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Prosodic focus in English vs. French: A scope account

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We compare the use of prosodic prominence in English and French to convey focus. While previous studies have found these languages, and Germanic vs. Romance more generally, to differ in their use of prominence to encode focus (e.g., Ladd 1990; 1996; 2008; Lambrecht 1994; Cruttenden 1997; 2006), exactly what underlies the difference remains an open question. We investigate two possibilities: The difference between the languages could be due to a difference in their phonology, restricting the circumstances in which material can be prosodically reduced, as proposed in Féry (2014). Alternatively, there could be syntactic, semantic, and/or pragmatic differences concerning when prominence can be used to encode focus. We compare these hypotheses in a production study which varied the type of focus context (corrective, contrastive, parallelism) to establish the contextual conditions on when a shift in prosodic prominence can occur. The results confirm earlier claims that French uses prosodic prominence to encode focus in corrections, but fails to prosodically encode other types of focus, in contrast to English. We further find that French and English encode focus with very similar acoustic means. Our results show that both languages have the phonological/phonetic means to encode focus using prominence shifts, but differ with respect to the semantic and pragmatic circumstances in which they use them. We propose that these semantic/pragmatic differences between English and French are a result of differences in the syntactic scope possibilities of the focus operator involved in prosodic focus marking.

1 Introduction

In English, prosodic prominence is used to convey information status: A boost in prominence indicates that a constituent encodes new or contrastive information, while a reduction in prominence indicates that it encodes given information (e.g., Ladd 1996; 2008). Not marking information status prosodically leads to processing difficulty, both when constituents that encode given information are accented and when constituents that encode new information remain unaccented (Terken & Nooteboom 1987; Dahan et al. 2002; Arnold 2008a; Ito & Speer 2008; among others).

Bolinger (1972) explained the distribution of accents via the notion of predictability: Accents are placed on words that carry more information or are less expected compared to others. In single-word utterances, it is well established that frequent words (and hence more predictable words) are phonetically reduced. One could therefore consider this approach to accent placement in multi-word utterances as the null hypothesis, and there is indeed evidence for predictability effects (e.g., Terken 1984; Aylett & Turk 2004; 2006; Bell et al. 2009; Jaeger 2010). Another important factor is the prior salience of the referent of an expression (e.g., Nooteboom & Terken 1982; Terken 1984; Terken & Hirschberg 1994; Arnold 2008b), or a combination of such factors (e.g., Lam & Watson

2010; Watson 2010). These effects make intuitive sense: A weaker acoustic signal should be sufficient to convey more expected information, which can be rationalized based on information-theoretic grounds (cf. the discussion in Aylett & Turk 2004). An expected linguistic expression or an expression referring to an already salient referent should be more easily retrieved and hence should need less *oomph* in the signal to be successfully transmitted. This perspective is appealing because it holds the promise of relating contextual effects on prosody to other types of effects sensitive to the prior salience of information, such as the mechanisms underlying priming effects.

The fact that such accounts of prominence allocation and accent placement seem plausible, however, does not mean that they are accurate. Ladd (1990; 1996; 2008), for example, points out that predictability cannot be the whole story. Languages differ dramatically in how prosody interacts with discourse context in multi-word utterances. For instance, it has long been observed that Romance and Germanic languages differ in that in Romance, a shift in prominence only occurs in a subset of contexts compared to Germanic (Ladd 2008; Büring 2009; among others).[1] One recurring claim is that Romance languages consistently encode only corrective focus prosodically (e.g., Ladd 1996; 2008; Cruttenden 1997; 2006). Lambrecht (1994: 343) observes that in cases of "metalinguistic correction, non-phrase final accent is possible […] in French", but that French fails to shift prominence away from the sentence-end otherwise. Zubizarreta (1998: 75) claims that Spanish and Italian can only have non-final main prominence under "emphatic" stress.[2] Some languages, like Northern Sotho (Zerbian 2007) and Hausa (Hartmann & Zimmermann 2007), seem to not mark focus prosodically at all, even in the absence of alternative syntactic or morphological marking.

This cross-language variation is one reason why linguistic theories view the accentuation pattern of a language to be at least partly determined by its grammatical system. That accent placement is not entirely reducible to predictability is also made plausible by the observation that highly predictable words often resist deaccentuation. This holds even in English, where accent placement has been explicitly argued to be sensitive to predictability (e.g., Aylett & Turk 2004). Consider an example where a predictability-based effect of phonetic reduction has, in fact, been demonstrated. Lieberman (1963) observed that the word *nine* is slightly reduced in *a stitch in time saves nine* compared to when it occurs in *the number that you will hear is nine*. In the idiomatic expression, the word *nine* is highly predictable by the time it is realized. A reduction account based on predictability can explain the difference. But note that deaccenting *nine* and shifting main prominence to a different word (such as *saves*) results in infelicity. That is, while a predictability account can explain the gradient reduction observed by Lieberman, it is not clear that it provides an adequate model of accent placement and prominence shifts (cf. Klassen & Wagner 2017 for discussion).

Cross-linguistic differences in accent placement have played an important role in comparing different accounts of contextual effects on prosody. And yet, it is not exactly evident what it is about Romance languages that make them different with respect to their prosodic marking of focus compared to Germanic. Current research does not even agree on whether these differences are phonological or semantic. One way in which English marks contrastive or focused constituents is through post-focal reduction, which results in a shift of relative prominence to the focused constituent (Ladd 1980; 2008; among

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[1] Some Germanic languages are argued to not use prosody as robustly as others. For example, Icelandic does not deaccent given information (Nolan & Jónsdóttir 2001; Dehé 2009).
[2] Zubizarreta (1998: 21) observes some cases in French where prominence seemingly occurs non-finally, even in "non-contrastive" cases. The post-focal constituents that remain unaccented in these cases are arguably right-dislocated—we do not discuss such cases in this paper.

others). A common claim is that French shifts prominence only in a subset of the contexts in which English does (cf. Ladd 2008). French has been reported to show post-focal reduction at least in so-called corrective contexts (Jun & Fougeron 2000) or in responses to wh-questions (Féry 2001), but there has not been a study directly comparing the two languages, and there is disagreement as to what the precise conditions on focus marking in French are. There have been several experimental studies showing that Romance and Germanic differ in a specific type of context (e.g., Swerts et al. 2002 on Italian vs. Dutch; Swerts 2007 on Romanian vs. Dutch).[3] However, there have been no studies showing that a particular language uses prominence shifts in one context but not in another, nor have there been studies showing a direct interaction between focus type and language type—with one exception: Cruttenden (2006).

Cruttenden (2006) conducted a production experiment on 12 typologically diverse languages, including English and French. The study examined 10 dialogues involving different focus contexts which, in English, lead to a prominence shift. We assume that a prominence shift involves placing the last accent in an utterance on the focused word instead of in its default location. The material following the focused word is deaccented or at least is severely compressed in pitch and otherwise reduced in such cases. In Cruttenden's study, each dialogue was translated into the other languages. Based on native speaker recordings, each utterance was classified for whether or not prominence was shifted. Certain dialogues, which reliably led to a prominence shift in English, did not in French. For example, all 7 English participants shifted prominence in the second conjunct to the name of the team and deaccented *one* as in (1), while in French, none of the 14 participants did (instead, all accented *un* 'one', as expected for default accent placement), shown in (2).[4,5]

(1)   Prominence shift in *English* (Cruttenden 2006: 325)
        A: What was the score?
        B: Liverpool 1, Manchester United 1.

(2)   No prominence shift in *French* (Cruttenden 2006: 338)
        A: Quel était   le   résultat?
              which be.3SG.IPFV DEF.SG.M   result
              'What was the score?'

        B: Paris St. Germain un, St. Etienne un.
              Paris St. Germain one St. Etienne one
              'Paris St. Germain 1, St. Etienne 1.'

It is not the case, however, that French simply does not shift prominence. In another dialogue, shown in (3)–(4), all 7 English speakers and 11 of 14 French speakers shifted prominence to *your sister/ta soeur*. In other words, focus was prosodically marked in both languages:

(3)   Prominence shift in *English* (Cruttenden 2006: 324)
        A: I did all the work.
        B: You mean your sister did all the work.

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[3] Romance and Germanic focus have also been shown to differ perceptively (e.g., Swerts & Vroomen 2015 on Canadian French vs. Dutch).

[4] The contexts for French were not provided in Cruttenden (2006); we added the presumed contexts, based on the English dialogues provided in the paper. In addition, the glosses for the French examples have been adjusted to conform to the Leipzig Glossing Rules.

[5] In Cruttenden (2006), another dialogue (item 8) of the same type of focus as (1) produced the same results. Similar results were also found for a second dialogue (item 7) of the same type of focus as in (3), where all 7 English speakers shifted prominence and 12/14 French speakers did as well.

(4)   Prominence shift also in *French* (Cruttenden 2006: 337)
       A: J'-ai   fait   tout le   travail.
            1SG.NOM-have.1SG do.PST.PTCP   all   DEF.SG.M work
            'I did all the work.'

       B: Tu   veux   dire   que   ta   soeur a
            2SG.NOM   want.2SG.PRS   say.INF COMP   SG.F.POSS   sister have.3SG
            fait   tout le   travail.
            do.PST.PTCP   all   DEF.SG.M work
            'You mean your sister did all the work.'

While Cruttenden's study convincingly showed that there are cross-linguistic differences in which types of context affect accent placement, the study has a number of limitations. There was only one test sentence per type of context, which limits the generalizability of the results and is probably the reason why statistical evaluation was not undertaken. There was also no attempt to characterize what it was about particular contexts and particular languages that made prosodic prominence be affected or not. In other words, there was no discussion of the factors that might explain the differences between them, nor any discussion of how they relate to the kinds of factors that semantic theories of focus might expect to be relevant. A further limitation is that the study only reports prominence annotations by a native speaker of English and does not report any comparison of the phonetic cues employed in the various languages. In other words, even if two languages were reported to show a prominence shift in a given condition, we do not know whether the phonetic implementation of focus was similar.

Our study differs from Cruttenden (2006) in several ways. In terms of cross-linguistic breadth, it is much more limited since we only compare French and English. While a broader survey would be desirable, it is important to note that this study is, to our knowledge, the first to directly test whether a Romance language indeed reliably marks focus in corrective contexts in a similar way to Germanic languages, but reliably diverges from Germanic in other focus contexts. A direct comparison between French and English will not only establish whether there is a systematic difference between the two languages, but also whether the phonetic cues used when the two languages do mark focus are different, as previously reported.

We investigate two varieties of French, Québec French and European French. Xu et al. (2012) show that prosodic focus-marking through post-focal compression has spread across Asian languages through language contact. It could be that marking focus prosodically has some adaptive advantage, perhaps because it facilitates processing. As Québec French has been in close contact with English for over 400 years, a comparison of Québec French and European French could reveal whether prosodic focus marking has been influenced through language contact.

Our study goes beyond Cruttenden's in that it carefully controls for various contextual, syntactic and phonological factors, and includes a greater number of stimuli per manipulation to ensure generalizability of the results and to substantiate their validity through statistical tests. Furthermore, we compare the languages based on the phonetic correlates of prosody (pitch, duration, intensity) to better understand which phonetic cues are used in a prominence shift in which focus contexts.

There have been two main types of hypotheses about the factors that explain why, in certain circumstances, focus is marked in Germanic but not in Romance. The first type of hypothesis is that phonological factors are crucial. Ladd (1996: 233), for example, mentions that the phonological size of the constituents involved plays a role in Italian, in that *large* constituents are more easily deaccented. Féry (2014) proposes an account of the difference in how focus is marked between French and English in which phonological

size plays a critical role. The claim is that in French, only constituents that are (at least) the size of a phonological phrase can be prosodically reduced. This is argued to be a consequence of the observation that French uses phrasing to encode focus rather than the distribution of pitch accents. Our data will show, in contrast, that given the right contexts, speakers of French shift prominence even within noun phrases and when the words involved are short and are not the types of syntactic constituents that map to phonological phrases—which runs counter to this hypothesis.

The second type of hypothesis attributes the difference between Germanic and Romance to syntactic/semantic differences, rather than to phonological ones. Perhaps the most common assumption in this literature is that languages like French mark focus only when an assertion is *corrective*. Under this view, it is the pragmatic import of prosodic prominence that differentiates French and other Romance languages from English (cf. Ladd 1996; 2008). The basic idea is that languages differ in which *types* of focus are marked prosodically. Surprisingly, the notion of *corrective focus* has, to our knowledge, never been directly related to current semantic theories of focus. This may be because the most widely assumed theory of focus, that of Rooth (1985; 1992), does not distinguish between different types of focus. We discuss how we can formalize the idea that an assertion must be corrective to be focus-marked in French but not in English: The focus operator involved can potentially have different semantic content. We also propose an arguably more appealing interpretation of the findings in which the two languages have the same operator, but the operator has different syntactic scope possibilities, a hypothesis that we call the Scope Hypothesis.

It is rare that one finds a phenomenon in which researchers disagree whether the explanation of the differences resides in phonology or in the syntax/semantics, as is the case for prosodic focus marking. The experiments reported in this paper resolve at least this question and rule out accounts that purely rely on phonology (such as the Phrasing Hypothesis; discussed in Section 2.3), even if some questions regarding the underlying syntactic/semantic differences remain open, and the evidence arbitrating between the Scope Hypothesis and the Corrective Focus Hypothesis will remain inconclusive (discussed in Sections 3 and 4). Our results also show that the languages are very similar in how they encode focus when they both encode it—the same acoustic cues are used in French and English, and in analogous ways. The main differences lie in *when* prominence is used to encode focus.

The paper is organized as follows. In Section 2, we discuss hypotheses on where the locus of variation is in prosodically encoding focus in English versus French and explicate these hypotheses using Rooth's (1992) alternatives theory of focus. In Sections 3–5, we present the prosodic results of our experiments. In Section 6, we compare acceptability ratings between cleft and non-cleft focus contexts in order to eliminate a possible methodological concern. Section 7 concludes.

2 Focus structure and potential sources of variability

In the following, we present the essential elements of Rooth's (1992) alternatives theory of focus, how this theory enables us to identify possible dimensions along which languages might differ in how focus is encoded, and then proceed to discuss several prior claims on how French and English differ with respect to how context affects prosodic prominence.

2.1 The alternatives theory of focus

Rooth (1985; 1992) introduced a theory of linguistic focus which has proven to be particularly insightful in understanding notions like *focus* and *givenness,* and in accounting for focus-related prosodic phenomena such as contrastive stress or prosodic question-answer congruence. The basic idea is that every expression in language comes with

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two associated meanings: Its regular denotation and a set of alternatives. Minimally, this set of alternatives comprises the expression itself. But if the expression or one of its sub-constituents is marked as focused (noted syntactically with an F-feature on that node), then contextually relevant alternatives to that constituent are introduced. Depending on which elements within a constituent are marked with an F-feature, the content of the corresponding alternative set changes. Consider the alternatives to a proposition, which vary depending on whether the subject (5a) or object (5b) is marked as focused via F:

(5) A: Who read Moby Dick?
  a. B: JOHN$_F$ read Moby Dick.
      Alternative set: { John read Moby Dick, Jane read Moby Dick, … }

  b. B: #John read MOBY DICK$_F$.
      Alternative set: { John read Moby Dick, John read Walden, … }

One fact that any account of focus must explain is why (5a) is felicitous in this context while (5b) is not. The crucial insight in Rooth's theory is that prosodic focus is anaphoric, and that a pronunciation that fails to find a proper antecedent in the context will be infelicitous, much like using a pronoun without a proper antecedent. This anaphoric requirement is attributed to the focus operator ~. The ~ operator introduces the presupposition that some member of the alternative set to the constituent it attaches to is salient in the discourse.[6] The examples in (5) have the representations in (6). In this and the following examples, we indicate F-marked material by SMALLCAPS and non-F-marked material in the scope of ~ by **boldface**. The antecedent that ~ is anaphoric to is not specially marked, but will be indicated in the text.

(6) a. ~[JOHN$_F$ **read Moby Dick**]
      Focus presupposition: There is a salient antecedent alternative of the form *x read Moby Dick*.

  b. ~[**John read** MOBY DICK$_F$]
      Focus presupposition: There is a salient antecedent alternative of the form *John read x*.

