

**On the interpretation and processing of exhaustivity:
Evidence of variation in English and French clefts**

Emilie Destruel & Joseph DeVeugh-Geiss
University of Iowa, University of Potsdam

Abstract

One outstanding issue in the analysis of the meaning of clefts concerns the source of the exhaustive inference they convey. Conventionally-coded semantic accounts predict that this inference is robust and will arise regardless of contextual variation while allowing for cross-linguistic variation. On the contrary, non-conventionally-coded pragmatic accounts predict exhaustivity to be more variable within a language, including cases where it can be cancelled, although (potentially) the inference will be more stable across languages. This article presents an original empirical perspective on the debate by looking both at the interpretative and the processing properties of English compared to French clefts. The combination of offline and online measures reported here show crucial and surprising differences within and across the two languages, findings which are unexpected under all current theories of clefts' meaning. We discuss a preliminary sketch for an analysis, which proposes that the differences between French and English are due to the way the existential presupposition derived from the cleft structure interacts with context (cf. Pollard & Yasavul, in press; De Veugh-Geiss et al., 2018)

Keywords: French; English; Clefts; Exhaustive inference; Existence presupposition; Response times.

1 Introduction

In English, in addition to asserting the proposition (2a) and carrying an existential presupposition (2b), the focus-background *it*-cleft in (1) also triggers an exhaustive inference such that the pivot is interpreted as if under the scope of an exclusive particle (2c).

- (1) It is a baby who is shaking a rattle.
- (2) a. A baby is shaking a rattle. (prejacent proposition)
b. Someone is shaking a rattle. (existential presupposition)
c. Only a baby is shaking a rattle. (exhaustive inference)

One outstanding problem in the literature on the meaning of clefts concerns the source of this exhaustivity. Opinions differ mainly along a semantic-pragmatic divide, boiling down to whether the inference is encoded as part of the conventional meaning of clefts (Büring & Kriz, 2013; Velleman et al., 2012) or whether it is derived from pragmatic reasoning on the context (Horn, 1981). Cross-linguistically, similar structures (at least in surface) are also acknowledged to convey exhaustivity. Specific cases of this are the Hungarian pre-verbal focus position (Kiss, 1998), the German *es*-cleft (Drenhaus et al., 2011), and of core interest for this paper, the French *c'est*-cleft in (3) (Lambrecht, 1994).

- (3) C'est un bébé qui agite un hochet.
- It-is a baby who shakes a rattle
- ‘It’s a baby who is shaking a rattle.’

One question is whether the exhaustive effects in these different structures are expressed with the same strength and systematicity. From a theoretical perspective, the semantic and pragmatic accounts put forward in the past literature, though mainly developed around English, should in principle be expandable to explain speakers' inferencing behavior with corresponding structures cross-linguistically. Yet to date, there have been few attempts to directly compare the inference

across languages, and especially across languages that differ in their use of clefting as a strategy to mark focus (but see Destruel et al., 2015; Skopeteas & Fanselow, 2011).

Given this, the main goal of this paper is to provide additional evidence to the debate on modeling exhaustivity by adopting a cross-linguistic perspective. Our general working hypothesis is that speakers of languages with broad uses of clefts will exhibit less robust exhaustive effects, and that differences among speaker's inferential behavior are expected to arise. Two relevant languages to test this hypothesis are English and French. The reason here is that these two languages differ in the options they allow to mark narrow focus (especially on grammatical subjects) and the contexts in which clefts can appear. That is, *it*-clefts are generally marked in English, i.e., preferred in contexts that convey meanings such as contrast (Destruel & Velleman, 2014; Destruel et al., 2017) or correction (Pollard & Yasavul, in press). On the other hand, *c'est*-clefts are more flexible in terms of their function and are used more commonly in French, in which they signal informational and identificational focus, in particular in place of prosodic subject focus (see, among others, Féry, 2013; Lambrecht, 1994), as well as broad-focus. As a result, our hypothesis predicts that French *c'est*-clefts will exhibit less robust exhaustive effects than English *it*-clefts. We test this prediction by using a sentence-picture verification task that combines offline (truth-value judgments) and online (response time) measures. The current study makes a novel methodological contribution, given that online measures are quite scarce in the literature on the meaning of clefts.

The remainder of the paper is structured as follows. Section 2 offers a brief review of the background literature on clefts, in which we further detail the differences between French and English clefts. In this section, we present the most influential theoretical perspectives on the meaning of clefts and the empirical landscape that has ensued from testing the theoretical claims, we review the major accounts on processing of other related inferences, and finally, we make explicit our research questions and hypotheses. We present our experiments and their results in Section 3. We provide a general discussion of our results in Section 4, and we discuss a way to think about the puzzle they present in Section 5. We conclude the paper in Section 6.

2 Background

2.1 Contrasting French and English clefts

There is at least some initial support for the idea that French *c'est*-clefts are similar to English *it*-clefts in meaning. Indeed, prior literature has commonly noted that *c'est*-clefts come with an existential presupposition and convey exhaustive effects (Decat, 2007; Katz, 1997; Lambrecht, 1994). Despite empirical work on French being scarce, Destruel (2013) and Destruel et al. (2015) suggest that *c'est*-clefts are indeed somehow exhaustive—though to a lesser extent than exclusives like *seulement* ‘only’. Therefore, nothing precludes existing theoretical accounts on English (see Section 2.2) to extend to French. But, there are some subtle and crucial differences that set the English and the French clefts apart—thus several reasons that such accounts would not extend to French.

First, French *c'est*-clefts are used more commonly than its English counterpart (Carter-Thomas, 2009; Katz Bourns, 2014), in particular in comparison to canonical sentence forms (SVO). This is primarily due to constraints on French prosody: whereas English can shift prosodic prominence to match the location of the focus constituent, French is more rigid, placing prosodic stress only at the right edge of an intonation phrase. The *c'est*-cleft, despite adding syntactic complexity, circumvents this prosodic restriction by creating an extra intonation boundary that can align with the focus constituent (Hamlaoui, 2009). Consequently, the *c'est*-cleft constitutes the default strategy to signal the simpler focus known as *information* focus—instantiated in answers to *wh*-questions—especially on grammatical subjects, as in our experimental material (see Section 3).¹

By comparison, the *it*-cleft constitutes a marked structure in English and is typically judged as a ‘bad’ answer to direct questions. For instance, Destruel & Velleman (2014) find that English speakers are very unlikely to produce an *it*-cleft (versus a canonical SVO sentence) and are also similarly unlikely to rate the cleft as a natural response in contexts where the preceding discourse includes an (overt) *wh*-question such as in (4). Instead, *it*-clefts are shown to be preferred

1 Lambrecht (1994) argues that canonical sentences with prosodic prominence, while being grammatically well-formed, are pragmatically odd in spoken French in focus-related contexts and occur very rarely. This idea is empirically substantiated; see, among others, Destruel (2013) and Féry (2013), who discuss this focus-marking asymmetry.

in contexts that license a stronger type of focus known as identificational, contrastive, or corrective focus (Kiss, 1998; Pollard & Yasavul, in press), as illustrated in the related example (5) from Destruel & Velleman (2014).

(4) Speaker A: This bean dip is fantastic. I really want to get the recipe. Who made it?

Speaker B: # It's Tim who made it.

(5) Speaker A: This bean dip is fantastic. I really want to get the recipe. I can't believe Shannon made it, she's usually not a very good cook.

Speaker B: Actually, it's Tim who made it.

Most crucially, the English and French cleft constructions differ in terms of the contexts in which they can felicitously appear. Indeed, *it*-clefts cannot signal *broad* focus. That is, sentences in which no content is given, and in which all information is new and unknown to the hearer. Moreover, the question corresponding to an English *it*-cleft has to match the focus-background structure of the cleft, thus leading to a (semi-)strict relationship between the cleft and the question it can answer (Abrusan, 2016). French *c'est*-clefts, on the contrary, can answer broad-focus questions (Katz, 2000; Lambrecht, 2001), shown in (6) from Clech-Darbon et al. (1999), in which the answer to the question for the cleft of the form '*It is X who Z*' is not congruent to a question derived from the cleft relative, i.e., '*Who Zed?*'—or a sub-question of this question—but rather the much broader question '*What happened?*'

(6) Question: Qu'est-ce qu'il s'est passé?

What is it that refl.3.sg is happened

'*What happened?*'

Answer:

C'est le petit qui est tombé dans l'escalier.

It is the small-one who is fallen in the stairs

'*The little one fell down the stairs.*'

In sum, French clefts are used both more commonly, in particular in place of canonical SVO sentence forms, and more broadly (i.e., in more focus-contexts) than their English counterparts,

but they are nonetheless noted to convey an exhaustive inference. Thus, the existing analyses on English should in principle apply to analyzing exhaustivity in *c'est*-clefts as well.

2.2 Past theoretical accounts on cleft exhaustivity

Although many constructions across languages can convey exhaustivity, much of the past theoretical literature has been developed around introspective judgments on the English *it*-cleft (see among others, Atlas & Levinson, 1981; Büring & Kriz, 2013; Horn, 1981; Velleman et al., 2012), empirical evidence has only arisen in recent years. Two opposing approaches have been proposed. Either exhaustivity in clefts is treated as a conventionally-coded semantic phenomenon (Atlas & Levinson, 1981; Büring & Kriz, 2013; Velleman et al., 2012), or as an instance of pragmatic enrichment (Horn, 1981, 2014; DeVeauh-Geiss et al., 2015; Pollard & Yasavul, in press).

Most semantic analyses of cleft exhaustivity argue that exhaustivity is in some way presupposed (although see Atlas & Levinson, 1981, in which exhaustivity is taken to be part of the asserted truth-conditions of the cleft sentence). The work of Percus (1997) and Hedberg (2013) hold that cleft sentences contain a covert determiner element, or some more complex compositional derivation, that makes them semantically equivalent to definite descriptions, e.g., *The one who is shaking a rattle is a baby*. These are assumed to be semantically exhaustive. In a similar vein, Büring & Kriz (2013) offer an analysis in terms of a homogeneity presupposition. According to this account, the cleft denotation must not be part of a larger sum individual satisfying the backgrounded predicate. Crucially though, all semantic accounts contend that exhaustivity effects in clefts are directly derived from the syntactic configuration. Put differently, they are part of the conventional meaning of the cleft itself. Such accounts make several clear empirical predictions. First, the interpretative effects of clefts within a language should be robust and systematic, i.e., they will arise whenever the syntactic structure is encountered in discourse, regardless of context. Second, they cannot be (easily) cancelled. Finally, of core interest for this paper, is the prediction that variation may arise between the two languages tested. Indeed, since felicity-constraints may differ depending on language-specific semantic coding in the cleft structures themselves, the degree of exhaustivity attributed to clefts may differ across speakers of these different languages.

