extractedPP: L'architecte a conçu une fenêtre dont le maçon désapprouve la forme, parce qu'elle n'est pas parfaitement symétrique.

11.
subj_extractedPP: Chronopost m'apporte un colis dont le poids étonne le livreur, parce qu'il ne lui semblait pas si lourd.
obj_extractedPP: Chronopost m'apporte un colis dont le livreur sous-estime le poids, parce qu'il ne lui semblait pas si lourd.

12.
subj_extractedPP: Google présente une innovation dont l'originalité enthousiasme mes collègues sans aucune raison.
obj_extractedPP: Google présente une innovation dont mes collègues admirent l'originalité sans aucune raison.

13.
subj_extractedPP: Les randonneurs longent un canyon dont la profondeur effraye le guide, lorsqu'il y jette une pierre.
obj_extractedPP: Les randonneurs longent un canyon dont le guide déplore la profondeur, lorsqu'il y jette une pierre.

14.
subj_extractedPP: Les ouvriers installent un échafaudage dont l'instabilité angoisse les propriétaires, malgré le discours rassurant de l'entrepreneur.
obj_extractedPP: Les ouvriers installent un échafaudage dont les propriétaires désapprouvent l'instabilité, malgré le discours rassurant de l'entrepreneur.

15.
subj_extractedPP: Le jardinier fait pousser des fleurs dont la couleur charme les vieilles dames durant leur promenade matinale.
obj_extractedPP: Le jardinier fait pousser des fleurs dont les vieilles dames aiment la couleur durant leur promenade matinale.

16.
subj_extractedPP: L'entrepreneur essaye de réparer un mur dont la fragilité terrifie les voisins, parce qu'il menace de s'écrouler.
obj_extractedPP: L'entrepreneur essaye de réparer un mur dont les voisins constatent la fragilité, parce qu'il menace de s'écrouler.

17.
subj_extractedPP: Le promoteur propose un studio dont le coût affole les jeunes acheteurs, car ils ont un revenu limité.
obj_extractedPP: Le promoteur propose un studio dont les jeunes acheteurs critiquent le coût, car ils ont un revenu limité.

18.
subj_extractedPP: Un célèbre pâtissier a mis au point une recette dont la simplicité ravit les apprentis depuis des générations.
obj_extractedPP: Un célèbre pâtissier a mis au point une recette dont les apprentis aiment la simplicité depuis des générations.

19.

subj_extractedPP: Le nouvel élu raconte une histoire dont le charme séduit le public, alors qu'on ne l'a jamais entendu parler aussi bien pendant la campagne.

obj_extractedPP: Le nouvel élu raconte une histoire dont le public savoure le charme, alors qu'on ne l'a jamais entendu parler aussi bien pendant la campagne.

20.
subj_extractedPP: Les Chinois construisent un missile dont la précision alarme les Coréens, après l'échec des négociations de paix.

obj_extractedPP: Les Chinois construisent un missile dont les Coréens craignent la précision, après l'échec des négociations de paix.

21.
subj_extractedPP: L'entreprise organise une réception dont la magnificence éblouit les journalistes comme prévu.

obj_extractedPP: L'entreprise organise une réception dont les journalistes commentent la magnificence comme prévu.

22.
subj_extractedPP: On apporte un diamant dont la pureté fascine le marchand, parce qu'il brille de mille feux.
obj_extractedPP: On apporte un diamant dont le marchand admet la pureté, parce qu'il brille de mille feux.

23.
subj_extractedPP: Le docteur a un cabinet dont la propreté rassure les patients quand ils entrent.
obj_extractedPP: Le docteur a un cabinet dont les patients remarquent la propreté quand ils entrent.

24.
subj_extractedPP: Le nouvel assistant prépare des dossiers dont la clarté rassure l'avocat pendant le procès.
obj_extractedPP: Le nouvel assistant prépare des dossiers dont les avocats apprécient la clarté pendant le procès.

Appendix F: Materials for Experiment 4 (French)

1.
subj_extractedPP: De quelles activités est-ce que certains aspects menacent la santé des employés?
subj_noextract: Est-ce que certains aspects des activités de l'entreprise menacent la santé des employés?
subj_ungrammatical :missingde: Quelles activités est-ce que certains aspects menacent la santé des employés?
obj_extractedPP: De quelles activités est-ce que les employés craignent certains aspects pour leur santé?
obj_noextract: Est-ce que les employés craignent certains aspects des activités de l'entreprise pour leur santé?
obj_ungrammatical :missingde: Quelles activités est-ce que les employés craignent certains aspects pour leur santé?

2.
subj_extractedPP: De quel classement est-ce que l'impact inquiète les enseignants pour leur université?
subj_noextract: Est-ce que l'impact du classement inquiète les enseignants pour leur université?
subj_ ungrammatical :missingde: Quel classement est-ce que l'impact inquiète les enseignants pour leur université?
obj_extractedPP: De quel classement est-ce que les enseignants redoutent l'impact pour leur université?
obj_noextract: Est-ce que les enseignants redoutent l'impact du classement pour leur université?
obj_ ungrammatical :missingde: Quel classement est-ce que les enseignants redoutent l'impact pour leur université?