The two structures differ in the anaphoric requirement that ~ introduces because the alternative sets differ: (6a) involves a set of alternatives of the form *x read Moby Dick,* with varying substitutions for *John,* while (6b) involves a set of alternatives of the form *John read x,* with varying substitutions for *Moby Dick.* The context provides a question that consists of propositions of the form *x read Moby Dick*, and therefore only the anaphoric requirement in (6a) is satisfied in this context.

   The use of prosodic focus is usually obligatory when possible; for example, in (5a), it would be infelicitous to respond to the question with the default pronunciation with an accent on both the subject and object. Current focus theories differ in how they explain the obligatoriness of prosodic focus. Williams (1997) proposes a principle *Don't overlook anaphoric possibilities*, and Schwarzschild (1999) a violable OT constraint AVOIDF, which minimizes the use of F-markers. Wagner (2005) and Sauerland (2005), on the other hand, explain the obligatoriness of focus marking with the principle *Maximize Presupposition* (Heim 1991).

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[6] In Rooth's (1992) theory, this is implemented by positing an actual covert pronoun that imposes an anaphoric requirement on the context set. The precise implementation of the anaphoric requirement is not important here.

The ~ operator has no direct phonological exponent.[7] Rather, the presence of ~ is only detectable through its effect on prosodic prominence within its sister constituent. According to Rooth (1992), there is a straightforward relationship between ~ and prosodic prominence in its attachment site, which he refers to as its *scope*. Truckenbrodt (1995) makes this condition explicit as follows:[8]

(7)   **Focus prominence**: An F-marked constituent in the scope of ~ receives main prominence.

This correlation between scope and prosodic prominence makes interesting predictions about the relationship between syntax and prosody, since the scope of ~ in English is by no means fixed. For example, there could be prosodic focus marking within a subject, leaving the prominence of the VP intact (8a), or main prominence could fall within the subject (8b), with the VP being deaccented. The difference, in Rooth's theory, is one of scope:

(8)   a.   There was an old man and a young man.
               ~[**The** OLD$_F$ **man**] was reading Moby Dick.

         b.   The young man was reading Moby Dick.
               ~[**The** OLD$_F$ **man was reading Moby Dick**].

The sentence in (8a), where only *man* is reduced and the pitch accent on the VP (on *Dick*) remains, requires an antecedent of the form *the x man*. In contrast, the sentence in (8b), where the entire string *man was reading Moby Dick* is reduced, requires an antecedent of the form *the x man was reading Moby Dick*. This difference arises through the different scopes of ~, and is reflected in the prosodic rendition of the utterance.

The notion *scope of* ~ (i.e., the attachment site of ~) will play a central role in this paper. Importantly, it has to be distinguished from what is referred to as the "breadth" of focus (Ladd 1980: 75). For example, a sentence with focus on the VP is often said to show *broad focus* (Eady et al. 1986) compared to a sentence with *narrow focus* on the object, while focus on the entire sentence is sometimes called *neutral* (e.g., Eady et al. 1986) or *wide* (e.g., Büring 2016). The width of focus corresponds in Rooth's theory to the attachment site of F within the scope of ~:

(9)   a.   Sentence-Focus (*neutral* or *wide*):   ~[JOHN WAS READING MOBY DICK]$_F$.
         b.   VP-Focus (*broad*):   ~[**John** [WAS READING MOBY DICK]$_F$].
         c.   NP-Focus (*narrow*):   ~[**John was reading** [MOBY DICK]$_F$].

Wide focus is licensed by a contextually relevant proposition of any shape (e.g., *Mary was sleeping* in the context *What was everyone doing?*). VP-Focus requires alternatives of the form *John was x-ing* (e.g., *John was swimming*). Narrow focus on the object, as in (9c), requires alternatives that only differ in the choice of object (e.g., *John was reading Leaves of Grass*).

Rooth's theory of focus also allows us to make precise what we mean by the terms *focused* and *given*: A constituent that is in the scope of ~ and F-marked is marked as *focused*; a constituent that is in the scope of ~ (or contained in an F-marked constituent) and not F-marked is marked as *given*; and a constituent that is not in the scope of ~ is neither

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[7] Of course, there are other, overt focus sensitive operators like *only* and *even*. Rooth (1992; 1996), however, argues that all uses of focus alternatives involve ~, and that the focus-sensitivity of *only* and *even* is mediated by ~. This is not crucial for the present article.

[8] This condition does not cover cases in which multiple constituents in the scope of ~ are F-marked. An arguably better formulation is the constraint *GIVEN proposed in Bader (2001), according to which given (here: non-F-marked) material in the scope of ~ may not be prominent and accented.

marked as focused nor given.[9] This last category is similar to what others have called *discourse new*, but the notion of discourse new plays no direct role in Rooth's theory.[10]

Returning to Lieberman's (1963) example, the alternatives theory of focus can explain why deaccenting *nine* in *a stitch in time saves nine* is infelicitous. A shift in prominence to *stitch* suggests that the whole idiom is in the scope of $\sim$, and that *stitch* is F-marked and therefore marked as focused, while the rest of the idiom is not and therefore marked as given. This prosody thus requires an antecedent of the form *an x in time saves nine*. But such an alternative is highly unlikely to be already contextually salient, nor can it easily be accommodated: Since this is an idiomatic expression, substituting an alternative for *stitch* will lead to an expression that only has a literal meaning.[11]

2.2 The nature of cross-linguistic variation

We can use Rooth's formalism to make explicit possible points of cross-linguistic variation in focus marking. A commonly held view is that the difference between English and French with respect to focus and givenness must be related to the considerably different prosodic systems of the two languages (e.g., Jun & Fougeron 2000; Féry 2001). Two potential types of phonological sources of variation, or *P-differences*, are listed in (10):[12]

(10)   Potential P-differences:
    a.   Some property of the prosodic system of the language trumps the effect of focus prominence, and consequently focus is not marked prosodically.
    b.   A phonological property other than prominence marks the scope of $\sim$.

Our experiment tests two concrete claims about P-differences, one for each of (10a) and (10b).

A different potential source of cross-linguistic variation stems from the syntax and semantics of $\sim$, which we refer to as *S-differences*. One possibility is that $\sim$ might vary between languages in its precise presupposition. The idea that (some) Romance languages only mark corrective focus is of this type, and could be captured in Rooth's approach by building "correctiveness" into $\sim$. In this paper, we propose a second possibility, that languages could instead vary in the syntactic scope possibilities of $\sim$. We summarize these two potential S-differences in (11a) and (11b) respectively:

(11)   Potential S-differences:
    a.   The semantic and/or pragmatic content of the $\sim$ operator is different across languages.
    b.   The syntactic scope possibilities of $\sim$ differ across languages (which results in limitations on what can be contrasted and hence predicts semantic/pragmatic differences).

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[9] Note that a constituent can be marked as given in English either if its referent or denotation is discourse salient, or when (just) its linguistic form is discourse given. See Wagner (2012a) for discussion.

[10] Some prior studies argue for separate notions of focus and givenness marking (e.g., Reinhart 2006; Katz & Selkirk 2011), but whether this complexity is needed remains controversial (cf. Wagner 2005; 2012b). Prince (1981) differentiates additional types of information status, but some of the distinctions, such as between "inferred" and "evoked" information, may be about *how likely it is that a particular alternative will be considered to be salient in a context*—rather than constituting a theoretical primitive.

[11] Variations of this account such as Schwarzschild's (1999) theory of givenness can be straightforwardly translated into Rooth's formalism (cf. Wagner 2005; 2006; Büring 2008). Schwarzschild's account differs from Rooth's in that it does not require antecedents to be contrastive. To shift prominence in (5a), for example, the context only needs to contain an antecedent that entails that *someone read Moby Dick*, but does not necessarily have to provide for alternatives to *John*. See Wagner (2006) for discussion.

[12] Another potential P-difference is that languages might differ in the principle relating the scope of $\sim$ and prosody. We know of no concrete proposal along these lines.

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We test for S-differences by varying the context such that depending on the content and scope of ~, focus/givenness marking should or should not be possible.

In the following subsections, we review various concrete hypotheses about P-differences and S-differences for how English and French may differ in how they employ prominence shifts to encode focus.

2.3 *The Phrasing Hypothesis*

One explicit hypothesis about why French differs from English (and other languages like German) is proposed in Féry (2001; 2014). Féry (2001) argues that stress-languages like English encode focus via the placement of pitch accents on particular words, while phrasing-languages like French encode focus via prosodic phrasing. This fits with the idea that in French, accentuation is more generally a property of phrases (Delattre 1938; among others), while in English, it is a property of words. According to Féry (2014), this has the consequence that in English, any syllable can be prosodically reduced, while in French, only entire phonological phrases can be.

The two focus marking strategies can result in superficially similar patterns. In French, various studies found a post-focal reduction in pitch (Di Cristo 1998; Jun & Fougeron 2000; Féry 2001; Dohen & Loevenbruck 2004), similar to what is often reported in English. In responses to subject wh-questions, for example, both English and French show reduced pitch on the VP (Breen et al. 2010 and Xu & Xu 2005 for English; Féry 2001 for French). This is as expected under what we call the *Phrasing Hypothesis*: Since the VP is mapped to a separate phonological phrase, post-focal reduction is possible in French in this case.

The differences between the two types of languages emerge when looking at cases in which the post-focal material does not form a separate phonological phrase. Hamlaoui et al. (2012) found that in noun-adjective sequences, adjectives are not prosodically reduced when focus is placed on the noun. The explanation proposed in Féry (2014) is that the adjective is not assigned to a separate phonological phrase, and hence there can be no post-focal compression of pitch and more generally, there is no post-focal prominence reduction. Féry (2014) and Destruel & Féry (2015) present evidence that post-verbal adjuncts show pitch reduction when the verb is focused while post-verbal arguments do not. The proposed explanation is that internal arguments are phrased with the verb, while adjuncts are mapped to their own separate phonological phrase, and hence can be reduced.

The Phrasing Hypothesis not only makes predictions about *when* focus can be marked by prosodic prominence, but also about *how* it should be marked. One prediction is that the phonetic cues used to mark focus in French should be the same ones that correspond to the encoding of phrasing, and might differ from those used in English which has been argued to encode focus via the level of prominence on particular constituents. Most prior studies did not check for intensity cues for focus in French, which are typically associated with focus prominence in English, and moreover did not directly compare English with French. Any observations about differences in the phonetic realization of focus between the languages have been gleaned from different studies that used various methods, which provides another motivation for the present study.

We summarize the predictions of the Phrasing Hypothesis as follows:[13]

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[13] The Phrasing Hypothesis relates to ideas about cross-linguistic variation in focus marking and phrasing developed in Büring (2009). We return to Büring's approach in Section 6.

(12)   Predictions of the Phrasing Hypothesis:
　　　　a.   **Types of focus**: No differences are predicted between French and English (i.e., independent of type of focus, a prominence shift should only be possible whenever the given constituent is sufficiently large to be mapped to a phonological phrase).
　　　　b.   **Phonological difference**: In French, only entire phonological phrases can deaccent (but within a phonological phrase, focus/givenness cannot be marked), while in English, focus can shift within any phonological domain.
　　　　c.   **Phonetic realization**: French should exclusively use cues related to phrasing, while in English, where focus marking is stress-based, stress-related cues should (also) be used.

The Phrasing Hypothesis assumes that French and English differ due to a P-difference along the lines of (10a). We now turn to a P-difference along the lines of (10b), where the scope of ~ is marked by something other than a shift in prominence.

2.4 *The Initial High Hypothesis*

Another way in which French has been argued to differ from English is that it has been reported to show an additional prosodic strategy to mark focus, namely a high or rising tone at the beginning of the focused constituent. The initial high, which is often referred to as the *accent d'insistance*, is optional and can occur in an accentual group in addition to the high tone present on the final syllable. It typically occurs on one of the first two syllables (e.g., Grammont 1914; Fouché 1935; Delattre 1938; Jun & Fougeron 2000), although function words are skipped (Jun & Fougeron 2000; Post 2000a; Welby 2006). It is often analyzed as a boundary tone rather than as a pitch accent (Jun & Fougeron 2000; Féry 2001; Welby 2006).

　Di Cristo (1998) reports that an early high peak is the predominant realization of at least some types of foci (see also the discussion in Welby 2003). Beyssade et al. (2009) present evidence in favor of a phrase initial high as a general strategy to mark focus, and argue that French differs from English in using "Intonational Highlighting" rather than the distribution of pitch accents to mark focus. We refer to this as the *Initial High Hypothesis*. The Initial High Hypothesis is compatible with the Phrasing Hypothesis, since the high tone serves as a cue to phonological phrasing. The placement of an initial high is compatible with post-focal compression, so it is in principle orthogonal to the main question we explore here, concerning the conditions on prominence shifts. However, it is conceivable that the initial high could be an *alternative* strategy to mark focus when other tools such as prominence shifts are not available.

　The status of the initial high tone as a focus marker is controversial. Jun & Fougeron (2000; and references therein) identify rhythm, style, and speaker as the main factors influencing its occurrence. Welby (2006) argues that the best predictor for the presence of the initial high is phrase length. While German & D'Imperio (2016) observed the initial high to be more likely to be found at the left edge of focused constituents, they also found a higher occurrence on long constituents that were not focused. Rhythmic reasons were also found to play a role in Astésano et al. (2007). Féry (2001) states that the initial high is often used purely for expressive purposes or in news speech, and is not specifically tied to focus realization.

　While our study mainly focuses on the different predictions of the Phrasing Hypothesis and Scope Hypothesis (discussed in Section 2.6) for post-focal reduction, our data lends itself to look for initial highs as a marker of focus. The predictions of the Initial High Hypothesis can be summarized as follows:

(13)   Predictions of the Initial High Hypothesis:
      a.   **Types of focus**: Differing assumptions exist in the literature with respect to whether the initial high only occurs in certain types of foci (see e.g., Di Cristo 1998).
      b.   **Phonological difference**: There should frequently be an initial high tone in French at the beginning of the focused phrase, either instead of or accompanied by a prominence shift to the focused constituent.
      c.   **Phonetic realization**: The initial high tone should cause a pitch excursion at the beginning of focused phrases in French but not in English, where no such initial high tone has been posited.

We now turn to two hypotheses concerning possible S-differences between French and English.

2.5 The Corrective Focus Hypothesis

Perhaps the most widespread idea about how French (and other Romance languages) differs from English (and other Germanic languages) is that the former only marks focus in cases of (metalinguistic) correction (Lambrecht 1994: 343; Ladd 2008: 236). What it means to be corrective has only been discussed informally. Gussenhoven (2007: 91) characterizes it as follows: "When the focus marks a constituent that is a direct rejection of an alternative, either spoken by the speaker himself ('Not A, but B') or by the hearer, the focus is 'corrective' […]". Note, however, that a constituent cannot be rejected by another constituent; rather, a correction is a discourse relationship between alternative assertions.[14] One way to make more precise what it means for a speech act to be corrective is that it suggests an amendment to a previous speech act. A corrective assertion proposes to update the common ground (the agreed beliefs shared by speaker and hearer) with a different proposition than the one asserted by the previous assertion, which it aims to reject. With respect to the distribution of prosodic focus marking, the Corrective Focus Hypothesis predicts the following:

(14)   Predictions of the Corrective Focus Hypothesis:
      a.   **Types of focus**: In English, any type of focus will induce prosodic effects, while in French, focus will only be marked if the antecedent is an assertion that the current assertion aims to correct.
      b.   **Phonological and phonetic predictions**: No focus-related differences are predicted (i.e., there is no reason to expect different phonological conditions on the marking of focus or different phonetic cues for the encoding of focus in French or English).

Some previous experimental results appear to support the Corrective Focus Hypothesis. Jun & Fougeron (2000) and Dohen & Loevenbruck (2004) present evidence showing that French marks focus prosodically with post-focal reduction in corrective contexts, but they did not include a comparison case with non-corrective focus. Our experimental design, described in Section 3, includes both corrective and non-corrective utterances, and varies phonological and syntactic size in the post-focal domain in ways that will allow us to put both the Corrective Focus and Phrasing Hypotheses to the test.