In opposition to this view, pragmatic accounts of exhaustivity, Horn (1981, 2014) take the inference to be a generalized conversational implicature (GCI). According to Grice (1975) and, later on Levinson (2000), GCIs are taken to arise as a matter of default, but, because they are not part of the meaning explicitly endorsed by the speaker (i.e., the asserted meaning), they can be cancelled if not supported by the context. DeVeugh-Geiss et al. (2015) also present a pragmatic analysis of exhaustivity in clefts, in which the inference is a focus-triggered scalar implicature. They argue that clefts are a structural device for marking focus unambiguously and they give rise to stronger exhaustivity effects than their canonical counterparts.

Recently, Pollard & Yasavul (in press), present a dynamic account of exhaustivity illustrated in Section 5. They argue that exhaustivity is not coded in the cleft *per se*, but rather, is the result of the interaction of the existence presupposition of clefts with the meaning of *wh*-questions (Hamblin, 1971). In this account, the existence presupposition of clefts are anaphoric (e.g., Delin 1992), and the exhaustive/non-exhaustive interpretation comes about in how the antecedent discourse referent is resolved (Pollard & Yasavul, in press; De Veugh-Geiss et al. 2018). In the non-exhaustive case, clefts pick up some (non-maximal) discourse referent to designate further. This can be illustrated in the case of correction, e.g., when revising misinformation about a referent in the discourse, as in (7), adapted from Pollard & Yasavul (in press).²

(7) A: Did you hear, Bob got an NSF grant!

B: Well, actually, it was John. And Mike got one, too!

When the cleft answers a *wh*-question, exhaustivity arises: (i) the *wh*-question introduces a maximal discourse referent, and (ii) the cleft existential has this discourse referent as its antecedent.

Regardless of how exhaustivity is exactly derived, all pragmatic accounts make the same clear predictions. First, exhaustivity in clefts is subject to defeasibility, and the content of these inferences can be reasserted by the speaker without giving a feeling of redundancy. Furthermore,

2 One could claim that the acceptability of the second clause in B's response is an example of domain widening; however, in the same discourse with the exclusive *only* instead of the cleft, the continuation becomes unacceptable.

assuming that the mechanisms that derive inferences such as implicatures are somehow universal or generalizable, one should expect little to no variation across languages. In other words, all speakers should derive exhaustivity in clefts with the same strength, thus exhibiting similar inferencing behavior.

In the next subsection, we explore how the predictions from the theoretical approaches have fared in light of recent empirical evidence.

2.3 The empirical landscape

In recent years, an emerging body of experimental work has posed several challenges to strict semantic accounts of exhaustivity in clefts. Much of this work has relied on exhaustivity violations to test for the nature of the inference, that is, by comparing the behavior of the exclusive particle *only* to clefts, and other strong focus positions. The linking hypothesis behind these studies is that, if exhaustivity is violated but can nonetheless be cancelled in the case of unembedded clefts, then it must not be semantically encoded. Indeed, findings suggest that the exhaustive effects observed with clefts are more easily cancellable than exclusives (see, e.g., Destruel et al., 2015; Onea & Beaver, 2009; Xue & Onea, 2011), although they might be less easily cancellable than for the corresponding SVO structures (for German: De Veugh-Geiss et al., 2017, 2018; for English and German: Zimmermann et al., under review). Moreover, results show that the cancellation of exhaustivity with clefts is at least marginally acceptable in felicity judgment tasks (Byram-Washburn et al., 2013; Saur, 2013; DeVeugh-Geiss et al., 2015).

A further challenge for semantic analyses is that exhaustivity in clefts and other fronting strategies has been found to interact with contextual factors (Geröcs et al., 2014; Skopeteas & Fanselow, 2011) as well as vary cross-linguistically (Onea & Beaver, 2009; Destruel, 2013; Hole & Zimmermann, 2013; Skopeteas & Fanselow, 2011). For instance, Onea & Beaver (2009) compared Hungarian pre-verbal focus and German prosodic focus (i.e., sentences bearing an A-accent). They found that the former—the structural focus position—was associated with stronger exhaustive effects. In a similar vein, a recent study by Zimmermann et al. (under review) reports on several verification/falsification tasks in Hungarian, German, and English. They found distributional differences in the exhaustive inference between the preverbal focus position in Hungarian and clefts in German and English. A further study by Skopeteas and Fanselow (2011) compared languages that all have a left peripheral focus position (i.e., Spanish, Greek, and

German), and showed that exhaustivity is significantly weakened when the fronted focus element is *unexpected* relative to more likely alternatives. The same study also demonstrated that the Hungarian preverbal focus position displays more robust effects than the corresponding position in Spanish, German, and Greek. Also, Geröcs et al. (2014) found that the exhaustive effects associated with the Hungarian preverbal focus position was weaker when no explicit question was present, and the amount of time participants had to respond decreased.³

Last, a recent study by Tieu & Kriz (2017) on the L1 acquisition of exhaustivity indeed hints at differences between English and French. Existing data on the acquisition of English *it*-clefts suggests that children start out by interpreting clefts non-exhaustively and have partly acquired exhaustivity around the age of 4-5 years old (Heizmann, 2007, 2012).⁴ In Tieu & Kriz's (2017) truth-value judgment task, children looked at pictures containing three familiar objects (created in an exhaustive and a non-exhaustive condition) while a puppet described them in a video using a cleft sentence, an exclusive sentence, or a sentence with a definite description. Children were then asked to judge whether the sentence uttered by the puppet accurately described the picture or not. However, similar to English, French-speaking children started out by interpreting clefts non-exhaustively, they were found to continue interpreting clefts non-exhaustively at 6 years old (i.e., comparatively later than English-speaking children in Heizmann's studies).

In sum, while the theoretical literature trends toward supporting semantic analyses of exhaustivity in clefts, the empirical literature has largely been compatible with non-truth-conditional accounts. Most offline measures would however benefit by corresponding online data,

3 Importantly, we must note that pragmatic accounts of cleft exhaustivity are not immune to problems either. One limitation is that the operation of cancellation is not always straightforward, and there is in fact much variation in judgments on the perceived (un)acceptability of added information with clefts. Another limitation is that the validity of the link between the robustness of the exhaustive inference and its semantic-pragmatic source merits being called into question. For instance, Spector (2014) and Bade (2015) present cases where implicatures appear to be obligatory, thus breaking at least one direction of the equivalence between cancellability and implicature.

4 We thank an anonymous reviewer for pointing out that there also exists experimental literature on the L1 acquisition of the exhaustive interpretation in Hungarian focus, which converges on the finding that children before the age of 6 do not associate an exhaustive interpretation with the Hungarian pre-verbal focus position (see, among others, Pintér, 2015, 2016).

providing insight into underlying cognitive processes. Indeed, the linking hypothesis here is that the cognitive operations underlying the cancellation of the exhaustive inference are costly. In other words, if cleft exhaustivity is activated by default, but cancellation occurs in a second costly step, longer processing times should arise in contexts where exhaustivity is violated.

Because none of the current theories on clefts' meaning make clear predictions regarding the processing of the exhaustive inference, the next subsection turns to examining the psycholinguistic literature on the time-course of two crucial non-truth-conditional components of meaning, implicatures and presuppositions.

2.4 On the processing on related inferences

One of the main concerns in the literature on processing inferences is to understand how these non-truth-conditional components are computed with respect to the truth-conditional content in a given expression. The most extensive investigations conducted involve scalar implicatures, notably, the implicature from quantifier 'some', whereby a sentence such as (8) literally encodes (8a) but is also taken to imply (8b) (see Bott & Noveck, 2004; Breheny et al., 2006; Huang & Snedeker, 2009; Grodner et al., 2010; Nieuwland et al., 2010; Tomlinson et al., 2013).

- (8) Some students attended the conference.
- a. *At least one* student attended the conference. (lower-bound semantic interpretation)
 - b. *Some but not all* students attended the conference. (upper-bound pragmatic interpretation)

Historically, two opposing views have been proposed. On the one hand, the Default hypothesis (Chierchia, 2004; Levinson, 2000), argues that the (generalized conversational) implicature in (8b) arises automatically and effortlessly within the interpretation of the sentence. Likewise, this should happen independent of context. This predicts that the upper-bound pragmatic interpretation should be less resource-intensive and therefore faster than the lower-bound semantic interpretation. On the other hand, the Literal-First hypothesis (Huang & Snedeker, 2009) posits that the semantic interpretation in (8a), compatible with *all*, is computed rapidly as a by-product of basic sentence processing, which is then negated to arrive at the enriched meaning. Therefore, this account

predicts that scalar implicatures require extra time and resources, thus making the opposite prediction from the Default hypothesis.

Empirically, though, a few studies suggest that scalar implicatures are accessed rapidly and produce no obvious processing cost (see Grodner et al., 2010, Breheny et al., 2013). The majority of the studies have lent support to the Literal-First account, providing evidence that the derivation of scalar implicatures do incur processing costs. This has been replicated across methodologies, e.g., truth-value judgments (Bott & Noveck, 2004), self-paced reading (Breheny et al., 2006), and eye-tracking (Huang & Snedeker, 2009; Storto & Tanenhaus, 2005). As summed up by Huang & Snedeker (2009: 408), “even the most robust pragmatic inferences take additional time to compute.”

Research on the processing of presuppositions, in contrast, is relatively nascent and suggests that the presupposed content of an utterance is available and integrated very rapidly; in some cases, on a par with asserted content (Schwarz, 2014). This has been found in a variety of experimental measures, including self-paced reading tasks (Altmann & Steedman 1988), ERP studies (van Berkum et al., 2003; Burkhardt, 2006), and eye-tracking studies (Schwarz, 2014, 2015).⁵ One particular relevant point for the experiment reported here is that very few studies with online measures of presupposition violations can be found in the literature. One example is Tiemann et al. (2011), who found faster reading times in regions following a presupposition trigger for contexts which explicitly contradicted the presupposition in comparison to both neutral and supporting contexts. This finding suggests that participants had processed the violation, but had given up on parsing the remainder of the sentence.