3.
subj_extractedPP: De quel désert est-ce que la splendeur émerveille mes enfants à chaque pas?
obj_extractedPP: De quel désert est-ce que mes enfants apprécient la splendeur à chaque pas?

4.
subj_extractedPP: De quel appartement est-ce que le prix surprend le jeune couple, parce qu'il est bien trop élevé?
obj_extractedPP: De quel appartement est-ce que le jeune couple discute le prix, parce qu'il est bien trop élevé?

5.
subj_extractedPP: De quel bureau est-ce que la taille déçoit le nouvel employé, parce qu'il ressemble à un placard?
obj_extractedPP: De quel bureau est-ce que le nouvel employé critique la taille, parce qu'il ressemble à un placard?

6.
subj_extractedPP: De quelles fleurs est-ce que la beauté réconforte la famille pendant l'enterrement?
obj_extractedPP: De quelles fleurs est-ce que la famille admire la beauté pendant l'enterrement?

7.
subj_extractedPP: De quelles pyramides est-ce que la hauteur impressionne les visiteurs pendant leur voyage?
obj_extractedPP: De quelles pyramides est-ce que les visiteurs admirent la hauteur pendant leur voyage?

8.
subj_extractedPP: De quelle décapotable est-ce que la couleur enchante le footballeur à cause de sa luminosité?
obj_extractedPP: De quelle décapotable est-ce que le footballeur adore la couleur à cause de sa luminosité?

9.
subj_extractedPP: De quelle viande est-ce que l'odeur indispose le nouveau serveur, parce qu'il est végétarien?
obj_extractedPP: De quelle viande est-ce que le nouveau serveur déteste l'odeur, parce qu'il est végétarien?

10.
subj_extractedPP: De quelle fenêtre est-ce que la forme trouble le maçon, parce qu'elle n'est pas parfaitement symétrique?
obj_extractedPP: De quelle fenêtre est-ce que le maçon désapprouve la forme, parce qu'elle n'est pas parfaitement symétrique?

11.
subj_extractedPP: De quel colis est-ce que le poids étonne le livreur, parce qu'il ne semblait pas si lourd?

obj_extractedPP: De quel colis est-ce que le livreur sous-estime le poids, parce qu'il ne semblait pas si lourd?

12.
subj_extractedPP: De quelle innovation est-ce que l'originalité enthousiasme mes collègues sans aucune raison?
obj_extractedPP: De quelle innovation est-ce que mes collègues admirent l'originalité sans aucune raison?

13.
subj_extractedPP: De quel canyon est-ce que la profondeur effraye le guide, lorsqu'il y jette une pierre?
obj_extractedPP: De quel canyon est-ce que le guide déplore la profondeur, lorsqu'il y jette une pierre?

14.
subj_extractedPP: De quel échafaudage est-ce que l'instabilité angoisse les propriétaires, malgré le discours rassurant de l'entrepreneur?
obj_extractedPP: De quel échafaudage est-ce que les propriétaires désapprouvent l'instabilité, malgré le discours rassurant de l'entrepreneur?

15.
subj_extractedPP: De quelle fleur est-ce que la couleur charme les vieilles dames durant leur promenade matinale?
obj_extractedPP: De quelle fleur est-ce que les vieilles dames aiment la couleur durant leur promenade matinale?

16.
subj_extractedPP: De quel bâtiment est-ce que la fragilité terrifie les voisins, parce qu'il menace de s'écrouler?
obj_extractedPP: De quel bâtiment est-ce que les voisins constatent la fragilité, parce qu'il menace de s'écrouler?

17.
subj_extractedPP: De quel studio est-ce que le coût affole les jeunes acheteurs, car ils ont un revenu limité?
obj_extractedPP: De quel studio est-ce que les jeunes acheteurs critiquent le coût, car ils ont un revenu limité?

18.
subj_extractedPP: De quelle recette est-ce que la simplicité ravit les apprentis depuis des générations?
obj_extractedPP: De quelle recette est-ce que les apprentis aiment la simplicité depuis des générations?

19.
subj_extractedPP: De quelle histoire est-ce que le charme séduit le public lors du discours du nouvel élu?
obj_extractedPP: De quelle histoire est-ce que le public savoure le charme lors du discours du nouvel élu?

20.
subj_extractedPP: De quels missiles est-ce que la précision alarme les coréens après l'échec des négociations de paix?
obj_extractedPP: De quels missiles est-ce que les coréens craignent la précision après l'échec des négociations de paix?

21.
subj_extractedPP: De quelle réception est-ce que la magnificence éblouit les journalistes comme prévu?
obj_extractedPP: De quelle réception est-ce que les journalistes commentent la magnificence comme prévu?

22.
subj_extractedPP: De quel diamant est-ce que la pureté fascine le marchand, parce qu'il brille de mille feux?
obj_extractedPP: De quel diamant est-ce que le marchand admet la pureté, parce qu'il brille de mille feux?

23.
subj_extractedPP: De quel cabinet médical est-ce que la propreté rassure les patients quand ils entrent?
obj_extractedPP: De quel cabinet médical est-ce que les patients remarquent la propreté quand ils entrent?

24.
subj_extractedPP: De quels dossiers est-ce que la clarté rassure les avocats pendant le procès?
obj_extractedPP: De quels dossiers est-ce que les avocats apprécient la clarté pendant le procès?