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[14] This is likely too narrow. If A asked *Did John return the book?*, the response *No, Bill has it* can also be characterized as a correction, but in this case of a proposition that is presupposed, not one that has been asserted. Whether such corrections of entailments of prior utterances also lead to prominence shifts in Romance languages has to our knowledge not been tested.

One way to make the Corrective Hypothesis explicit is to try to build it into the semantics of ~. Suppose that French uses an operator $\sim_{Fr}$, which encodes that the complement of ~ has to be a correction of the antecedent. Its English counterpart $\sim_{En}$ would not require correctiveness. But note that the contribution of $\sim_{Fr}$ only makes sense if it attaches to a constituent that denotes an assertion, since is not clear what it means for a constituent to be corrective. For example, if ~ attaches to a DP, how would the requirement that the DP be corrective be interpreted? The only sense we can give to this is that the DP must form part of a bigger assertion which stands in a corrective relation to a previous one. It seems then that the Corrective Focus Hypothesis as outlined here requires non-compositional reference to the larger structure that a focused constituent is part of. There is another way, however, to think about the difference between French and English that avoids this non-compositionality, to which we turn now.

2.6 A new proposal: The Scope Hypothesis

Suppose that French differs from English in that the focus-sensitive operator ~ involved in prosodic focus marking has a much narrower set of syntactic scope possibilities in French compared to English, which results in a narrower set of pragmatic contexts in which focus can be marked. We will call this the *Scope Hypothesis*.

While syntactic scope seems like a natural point of cross-linguistic variation given Rooth's (1992) formalism, we are not aware of any work where a hypothesis of this type has been proposed to account for cross-linguistic differences in prosodic focus marking. While the literature on focus often refers to different *types of focus* (e.g., Gussenhoven 2007), Rooth's theory of alternatives does not actually distinguish different focus types, and any apparent differences in focus type must be explained as interactions with other factors. We argue that the scope of ~ may be helpful in explaining apparent effects of focus types.

If ~ in French is indeed more restricted in its scope possibilities than in English, there are a number of possibilities for how restricted it might be. One possibility is that in French, ~ is a sentential operator (similar to *always*), which can attach to any constituent that denotes a proposition, whereas in English, it can attach to many different constituents, including DPs (similar to *only*). Under this version, the scope possibilities in French are more constrained than in English, where it is assumed that ~ can attach to constituents of any conjoinable semantic type (e.g., Rooth 1992). This idea is able to account for some of the known differences between the two languages. Consider again the examples from Cruttenden (2006) (cf. (1)–(4)):

(15) a. A: What was the score?
          B: $\sim_1$[LIVERPOOL$_F$ **1**], $\sim_2$[MANCHESTER UNITED$_F$ **1**].
      b. A: I did all the work.
          B: ~[**You mean** [YOUR SISTER]$_F$ **did all the work**].

In (15a), two focus operators are involved, each of which takes scope over a sub-constituent of the utterance. The two ~ operators attach to DPs and the antecedents for focus marking are within the same utterance. In (15b), the contrast that B evokes is one between at least two potential alternative utterances, *You mean you did all the work* vs. *You mean your sister did all the work,* and the focus operator can attach to the propositional node.[15]

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[15] Of course, the context only provides *I did all the work* as an antecedent. But this entails (from B's perspective) the proposition *You mean that you did all the work*. As is well known, entailed propositions can serve as the antecedent for focus marking (Rooth 1996; Schwarzschild 1999), so the presupposition of ~ would be satisfied.

If in French, ~ can only attach to clausal nodes denoting propositions, embedded uses of ~ should be impossible. Thus, the focus structure in (16) with embedded ~ should not be possible, and hence focus should not be marked prosodically. However, prosodic focus marking should be possible in examples equivalent to (15b), illustrated in (17), since ~ can attach to the root in this case to introduce a focus presupposition that is licensed by the context.

(16) A: Quel était le résultat?
which be.3SG.IPFV DEF.SG.M result
'What was the score?'

B: *~₁[PARIS ST. GERMAINF **un**], ~₂[ST. ETIENNEF **un**].
Paris St. Germain one St. Etienne one
'Paris St. Germain 1, St. Etienne 1.'

(17) A: J'-ai fait tout le travail.
1SG.NOM-have.1SG do.PST.PTCP all DEF.SG.M work
'I did all the work.'

B: ~[**Tu veux dire que** [TA SOEUR]F **a**
2SG.NOM want.2SG.PRS say.INF COMP 2SG.F.POSS sister have.3SG
fait tout le travail].
do.PST.PTCP all DEF.SG.M work
'You mean your sister did all the work.'

Thus, the Scope Hypothesis can rationalize some of the differences found in Cruttenden (2006). Note that corrective examples are always compatible with ~ taking wide scope and attaching to the clause node that denotes a proposition, precisely because entire utterances are juxtaposed. What might intuitively appear like a "type of focus" effect might instead simply involve differing scopes of ~. We summarize the predictions of the Scope Hypothesis in (18):

(18) Predictions of the Scope Hypothesis (pre-final version):
   a. **Types of focus**: In English, ~ can attach to any constituent (i.e., any type of focus can induce prosodic effects), while in French, prosodic focus marking is only possible when ~ attaches to nodes that are at least clause-sized.
   b. **Phonological and phonetic predictions**: No focus-related differences are predicted (i.e., there is no reason to expect different phonological conditions on the marking of focus, or particular phonetic cues for the encoding of focus).

The Scope Hypothesis has some similarity with the Corrective Focus Hypothesis: As we noted, requiring focus to be corrective imposes a condition on the entire utterance, not just the focused constituent. According to the Scope Hypothesis, attaching to the entire utterance—and not to smaller nodes—is the real difference, which gives rise to the appearance that French only marks one type of focus using prominence.

   The Scope Hypothesis is different from the Corrective Focus Hypothesis in that it attributes cross-linguistic variation in prosodic effects of focus to differences in the syntactic scope possibilities of the ~ operator rather than its semantic content. We presented the idea that ~ in French only attaches to constituents that denote propositions, but there are actually variants of this proposal. For example, perhaps ~ in French can only attach to root nodes, that is, to syntactic objects that denote speech acts. Either way, it often makes

similar predictions to the Corrective Focus Hypothesis. The crucial difference is that the Scope Hypothesis predicts that a prominence shift should be possible in French whenever the relevant scope is possible, irrespective of whether the antecedent is an assertion that stands in a corrective relation to the present assertion. Our experiments were designed to tease some of the divergent predictions apart, but the results stop short of resolving the issue, as we will see. If the Scope Hypothesis is correct, we should find independent syntactic evidence for scope differences. The observation that French resorts to marking focus with clefts more often than English (e.g., Lambrecht 1994) could be seen as a reflex of the difference in scope options for ∼. Clefts are bi-clausal, and clefting might be a strategy to single out a constituent by putting it into a separate clause and adjoining ∼ to it. A more thorough discussion of such syntactic differences is beyond the scope of this paper.[16]

3 Experiment 1: Adjectival modification

The Scope Hypothesis holds that French differs from English in that ∼ must take scope at the root node, while English allows for ∼ to take scope over embedded nodes as well. In order to test this hypothesis, our experiment examined instances of adjectival modification in different types of focus contexts—corrective focus, contrastive focus, and embedded parallelism (cf. Gussenhoven 2007). For comparison, we included a control condition in which all information was discourse new. Additionally, we included a condition in which the focused constituent appears in the pivot of a cleft to ensure that the non-clefted focus structures we used were not infelicitous. This is particularly relevant for French, where clefts are commonly used as a way to encode focus (Lambrecht 1994; Clech-Darbon & Rialland 1999; Hamlaoui 2008; 2009).

3.1 Stimuli

We created 16 item sets which varied across the five conditions (corrective focus, contrastive focus, embedded parallelism, cleft, control). Each condition within an item set had lexically identical target constituents. As is conventional in the field, we will henceforth refer to each set of dialogues with similar linguistic material differing only in condition as an *item* (see Supplementary file 1 for a complete list of our experiment stimuli).

Below, we illustrate each condition and discuss the predictions for English versus French based on the Scope Hypothesis, Corrective Focus Hypothesis, Phrasing Hypothesis, and Initial High Hypothesis. In so-called *corrective focus* contexts, the entire prior assertion serves as the antecedent for focus marking. We can understand a corrective assertion in terms of how it updates the common ground: A corrective assertion proposes to update the common ground with a new proposition that aims to amend a previous context update. The focus in this case is the sub-constituent in which the two assertions differ. In Roothian terms, the representation of corrective focus involves ∼ with wide scope over the clausal node:[17]

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[16] An additional issue for the Scope Hypothesis arises if we take it to be a general claim about the scope of focus operators in French, since focus operators like *seul* 'only' can associate with a smaller constituent than a proposition such as a DP. And yet Rooth's analysis actually holds that *all* focus associations are mediated by ∼. One response would be to give up on this assumption of Rooth's, and propose that different focus-sensitive operators can have different syntactic scope options. In English, as in French, there are focus operators that differ in their syntax. The operator *only* seems to be able to attach to constituents of various types (Rooth 1985; Wagner 2006), while the focus-sensitive operator *always* can only attach in the adverbial position. Perhaps ∼ in English is more like *only* in its syntactic distribution, while ∼ in French is more like English *always* (see Wagner 2006). As for French *seul,* it appears to be like English *only.* Another possibility is that this appearance is misleading, and *seul* is actually always a propositional operator (see Büring & Hartmann 2001 for an argument that this is the case for German *nur*). See also Beaver & Clark (2008) for a discussion of differences between types of focus association.

[17] We assume that 'No' constitutes its own speech act, and hence does not have to be within the scope of ∼, even in French.

(19)   Corrective focus in *English*:
      A: Yesterday, Jordan bought a blue bike.
      B: No, ~[**yesterday, he bought a** RED$_F$ **bike**].

(20)   Corrective focus in *French*:
      A: Pour le   pique-nique de cet   après-midi, Guillaume va
           for   DEF.SG.M picnic   of DEM.SG.M afternoon Guillaume go.3SG
           apporter une   salade froide.
           bring.INF INDF.SG.F salad cold.SG.F
           'For the picnic this afternoon, Guillaume is going to bring a cold salad.'
      B: Non, ~[**il**   **va**   **apporter une**   SOUPE$_F$ **froide**].
           no   3SG go.3SG bring.INF INDF.SG.F soup   cold.SG.F
           'No, he's going to bring a cold soup.'

The focus alternatives involved in corrective focus are alternatives to the entire clausal node, as in (19)–(20), or possibly alternative speech acts, if operators like *assert* are represented in the syntax:

(21)   ~[(assert) **yesterday, he bought a** RED$_F$ **bike**].

A corrective statement contrasts entire propositions (or perhaps speech acts) with each other. We call any contrast between constituents of a smaller size *contrastive focus*. In such cases, a sub-constituent is contrasted with linguistic material in an antecedent statement. For example, *a red bike* is contrasted with *a blue bike* in (22), and *une soup froide* with *une salade froide* in (23). Note that our *contrastive focus* differs from *corrective focus* in that it does not reject the proposition asserted in the antecedent proposition, but proposes to add an additional proposition to the common ground; one that contains a similar part, such as *bought an x bike*:

(22)   Contrastive focus in *English*:
      A: Yesterday, Jordan bought a blue bike.
      B: Really? Yesterday, my friend bought a red bike.

(23)   Contrastive focus in *French*:
      A: Pour le   pique-nique de cet   après-midi, Guillaume va
           for   DEF.SG.M picnic   of DEM.SG.M afternoon Guillaume go.3SG
           apporter une   salade froide.
           bring.INF INDF.SG.F salad cold.SG.F
           'For the picnic this afternoon, Guillaume is going to bring a cold salad.'
      B: C'-est   vrai? Marie va   apporter une   soupe froide.
           3-be.3SG true Marie go.3SG bring.INF INDF.SG.F soup cold.SG.F
           'Really? Marie is going to bring a cold soup.'

In the contrastive condition, the focus operator must take narrower scope than in the corrective condition. In examples (22) and (23), attaching ~ either to the VP or the DP would lead to a focus presupposition that is fulfilled by an antecedent in the context, as shown in (24).[18] Based on the Scope Hypothesis, either representation should be possible in English only, since in French, ~ should not be able to attach to a DP or a VP.

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[18] The principle Maximize Presupposition (Heim 1991) would favor attaching ~ to the bigger constituent. See also Truckenbrodt (1995), who argues that the scope of ~ is generally maximized.

(24)   a.   My friend ~[$_{VP}$ **bought a** RED$_F$ **bike**].
        b.   My friend bought ~[$_{DP}$ **a** RED$_F$ **bike**].

In both corrective focus and contrastive focus, the antecedent for focus marking is in a separate utterance, introduced in the first part of the dialogue in our examples. There are also cases of prosodic focus marking in which a constituent within the *same sentence* serves as an antecedent. These sentences therefore involve an embedded parallelism, since two constituents with parallel structure appear in the same utterance:[19]

(25)   Embedded parallelism in *English*:
       A: I heard that Jordan is into cycling.
       B: Yeah, the other day, he bought a blue bike and a red bike.

(26)   Embedded parallelism in *French*:
       A: J'-ai   entendu   dire   que   Guillaume irait   à
           1SG-have.1SG hear.PST.PTCP say.INF COMP Guillaume go.3SG.FUT.IPFV to
           un   pique-nique.
           INDF.SG.M picnic
           'I heard that Guillaume will go to a picnic.'
       B: Ouais, il   va   apporter une   salade froide   et   une
           yes   3SG   go.3SG bring.INF INDF.SG.F salad   cold.SG.F and INDF.SG.F
           soupe froide.
           soup   cold.SG.F
           'Yeah, he's going to bring a cold salad and a cold soup.'

In Roothian terms, such examples would be analyzed as involving two ~ operators, with narrow scope over the contrasting DPs (Rooth 1992), which serve as the antecedent of the focus marking for each other:

(27)   He bought ~$_1$[$_{DP}$ **a** BLUE$_F$ **bike**] and ~$_2$[$_{DP}$ **a** RED$_F$ **bike**].

Based on the Scope Hypothesis, a representation like (27), which in the following we will simply call *parallelism*, should be impossible in French.

   The predictions of each focus condition for adjectival modification under the four accounts we consider are summarized in (28)–(30). Note that the Phrasing and Initial High Hypotheses both differ from the Scope and Corrective Focus Hypotheses, but make the same predictions across all types of focus examined.

(28)   Predictions of the Scope Hypothesis and Corrective Focus Hypothesis:
       a.   **Corrective focus**: English and French should pattern the same, and mark corrective focus prosodically.
       b.   **Contrastive focus**: There should be no prosodic marking of focus in French (based on (24)), while in English, focus should be marked prosodically.
       c.   **Parallelism**: There should be no prosodic marking of focus in French (unless, as under the Scope Hypothesis, entire speech acts are coordinated in parallel structures; see Section 4), while in English, focus should be marked prosodically.

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[19] We acknowledge that the term *embedded parallelism* is not ideal, since all our foci involve a parallelism (even if not a within-sentence one). A useful term could be *embedded focus*, where any non-root attachment of ~ is called "embedded", but this term is often used with respect to the placement of certain F-markers (e.g., Féry & Samek-Lodovici 2006).

(29)   Prediction of the Phrasing Hypothesis:
         Whenever a constituent does not form a phonological phrase of its own, no
         prosodic marking is expected; if the given constituent is at least Φ-sized, it should
         show pitch compression in French.

(30)   Prediction of the Initial High Hypothesis:
         While English and French may pattern similarly with respect to prominence shifts,
         French should in addition regularly show an initial high tone on the focused
         constituent.

French and English might differ not just in their use of prosodic focus, but also in the
trade-off between syntactic and phonological means of encoding focus, as discussed in the
literature on Romance vs. Germanic (Vallduví 1992; Lambrecht 1994; Cruttenden 1997;
Ladd 2008; among others). One salient difference between the two languages is that clefts
are used more frequently in French, in particular for subject focus (Clech-Darbon & Rial-
land 1999; Hamlaoui 2008; 2009). We therefore included a *cleft* condition, with an *it*-cleft
in English, (31), and a *c'est*-cleft in French, (32). The type of focus we used with clefts is
corrective.