2.5 Research questions and hypotheses

The experiments reported hereafter are motivated by three observations: (i) the gap between the theoretical and the empirical literature on clefts; (ii) the limited amount of work on the meaning of clefts with a direct cross-linguistic comparison; and, to date (iii) the little systematic empirical evidence with an online component. Consequently, we aim to address the questions below:

5 However, similar to the recent experimental studies on implicature processing suggesting that contextual cues play a significant role (Degen 2015, Degen & Tanenhaus 2016, 2016), it is worth noting that Kim (2007) finds that attention to presuppositions partly depends on context, and argues assertions and presuppositions are processed differently.

- I. Are there differences in terms of the strength and systematicity of the exhaustivity interpretation for clefts within and across English and French, specifically in comparison to exclusives and intonational focus constructions?
- II. Are the underlying processing costs involved in the derivation of exhaustivity the same across sentences and languages?

As such, our data can provide a baseline for participants' relative preference of accepting/rejecting clefts across languages when exhaustivity is violated in context, and a baseline to evaluate whether the preference is reflected in online processing (by analyzing participants' response times).

As discussed in Section 2.3, a general finding in offline behavioral studies is that, in contexts violating exhaustivity, clefts elicit different response patterns relative not only to the asserted exhaustivity of exclusives, but also to the pragmatic exhaustivity of prosodic focus constructions (Section 2.3), at least in English. Thus, we expect such a difference both to be found in offline measures (truth-value judgments) and to be reflected in online measures (response times) as well. Furthermore, in light of differences in the felicitous discourse contexts for French and English clefts, we expect that French *c'est*-clefts will exhibit less robust exhaustivity effects in violation contexts. Correspondingly, we also expect clefts in French to not exhibit the same degree of processing costs in these same contexts as clefts in English. Finally, we expect that, if the exhaustive inference is automatic or default in a given language, then processing times should favor such parses, which will lead to differences in response times when participants reject ('false') or accept ('true') the cleft as appropriate in contexts violating exhaustivity.

Overall, the results will bear on the debate on the nature of exhaustivity in clefts by providing data from a novel test that directly compares speakers' inferential behavior in two languages. Specifically, if differences are indeed empirically substantiated, this can tell us whether French clefts should still be treated on par with English clefts, or whether we should posit a different meaning entirely. In the end, we sketch out a unified account in Section 5.

3 The experiments

The experiment—a sentence-picture verification task—was conducted in English and French. Because the design, procedure, and material are similar in all versions of the experiment, we present the common elements of the methodology in 3.1. We then discuss the results per language, in 3.2.1 for English, and in 3.2.2 for French.

3.1 Methods

3.1.1 Participants

For English, a total of 64 undergraduates from a Midwestern university (age range 18-21 years old), all native monolingual speakers, were given extra credit for their participation. For French, a total of 64 native monolingual speakers (all from Southwestern France) were recruited and given monetary compensation for their participation. Of these participants, 89% were undergraduate students, 9% graduate students, and 2% young professionals working at a university. All participants were naïve as to the purpose of the experiment and had normal or corrected-to-normal hearing and vision.

3.1.2 Materials and design

We manipulated two within-subject factors. The first was the *Picture* type seen by participants, which had four levels/conditions (see Figure 1), and for which we created forty different versions per condition.

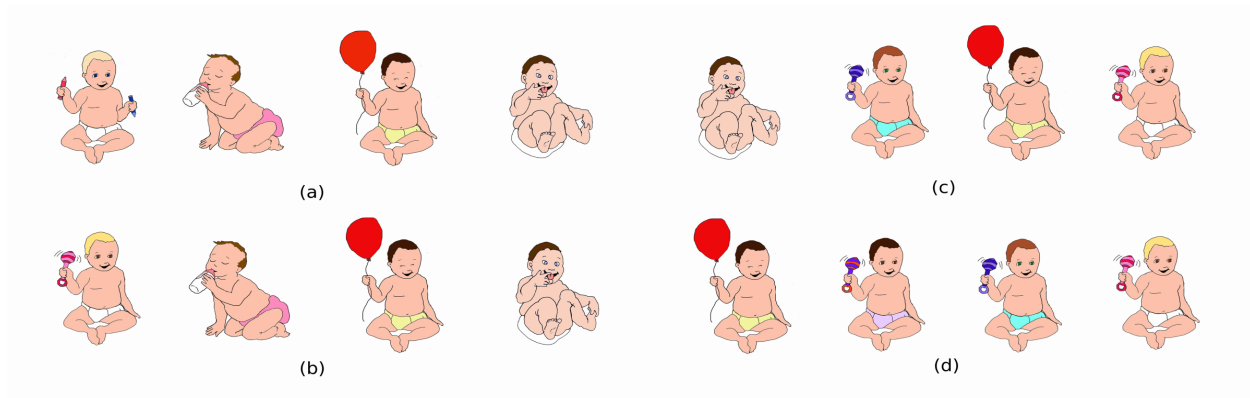


Figure 1 Sample pictorial stimulus.

In the WRONG condition in (a), none of the four characters on the picture has the property described by the predicate. In the –VIOLATION condition in (b), one character has the property asserted in the sentence, supporting the inference ‘no one other than X has property Z’. Finally, in the main condition of interest, the +VIOLATION conditions in (c) and (d), at least one alternative character is

also performing the described action, such that exhaustivity is violated.⁶ Crucially, all pictures consisted of four characters of roughly the same size, color, and shape (unless otherwise required by the descriptive adjective in the sentence), and in order to avoid recognition effects, the location of the target character was counterbalanced across the four positions in the picture.

The second factor manipulated was the *Sentence* form, for which we created forty lexicalizations for each of the three conditions (CLEFT, EXCLUSIVE and SVO sentences with prosodic focus). An illustrative test item is given in (9) (see also Appendix A and B.)

- (9) a. It's a [blond]_F baby who is shaking a rattle.
C'est un bébé [blond]_F qui secoue un hochet.
- b. Only a [blond]_F baby is shaking a rattle. $\left[\begin{array}{c} \uparrow \\ \text{SEP} \\ \downarrow \end{array} \right]$
Seul un bébé [blond]_F secoue un hochet. $\left[\begin{array}{c} \uparrow \\ \text{SEP} \\ \downarrow \end{array} \right]$
- c. A [blond]_F baby is shaking a rattle.
Un bébé [blond]_F secoue un hochet. $\left[\begin{array}{c} \uparrow \\ \text{SEP} \\ \downarrow \end{array} \right]$

All sentences followed the same basic pattern, including the indefinite article *un(e)/'a'*, a descriptive adjective, a [+human] subject noun, a transitive verb and a [-animate] object.⁷ Importantly, only a portion of the NP was focused, the adjective (signaled via a pitch accent), which may help in determining the exhaustive effects that arise, or in other words, in identifying the set of alternatives relevant for the interpretation of the sentence.⁸ For instance, given the

6 A post-hoc analysis revealed no significant difference in truth-value judgments or response times between the 1-actor pictures (Fig.1.c) or 2-actor pictures (Fig.1.d), either in English or in French, so we collapsed responses together and report on the aggregate of responses for the +VIOLATION condition in Section 3.2.

7 Because in French adjectives can be either pre- or post-nominal, and to control for any effects of word order, the French stimuli included an equal number of items with pre- and post-nominal adjectives.

8 It is important to note that because French is known to less freely resort to prosody to signal focus than English, the prosodic disambiguation of the QUD that comes along with the presence of a pitch

experimental item in (7a), it would be wrong to argue that the open proposition exhaustified is ‘*X is shaking a rattle*’; instead, the exhaustive effects are sensitive to the specific focus domain. In order to ensure that the desired intonational pattern was achieved, i.e., with focus realized on the adjective, the adult native speakers recording the experimental items were prompted by the experimenter with a *wh*-question of the form ‘*Which X did Z?*’ in the respective language.

In addition to the 40 experimental items, we created 40 fillers (consisting of other non-canonical structures such as existentials, definite descriptions and passives, all with focus on the adjective), and randomized the total into eight experimental lists via a 2 x 3 Latin square design.

For each language, two versions of the experiment were created. In version 1, the target sentences tested were exclusives and clefts; in version 2, clefts and canonical sentences with prosodic focus. In all other respects, the two versions of the experiments were identical; crucially, the experimental stimuli for the cleft condition in both version 1 and version 2 were exactly the same. In total, 32 participants completed each version of the experiment in English and French (which we will refer to as E1, E2, F1, F2). Thus, overall each participant in each version of the experiment judged a total of 80 sentences, only seeing each target item in one of the conditions.

3.1.3 Procedure

Participants completed the task, which lasted approximately 30-40 minutes, in a laboratory using the software SuperLab Pro 4.5 (Cedrus Corporation, USA). A training session consisting of two practice trials introduced participants to the task before the experiment began. On every trial, participants looked at a single centrally-located picture displayed on the computer screen for 2000ms, after which they heard the stimulus in a set of headphones at a self-adjusted volume. The picture remained on the screen as the sentence finished playing. Participants were asked to judge

accent for English is not as reliable for French speakers; i.e., although prosody can be used to mark informational focus (see Beyssade et al., 2015; Delais-Roussarie et al., 2002; Jun and Fougeron, 2000; Welby, 2006), it is not clear that French speakers use this as a cue in comprehension. For instance, in an experiment investigating the prosody of DPs, Hamlaoui, Féry & Coridun (2012) find that French speakers do realize different focus structures in a DP in the same way (e.g. [moineau]_F marron vs. moineau [marron]_F), yet a follow-up perception test by the same authors revealed that speakers could not accurately distinguish the intended focus structures on the basis of prosody alone.

as fast as possible whether the sentence appropriately described the picture by pressing a True or False button (counterbalanced) on a USB Response Pad (RB-530). Between each trial, a white screen appeared for 2500ms. We collected truth-value judgments (TVJ) and recorded response times (RT). Figure 2 illustrates how the procedure unfolded and what the RTs analyzed correspond to.