(31)   Cleft condition in *English*:
         A: Yesterday, Jordan bought a blue bike.
         B: No, ~[**it was a** RED$_F$ **bike that he bought yesterday**].

(32)   Cleft condition in *French*:
         A: Pour le   pique-nique de cet   après-midi, Guillaume va
              for   DEF.SG.M picnic   of DEM.SG.M afternoon   Guillaume go.3SG
              apporter   une   salade froide.
              bring.INF INDF.SG.F salad   cold.SG.F
              'For the picnic this afternoon, Guillaume is going to bring a cold salad.'

         B: Non, ~[**c'-est   une   **SOUPE$_F$** froide   qu'-il   va   apporter**].
              no   3-be.3SG INDF.SG.F soup   cold.SG.F OBJ.REL-3SG go.3SG bring.INF
              'No, it's a cold soup that he's going to bring.'

The constituent of interest occurs early in the sentence in the cleft condition, as opposed
to in all other conditions. This makes direct comparison of the prosodic results impossible,
and hence we will exclude this condition from most of our prosodic analyses. The reason
for including clefts was to establish their naturalness compared to non-cleft realizations of
focus. The concern was that not using a cleft might be anomalous in French. These results
are discussed in Section 6.
   In order to evaluate whether focus is marked prosodically at all, we also included a *con-
trol* condition in which there is no potential antecedent for focus marking, and both target
words are contextually new:

(33)   Control condition in *English*:
         A: Jordan is always purchasing cycling stuff.
         B: Yeah, yesterday, he bought a red bike.

(34)   Control condition in *French*:
         A: Guillaume ira   à un   pique-nique.
              Guillaume go.3SG.FUT to INDF.SG.M picnic
              'Guillaume is going to a picnic.'

B: Ouais, il   va   apporter une   soupe froide.
    yes   3SG go.3SG bring.INF INDF.SG.F soup cold.SG.F
    'Yeah, he's going to bring a cold soup.'

By design of the experiment, the participant is asked to respond with a particular scripted sentence. Hence, in the conditions in which a cleft is not used, participants must either mark focus prosodically (i.e., by shifting prominence in an informative manner or perhaps by using an initial high tone), or not mark it at all.

 We varied two factors between item sets, to determine if they might play a role in whether focus is marked prosodically. The first is phonological size. Ladd (1996) was the first to suggest that the size of the constituent involved in a contrast may be important for determining whether a prominence shift can occur in Romance, specifically in Italian. An effect of phonological size in French could potentially provide evidence for the Phrasing Hypothesis, if longer constituents are more likely to be phrased separately. Ladd's original observation is compatible with phonological size playing a role. As a first test of this, we varied the phonological size of the given material between items within our 16 item sets involving adjectival modification: 8 involved given constituents of 2 syllables and 8 of 1 syllable. If phonological size matters, this manipulation could have an effect on the possibility of prosodic focus marking in French. Examples of adjectival modification in the corrective focus condition showing the given word as 1 vs. 2 syllables are provided in (35) and (36) for French with *bleu* 'blue' and *mignonne* 'cute'. (See Supplementary file 1 for all examples in English and French.)

(35)   Adjectival modification with a given word of 1 syllable in *French*:
        A: Hier   soir,   Natalie a   nettoyé   le   plafond
            yesterday evening Natalie have.3SG clean.PST.PTCP DEF.SG.M ceiling
            bleu.
            blue.SG.M
            'Last night, Natalie cleaned the blue ceiling.'

        B: Non, elle a   nettoyé   les   murs   bleus.
            no   3SG.F have.3SG clean.PST.PTCP DEF.PL.M wall.PL blue.PL.M
            'No, she cleaned the blue walls.'

(36)   Adjectival modification with a given word of 2 syllables in *French*:
        A: Hier,   Lisette a   acheté   une   veste mignonne.
            yesterday Lisette have.3SG buy.PST.PTCP INDF.SG.F coat cute.SG.F
            'Yesterday, Lisette bought a cute coat.'

        B: Non, elle a   acheté   une   jupe mignonne.
            no   3SG.F have.3SG buy.PST.PTCP INDF.SG.F skirt cute.SG.F
            'No, she bought a cute skirt.'

It could be that the difference in word order between nouns and adjectives in French interacts with prosodic focus marking. Pre-nominal adjectives in French usually undergo liaison with the following noun, while liaison between the noun and a post-nominal adjective is more variable (Durand & Lyche 2008; Kilbourn-Ceron 2017). This can be seen as an indication that the two word orders differ in their prosodic phrasing: An *adjective-noun* sequence may be obligatorily phrased together as one domain, while a *noun-adjective* sequence may be phrased as two domains, even if the correlation between liaison and phrasing has been noted to be far from perfect (Post 2000b; Pak & Friesner 2006; Côté

2011).[20] Noun-adjective sequences are also less likely than adjective-noun sequences to show clash resolution on the first word (Post 2000a; 2000b). If post-focal reduction correlates with phrasing, we would expect it to be more likely in noun-adjective sequences where adjectives are more likely to be phrased separately. In order to test for such an effect of word order, we included 4 item sets with pre-nominal adjectives and 12 item sets with post-nominal adjectives. Post-nominal adjectives have been shown in the previous examples, such as (35). An example of pre-nominal adjectival modification in French is in (37):[21]

(37)   A: Hier   soir,   Martin a   joué   avec son
              yesterday evening Martin have.3SG play.PST.PTCP with SG.M.POSS
              vieux   chat.
              old.SG.M cat
              'Last night, Martin played with his old cat.'

          B: C'-est   vrai? Gabriel a   joué   avec son
              3-be.3SG true Gabriel have.3SG play.PST.PTCP with SG.M.POSS
              jeune   chat.
              young.SG.M cat
              'Really? Gabriel played with his young cat.'

In order to maintain comparability across word orders, the focused word always came first in linear order (focused word > given word). Beyond phonological size, focus marking might also interact with the *syntactic size* of the constituents involved. We tested for such effects in Experiments 2 and 3, discussed in Sections 4 and 5. The three experiments were part of a single study, but they are presented separately following the logic of the design of the sub-experiments.

3.2 Procedure

The structure of the English and French experiments was as parallel as possible given independent syntactic differences between the languages. The experiments were run in a latin-square design, where each participant saw one condition from each item set, but an equal number of trials from each condition across the experiment. Each trial consisted of a pseudo-dialogue with an auditorily presented context and a scripted response to be read aloud by the participant, followed by a response rating provided by the participant. A sample dialogue for English is in (38):

(38)   Yesterday, Jack bought a checkered shirt.
       Really? The other day, I bought a striped shirt.

       Listen, then respond. Press any key when you are done recording!

In order to elicit the most natural conversation possible, the auditorily presented contexts were pre-recorded. There were English, Québec French, and European French versions of the pre-recorded stimuli, each recorded by a monolingual female native speaker of the respective language in her twenties.

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[20] Optionality in phrasing in the case of post-nominal modification might also reflect syntactic differences, such as between adjectival modification vs. reduced relative clause modification. Our items were not designed to test for such potential syntactic distinctions.

[21] The unbalanced number of pre- vs. post-nominal adjectives reflects the fact that pre-nominal adjectives are very limited in French.

After filling out a consent form and language questionnaire, participants read the instructions and the experimenter also verbally went over them. To familiarize participants with the task, there were four practice dialogues at the beginning of the experiment.

The actual experiment then proceeded as follows. Participants saw the complete dialogue on the screen as in (38), and read the dialogue silently. When ready, they pressed a key to hear the pre-recorded first part of the dialogue in their headphones, and were immediately able to utter their response. The reason the participants were given their scripted response before hearing the context was that without preparation, it would have taken too long to absorb the content to be able to respond within a reasonable period of time. Further, the entire dialogue was presented because otherwise, participants might have already pre-planned a response with a particular prosody, and then have become confused if their own response did not fit the given context.

After recording their response, participants saw a second screen requesting a naturalness rating of their response given the context. The precise wording was: "Please rate how natural your response was given what the other person said. [1 = completely unnatural, 5 = completely natural]". We included unrelated filler dialogues that were interspersed among test trials, so each participant completed 60 trials in total (30 test trials; 30 fillers). The overall experiment lasted 15–25 minutes; no time limit was imposed.

3.3 Participants

Participants were recruited from our participant pool as well as through online ads. A total of 35 English and 33 French speakers participated. Among the French groups, we recruited 16 European French speakers and 17 Québec French speakers. Regarding possible differences between speaker groups, we were particularly interested in the potential influence of English on the French speakers.[22] This is because, as mentioned above, there is evidence from language contact, between Chinese and neighboring languages, that prosodic features of focus marking can spread, perhaps because it is a useful tool to encode information status that can be imported without dramatic changes to other parts of the grammar (Xu et al. 2012). We checked for influence of English on French as follows. Following Akita (2005), we categorized the French speakers into two groups based on global accent ratings conducted by three English-speaking judges on English production data collected from each participant. We excluded 4 European French speakers and 1 Québec French speaker who were judged to have high influence of English in order to focus on how French speakers without significant English influence use prosody. The final number of participants whose data were analyzed is thus: 35 English speakers, 12 European French speakers, and 16 Québec French speakers.[23]

3.4 Quantitative measures

Our study deliberately focuses on prominence shifts as a means to encode focus.[24] Our approach is to look for quantitative differences in focus effects across conditions that would reflect prominence shifts, and to compare across languages to see whether any differences can be observed. The reason for this is that we wanted to minimize the theoretical

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[22] Although we do not expect influences in the direction of French to English, we nevertheless point out that the French level of our English speakers was on average much lower than the English level of our French speakers.

[23] The reason for the uneven numbers of participants was that it was harder to recruit French speakers. However, 12 participants for a production study is a relatively large number, far exceeding most prior studies on the production of focus in French.

[24] Of course, there could be other cues to focus than prominence shifts. See Gryllia et al. (2016) for a discussion of other types of cues from the prosody of in-situ wh-questions in French.

assumptions that go into the interpretation of our data. The different phonological systems of the two languages are such that superficially very similar pitch contours, for example, might have very different phonological interpretations, which makes a direct comparison of a phonological transcription more difficult. Importantly, our main predictions are about focus being encoded or not. Any quantitative differences that we find in particular focus contexts can serve to falsify claims that focus is not marked prosodically. The downside of examining quantitative cues is that we might overlook phonological differences where the languages seem similar given the phonetic realization. Thus, even if we find that focus is marked phonetically in similar ways in a particular context, this does not necessarily mean that the phonological representation of focus in that condition is the same. As a consequence, our results may remain compatible with multiple phonological interpretations, but this does not diminish the main findings about the interaction of focus type with whether or not focus is marked prosodically at all.

In looking at cues to focus, we begin by examining quantitative measures of *relative* prominence between words of interest, rather than the absolute prominence of particular words. Although the latter has been shown to be most relevant in encoding focus (see Ladd 1980; Wagner 2005; Ladd 2008; among others), absolute measures of prominence are harder to interpret. For example, a word placed earlier in a phrase will tend to have higher intensity than a word later in a phrase (Poschmann & Wagner 2016), as the latter might have lower pitch due to declination and downstep effects (cf. Ladd 2008). The prominence of a word will also be influenced by its segmental make-up. Since each two-word sequence appears in all 5 conditions, we can control for such by-item effects.

In all of our conditions, the focused constituent always preceded the given constituent. In English, material preceding foci is often optionally accented. That is, when the last accented word within an intonational phrase (carrying *nuclear stress*) is particularly prominent, it can easily be preceded by accented words even if it carries narrow focus. On the other hand, post-focal material must be deaccented or at least heavily reduced since, arguably, focus fixes the relative prominence between words, but does not necessarily proscribe the phonetic realization. This difference in the degree of perceived prominence between prenuclear and nuclear accents has been observed for both English and French (Hualde et al. 2016). We therefore decided to investigate the difference between early focus followed by a post-focal word and all-new controls. For example, in the dialogue for corrective focus in (39), we are interested in quantitative measures correlating with prominence on the target constituents *steel* and *knives*.

(39)   A: Last week Johanna polished the silver knives.
        B: No, she polished the steel knives.

To obtain measurements for the target constituents, we automatically annotated the data using the Prosodylab-Aligner (Gorman et al. 2011). Using Praat scripts (Boersma & Weenink 2011), we extracted duration, intensity, and pitch measurements on the focused constituent and the following given constituent; in (39), *steel* and *knives* respectively. We then computed measures of relative prominence by looking at the difference between the focused and given constituents. We used measures sensitive to the ratio rather than the difference between the physical measure (difference in semitones of maximal pitch; in log duration; in intensity measured in db). The use of logarithmic difference measures is motivated by much psychoacoustic work which shows that perceptual differences in

pitch, loudness, and duration are better modeled as ratios rather than as differences in absolute values (e.g., Breen et al. 2010).

3.5 Results of Experiment 1: Adjectival modification items

In this section, we present the results of Experiment 1, which directly compares adjectival modification items across focus conditions in English and French. We first observe whether focus is prosodically marked, and if so, whether the type of focus conditions this marking. Specifically for French, we examine whether word order or the syllable size of the given item influences focus marking. Secondly, we investigate precisely *how* focus marking is achieved when focus marking does occur: Does the prominence shift occur because of a boost on the focused constituent or a reduction on the given constituent, or a combination of both? Finally, we take a closer look at French in light of the predictions of the Initial High Hypothesis.

To recap our overall predictions, if S-differences are the main reason why French and English differ in their use of prosody, we expect the languages to share similar relative measurements in at least some focus contexts—in particular, in corrections. If P-differences in terms of phrasing are the main reason why French and English differ, we expect items that do not phonologically allow for focus marking in French to be different from their English counterparts across all focus types.

3.5.1 Is focus prosodically marked?

Figure 1 shows the means for relative measures of prominence depending on focus condition for English, Québec French (QuFrench), and European French (EuFrench).[25] As mentioned, we cannot include the cleft in this analysis since the syntax of the focused constituent is at the beginning of the sentence, and is therefore not comparable to the focused constituent in the other conditions (located at the end of the sentence). We discuss
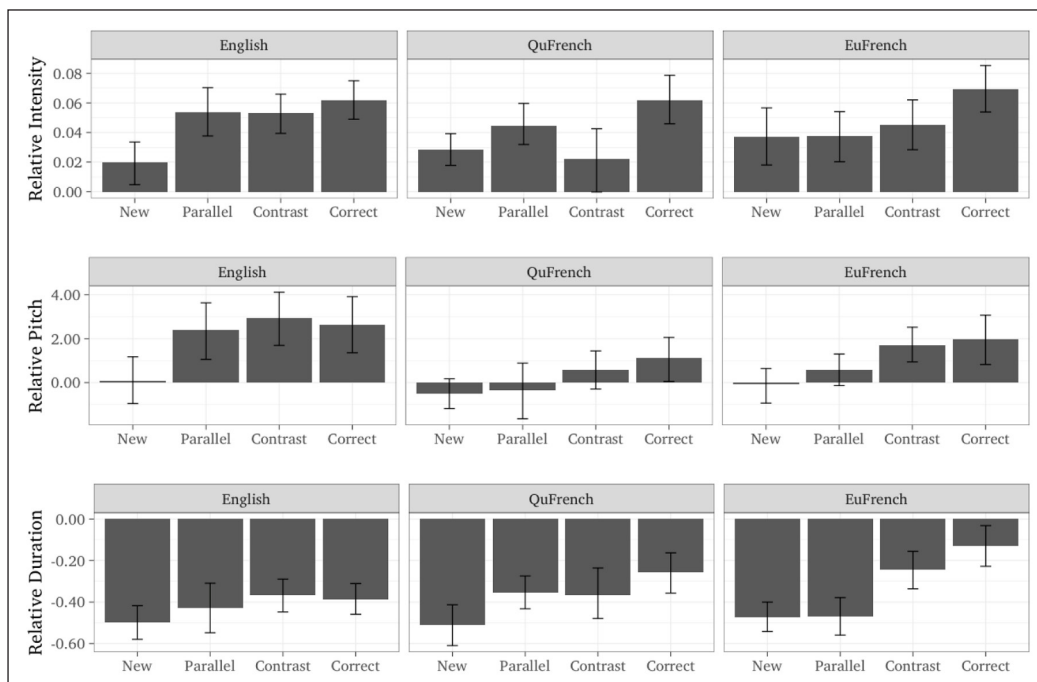
Figure 1: Relative intensity, pitch, and duration by focus condition in English, Québec French, and European French.

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[25] In all figures, error bars indicate 95% confidence intervals.

some interesting results from the cleft condition separately in Section 6. We observe the following pattern overall: In English, all focus conditions are consistently distinguished from the control condition (*New* in the figures), while in French, only corrective focus is consistently different.[26]

We are also concerned with whether focus marking is affected by the phonological size of the given item or by word order in adjectival modification in French. Figure 2 plots the results for pre- vs. post-nominal adjectives for Québec and European French together.

The plots in Figure 2 do not show any clear differences depending on word order, and are compatible with word order playing only a minor or no role in determining whether focus is marked or not.

Figure 3 plots the results for the adjectival modification items by syllable count. We do not observe any overall distinctions between monosyllabic and disyllabic given items in French (nor in English).

For the statistical analysis, we used a linear mixed model regression which allowed us to control for both subject and item random effects (Baayen 2008).[27] To assess whether the various focus conditions show evidence for prosodic focus marking, we fit models for each of the dependent measures—relative intensity, pitch, and duration—within each Language. The models included Focus and number of syllables (1 or 2) and their
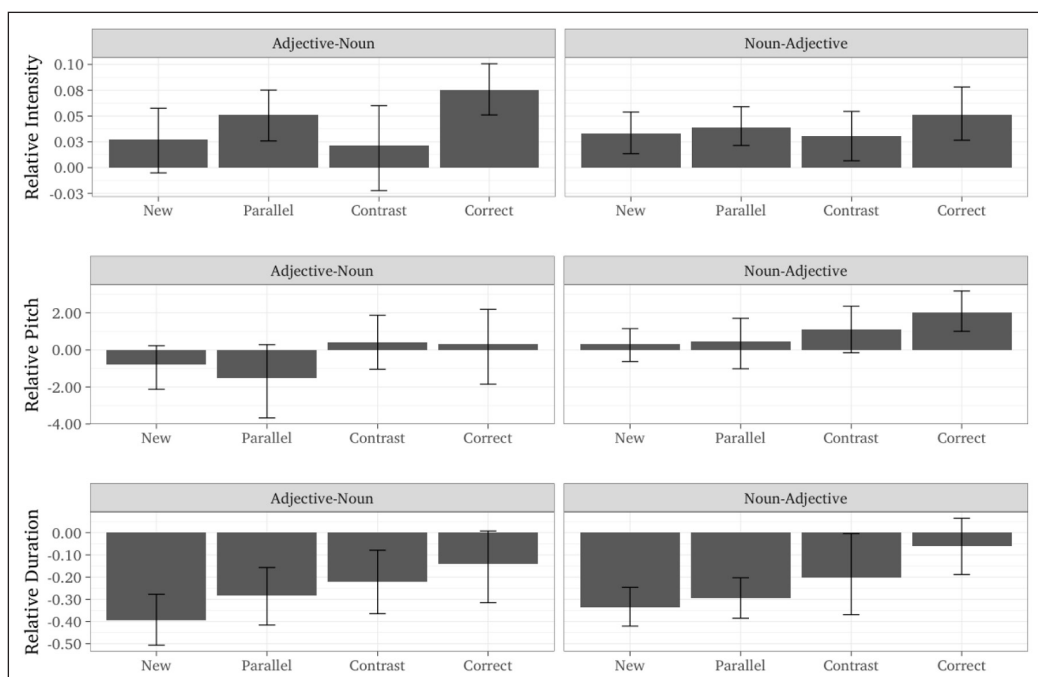
Figure 2: Relative intensity, pitch, and duration values for adjective-noun and noun-adjective word order in French (Québec and European French pooled together).

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[26] Note that relative duration measures are negative because the given constituent tended to be longer in terms of number of segments than the focused one. Intensity generally decreases throughout a phrase (Poschmann & Wagner 2016), which is one reason why relative intensity measures are positive even when focus was not marked. Likewise, pitch declines throughout an utterance due to declination and downstep, which is likely one reason why relative pitch tends to be positive even in the absence of focus marking.

[27] For the statistical analysis, we used the lmer function of the lme4 package in R. An example model is as follows:

(i)   model = lmer(rpitch~focus + (focus|participant) + (focus|item),data = English)

In two cases, the models did not converge, in which case we used a simpler random effect structure where we excluded the correlation term between intercept and slope. See Barr et al. (2013) for discussion.
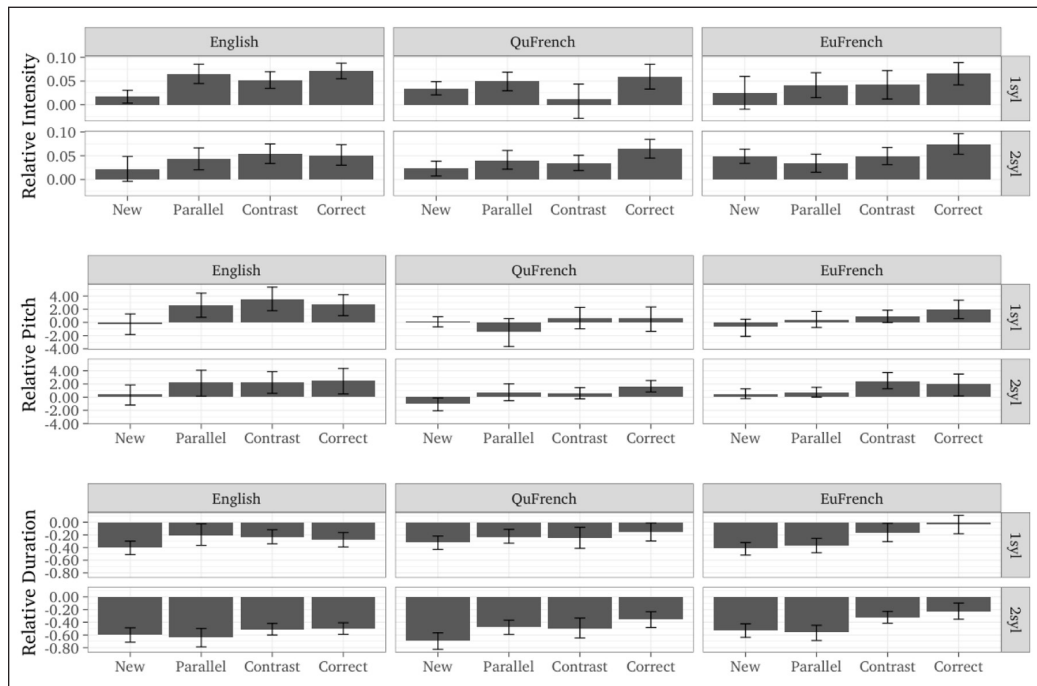
Figure 3: Relative intensity, pitch, and duration values for monosyllabic and disyllabic given items in English, Québec French, and European French.

interaction as fixed categorical factors.[28] We used dummy coding for our models, such that each focus condition was compared to a baseline (the control, labelled *New*). We also centered the factor Syllable to reduce colinearity. The random effect terms for items and participants included a slope for Focus.

Table 1 summarizes the results for relative intensity; that is, the intensity difference (measured in db) between the focused and given constituents.

The relevance of the factor Focus was tested by three comparisons: Each focus condition—parallelism, contrastive focus, corrective focus—was compared against the control condition. The line *New.vs.Par* in Table 1, for example, reports the statistical comparison of the control with parallelism. The columns for language report the estimates and standard errors for the relevant predictors as well as their significance.

In English, the three focus conditions show a significant difference in relative intensity compared to the control condition. This suggests that, as expected, there is a prominence difference that encodes focus in *all* focus contexts in English. We also observe that there is no interaction with number of syllables; that is, it seems that the difference in intensity relative to the control is not distinct depending on whether the given word has one or two syllables.

Turning to French, we see that in both Québec and European French, only corrective focus is significantly different compared to the control. In other words, intensity appears to encode focus only in corrective contexts. Importantly, this difference between the two languages is significant: The model that comprises all data (the fourth column labelled *All* in Table 1) shows a significant interaction between the difference between the control condition, in which both target words are new, and parallelism and contrast in English vs. French. But English and French do not differ significantly in the difference between the control condition and corrections. In other words, there is evidence that parallelism and contrastive focus are marked differently in French, but not that corrective cases are. This

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[28] *Focus* in the statistical analysis refers to parallelism, contrastive focus, corrective focus, and control.

Table 1: Mixed effects linear regression models of relative intensity measures of adjectival modification items.

	Eng	QuF	EuF	All
(Intercept)	0.02 (0.01)	0.03 (0.01)**	0.03 (0.02)*	0.03 (0.01)**
New.vs.Par	0.04 (0.01)***	0.02 (0.01)	−0.00 (0.01)	0.02 (0.01)**
New.vs.Con	0.04 (0.01)***	−0.01 (0.02)	0.01 (0.01)	0.01 (0.01)*
New.vs.Cor	0.05 (0.01)***	0.04 (0.01)**	0.04 (0.01)**	0.04 (0.01)***
syl1.vs.2	−0.00 (0.03)	−0.00 (0.02)	0.01 (0.03)	0.00 (0.02)
New.vs.Par:syl1.vs.2	−0.01 (0.02)	0.01 (0.03)	−0.04 (0.03)	−0.01 (0.01)
New.vs.Con:syl1.vs.2	−0.00 (0.02)	0.01 (0.03)	0.00 (0.03)	0.00 (0.01)
New.vs.Cor:syl1.vs.2	−0.01 (0.02)	0.02 (0.03)	0.00 (0.03)	−0.01 (0.01)
AN.vs.NA		−0.01 (0.03)	0.02 (0.03)	
New.vs.Par:AN.vs.NA		−0.01 (0.03)	0.01 (0.03)	
New.vs.Con:AN.vs.NA		0.04 (0.04)	−0.02 (0.03)	
New.vs.Cor:AN.vs.NA		−0.02 (0.03)	−0.03 (0.03)	
Eng.vs.Fr				0.02 (0.02)
Qu.vs.Eu				0.01 (0.01)
New.vs.Par:Eng.vs.Fr				−0.03 (0.01)**
New.vs.Par:Qu.vs.Eu				−0.02 (0.02)
New.vs.Con:Eng.vs.Fr				−0.04 (0.01)**
New.vs.Con:Qu.vs.Eu				0.01 (0.02)
New.vs.Cor:Eng.vs.Fr				−0.01 (0.01)
New.vs.Cor:Qu.vs.Eu				−0.00 (0.01)

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

result is expected under the Scope and Corrective Focus Hypotheses, which both predict that the corrective focus condition will be encoded in French for adjectival modification items, but unexpected under the Phrasing Hypothesis, where types of focus overall are not predicted to play a role.

There was no interaction with syllable count in whether focus was encoded in French, just as in English. In French, we had an additional between-item manipulation, namely whether the adjective was pre- or post-nominal. Recall that, in both cases, the focused item is always linearly followed by the given item. There was no interaction between word order and prosody, suggesting that this syntactic difference does not impact the realization of focus.

We now consider the statistical results for relative pitch, summarized in Table 2. The results for pitch reveal that all three languages show effects for corrective focus, but only English shows a significant effect for parallelism. It is noteworthy that we also found an effect for contrastive focus in European French, which we return to below. The interaction between language (English vs. French) and the difference between the control and parallelism did not quite reach significance ($p < 0.08$). Just as in the case of intensity, the interaction of pitch with syllable count is not significant in English or French and the manipulation of word order does not have any significant effect in either variety of French.

Finally, we consider the statistical results for relative duration, summarized in Table 3. The results for duration are more complex. First, duration does not appear to encode focus in cases of parallelism in English or European French, but there is a difference in Québec French. In both varieties of French, as in English, duration provides a significant cue for

Table 2: Mixed effects linear regression models of relative pitch measures of adjectival modification items.

	Eng	QuF	EuF	All
(Intercept)	0.01 (0.76)	−0.90 (0.54)	−0.43 (0.60)	−0.20 (0.45)
New.vs.Par	2.28 (0.89)*	−0.07 (0.99)	0.70 (0.67)	1.05 (0.56)
New.vs.Con	2.84 (0.96)**	1.03 (0.67)	1.73 (0.77)*	1.92 (0.55)***
New.vs.Cor	2.83 (0.98)**	1.53 (0.68)*	2.17 (0.91)*	2.16 (0.52)***
syl1.vs.2	0.66 (1.33)	−2.15 (1.05)*	0.47 (1.06)	0.24 (0.76)
New.vs.Par:syl1.vs.2	−1.41 (1.60)	3.09 (1.81)	−1.14 (1.37)	−0.08 (0.96)
New.vs.Conrsyl1.vs.2	−1.96 (1.92)	1.16 (1.20)	0.32 (1.36)	−0.51 (1.01)
New.vs.Cor:syl1.vs.2	−1.65 (1.97)	2.33 (1.20)	−0.54 (1.55)	−0.23 (0.95)
AN.vs.NA		1.83 (0.94)	1.36 (1.29)	
New.vs.Par:AN.vs.NA			0.06 (1.62)	
New.vs.Con:AN.vs.NA			−0.21 (1.65)	
New.vs.Cor:AN.vs.NA			−0.56 (1.87)	
Eng.vs.Fr				−0.28 (0.85)
Qu.vs.Eu				0.43 (1.00)
New.vs.Par:Eng.vs.Fr				−1.88 (1.08)
New.vs.Par:Qu.vs.Eu				0.52 (1.40)
New.vs.Con:Eng.vs.Fr				−1.41 (1.05)
New.vs.Con:Qu.vs.Eu				0.50 (1.26)
New.vs.Cor:Eng.vs.Fr				−0.95 (0.99)
New.vs.Cor:Qu.vs.Eu				0.37 (1.27)

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table 3: Mixed effects linear regression models of relative duration measures of adjectival modification items.

	English	Qn	Eu	All
(Intercept)	−0.52 (0.10)***	−0.49 (0.07)***	−0.47 (0.06)***	−0.49 (0.06)***
New.vs.Par	0.10 (0.07)	0.12 (0.06)*	0.04 (0.06)	0.09 (0.04)*
New.vs.Con	0.15 (0.03)***	0.08 (0.08)	0.18 (0.06)**	0.15 (0.02)***
New.vs.Cor	0.16 (0.04)***	0.24 (0.07)***	0.30 (0.07)***	0.24 (0.03)***
syl1.vs.2	−0.23 (0.19)	−0.38 (0.12)**	−0.12 (0.12)	−0.25 (0.11)*
New.vs.Par:syl1.vs.2	−0.14 (0.12)	0.15 (0.12)	−0.10 (0.11)	−0.05 (0.07)
New.vs.Con:syl1.vs.2	−0.05 (0.05)	0.16 (0.12)	−0.10 (0.11)	0.03 (0.04)
New.vs.Cor:syl1.vs.2	−0.02 (0.07)	0.20 (0.13)	−0.08 (0.13)	0.05 (0.05)
New.vs.Par:wordOrderAN.vs.NA		0.02 (0.13)	−0.02 (0.13)	
New.vs.Con:wordOrderAN.vs.NA		0.08 (0.14)	0.12 (0.13)	
New.vs.Cor:wordOrderAN.vs.NA		−0.00 (0.15)	0.08 (0.15)	
Eng.vs.Fr				0.05 (0.11)
Qu.vs.Eu				0.03 (0.06)
New.vs.Par:Eng.vs.Fr				−0.02 (0.07)
New.vs.Par:Qu.vs.Eu				−0.09 (0.07)
New.vs.Con:Eng.vs.Fr				0.00 (0.05)
New.vs.Con:Qu.vs.Eu				0.11 (0.07)
New.vs.Cor:Eng.vs.Fr				0.12 (0.05)*
New.vs.Cor:Qu.vs.Eu				0.06 (0.06)

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

corrective focus, which is compatible with the Corrective Focus and Scope Hypotheses, but not with the Phrasing or Initial High Hypotheses, which predict uniformity across all focus types. Duration also appears to encode focus in cases of contrastive focus in English and European French.