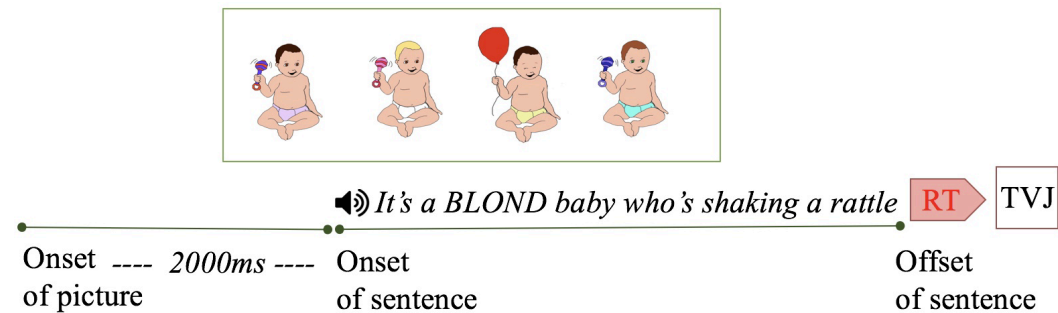


Figure 2 Procedural steps in the experiment.

3.1.4 Data preparation & analysis

Since sentence duration varied across sentence conditions and across language (the English and the French experimental items differed in length), we analyzed RTs from the offset of the sentence, and thus removed from the final analysis all responses made while the sentence was still playing. Furthermore, because participants were permitted to execute their response at any point after the sentence started playing, they could have in principle responded immediately after the onset of the adjective (e.g., *blond*) without considering the remaining portions of the sentence. As such, analyzing RTs from the offset of the sentence also allowed us to exclude results from participants who may have been guessing or anticipating heuristically what the end of the sentence might be.

We should note a potential issue with the French version of the experiment, related to the form of the indefinite article. In French, the indefinite article *un/une* has the same form as the numeral *one*. If we find that participants interpret the stimuli as strictly exhaustive, it will be difficult to decide whether they did so because of the meaning they attribute to the sentence structure itself, or because of the fact that they interpreted the sentence as meaning ‘*exactly one X*’ due to the indefinite. To cope with this possibility, we asked participants whether they had interpreted the indefinite as the numeral *one* in a short debriefing session following the experiment. We found that two participants, who completed the second version French experiment (F2), did so, thus consistently judging both types of sentences as ‘false’ in the +VIOLATION picture condition.

We decided to exclude this data from the analysis, so the results for F2 are based on 30 participants instead of 32.

All RT data were log-transformed, and for the *Sentence* form and *Truth-Value Judgment* predictors sum contrasts encoded as numeric covariates were used (*Sentence*: cLEFT: 1, EXCLUSIVE/SVO: -1; *TVJ*: TRUE: 1, FALSE: -1). Note that, although we measured response times for all picture conditions, since we have no particular predictions for the RTs of the other picture types, we only report the results for the +VIOLATION picture, the main condition of interest. We report parsimonious mixed models following the recommendations made in Bates et al. (2015), including random intercepts and random slopes for participants and items supported by the data, identified utilizing the *rePCA* function in the *RePsychLing* library⁹ (MIT, v.0.0.4). For the generalized linear mixed-effects models for the binary TVJ data, we report on estimates, standard errors, z-values, and p-values; and for the linear mixed-effects models for the RT data we report on estimates, standard errors, and t-values, with any t-value exceeding 1.96 considered statistically significant with $p < .05$. Analyses were implemented using the *lme4* library in the R environment (GPL-2|GPL-3, v.3.3.3) (R Core, 2017).

3.2 Results

3.2.1 English results

Table 1 illustrates the TVJ results in percentage for the ‘true’ judgments, for both versions of the experiment E1 and E2.

		+VIOLATION condition	-VIOLATION condition	WRONG condition
		% ‘true’ TVJ	% ‘true’ TVJ	% ‘true’ TVJ
E1	<i>it</i> -CLEFT	53%	96%	0%
	EXCLUSIVE	1%	99%	1%
E2	<i>it</i> -CLEFT	65%	97%	3%
	SVO	87%	97%	1%

Table 1 Percentage of ‘true’ truth-value judgments for E1 and E2.

The high rate of accuracy for response in both the WRONG and the –VIOLATION control picture condition indicates that participants were engaged in the task and not responding at chance. In the condition of interest (+VIOLATION), ‘true’ judgments for *it*-clefts were almost evenly divided in E1 (53%) but more biased toward ‘true’ judgments in E2 (65%), perhaps due to the local effect of the exclusive condition making exhaustivity more salient in version 1 of the experiment. In line with previous experimental studies which found *it*-clefts to show weaker exhaustivity than exclusives yet stronger exhaustive effects than their canonical counterparts, in the + VIOLATION condition participants were significantly more likely to choose ‘false’ for EXCLUSIVES (E1 $\beta = 3.4049$, SE = 0.5469, $z = 6.226$, $p = 4.79e-10$) and ‘true’ for SVO sentences (E2 $\beta = -0.9836$, SE = 0.3011, $z = -3.266$, $p = 0.00109$) when compared to CLEFTS.

Turning to response times, let us first recall that RTs were analyzed from the offset of the sentence until the time when participants pressed the T/F button to indicate their judgment. The two left graphs in Figure 3 show RTs collapsed for all truth-value judgments (i.e., aggregating ‘true’/‘false’ responses) in the +VIOLATION condition. When exhaustivity did not hold, English participants showed a significant delay when making judgments for CLEFTS in comparison to both EXCLUSIVES (E1 $\beta = 0.15818$, SE = 0.07672, $t = 2.06$) and SVO sentences (E2 $\beta = 0.10740$, SE = 0.05200, $t = 2.07$). Now zooming in on the cleft condition, we find that participants took significantly more time to give a ‘true’ judgment than a ‘false’ judgment in both English experiments, seen in the two right graphs in Figure 3. A mixed-effects logistic regression model predicting log RTs from the truth-value judgment revealed a significant difference in both experiments (E1 $\beta = 0.2871$, SE = 0.0664, $t = 4.32$; E2 $\beta = 0.26090$, SE = 0.07200, $t = 3.62$).

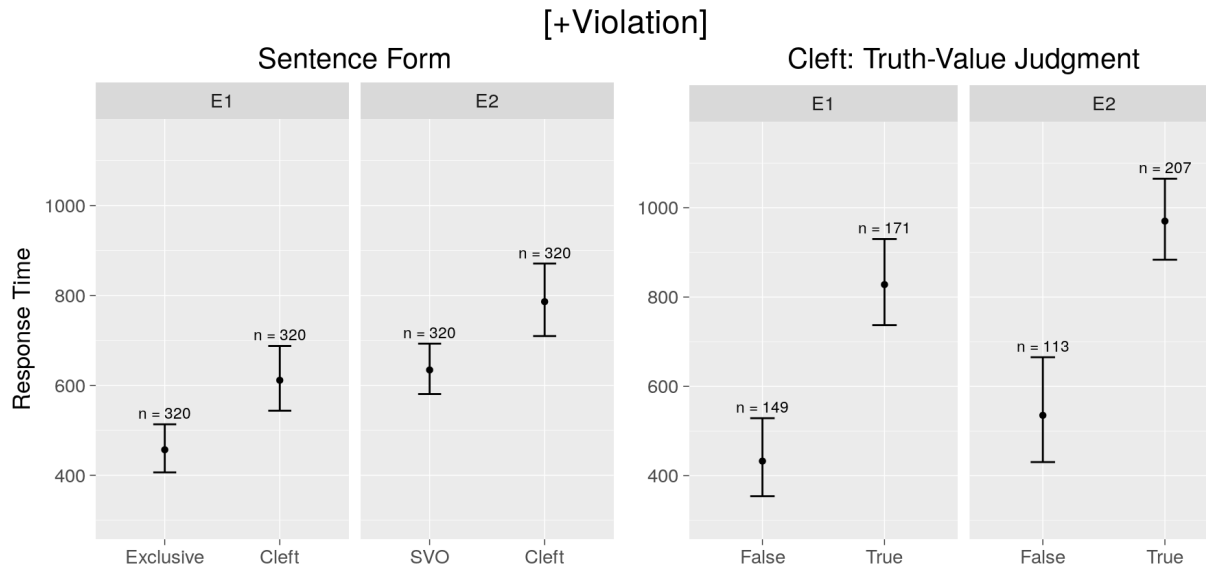


Figure 3 Response Times with 95% confidence intervals (back-transformed means in ms) in +VIOLATION condition for English E1 and E2, conditional on Sentence form for all ‘true’/‘false’ responses (left) as well as per Truth-Value Judgment made in the CLEFT condition only (right). Total number of judgments appear above the confidence intervals.

3.2.2 French results

Table 2 illustrates the TVJ results in percentage for the ‘true’ judgments, for both versions of the experiment F1 and F2.

		+VIOLATION condition	–VIOLATION condition	WRONG condition
		% ‘true’ TVJ	% ‘true’ TVJ	% ‘true’ TVJ
F1	<i>c’est</i> -CLEFT	74%	99%	0%
	EXCLUSIVE	2%	97%	1%
F2	<i>c’est</i> -CLEFT	78%	97%	2%
	SVO	90%	99%	3%

Table 2 Percentage of ‘true’ truth-value judgments for F1 and F2.

We observe that both clefts and canonicals are widely accepted in the +VIOLATION condition, suggesting that participants did not interpret the French indefinite article *un* as the numeral ‘one’, as discussed in Section 3.1.2. As in English, when exhaustivity was violated participants were significantly less likely to select ‘true’ for EXCLUSIVES than for CLEFTS (F1: $\beta = 4.6181$, SE =

0.7786, $z = 5.932$, $p = 3.00e-09$); by contrast, in F2 when comparing SVO and CLEFTS no significant difference was found (F2: $\beta = -0.5599$, $SE = 0.7153$, $z = -0.783$, $p = 0.434$). The descriptively higher number of ‘true’ TVJs (F1: 74%; F2: 78%) in addition to the lack of statistical significance found when comparing CLEFTS to SVO is compatible with French *c’est*-clefts being merely weakly exhaustive.