That duration can be a significant cue for contrastive focus and parallelism in French is unexpected under the Corrective Focus and Scope Hypotheses. However, since prior mention alone can affect a reduction in the duration of a word even without deaccentuation (Lieberman 1963; Bard et al. 2000; Wagner et al. 2010; Kahn & Arnold 2012; Klassen & Wagner 2017), this difference is not necessarily reflective of a shift in prominence to the focused constituent. None of the interactions with language reached significance, other than that duration is a significantly better cue to corrective focus in French compared to English.

Overall, the results for corrective focus and for parallelism are compatible with the Corrective Focus Hypothesis and the Scope Hypothesis. The distinction between the two types of focus in French is illustrated in (40) and (41) (see (20) and (26), respectively, for contexts). In English, in contrast, both scope alignments are possible.

(40)   Corrective focus is possible in *French*:
        No, ~[(assert) **il   va   apporter une   **SOUPE$_F$** froide**].
        no   3SG go.3SG bring.INF INDF.SG.F soup   cold.SG.F
        'No, he's going to bring the cold soup.'

(41)   Parallelism is impossible in *French* under Corrective Focus and Scope Hypotheses:
        *Ouais, il   va   apporter ~$_1$[**une   **SALADE$_F$** froide**] et   ~$_2$[**une**
        yes   3SG go.3SG bring.INF   INDF.SG.F salad   cold.SG.F and   INDF.SG.F
        SOUPE$_F$ froide**].
        soup   cold.SG.F
        'Yeah, he's going to bring a cold salad and a cold soup.'

With respect to contrastive focus (see (23) for context), we found more variation in the French data than for the other focus types. It is possible that this condition did not succeed in tightly controlling the focus structure that speakers used when pronouncing this type of sentence. Under the Scope Hypothesis, there is an interpretation of this variability: Besides impossible broad/narrow scope for ~ in contrastive focus, there is a possible representation that involves a ~ operator with wide scope, namely when the subject is also F-marked, as illustrated in (42a).

(42)   a.   ~[MARIE$_F$ **va   apporter   une   **SOUPE$_F$** froide**].
        b.   *Marie   va   ~[**apporter   une   **SOUPE$_F$** froide**].
        c.   *Marie   va   apporter   ~[**une   **SOUPE$_F$** froide**].
             Marie   go.3SG bring.INF   INDF.SG.F soup   cold.SG.F
             'Marie is going to bring a cold soup.'

Since our stimuli were not created to rule this out, the intermediate prosodic results in French in this condition could be due to this possibility in focus marking. Perhaps some speakers encoded the contrast using ~ with widest scope and double focus, as in (42a), while others chose not to mark the contrast with double focus, as in (42b) or (42c).

3.5.2 Is focus marked in the same way across languages?

Thus far, we have focused on cross-linguistic differences regarding *when* a prominence shift occurs. Another possible source of differences is *how* a prominence shift is achieved:

One language might boost the focused constituent, while another reduces the given constituent. In previous studies on European French, Dohen & Loevenbruck (2004) report an increase in duration on the focused item, but, like Jun & Fougeron (2000), no reduction of duration on the post-focal material. In English, on the other hand, lengthening and shortening of duration are used to mark focus and givenness respectively (e.g., Breen et al. 2010). In earlier literature, cross-language comparison has been hindered by the fact that results such as these come from independent studies with different conditions. In our study, by contrast, we can directly compare how intensity, pitch, and duration cues are used to encode prosodic focus in English versus French.

We plotted and ran statistical tests on the absolute values for maximum duration, intensity, and pitch for the focused and given constituents separately. An examination of absolute acoustic measures does not reveal any systematic distinctions that would point to clear P-differences with respect to focus marking between English, Québec French, and European French, and thus these plots are not shown here for reasons of space. English and French both employ cues on the focused and given constituents to encode focus when they do mark it and there is no clear overall difference between the languages in which strategy (boost, reduction, or both) is used.

A brief summary of the results is as follows. With respect to intensity, plots showed effects on both the focused and the given words, as expected in light of established results in English (e.g., Breen et al. 2010). Crucially, English and French differed significantly in parallelism and contrastive focus, but not in corrective focus (either for the focused or given word). This result is of interest since it suggests that English and French use this same acoustic cue when they both mark focus. Previous studies on French have often not examined intensity at all, although Dahan & Bernard (1996) and Hamlaoui et al. (2012) have observed that intensity is a relevant cue for focus marking in this language.

Concerning pitch, overall results suggest high inter-speaker variability with respect to how pitch cues were employed: Some speakers adjusted pitch by boosting the focused constituent while others reduced pitch on the given constituent. There is a significant interaction between Focus and Language such that pitch on the focused constituent is realized differently in English compared to French for both contrastive focus and corrective focus. Otherwise, none of the differences between the two languages was significant.

Lastly, concerning duration, our results for English showed an effect on both the focused and given words, replicating previous studies such as Breen et al. (2010). The effect of duration on the given constituent significantly differs between English and French for the case of parallelism, but other differences between English and French were not observed for this cue. Between Québec French and European French, however, some significant differences were observed in the interaction between Focus and Language: The given constituent is realized differently for parallelism, and the focused constituent is realized differently for both contrastive and corrective focus, where Québec French behaves more like English overall. A durational reduction could be due to repetition of the word rather than reflecting focus marking. This has been shown for English (Bard et al. 2000), and it seems plausible that Québec French could behave more like English in this regard than European French.

Overall, our results show that French and English are very similar when it comes to how they mark corrective focus. Most importantly, the use of intensity differs in French compared to English in parallelism and contrastive focus, but not in corrective focus.

3.5.3 What about initial high tones?

We now turn to address the results of our experiment in light of the Initial High Hypothesis. If focus is (mostly) not marked in two of our focus manipulations by a prominence shift

(parallelism and contrastive focus contexts), it could still be marked by an initial high at the beginning of the focused constituent. In an attempt to check for such an effect, we measured the average pitch in the first quadrant (the first 25%) of the focused word of the adjectival modification items. Initial highs have been reported to be typically realized on one of the first two syllables in a phrase (Delattre 1938; Jun & Fougeron 2000; Welby 2006; among others). Welby (2006) argues that the initial high is not segmentally anchored, and can only be realized when there is sufficient time to do so. Our measure should thus be sensitive to the presence of an initial high tone at or near the beginning of the focused constituent. Jun & Fougeron (2000) found that in focused phrases, the initial high sometimes receives a much higher pitch level compared to the final accent. Our measure should also be sensitive to this type of effect.

The results are plotted in Figure 4. The plots show that the only comparison suggestive of a difference is the case of corrective focus vs. control in English. There was no evidence that an initial high was used to mark focus in Québec or European French, or that French differed from English in employing an initial high for this purpose.

In order to check whether our coarse-grained measure might have failed to detect the initial high or rise, we created average pitch plots for the two words of interest by slicing each word into 10 parts, and computing pitch measures for each time slice. We first centered the pitch for each participant by subtracting the median pitch for that participant, in order to normalize for individual differences. We then computed a mean measure of pitch over the respective time slice. Figure 5 shows pitch values over time for the two words. The plot shows average measures of pitch for every 10% slice of each word of interest, where slices 1–10 pertain to the focused word and slices 11–20 to the given word.[29] Note that the pitch level is generally shifted down in the case of parallelism—this is as expected given that in this condition, the target words came later in the utterance
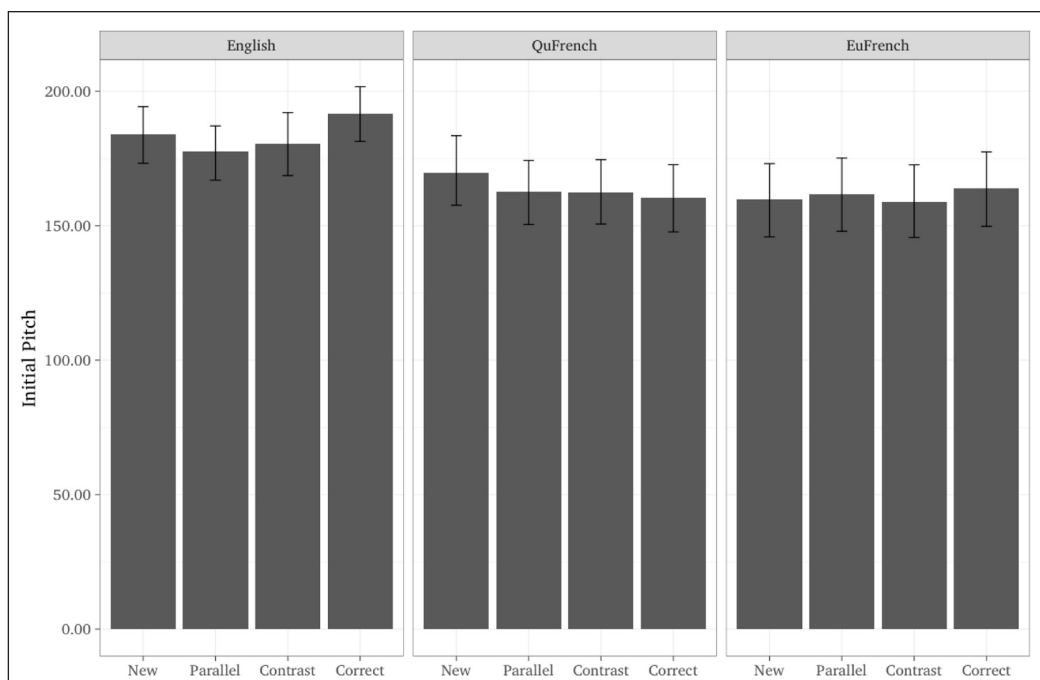
Figure 4: Maximum pitch in the first quadrant of the focused word across conditions in English, Québec French, and European French.

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[29] The values are negative because we centered pitch for each participant around the median, and the pitch was often already below the median due to downstep and declination by the time the focused and given word were pronounced.
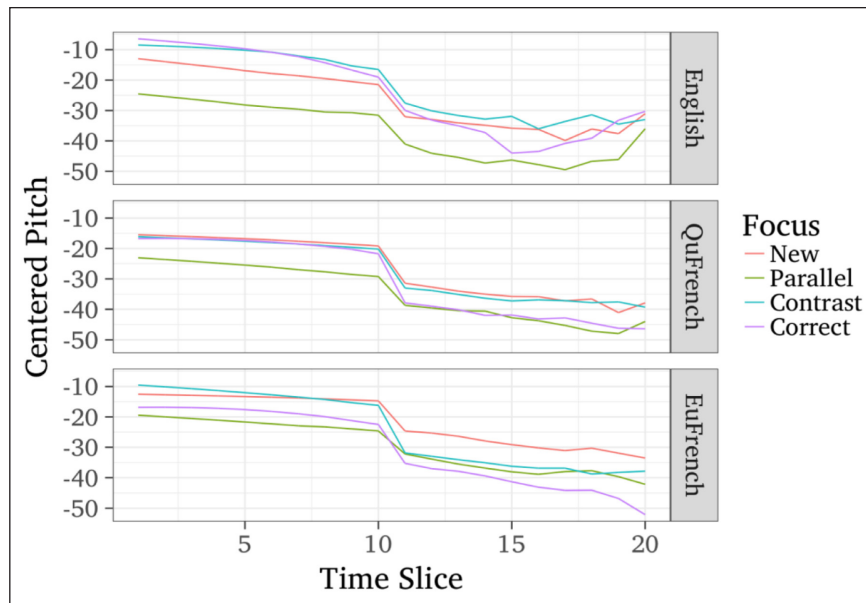
Figure 5: Average pitch plots for 20 time slices (slices 1–10: focused word; slices 11–20: given word).

(recall that the antecedent for the focus marking precedes in the same utterance), and the pitch level drops throughout over the course of the utterance. In English, the pitch level on the first word is higher in both the contrast and corrective condition. This is not observed in either variety of French. The main effect of focus on pitch in Québec French visible in the plot is that the pitch on the given word is lower in the corrective condition compared to the control condition; for European French, contrastive and corrective focus show lower pitch on the given word, and surprisingly the pitch level appears to be lower on the focused word as well in the corrective condition. Across all languages, the plots show a clear downstep between focused and given words in all conditions including the control condition, with an even greater difference in pitch in some of the focus conditions, which we attribute to post-focal pitch compression. While the plots are compatible with occurrences of initial highs, there is no evidence that initial highs are used specifically to mark focus in French.[30]

The absence of evidence for the use of initial high tones to mark focus could mean that our method is not sensitive enough to detect such effects, but our data are at least compatible with the idea that initial highs do not play an important role in encoding focus in French, compared to other cues.

3.6 Discussion of Experiment 1

Our results confirm previous findings that French can shift prominence at least in certain discourse contexts (e.g., Di Cristo 1998; Féry 2001; Cruttenden 2006; Ladd 2008), and more specifically, that European French marks corrective focus by post-focal pitch reduction (Jun & Fougeron 2000; Dohen & Loevenbruck 2004). They also confirm findings in earlier literature that English shifts prominence for focus purposes (e.g., Eady et al. 1986; Eady & Cooper 1986; Cruttenden 2006; Ladd 2008; Breen et al. 2010). Importantly, our results show for the first time experimentally that there is indeed an interaction between focus type and language when it comes to the marking of prosodic focus. While such interactions are implicitly assumed in earlier descriptions of the languages (e.g., in Ladd 2008), no study has actually shown evidence for this interaction in a direct comparison.

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[30] The apparent final rises in English toward the end of the word are probably an artifact of the pitch extraction algorithm. The speech toward the end of utterances was often creaky.

Our results show that French and English both prosodically encode corrective focus in similar ways, but differ with respect to other types of focus, especially parallelism: English uses prosody to mark focus in these contexts, but French does not. The fact that French and English pattern the same for corrective focus but not in other focus contexts is in line with the Scope Hypothesis, where ~ can only mark wide scope corresponding to a propositional-sized constituent in French, as well as with the Corrective Focus Hypothesis, where the locus of variation between English and French is in distinct semantics/pragmatics for the ~ operator.

Our results provide direct evidence against the Phrasing Hypothesis, which predicts that a prominence shift will not occur within a DP, independent of focus type. It is noteworthy that word order (adjective-noun vs. noun-adjective) did not have an effect on whether there was post-focal reduction. Noun-adjective sequences are more likely to be phrased separately, at least if we take the presence or absence of liaison to correlate with phrasing (cf. Post 2000b; Durand & Lyche 2008; Kilbourn-Ceron 2017). If this correlation between liaison and phrasing is correct, the Phrasing Hypothesis would predict a greater likelihood of reduction depending on word order (see also Féry 2004). There was also no effect of the size of the given constituent as measured in syllables, which again might have provided evidence for an effect of phrasing. Additionally, we found no evidence for the Initial High Hypothesis, in that we did not find that an initial high tone was used across focus contexts, instead of or in addition to shifting prominence.

It is interesting that French uses intensity as a cue to encode focus prominence, given that early studies of French found that intensity does not play a role in encoding accentuation (Parmenter & Blanc 1933; Delattre 1939), and other, more recent studies have not investigated intensity as a cue to focus (Jun & Fougeron 2000; Féry 2001, among others). Our results are in line with those of Dahan & Bernard (1996) and Hamlaoui et al. (2012), who did observe that intensity plays a role in prosodic focus-marking in French.

Earlier, we discussed whether the size of the constituents involved matters in whether prosodic focus marking is possible based on Ladd's (1996) observation that larger constituents allow for deaccentuation more readily in Italian. From Ladd's original comment, it is not evident exactly what is meant by "larger constituent": It could relate to phonological size or to syntactic size. We have observed that manipulating phonological size in terms of syllable count (1 vs. 2 syllables) does not appear to impact prosodic focus marking. We turn now to the results of two sub-experiments that manipulate syntactic size, in ways that interact with phonological phrasing that would lead to very different predictions based on the Phrasing Hypothesis.

4 Experiment 2: Complex sentences

We constructed a set of stimuli that involve the same focus conditions as in Experiment 1, but a different syntactic construction which employs clausal embedding. For the examples involving a focus antecedent, the focused constituent is always the subject of the matrix clause:

(43)   Complex sentence item in the corrective condition in *English*:
         A: Francis thinks that Lori is cute.
         B: No, Steve thinks that Lori is cute.

(44)   Complex sentence item in the corrective condition in *French*:
         A: François trouve   que   Lori est   jolie.
              François find.3SG.PRS COMP Lori be.3SG.PRS pretty.SG.F
              'François thinks that Lori is pretty.'

> B:　Non, Jean trouve　　　que　Lori est　　　jolie.
> 　　　No,　Jean find.3SG.PRS COMP Lori be.3SG.PRS pretty.SG.F
> 　　　'No, Jean thinks that Lori is pretty.'

The adjectival modification items of Experiment 1 are not able to differentiate between the Scope and Corrective Focus Hypotheses given the syntactic size of their focused/given constituents. Complex sentences introduce syntactically larger focused/given constituents. These items thus present the possibility of teasing apart the Scope Hypothesis from the Corrective Focus Hypothesis, specifically in the Parallelism condition: The former hypothesis predicts there to be focus marking in French, but the latter does not. Recall that the Scope Hypothesis can be stated as requiring that $\sim$ in French can attach to any node that denotes a proposition. According to this formulation, we would expect focus marking in these items to be possible in French even in cases of parallelism, as in (45). In contrast, under the Corrective Focus Hypothesis, focus marking in parallelism is disallowed since the semantic content of the corrective $\sim_{Fr}$ focus operator restricts it precisely to corrective focus cases.

(45)　Predictions of the Scope Hypothesis (where $\sim$ is restricted to proposition-sized nodes):
　　　Focus marking is possible in parallelism even in *French.*
　　　$\sim_1$[FRANÇOIS$_F$ **trouve**　　**que　Lori est**　　**jolie**]　　et　$\sim_2$[JEAN$_F$
　　　　François　find.3SG.PRS COMP Lori be.3SG.PRS pretty.SG.F and　　Jean
　　　trouve　　**que　Lori est**　　**jolie**].
　　　find.3SG.PRS COMP Lori be.3SG.PRS pretty.SG.F
　　　'François thinks that Lori is pretty and Jean thinks that Lori is pretty.'

These examples also allow us to further test the Phrasing Hypothesis. This hypothesis predicts that the complex sentence items should allow for prominence shifts irrespective of type of focus. According to Féry (2001; 2014), VPs are mapped to their own phonological phrase (Φ). This means that French VPs should be able to undergo pitch compression, since Φ phrases can be deaccented in French. The original observation motivating the assumption that VPs form phonological phrases is that focus was observed to be prosodically marked by post-focal pitch compression in subject *wh*-question contexts in Féry (2001). This suggests that VPs can be deaccented in French, in contrast to head nouns within noun phrases, as argued in Hamlaoui et al. (2012). According to the Phrasing Hypothesis, if bigger syntactic constituents involved in complex sentence items map to Φ phrases, we should see an interaction between syntactic size and focus in their effect on the prosodic marking of focus, and hence very different results compared to the items involving adjectival modification. Our experiment included 6 complex sentence item sets as in (43) and (44).

4.1 Results

We analyzed the complex sentence data in the same way as the adjectival modification data, comparing measurements on the focused constituent (the matrix subject) with measurements over the given constituent (the matrix verb to the end of the clause). The data in Figure 6 look similar to the adjectival modification item results (Experiment 1; Figure 1) in that French consistently shows a difference between corrective focus and control like English, but parallelism is not distinguished for the most part in French, while it is in English, at least in intensity. One notable difference is that pitch seems to be irrelevant as a cue to focus in complex sentences in English, in contrast to what was observed for the adjectival modification data.

　　For the complex sentence items, we tested for significant effects of Focus and interactions with Language using a mixed model linear regression, like for the adjectival modification
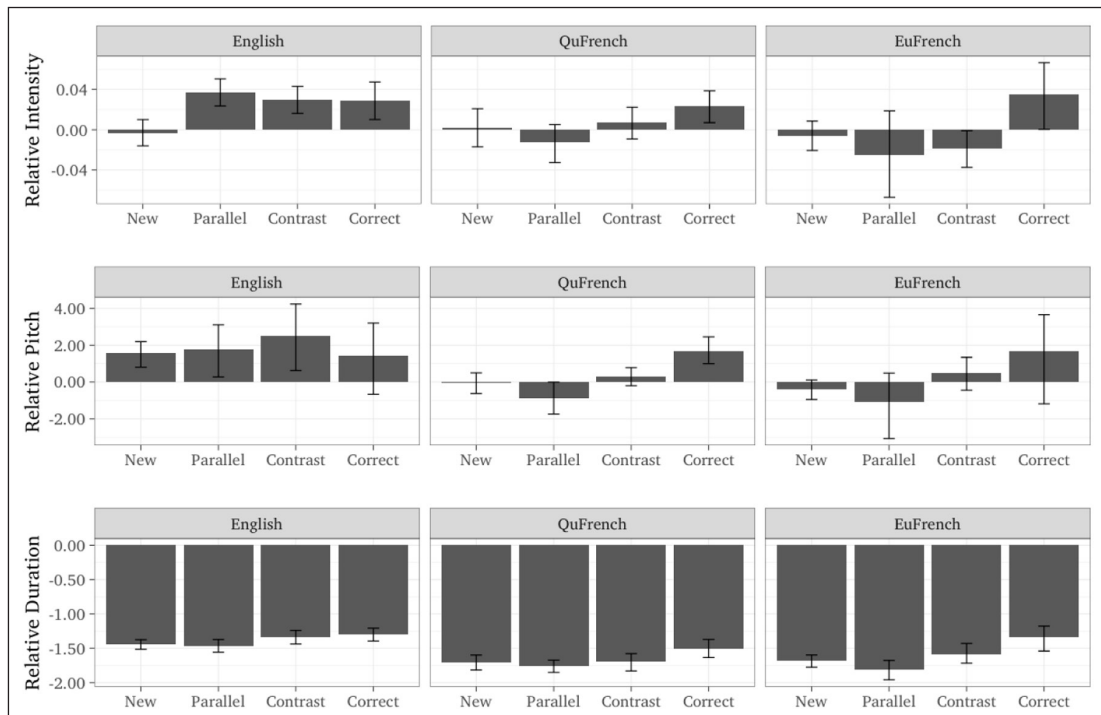
Figure 6: Relative intensity, pitch, and duration values for complex sentences involving embedding across conditions in English, Québec French, and European French.

items. Note that given the low number of items, we could not fit by-item random slopes for this data set. Table 4 shows the results.

4.2 Discussion

The results for complex sentences replicate those we observed for adjectival modification in that there is a significant interaction between Focus type and Language when looking at intensity, but only when we consider parallelism and contrastive focus. In other words, English encodes focus in parallelism and contrastive focus contexts using intensity, but French does not. Corrective focus seems to be marked similarly in French as in English.

The results thus appear to support the Corrective Focus Hypothesis, which predicts that focus is only encoded in corrective contexts in French, and speak against the Scope Hypothesis, at least in the version where ~ can attach to any proposition-denoting node. If ~ could attach to any proposition-denoting node in French, we would expect focus marking for *all* types of focus in French—even in parallelism, as outlined in (45)—and, thus, for French to be similar to English. This prediction is not borne out since French only marks focus in the corrective focus condition.

We can interpret these results, however, under an alternative formulation of the Scope Hypothesis; one that is more restrictive, where ~ can only attach to root nodes in French. This scope restriction in French would rule out the possibility of focus marking in parallelism even for complex sentences. In other words, (46b) would be impossible in French because ~ is attaching below the root node (cf. (45)):

(46)   Focus marking possible in parallelism in *English* but impossible in *French* (where ~ is restricted to root nodes):
   a.   ~$_1$[FRANCIS$_F$ **thinks that Lori is cute**] and ~$_2$[Steve$_F$ **thinks that Lori is cute**].
   b.   *~$_1$[FRANÇOIS$_F$ **trouve que Lori est jolie**] et ~$_2$[JEAN$_F$ **trouve que Lori est jolie**].

Table 4: Mixed effects linear regression models of relative measures of the complex sentence items by language.

	Intensity	Pitch	Duration
(Intercept)	−0.00 (0.01)	0.36 (0.28)	−1.61 (0.06)***
New.vs.Par	0.00 (0.01)	−0.44 (0.54)	−0.04 (0.05)
New.vs.Con	0.01 (0.01)	0.77 (0.47)	0.04 (0.04)
New.vs.Cor	0.03 (0.01)***	1.30 (0.78)	0.19 (0.05)***
Eng.vs.Fr	0.00 (0.01)	−1.74 (0.52)***	−0.21 (0.12)
Qu.vs.Eu	−0.01 (0.01)	−0.39 (0.73)	0.03 (0.06)
New.vs.Par:Eng.vs.Fr	−0.06 (0.02)***	−0.91 (1.02)	−0.09 (0.09)
New.vs.Par:Qu.vs.Eu	−0.00 (0.02)	0.24 (1.47)	−0.05 (0.09)
New.vs.Con:Eng.vs.Fr	−0.04 (0.01)**	−0.44 (0.93)	−0.03 (0.08)
New.vs.Con:Qu.vs.Eu	−0.02 (0.02)	0.42 (1.21)	0.10 (0.08)
New.vs.Cor:Eng.vs.Fr	0.00 (0.02)	2.28 (1.46)	0.05 (0.09)
New.vs.Cor:Qu.vs.Eu	0.03 (0.02)	0.82 (1.89)	0.08 (0.09)

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

This version of the Scope Hypothesis and the Corrective Focus Hypothesis make the same predictions for our experiment, and we can therefore not arbitrate between them. The predictions of the two hypotheses are summarized as follows:

(47)   Predictions of the Scope Hypothesis (where ~ is restricted to root nodes in *French*) and Corrective Focus Hypothesis for complex sentences:
   a.   **Contrastive focus and Parallelism**: No focus marking.
   b.   **Corrective focus**: Focus will be prosodically marked.

Finally, the results speak against the Phrasing Hypothesis, which would predict focus marking in all conditions in the complex sentence cases since the given constituent is a VP and maps to a phonological phrase, and hence can be deaccented. In contrast to the complex sentence items, the Phrasing Hypothesis predicts, as outlined above, no focus marking in any condition in the adjectival modification cases. In other words, the fact that the French data look qualitatively similar in both complex sentences and adjectival modification is unexpected under the Phrasing Hypothesis. Note that this is the same prediction as the proposition-based Scope Hypothesis, which cannot be upheld given these results:

(48)   Prediction of the Phrasing Hypothesis (and the Scope Hypothesis; ~ restricted to proposition-size nodes in *French*) for complex sentences:
        Focus will be prosodically marked.

We now turn to a third type of syntactic configuration, relative clause modification, which was aimed at further distinguishing the Phrasing Hypothesis from the other hypotheses, and further testing the influence of phonological and syntactic size.

5 Experiment 3: Relative clause modifiers

We also examined relative clause modification using the same focus types. We included 8 such item sets. Examples in the corrective condition, with focus on the head of the relative clause, are shown in (49) and (50).

(49)   Relative clause item in the corrective condition in *English*:
           A: Yesterday, John cut down an elm that was rotten.
           B: No, he cut down an oak that was rotten.

(50)   Relative clause item in the corrective condition in *French*:
           A: Émilie a   rencontré   un   Brésilien   qui   était
                  Émilie have.3SG meet.PST.PTCP INDF.SG.M Brazilian SUBJ.REL be.3SG.IPFV
                  végétarien.
                  vegetarian
                  'Émilie met a Brazilian who is vegetarian.'
           B: Non, elle a   rencontré   un   Russe   qui   était
                  no   3SG have.3SG meet.PST.PTCP INDF.SG.M Russian SUBJ.REL be.3SG.IPFV
                  végétarien.
                  vegetarian
                  'No, she met a Russian who is vegetarian.'

According to the Phrasing Hypothesis, if relative clauses are mapped to a separate phonological phrase, then prosodic focus marking in French should be possible for these types of examples. From the point of view of the Scope Hypothesis, the syntactic (and phonological) size of a relative clause should not make a difference: In order for a prominence shift to occur in the case of parallelism (e.g., …*an elm that was rotten and an oak that was rotten*), the fact that the modifier is a relative clause and not an adjective should not affect prominence shift since the focus operator cannot attach to the DP to facilitate focus marking (under either version of the Scope Hypothesis, where ~ attaches to clausal nodes or root nodes). Similarly, the syntactic differences between relativization and adjectival modification should not make a difference from the perspective of the Corrective Focus Hypothesis. These predictions are summarized in (42) and (43):

(42)   Prediction of the Phrasing Hypothesis for relative clauses:
           Focus will be prosodically marked.

(43)   Predictions of the Corrective Focus Hypothesis and the Scope Hypothesis (either version; where ~ is restricted to propositional nodes or root nodes) for relative clauses:
           a.   **Contrastive Focus and Parallelism**: No focus marking.
           b.   **Corrective Focus**: Focus will be prosodically marked.

5.1 Results

We submitted the relative clause data set to the same analysis as the other items, comparing the focused constituent (the relative clause noun head) to the given constituent (the relative complementizer and the rest of the clause). The means for relative intensity, pitch, and duration are illustrated in Figure 7.

    Again, we tested for significance using mixed effects models, reported in Table 5. There is no statistical evidence that English and French differ in how they mark the various focus types in relative clause items. Most crucially, there is no difference between corrective focus and the other two types of focus. These results are unexpected under both the Corrective Focus Hypothesis and the Scope Hypothesis. In part, this may be a power issue, as we are considering less data compared to the case of adjectival modification (8 vs. 16
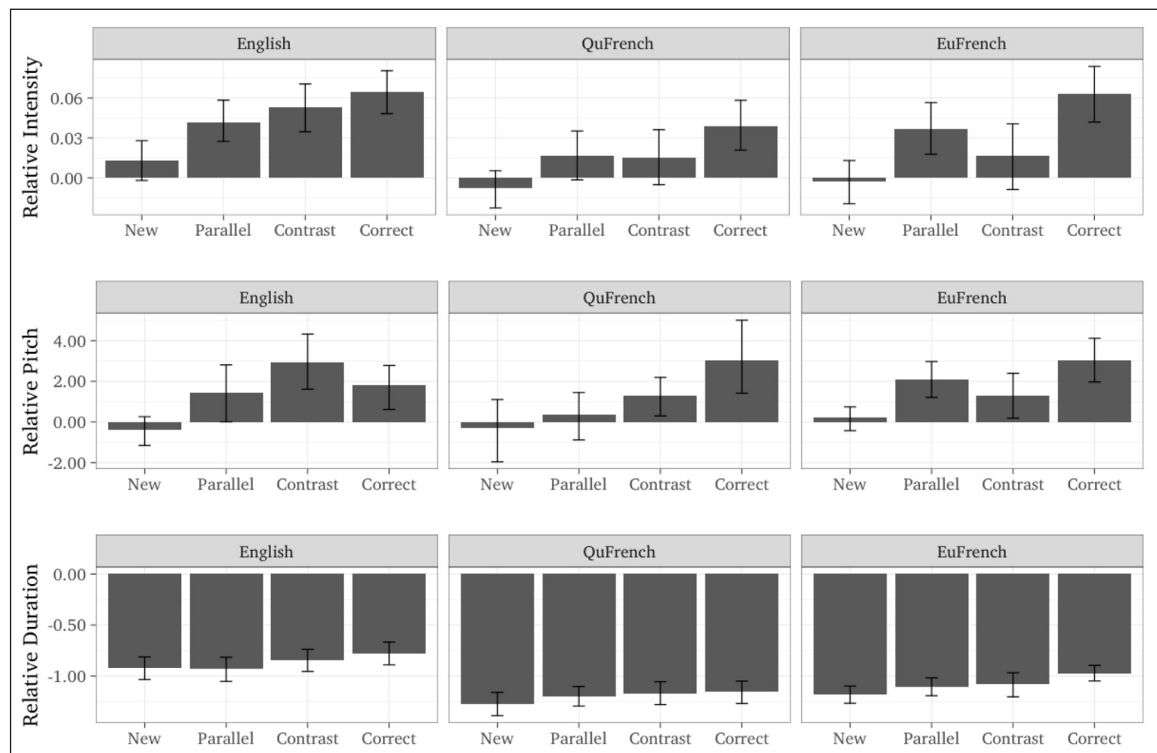
Figure 7: Relative intensity, pitch, and duration values for relative clause items across conditions in English, Québec French, and European French.

items).[31] However, given that the complex clauses (6 items) replicated our basic finding, we expect that this is not the full story.[32]

5.2 Discussion

French seems more similar to English when it comes to how focus marking works in the case of relative clauses compared to the other two types of constructions we investigated. While the interpretation of these results remains unclear, the findings could point to an interaction with phrasing as expected under the Phrasing Hypothesis. It seems plausible that relative clauses, but not head nouns, are mapped to their own intonational phrase. Note, however, that the Phrasing Hypothesis still faces three challenges in light of our overall results: First, why does focus type matter in the other two types of syntactic constructions (adjectival modification and complex sentence items)? Second, why do relative clauses and complex clauses not pattern together, based on the idea that the given constituent should map to a separate phonological phrase in both cases?