As before, we now examine log RTs in the +VIOLATION condition. The two left graphs in Figure 4 show RTs collapsed across TVJs. We observe that French participants' response times were significantly slower for CLEFTS than for EXCLUSIVES (F1 $\beta = 0.15120$, $SE = 0.05246$, $t = 2.88$), but not in the same comparison between CLEFTS and SVO sentences (F2: $\beta = -0.00278$, $SE = 0.03751$, $t = -0.07$).¹⁰ Concentrating on the +VIOLATION condition for CLEFTS for both F1 and F2, we examined whether log RTs were affected by the truth-value judgment made. Unlike in English, no significant difference in response times was found between TRUE and FALSE judgments for clefts in either experiment (F1: $\beta = -0.05878$, $SE = 0.04333$, $t = -1.36$; F2: $\beta = -0.04847$, $SE = 0.04724$, $t = -1.03$), shown in the two right graphs in Figure 4.

10 One notable difference that we wish to briefly comment on is the fact that response times for SVO vs. cleft sentences showed a delay in English but not in French. We wish to thank an anonymous reviewer for bringing this to our attention. Although we do not have precise predictions concerning the processing behavior of SVO sentences in either language, the delay in English might be linked to the markedness of the cleft structure compared to plain prosodic focus constructions, which was arguably more salient in this version of the experiment due to the explicit comparison being made between *it*-clefts and SVO sentences. That said, the non-delay in French SVO sentences is also interesting, because, assuming these sentences are indeed marked and infrequent compared to clefts (as argued in Lambrecht, 1994, and in direct contrast to English), we might expect a potential delay, but in the reverse direction to English, contrary to fact.

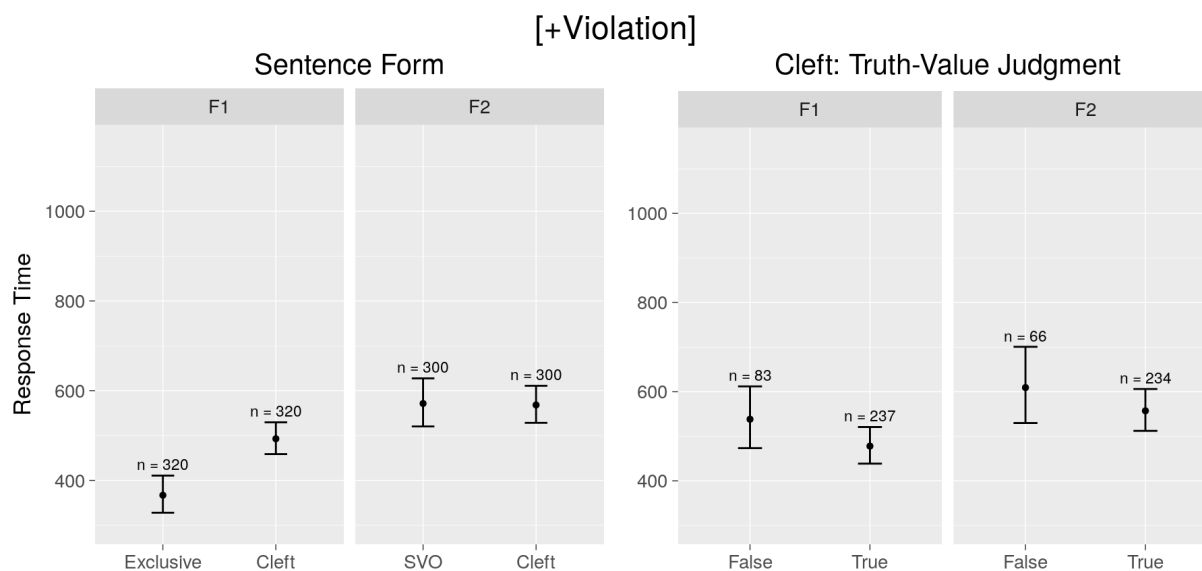


Figure 4 Response Times with 95% confidence intervals (back-transformed means in ms) in +VIOLATION condition for French F1 and F2, conditional on Sentence form for all ‘true’/‘false’ responses (left) as well as per Truth-Value Judgment made in the CLEFT condition only (right). Total number of judgments appear above the confidence intervals.

3.3 Interim summary

Two findings are most relevant to the discussion and proposal. First, the relatively high acceptance rate of clefts in contexts that fail to support exhaustivity in both languages, with the acceptability rate being higher for French than for English. Second, the overall slower processing for English clefts when exhaustivity was violated—in particular depending on the ultimate judgment made, with ‘true’ responses taking significantly longer than ‘false’ judgments in English, whereas no discernible difference was found in French. Going back to the research questions in 2.5, taken together the findings suggest that variation does occur between the two languages tested, both offline and in the underlying processing cost involved in the computation of exhaustivity. Overall, English and French appear not to convey exhaustivity in cleft sentences with similar strength and systematicity, with French clefts being associated with a weaker inference.

4 Discussion

In what follows, we examine our results in more detail, and what we find is that our data presents us with several problems in light of the past theoretical and empirical literature on exhaustivity in clefts. More specifically, in Section 4.1 we will compare pragmatic and semantic theoretical approaches to exhaustivity inferences in clefts and conclude that neither can straightforwardly

account for the offline results reported above (with the exception of Pollard & Yasavul, in press, which we discuss further in Section 5). In Section 4.2, we will then look at how the response time measures relate to findings in the processing literature, namely in the processing of implicatures and presuppositions. What we find is that the processing accounts discussed in the literature are incompatible with our results in fundamental ways. In Section 4.3 we sum up by returning to the motivation for comparing between French and English, which was at the core of the experiments, before turning to discussing a sketch for a unified proposal.

4.1 Theoretical implications

Pragmatic theories At first glance, it seems that pragmatic accounts, as in Horn (1981, 2014), and DeVeugh-Geiss et al. (2015), which treat cleft exhaustivity as a form of pragmatic enrichment, would more straightforwardly be compatible with our offline results for English and French (along with the growing-number of experimental studies showing the relative cancellability of cleft exhaustivity). Indeed, these non-truth-conditional accounts all predict a less stringent version of cleft exhaustivity such that the inference can (more easily) be violated, which is consistent with the relatively high acceptance rates we find for clefts in +VIOLATION contexts.¹¹

Upon a first view, pragmatic accounts might appear better suited to explain the online finding for English that exhaustive interpretations elicited quick judgments, perhaps as the default interpretation. Indeed, in Horn's view, exhaustivity is a generalized conversational implicature

11 Similar to our design, the study in De Veugh-Geiss et al. (2018) had contexts in which exhaustivity was either violated or not. Although we chose not to report on individual variation due to space constraints, it is worth mentioning that our results are in line with theirs: they found participants clustered into one group (consisting of about half the total participants) who treated clefts as exhaustive as exclusives, while another group (consisting of the other half) treated them as non-exhaustive as narrow focus. The authors argued that their results are incompatible with an exhaustivity inference that is conventionally-coded and contextually-entailed, as the semantic accounts of cleft exhaustivity would predict. Indeed, this is where our online data can shed an interesting light on the offline results, especially for English. Our findings suggest that, in English, an exhaustive interpretation might be derived as a default, with its cancellation occurring in a second, costly, step. In principle, this means that although we observe various responder types on the surface (exhaustive vs. non-exhaustive), these speakers might all be similar (exhaustive) to begin with.

(i.e., one that arises whenever the cleft is used), which thus arguably arises fairly quickly but can also be subsequently cancelled. Although Horn makes no claim about the underlying processing mechanisms involved in the derivation of exhaustivity with clefts, one tangible hypothesis is that the cancellation step is the one associated with a cost, which is what we find. Compare this, however, to the processing literature which has generally found pragmatic enrichment to be costly. We come back to our findings in terms of processing models in a bit.

Semantic theories One of the core properties of presuppositions is that they are taken for granted: to say that a sentence *S* carries a presupposition *P* roughly means that the use of that sentence is appropriate only if the speaker believes *P* to be part of the accepted common ground for the conversation in which (s)he is involved. Given this property, there is a strong intuition that presupposition triggers used in contexts that fail to entail *P* will lead to infelicity or falsity. The relatively high acceptance rate of clefts in +VIOLATION contexts clearly represents a challenge for such accounts: when cleft exhaustivity is not supported, the sentence should end up being as unacceptable as other global presupposition failures (see, e.g., Abrusan & Szendrői, 2013; Romoli & Schwarz, 2015), but we found that this was not (always) the case.

Yet, the observed variation—whereby French speakers appear not to derive an exhaustive interpretation for clefts by default, or that this interpretation is not as strongly activated as with English clefts—is ostensibly less of a challenge for semantic accounts. Indeed, presuppositions do not necessarily have to be homogeneous across languages. For a given presupposition, it is possible for one language to encode it while another does not. This has been argued to be the case, for instance, for the existential presupposition of clefts; while English clefts do encode existence, Straits Salish (Samish) and St’at’imcets clefts do not.¹² Similarly, Matthewson (2008), comparing English and St’at’imcets, claims that language variation in the discourse effects of their presuppositions affects the semantics of determiners and third-person pronouns. We also note that strict semantic accounts such as Kiss (1998) predict cross-linguistic

12 See Seth Cable’s examples in a handout from his 2008 course “Theoretical Perspectives on Languages of the Pacific Northwest: Proseminar on Semantic Theory.” See also the discussion in Tonhauser et al. (2013) about variation in the projective behavior of different presupposition triggers.

variation by positing that different languages will specify a positive or negative value for the exhaustive feature encoded in the cleft structure.

In sum, we are left with a puzzling picture, as seen from Table 3, showing that our findings cannot be straightforwardly accounted for by any theory of the meaning of clefts in their current forms. In Section 5 we will put forward an approach that we believe can best explain our findings, a proposal which—as stated by Pollard & Yasavul (in press), whose analysis we follow—“obviates the need to identify whether this putative implication is a presupposition, a conversational implicature, a conventional implicature, etc”. First, however, we will take a closer look at the response time measures as it relates to the literature on implicature/presupposition processing.

	+VIOLATION acceptance	Cross-linguistic variation
Semantic (presupposition)	✗	✓
Pragmatic (implicature)	✓	✗
Our results	✓	✓

Table 3 Predictions of theoretical accounts on clefts’ meaning versus our findings.

4.2 Processing literature

Implicature processing Turning to the processing literature, recall that the general trend seems to be that while presuppositions are derived very rapidly, implicatures are generally costly to compute. To the extent that we can take response time measures to represent indexes of processing difficulty, the finding that, in English, participants take less time to provide ‘false’ judgments in +VIOLATION visual contexts appears to be at odds with the Literal-First hypothesis (i.e., semantic meaning first, pragmatic meaning second) and much of the experimental literature reporting a delay in implicature computation (Bott & Noveck, 2004; Breheny et al., 2006; Noveck & Posada, 2003). In fact, the English data seems best predicted by the Default hypothesis, in which pragmatic implicatures arise rapidly, automatically, and effortlessly: that is, rejecting the cleft as appropriately describing a non-exhaustive picture is fast because the exhaustive inference is quickly present after the trigger appears, whereas accepting the cleft is costly because of the need

to go through (the second processing step of) the annulment of the unsupported inference. Importantly, although some experimental studies do indeed suggest that implicatures are fast to compute (Grodner et al., 2010), they only show no cost of cancellation: at best, the upper-bound pragmatic reading is as fast as the logical, semantic reading, but never faster.

In sum, under traditional approaches to implicature processing the response time measures reported here, in particular for English, are surprising—cleft exhaustivity appears to pattern differently from scalar implicatures. But, we shall make one brief note concerning new directions in the study of implicature processing, which has found that the costs associated with computing implicatures are dependent on several factors (e.g., contextual richness, the availability of alternatives, experimental task, common ground). For instance, recent work by Degen and colleagues (e.g., Degen & Tanenhaus, 2016) have proposed a probabilistic account of implicature derivation, re-focusing empirical efforts on examining the role of contextual information sources that contribute to the ultimate interpretation of a speaker’s intended meaning (e.g., form of the quantifier, discourse accessibility; see Degen, 2015). The common finding in these studies is that scalar implicatures can be modulated, thus arising as a matter of degree depending on support received from various contextual cues. Although our results do not align straightforwardly with traditional accounts of processing, they are conceivably compatible with such accounts: the fact that exhaustivity seems variable and dependent on context is, in principle, expected in these approaches.

Presupposition processing How do our results fit in with research on the processing of presuppositions? We remind the reader that the presupposed content of an utterance is found to be processed and integrated very rapidly in a variety of experimental measures (e.g., Burkhardt, 2006; Schwarz, 2014, 2015). Since exhaustivity for English *it*-clefts in particular was derived quickly (evidenced by the fast ‘false’ judgments), an analysis along these lines appears to be a fruitful first step.

As discussed above, however, the offline data poses a puzzle for presuppositional accounts: In Section 2.3, we mentioned that the few TVJ and related experimental studies with sentential or contextual presupposition contradiction have found broad rejections or a majority of ‘false’ judgments (e.g., Abrusan & Szendrői, 2013; Romoli & Schwarz, 2015). Our visual stimuli similarly contradicted what would be the global contextual entailments predicted by a

presuppositional account of exhaustivity, and we expected that if participants are confronted with a violation of this inference they will largely reject the picture. This is not what we found, with the majority of participants instead choosing ‘true’ in both languages—from 53% (in E1) to 78% (in F2) of the time—in spite of the violation of exhaustivity. Moreover, since presupposition cancellation, local accommodation, or suspension are phenomena which occur in embedding environments, as in the sentences tested in Romoli & Schwarz (2015), standard approaches to presupposition annulment would not predict a presupposition to be cancellable in the types of sentences we tested.

It is important to end our discussion by considering some of the limitations to the conclusions that can be drawn based on the methodology used. All in all, the present methodology does not allow us to decisively differentiate between all analyses on the source of the exhaustive effect in clefts. For instance, we do not know if the cleft sentences were perceived as degraded in the +VIOLATION condition, although past truth-value judgment experiments would predict they are (Saur, 2013; DeVeugh-Geiss et al., 2015). Nevertheless, we think—given the quick response times in English for the participants who chose ‘false’ and delayed response times when judging the sentence as ‘true’—the exhaustivity inference was first generated and then for some participants overridden or ignored. So, at this point, additional methodologies are required to make further, stronger claims about the processing of exhaustivity in clefts, such as eye-tracking or mouse-tracking, which would be able to shed more light on the underlying cognitive step(s) participants go through to arrive at a final (truth-value) judgment. What is important for the present paper though is the differences between the offline and online results for English versus French, and not the individual explanations of their integration.

4.3 Cross-linguistic perspective

We remind the reader that our initial motivation for testing English compared to French was the relative difference in the use of clefts in the two languages. Should French and English clefts be treated similarly with respect to exhaustivity? The variation observed in our experimental data, with French clefts telling a different story than their English counterpart in both offline and online measures, could lead one to argue that the two are radically different structures, and that an analysis of exhaustivity in English *it*-clefts will have difficulty also accounting for French *c'est*-clefts. In short, instead of treating the two clefts on par with each other, one option would be to posit

(completely) different meanings for English and French. However, this strikes us as an easy, and dispreferred, way out. Yet, for a unified approach, whatever analysis one proposes for cleft's exhaustivity in one language must be able to explain the different data in the other. Furthermore, in addition to the differences between English and French in both offline and online measurements, another tension should be explained: while English and French clefts are accepted in non-exhaustive contexts (and this to a larger extent than predicted by theoretical semantic accounts), this acceptability in English—but crucially not French—seems to come at a (processing) cost, the cost of the dismissal of the inference.

5 Proposal

Here, we would like to offer a possible solution to the problems that our data represents for current theories of the meaning of clefts. We must acknowledge that we only intend to discuss a sketch of a proposal at this point, and that spelling out more precisely the formal details needed to fully account for (crosslinguistic) variation will be an important research task.

We think that a unified account of exhaustivity in clefts is preferable, and, in a nutshell, we follow an idea that appears in the analyses of Pollard & Yasavul (in press) and De Veugh-Geiss et al. 2018 (and reminiscent of Horn, 1981 in deriving exhaustivity from the existential): the exhaustive inference is derived from an interaction with some other layer of meaning, namely, the existence presupposition of clefts. Crucially, we think the differences in the strength of exhaustivity between French and English could be boiled down to differences in the strictness placed on the requirement for question-answer congruence by both languages. This idea follows the spirit of Abrusan's (2016) account in explaining the soft vs. hard trigger distinction for the existence presupposition in focus and *it*-clefts. Let us now develop our idea slightly.

In our experiment, similar to the design in De Veugh-Geiss et al. (2018), clefts appeared out-of-the-blue. This absence of context required participants to accommodate the existence presupposition, which, following Delin (1992), Pollard & Yasavul (in press), and De Veugh-Geiss et al. (2018), among others, we take to be anaphoric. In this vein, Pollard & Yasavul's dynamic account takes clefts to be devices which pick up an antecedent discourse referent (DR), and whether or not exhaustivity arises depends on how this discourse referent is resolved. That is, Pollard & Yasavul argue that cleft exhaustivity is not coded in the cleft per se; rather, exhaustivity arises when clefts are taken to be answering a *wh*-question, and it does not

arise otherwise. More specifically, a question accepted in discourse introduces a maximal discourse referent with the property in question. The cleft, when used as an answer, has this maximal discourse referent as its antecedent and is thus interpreted exhaustively. According to this account, however, clefts are not necessarily used as answers to questions, as seen in example in (7), repeated below in (10). In such cases, the cleft picks up some antecedent DR (not necessarily the maximal one) in order to specify it further, and thus an exhaustive reading does not obtain.

(10) A: Did you hear, Bob got an NSF grant!^[SEP]

B: Well, actually, it was John. And Mike got one, too!

As discussed in Section 2.1, English clefts have a strict question-answer congruence requirement. As Abrusan (2016) writes, the cleft relative in English “constrains the background question to be the question to which the focused element [in the cleft pivot] is the direct, short answer” (184). This background question is of the form ‘*Who Z?*’ (or a sub-question of this question),¹³ which is derivable from the cleft relative ‘*(It is X) who Z*’ itself. That is, taking the denotation of the relative clause to be a lambda-abstract—e.g., for (1), $\lambda x.\text{shaking a rattle}(x)$ —it is straightforward to derive the set of propositions in a Hamblin-style question denotation, $\lambda p.\exists x.[p=\lambda w.\text{shaking a rattle}(x)(w)]$ (Hamblin, 1973; Abrusan, 2016).

By comparison, French clefts have a less stringent question-answer congruence requirement, and this is exactly the crux of our idea: we argue that for French, the corresponding background question can, but crucially need not be derived from the cleft relative (see, e.g., the all-new focus question in example 6). How would this idea resolve the differences between French and English? In English, accommodation of the anaphoric existence presupposition out-of-the-

13 Note that by contrast, a broader range of questions is argued to license plain focus constructions, such as ‘Who, if anyone, Z?’ as well as ‘Did anyone Z?’, neither question presupposing existence (Abrusan, 2016; see also the discussion in Rooth, 1996: 19). Accordingly, these differences in licensing properties are argued to give focus constructions a weaker existence presupposition compared to both *it*-clefts and preverbal focus in Hungarian, with plain focus in languages such as English being a so-called ‘soft’ presupposition trigger for existence (Abusch, 2002, 2010; see Abrusan, 2016 for details).

blue can go in one of two ways. On the one hand, one can assume that the cleft is an answer to a question, and in this case the existence presupposition of the cleft will have as its antecedent the maximal discourse referent congruent to the *wh*-question derivable from the cleft relative. On the other hand, the existential is accommodated to a non-maximal discourse referent to specify further. Crucially, we argue that the exhaustive interpretation is the initial default one, since it can be derived (almost) effortlessly from the focus-background structure of the cleft alone given the direct relationship between the cleft relative and the congruent question. A non-exhaustive interpretation will incur further costs, given that the context which would license it requires additional enrichment. Thus, the initial interpretation leads to ‘false’ judgments, whereas the enriched, i.e., costly, one leads to ‘true’ judgments. That more participants tended slightly toward the enriched meaning is in line with the claim that clefts most naturally occur in (non-exhaustive) corrective or contrastive contexts (Destruel & Velleman, 2014; Destruel et al., 2015). That interpretation, however, comes with a corresponding higher processing cost.