Clearly, the results we have found for relative clause modification pose a challenge for our account in terms of the Scope Hypothesis. It would be important to obtain more data on the prosody of relative clauses in a follow-up study.

Overall, the hypothesis inspired by Ladd (1996) that a larger domain for the given item would facilitate prosodic focus realization in French is not borne out in our data. The results for the complex sentence items show an interaction with type of focus, replicating

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[31] We note that there is an interaction between language and how contrastive focus is marked by pitch; we are not sure how to interpret this finding.

[32] One possibility (pointed out by a reviewer) is that the relative clauses (RC) in French may have been interpreted as non-restrictive (English *that* precludes such a parse). Non-restrictive RCs are standardly assumed to constitute separate speech acts (e.g., a non-restrictive RC within a yes-no-question still asserts its content, e.g.: *Does Sally, who's from Toronto, speak French?*), and one could argue then that the RC constitutes a separate root node. Note, however, that even then ~ would have to scope over the head *and* the RC, so it is not clear that this parse would solve the problem for the Scope Hypothesis.

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Table 5: Mixed effects linear regression models of relative measures of the relative clause items.

	Intensity	**Pitch**	**Duration**
(Intercept)	0.00 (0.01)	−0.16 (0.42)	−1.14 (0.08)***
New.vs.Par	0.03 (0.01)***	1.39 (0.58)*	0.06 (0.03)*
New.vs.Con	0.03 (0.01)**	1.95 (0.50)***	0.11 (0.03)***
New.vs.Cor	0.05 (0.01)***	2.84 (0.49)***	0.17 (0.03)***
Eng.vs.Fr	−0.02 (0.02)	0.51 (0.81)	−0.28 (0.15)
Qu.vs.Eu	0.00 (0.01)	0.53 (0.92)	0.09 (0.05)
New.vs.Par:Eng.vs.Fr	−0.00 (0.01)	−0.92 (1.11)	0.05 (0.05)
New.vs.Par:Qu.vs.Eu	0.01 (0.02)	1.29 (1.49)	−0.01 (0.07)
New.vs.Con:Eng.vs.Fr	−0.02 (0.02)	−2.06 (0.96)*	−0.01 (0.06)
New.vs.Con:Qu.vs.Eu	−0.00 (0.02)	−0.42 (1.32)	0.00 (0.08)
New.vs.Cor:Eng.vs.Fr	0.00 (0.02)	0.57 (0.94)	0.01 (0.05)
New.vs.Con:Qu.vs.Eu	0.02 (0.02)	−0.57 (1.30)	0.11 (0.07)

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

the results from the adjectival modification data. This interaction is not predicted by the Phrasing Hypothesis, nor by the Scope Hypothesis in which ~ can attach to any node that denotes a proposition: The Phrasing Hypothesis would predict prominence shifts for all foci in both complex sentences and relative clause modification. The proposition-based Scope Hypothesis would make the same prediction for the complex sentences (see (43) and (46)). The data from relative clause modification remain puzzling for all hypotheses, and a thorough look at a broader range of syntactic configurations seems necessary before this result can be interpreted.

6 Prosodic vs. syntactic ways of marking focus

The goal of our experiment was to compare how focus affects prosody in comparable sentences in English and French. However, one might question the validity of directly comparing these languages, since alternative syntactic strategies such as clefting might be used to convey focus more commonly in French than in English (e.g., Lambrecht 1994; 2001; Féry 2001; Ladd 2008). For example, narrow focus might preferentially be conveyed using a cleft structure in French, meaning that our target non-cleft sentences might simply be unacceptable or less acceptable than their clefted counterparts. This would weaken the validity of a comparison of the use of prosody in the non-clefted conditions across English and French. To dispel this concern, in this section, we try to validate the assumption that our materials are comparable across the two languages.

In order to test whether there was a preference for clefting in French, we examined the acceptability ratings that were included as part of the experiment. Since the cleft condition involved corrective focus, we were particularly interested in seeing how it compares with the uncleft corrective focus condition. The rating results in Figure 8 illustrate that in French, the non-cleft sentences are not rated any worse than the clefted sentences. This lack of difference in French thereby legitimizes a comparison of how different focus types in non-clefted sentences across French and English might be marked using prosody.

We tested for differences in acceptability ratings between English, Québec French, and European French using a mixed model regression with Response as the dependent variable, Focus and Language and their interaction as predictors, and random effects for Item and Participant that included slopes for the type of focus and language.

There were no interactions between Focus and Language. The only significant difference was that the ratings in the two French experiments were overall lower than in the English
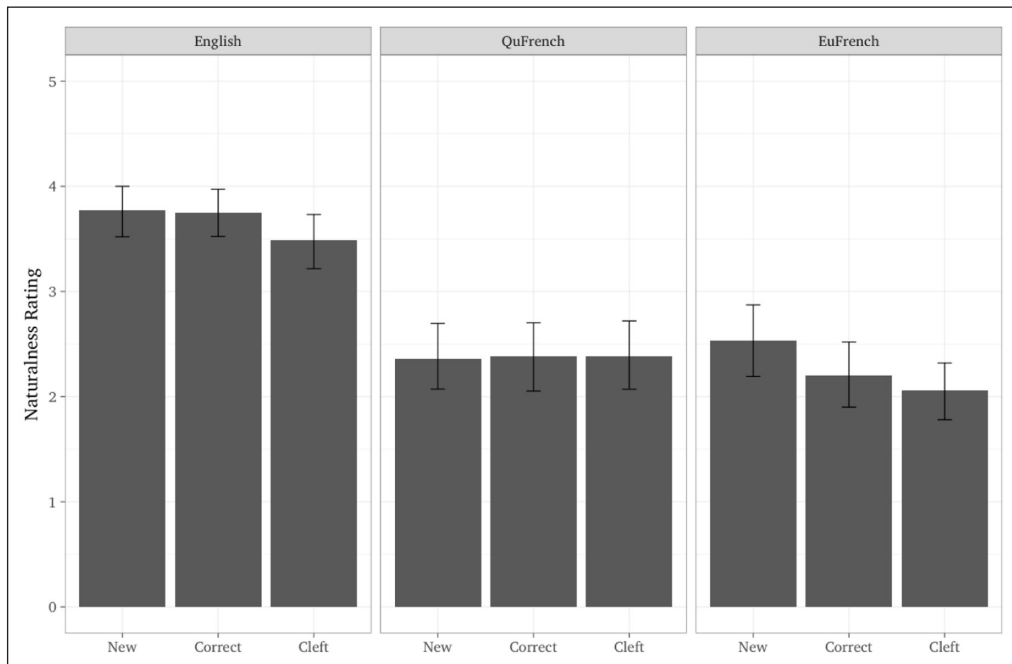
Figure 8: Acceptability ratings for English, Québec French, and European French, comparing corrective focus in a non-cleft and cleft with the control condition. 1 = completely unnatural; 5 = completely natural.

experiment, even in the control condition. We do not know why this was the case. It could be a result of the slightly different wording of the acceptability question in French (*S'il vous plait évaluer si la réponse est naturelle d'après ce qu'a dit l'autre personne.* 'Please evaluate if the response is natural given what the other person said.') versus in English (*Please rate how natural your response was given what the other person said.*), where the issue is that the French version says to evaluate *if* the response is natural whereas the English version says to evaluate *how* natural your response is. Alternatively, it could be that our French stimuli were overall less natural.

Crucially, the clefted structures were not rated as more acceptable than the non-clefted structures in French, and there was no significant French/English difference in how clefting was rated compared to other conditions. We therefore conclude that it is valid to compare the non-clefted structures across the two languages.[33]

One might ask whether our results show a trade-off between the use of prosodic versus syntactic means to mark focus (e.g., Lambrecht 1994; Büring 2009). Our materials were not designed to directly test this: As mentioned, we cannot compare the prosody of our cleft examples with the others because that would involve comparing constituents at the beginning of the sentence with constituents at the end. However, one way that our results do bear on the question of a syntax/prosody trade-off is with our complex sentence items as they involved subject focus, which is where clefts have been claimed to be the preferred choice to mark focus in French (Hamlaoui 2008; 2009). What is interesting is that the prosodic results for the complex sentence items were very similar to the adjectival modification data, where we observed that French and English both prosodically marked corrective focus and only English prosodically marked focus in parallelism and contrastive focus. Crucially, the cleft condition in the adjectival modification data differed from

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[33] Note that cleft sentences were rated as less natural in English than in French *overall*, consistent with the common observation of the wider use of clefts in French (e.g., Lambrecht 1994; 2001; Féry 2001; Ladd 2008).

the complex sentence data in that singling out the focused constituent through clefting is impossible in the former; thus, in adjectival modification, the cleft contained *both* given and focused constituents since the adjective cannot be stranded from the noun (**It was red that Jordan bought a bike yesterday*). As there was no difference in the results from the complex sentence items (subject focus cleft) versus adjectival modification (non-subject focus cleft), our results do not seem to support the idea that there is a trade-off between prosody and marking focus through syntactic means such as clefting. To further probe this question, it would be necessary to compare cases of subject focus with and without clefts.

At the same time, our results are compatible with the idea that languages differ in whether prosody or syntax is used to mark *certain* focus distinctions. In other words, it is not the case that French *in general* uses word order where English uses prominence (cf. Lambrecht 2001); rather, French and English differ both in how focus affects prosody and in the selection of different syntactic constructions (cleft vs. non-cleft), but these types of differences may not be directly dependent on each other.

Concerning the question of a prosody/word order trade-off, the Scope Hypothesis provides a new perspective on this type of cross-linguistic difference than currently discussed in the literature. Büring (2009), for example, explores how typological differences in the trade-off between prosody and word order can be envisioned within a theory driven by prosodic prominence. He classifies languages as *boundary-marking, edge-marking,* or *mixed*. Boundary-marking languages, such as English and Japanese, are those in which focus is marked by the insertion of a prosodic phrase boundary to the left or right of the focused elements. Edge-marking languages are exemplified by Spanish and Italian—and presumably French—where focus is indicated by non-standard constituent order with the focus in a left- or right-peripheral position, but not, or at least less, by directly manipulating the prosodic structure. Mixed languages are those such as German, Finnish, and Slavic in which either prosodic or syntactic structure may be used to mark focus (see Féry 2013 for a relevant discussion).

If the Scope Hypothesis is correct, then the difference between edge-marking languages like French and boundary-marking languages like English might not be grounded in the phonological reflexes of the observed differences, but rather in the scope options of ∼. This perspective on typological variation hence makes quite different predictions from Büring's, and from other accounts that are based on phonological differences like the Phrasing Hypothesis. This study thus represents a first step toward testing the various predictions that can distinguish the Scope Hypothesis from phonological alternatives.

7 Conclusion

Cross-linguistic differences in contextual effects on prosody provide important evidence for the interaction between grammar and prosodic prominence, and yet the nature of these differences remains ill-understood. This paper strived to make progress in our understanding of such differences by directly comparing English and two varieties of French.

We investigated differences in the use of prosody to mark focus between English and French from a semantic/pragmatic perspective, by including various types of focus such as parallelism, contrastive focus, and corrective focus as well as from a phonological perspective, by controlling the phonological and syntactic size of the given constituent.

The results show that French allows for a shift in prominence to realize focus in only a subset of the contexts in which English does. Specifically, French shifts prominence in corrective focus, confirming that this language can shift prominence in at least some contextual circumstances (e.g., Di Cristo 1998; Jun & Fougeron 2000; Féry 2001; Cruttenden 2006). Speakers of French systematically fail to shift prominence in the case of parallelism, when the antecedent for focus marking is introduced within the same utterance.

The difference between English and French is remarkably robust in the face of intense language contact—we found Québec French to be very similar to European French, even if they differ in the details of the phonetic realization of focus prosody to some extent.

The data clearly show that the distinction between English and French must at least partly be due to S-differences, and is not reducible to P-differences. Specifically, the results of our study cannot be explained by the Phrasing Hypothesis, under which prosodic means to encode focus are regulated by phonological phrasing in French. The fact that French shifts prominence in corrective focus but not in other focus contexts is not predicted by the Phrasing Hypothesis, where the type of focus does not play a role in affecting prominence shift. Furthermore, we found the same pattern when the phonological conditions for a prominence shift are fulfilled, contradicting the prediction of the Phrasing Hypothesis that under those circumstances, *any* type of focus should be marked. We did not find a systematic correlation between the presence of a early high tone on the focus constituent, as would be predicted by the Initial High Hypothesis.

Turning to S-differences, if we set aside the relative clause data, aspects of which none of the hypotheses considered can explain, the effects observed from adjectival modification and complex sentences are compatible with the intuition behind the Corrective Focus Hypothesis, which we proposed can be made explicit by saying that prosodic focus marking in French involves a focus operator ($\sim_{Fr}$) with a different semantics compared to the operator involved in English. The Corrective Focus Hypothesis, however, is in need of explication, since semantically it is not constituents that can be corrected but only assertions.

The Scope Hypothesis seemed more promising from a theoretical point of view, but the complex sentence results speak against one version of this hypothesis, under which in French, $\sim$ can only attach to clause-sized constituent that denote propositions. In view of this, we considered a more restrictive version of this hypothesis, which holds that it is not *proposition-sized* constituents (i.e., constituents that denote propositions) that $\sim$ must attach to, but *speech-act-sized* constituents (i.e., root nodes, which correspond to speech acts). The more restrictive version of the Scope Hypothesis is compatible with our experimental results, as is the Corrective Focus Hypothesis, but seems preferable for theoretical reasons.

In future studies, we aim to distinguish these two interpretations by examining a broader range of discourse relations between sentences. For example, if prominence shifts also happen when two consecutive assertions are contrasted with each other in a non-corrective way (that is, without one speech act suggesting an amendment to another), this would support the Scope Hypothesis but not be predicted by the Corrective Focus Hypothesis. A follow-up study is also needed to understand why French apparently marks all three types of focus in our relative clause examples.

Overall, the Scope Hypothesis offers a new perspective on how to account for cross-linguistic differences in focus realization. We have illustrated that Cruttenden's (2006) results for English and French are in line with the predictions of this hypothesis and it might shed new light on other cases as well. For instance, Cruttenden (2006) finds that Spanish speakers behave similarly to French speakers in only shifting prominence in a limited number of contexts (see also Klassen 2015; Klassen et al. 2016), while Italian speakers tended to shift prominence in a slightly wider range of contexts. Closer examination of these contexts with respect to the scope or content of $\sim$ seems to be a promising avenue for further research.

Abbreviations

DEF = definite, DEM = demonstrative, COMP = complementizer, F = feminine, FUT = future, INDF = indefinite, INF = infinitive, IPFV = imperfective, M = masculine, NOM = nominative, OBJ = object, PL = plural, POSS = possessive, PRS = present, PST = past, PTCP = participle, REL = relativizer, SG = singular, SUBJ = subject

Additional File

The additional file for this article can be found as follows:

- **Appendix.** Experiment Stimuli for 'Prosodic Focus in English vs. French: A scope account'. DOI: https://doi.org/10.5334/gjgl.172.s1

Competing Interests

The authors have no competing interests to declare.

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