In French, participants may follow a similar process to English, with one major difference: the congruent question is not strictly derivable from the cleft relative, since French clefts can be used to answer a broader range of questions. Thus, when French participants accommodate the existential, they have multiple paths: (i) accommodate a maximal discourse referent answering a question congruent to the backgrounded cleft relative, just as in English; (ii) accommodate a non-maximal discourse referent to specify further, again as in English; or, (iii) accommodate some non-maximal discourse referent relevant in the answer to an all-new focus question such as *What happened?*¹⁴ Note that, of these three options, only one, namely (i), results in an exhaustive interpretation.¹⁵ However, French clefts are more flexible in terms of their

14 Cf. Onea & Beaver (2016) and De Veauh-Geiss et al. (2018), in which the indefinite, e.g., *Someone is shaking a rattle* from (1), is argued to give rise to a *potential question* in the sense of Onea 2016, a peculiar non-maximal *wh*-question, e.g., *Who is this person who is shaking a rattle?* Following this line of thought, as one reviewer pointed out, clefts will always answer a question; however, while clefts in English can answer either a maximal *wh*-question or a non-maximal *wh*-question, in French there is still just one maximal question but there is more than one non-maximal question. Along these lines, as the reviewer put it, there may not be a non-question discourse referent a cleft can specify in the end.

15 As one reviewer pointed out, it would be worthwhile looking into how frequency effects might influence our data. Although there have been studies looking at the frequency of the cleft structure across

function, and unlike in English, the structural cue from which one might derive the background question is ambiguous, since the cleft relative is not strictly congruent to a narrow-focus question. Thus, no obvious and straightforward default strategy to help accommodate the existence presupposition will arise.

6 Conclusion

This paper investigated the relative difference in the strength of exhaustivity associated with two cleft structures: the English *it*-cleft and the French *c'est*-cleft. We employed a picture-sentence verification task for which we analyzed truth-value judgments and response times in different pictorial contexts, and notably one where exhaustivity was violated. The main results were that French and English varied greatly with respect to both factors. French speakers are more readily willing to accept the cleft in contexts violating exhaustivity and doing so without the processing cost that emerged with English speakers. We took these results to suggest that the exhaustive inference is the initial default interpretation in English when no further context is provided, which is not the case in French.

We discussed a sketch of a unified account for cleft exhaustivity based on an idea present in the analysis of Pollard & Yasavul (in press), which proposes that clefts do not encode exhaustivity but that rather, an exhaustive inference may or may not arise depending on how the anaphoric existence presupposition is resolved—either to a maximal discourse referent answering a congruent question (exhaustive interpretation) or to some discourse referent which is then given further specification (non-exhaustive interpretation, e.g., contrastive or corrective). For English speakers, without support of further contextual cues the initial interpretation is the former given the semi-strict relationship between the cleft relative and the congruent question. However, this interpretation can be overridden with contextual enrichment, albeit with a cost. For French, the fact that *c'est*-clefts can be used in broader contexts will make the exhaustive interpretation weaker and not arise as a default interpretation.

languages (see, e.g., Dufter 2009 for a comparison of Romance languages and German), there are very few directly comparing the distribution of clefts specifically in terms of the meanings in context associated with them (but see Karssenbergh & Lahousse, 2018 for a pioneering corpus analysis of different types of clefts.)

Although the work presented here constitutes a modest, yet necessary step towards better understanding the exhaustive inference associated with the English and French clefts, the results open up the possibility for further investigations in two paths. One of the advantages of our proposal is that it predicts that, in languages where clefts are used more broadly in discourse, the exhaustive effects should also be more diluted than as reported in English, Hungarian, and German. In future work on processing, examinations of the time-course for the availability of the exhaustive inference via more robust methods (e.g., eye-tracking or mouse-tracking), and considerations about the influence of other contextual and linguistic factors will also be of great theoretical interest.

Acknowledgments

The authors wish to thank Thomas Farmer for his help and advice with analyzing data in earlier versions of the experiments, as well as the XPrag.de program funded by the DFG SPP 172. This paper has greatly benefitted from discussions with many people, including David Beaver, Judith Degen, Mira Grubic, Edgar Onea, Clare Patterson, Agata Renans, Judith Tonhauser, Leah Velleman, Marta Wierzba, and Malte Zimmermann, as well as the members of the audience at the Texas Linguistics Conference 2014, Cognitive Science Conference 2015, and XPrag 2015. All errors are our own.

References

- Abrusan, Marta. 2016. Presupposition cancellation: explaining the soft-hard trigger distinction. *Natural Language Semantics* 24, 165–202.
- Abrusan, Marta & Kriszta Szendrői. 2013. Experimenting with the king of France: Topics, verifiability and definite descriptions. *Semantics & Pragmatics* 6, 1–43.
- Abusch, Dorit. 2002. Lexical alternatives as a source of pragmatic presuppositions. In Brendan Jackson (ed.), *Proceedings of SALT 12*, 1–19. Ithaca, NY: CLC Publications.
- Abusch, Dorit. 2010. Presupposition triggering from alternatives. *Journal of Semantics* 27, 37–80.
- Altmann, G. & M. Steedman. 1988. Interaction with context during sentence processing. *Cognition* 30, 191–238.
- Atlas, Jay & Stephen Levinson. 1981. It-clefts, informativeness and logical form: Radical pragmatics. In Peter Cole (ed.), *Radical pragmatics*, 1–62. New York: Academic Press.
- Bates, Douglas, Martin Machler, Ben Bolker & Steve Walker. 2015. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67, 1–48.
- Bergen, Leon & Daniel Grodner. 2012. Speaker knowledge influences the comprehension of pragmatic inferences. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 38, 1450–1460.
- van Berkum, J. J. A., C. M. Brown, P. Hagoort & P. Zwitserlood. 2003. Event-related brain potentials reflect discourse-referential ambiguity in spoken language comprehension. *Psychophysiology* 40, 235–248.
- Beysade, Claire, Barbara Hemforth, Jean-Marie Marandin, & Cristel Portes. 2015. Prosodic realizations of information focus in French. In Frazier, Lyn & Edward Gibson (eds.), *Explicit and Implicit Prosody in Sentence Processing*, 39–61. Amsterdam: John Benjamins Publishing Company.
- Bott, Lewis & Ira A. Noveck. 2004. Some utterances are underinformative: The onset and time course of scalar inferences. *Journal of Memory and Language* 51, 437–457.
- Breheny, R., N. Katsos & J. Williams. 2006. Are scalar implicatures generated by default? *Cognition* 100, 434–463.
- Breheny, R., H.J. Ferguson & N. Katsos. 2013. Investigating the time-course of accessing conversational implicatures during incremental sentence interpretation. *Language and Cognitive Processes* 28, 443–467.
- Büring, Daniel & Manuel Kriz. 2013. It's that, and that's it! Exhaustivity and homogeneity presuppositions in clefts (and definites). *Semantics and Pragmatics* 6, 1–29.

Burkhardt, P. 2006. Inferential bridging relations reveal distinct neural mechanisms: Evidence from event-related brain potentials. *Brain and Language* 98, 159–168.

Byram-Washburn, Mary, Elsie Kaiser & Maria Luisa Zubizarreta. 2013. The English it-cleft: No need to get exhausted. Poster: Linguistic Society of America (LSA).

Carter-Thomas, Shirley. 2009. The French c'est-cleft: Functional and formal motivations. In D. Banks, S. Eason & J. Ormrod (eds.), *La linguistique systématique fonctionnelle et la langue française*, 127–156. Paris, France: L'Harmattan.

Chemla, Emmanuel. 2009. Similarity: Towards a unified account of scalar implicatures, free choice permission and presupposition projection. Ms., ENS Paris.

Chierchia, Gennaro. 2004. Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface. In Belletti Adriana (ed.), *Structures and beyond*, 39–103. Oxford, UK: Oxford University Press.

Clech-Darbon, Anne, Georges Rebuschi & Annie Rialland. 1999. Are there cleft sentences in French? In Georges Rebuschi & Laurice Tuller (eds.), *The grammar of focus*, 83–118. Amsterdam: John Benjamins Publishing Company.

deCat, Cecile. 2007. *French dislocation: Interpretation, syntax and acquisition*. Oxford, UK: Oxford University Press.

Degen, Judith. 2015. Investigating the distribution of some (but not all) implicatures using corpora and web-based methods. *Semantics and Pragmatics* 8, 1–55.

Degen, Judith & Michael Tanenhaus. 2016. Availability of alternatives and the processing of scalar implicatures: a visual world eye-tracking study. *Cognitive Science* 40, 172–201.

Delais-Roussarie, Elisabeth, Annie Rialland, Jenny Doetjes, and Jean-Marie Marandin. 2002. The prosody of post-focus sequences in French. In Bernard Bel and Isabel Marlien (eds.), *Proceedings of Speech Prosody 2002*, 239–242. Aix en Provence.

Delin, Judy. 1992. Properties of It-cleft presupposition. *Journal of Semantics* 9, 289–306.

Destruel, Emilie, David Beaver & Elizabeth Coppock. 2017. Clefts: Quite the contrary! In Robert Trustwell (ed.), *Proceedings of Sinn und Bedeutung 21*. University of Edinburgh. Preprint version cited.

Destruel, Emilie & Leah Velleman. 2014. Refining contrast: Empirical evidence from the English it-cleft. In Christopher Pinon (ed.), *Empirical issues in Syntax and Semantics 10*, 197–214.

- Destruel, Emilie, Daniel Velleman, Edgar Onea, Dylan Bumford, Jingyang Xue & David Beaver. 2015. A cross-linguistic study of the non-at-issueness of exhaustive inferences. In Florian Schwarz (ed.), *Experimental perspectives on presuppositions*, 135–156. Berlin: Springer.
- DeVeugh-Geiss, Joseph P., Malte Zimmermann, Edgar Onea & Anna-Christina Boell. 2015. Contradicting (not-)at-issueness in exclusives and clefts: An empirical study. In Sarah D’Antonio, Mary Moroney and Carol Rose Little (eds.), *Proceedings of SALT 25*, 373–393.
- DeVeugh-Geiss, Joseph P., Swantje Tonnis, Edgar Onea & Malte Zimmermann. 2017. An experimental investigation of (non-)exhaustivity in clefts. In Robert Trustwell (ed.), *Proceedings of Sinn und Bedeutung 21*. Preprint version cited.
- De Veugh-Geiss, Joseph P., Swantje Tönnis, Edgar Onea & Malte Zimmermann. 2018. That's not quite it: An experimental investigation of (non-)exhaustivity in clefts. *Semantics and Pragmatics* 11, 3. Early access version cite.
- Drenhaus, Heiner, Malte Zimmermann & Shravan Vasishth. 2011. Exhaustiveness effects in clefts are not truth-functional. *Journal of Neurolinguistics* 24, 320–337.
- Dufter, Andreas. 2009. Clefting and discourse organization: Comparing Germanic and Romance. In Andreas Dufter, & Daniel Jacob (Eds.) *Focus and Background in Romance Languages* (Studies in Language Companion Series 112), 83-121. Amsterdam: John Benjamins Publishing Company.
- Féry, Caroline. 2013. Focus as alignment. *Natural Language and Linguistic Theory* 31, 683–734.
- Geröcs, Matyas, Anna Babarzy & Balazs Suranyi. 2014. Exhaustivity in Focus: Experimental Evidence from Hungarian. In Joseph Emonds and Markéta Janebová (eds.), *Language Use and Linguistic Structure*, 181–194. Olomouc: Palacky University.
- Grice, Paul Herbert. 1975. Logic and conversation. In Peter Cole & Jerry L. Morgan (eds.), *Speech acts* (syntax and semantics 3), 41–58. New York: Academic Press.
- Grodner, Daniel, Natalie M. Klein, Kathleen. M. Carbary & Michael Tanenhaus. 2010. “Some,” and possibly all scalar inferences are not delayed: Evidence for immediate pragmatic enrichment. *Cognition* 116, 42–55.
- Hamblin, Charles Leonard. 1971. Mathematical models of dialogue. *Theoria* 2, 131–155.
- Hamlaoui, Fatima. 2009. La focalisation à l’interface de la syntaxe et de la phonologie: le cas du français dans une perspective typologique. Ph.D dissertation. Paris 3 Sorbonne Nouvelle.
- Hamlaoui, Féry & Coridun. 2012. Expression prosodique du focus et du donné au sein des groupes nominaux [N A] du français. In Frank Neveu, Valelia Muni Toke, Peter Blumenthal, Thomas Klinger, Pierluigi Ligas, Sophie Prévost and Sandra Teson-Bonnard (eds.), *Actes du 3ème Congrès Mondial de Linguistique Française*, 1505-1518. EDP Sciences.

Hedberg, Nancy. 2013. Multiple focus and cleft sentences. In Katharina Hartmann & Tonjes Veenstra (eds.), *Cleft structures*, 227–250. Amsterdam: John Benjamins Publishing Company.

Heizmann, Tanja. 2007. Childrens acquisition of exhaustivity in clefts. In Heather Caunt-Nulton, Samantha Kulatilake & I-Hao Woo (eds.), *Proceedings of the 31st Boston University Conference on Language Development*, 298–309. Cascadilla Press.

Heizmann, Tanja. 2012. Exhaustivity in questions & clefts and the quantifier connection: A study in German and English. PhD dissertation. UMass, Amherst.

Horn, Larry. 1981. Exhaustiveness and the semantics of clefts. In Victoria E. Burke & James Pustejovsky (eds.), *North Eastern Linguistic Society (NELS)*, vol. 11, 125–142. Amherst: University of Massachusetts.

Hole, Daniel & Malte Zimmermann. 2013. Syntactic Partitioning in (South) East Asian: A cross-linguistic comparison of clefting in Japanese, Burmese and Chinese. In Katharina Hartmann and Tonjes Veenstra (Eds.), *Cleft Structures*, 285–318. Amsterdam: John Benjamins Publishing Company.

Horn, Larry. 2014. Information structure and the landscape of (non-)at-issue meaning. In Caroline Féry & Shinichiro Ishihara (eds.), *The Oxford handbook of information structure*, 108–127. Oxford, UK: Oxford University Press.

Huang, Yi Ting & Jesse Snedeker. 2009. Online interpretation of scalar quantifiers: Insight into the semantics-pragmatics interface. *Cognitive Psychology* 58, 376–415.

Jun, Sun-Ah & Cécile Fougeron. 2000. A phonological model of French intonation. In Antonis Botinis (ed.), *Intonation: Analysis, modeling and technology*, 209–242. Dordrecht: Kluwer.

Karssenber, Lena & Karen Lahousse, 2018. The information structure of French *il y a* clefts and *c'est* clefts: A corpus-based analysis. *Linguistics* 56, 513–548.

Katz, Stacey. 1997. The syntactic and pragmatic properties of the *c'est*-cleft construction. Ph.D. dissertation. University of Texas at Austin.

Katz, Stacey. 2000. Categories of *c'est*-cleft constructions. *Canadian Journal of Linguistics*, 253–273.

Katz Bourns, Stacey. 2014. Contrasting *c'est*-clefts and it-clefts in discourse. In Stacey Katz Bourns & Lindsey L. Myers (eds.), *Perspectives on linguistic structure and context: Studies in honor of Knud Lambrecht*, 199–222. Amsterdam: John Benjamins Publishing Company.

Kim, Christina S. 2007. Processing presupposition: Verifying sentences with 'only'. In Joshua Tauberer, Aviad Eliam & Laurel MacKenzie (eds.), *Papers from Penn Linguistics Colloquium 31*, vol. 14. 1, 213–226. Penn Working Papers in Linguistics.

Kiss, Katalin. 1998. Identificational focus versus information focus. *Language* 74, 245–273.

Lambrecht, Knud. 1994. *Information structure and sentence form: Topic, focus and mental representations of discourse referents*. Cambridge, UK: Cambridge University Press.

Lambrecht, Knud. 2001. A framework for the analysis of cleft constructions. *Linguistics*, 463–516.

Levinson, Stephen. 2000. *Presumptive meanings*. Cambridge: MIT Press.

Matthewson, Lisa. 2008. Pronouns, presuppositions, and semantic variation. In Tova Friedman & Satoshi Ito (eds.), *Proceedings of SALT 18*, 527–550.

Nieuwland, Mante S., Tali Ditman & Gina R. Kuperberg. 2010. On the incrementality of pragmatic processing: An ERP investigation of informativeness and pragmatic abilities. *Journal of Memory and Language* 63, 324–346.

Noveck, Ira, & Andres Posada. 2003. Characterizing the time course of an implicature: An evoked potentials study. *Brain and Language*, 85, 203–210.

Onea, Edgar & David Beaver. 2009. Hungarian focus is not exhausted. In Ed Cormany, Satoshi Ito & David Lutz (eds.), *Proceedings of SALT 19*, 342–359.

Onea, Edgar & David Beaver. 2016. Complete vs. exhaustive answers: The discourse semantics of it-clefts. Talk given in Frankfurt on May 24 2016.

Percus, Orin. 1997. Prying open the cleft. In Kiyomi Kusumoto (ed.), *North Eastern Linguistic Society (NELS) 27*, 337–351.

Pintér, Lilla. 2015. The acquisition of the exhaustive interpretation of Hungarian focus constructions. Talk presented at the 12th International Conference on the Structure of Hungarian. Leiden: Germany.

Pintér, Lilla. 2016. Preschoolers' interpretation of presupposed and pragmatically implied exhaustivity. Talk presented at the VIII International Conference of Language Acquisition. Palma de Mallorca: Spain.

Pollard, Carl & Murat Yasavul. In press. Anaphoric it-clefts: The myth of exhaustivity. *Proceedings of the Chicago Linguistic Society (CLS)* 50.

R Core Team. 2017. R: A language and environment for statistical computing. R Foundation for Statistical Computing Vienna, Austria. <https://www.R-project.org/>.

Romoli, Jacopo & Florian Schwarz. 2015. An experimental comparison between presupposition and indirect scalar implicatures. In Florian Schwarz (ed.), *Experimental perspectives on presuppositions*, 215–240. Berlin: Springer.

Rooth, Mats. 1996. On the interface principles for intonational focus. In Teresa Galloway & Justin Spence (eds.), *Proceedings of SALT 6*, 202–226. Ithaca, NY: Cornell University.

Saur, Eva-Maria. 2013. Clefts: Discourse function and the nature of exhaustivity violation effects. M.Sc. Thesis, Universität Potsdam.

Schwarz, Florian. 2014. Presuppositions are fast, whether hard or soft – evidence from the visual world. In Todd Snider, Sarah D’Antonio & Mia Weigand (eds.), *Proceedings of SALT 24*, 1–24. LSA and CLC Publications.

Schwarz, Florian. 2015. Presuppositions vs. asserted content in online processing. In Florian Schwarz (ed.), *Experimental perspectives on presuppositions*, 89–108. Berlin: Springer.

Skopeteas, Stavros & Gisbert Fanselow. 2011. Focus and the exclusion of alternatives: On the interaction of syntactic structure with pragmatic inference. *Lingua* 11, 1693–1706.

Storto, Gianluca & Michael K. Tanenhaus. 2005. Are scalar implicatures computed online? In Bary Corien Maier, Emar & Janneke Huitink (eds.), *Proceedings of Sinn und Bedeutung 9*, 431–445. Nijmegen: Nijmegen Centre for Semantics.

Tieu, Lyn & Manuel Kriz. 2017. Connecting the exhaustivity of clefts and the homogeneity of plural definite descriptions in acquisition. In Maria LaMendola & Jennifer Scott (eds.), *Proceedings of the 41st Annual Boston University Conference on Language Development*, 651–664.

Tomlinson, John, Todd M. Bailey & Lewis Bott. 2013. Possibly all of that and then some: Scalar implicatures are understood in two steps. *Journal of Memory and Language* 69, 18–35.

Tonhauser, Judith, David Beaver, Craige Roberts & Mandy Simons. 2013. Toward a taxonomy of projective content. *Language* 89, 66–109.

Velleman, Dan Bridges, David Beaver, Emilie Destruel, Dylan Bumford, Edgar Onea & Liz Coppock. 2012. It-clefts are IT (Inquiry Terminating) constructions. In Anca Chereches (ed.), *Proceedings of SALT 22*, 441–460.

Welby, Pauline. 2006. French intonational structure: Evidence from tonal alignment. *Journal of Phonetics* 34, 343–371.

Whelan, Robert. 2008. Effective analysis of reaction time data. *The Psychological Record* 58, 475–482.

Xue, Jingyang & Edgar Onea. 2011. Correlation between presupposition projection and at-issueness: An empirical study. *Proceedings of the ESSLLI 2011 “Workshop on Projective Meaning.”*

Zimmermann, Malte, Joseph P. De Veugh-Geiss, Swantje Tönnis & Edgar Onea. To appear. (Non-)Exhaustivity in Focus Partitioning: A cross-linguistic investigation on exhaustivity. In Veronika Hegedüs and Irene Vogel (eds.), *Approaches to Hungarian 16. Papers from the 2017 Budapest Conference*.