Prosodic focus in English vs. French: A scope account

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Abstract

We compare the use of shifts in 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 prosody 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 could be due to phonology; for example, the languages might differ in their phonological ability to encode a shift in prominence. Alternatively, there could be syntactic, semantic, and/or pragmatic differences concerning when a prominence shift can occur. We compare possible explanations through a production study where we vary 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, contradicting some earlier claims in the literature. 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 based on Rooth's (1992) alternatives theory of focus.

Keywords focus, prosody, scope, contrast, intonation, prominence

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 and Nooteboom 1987; Dahan et al. 2002; Arnold 2008a; Ito and Speer 2008; i.a.).

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. Given that predictability effects on single-word utterances are essentially uncontroversial, one could consider this approach to accent placement in multi-word utterances as the null hypothesis.

Indeed, accenting is often argued to depend on the local predictability of a particular linguistic expression (e.g., Terken 1984; Aylett and Turk 2004, 2006; Bell et al. 2009; Jaeger 2010), the prior salience of the referent of an expression (e.g., Nooteboom and Terken 1982; Terken 1984; Terken and Hirschberg 1994; Arnold 2008b), or a combination of such factors (cf. Lam and Watson 2010; Watson 2010).

The logic behind such accounts is that a weaker signal should be sufficient to convey more expected information, which can be rationalized based on information-theoretic grounds (cf. the discussion in Aylett and 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 from an information-theoretic angle, 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; i.a.).[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 and 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 and 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 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 and Wagner 2017 for discussion).

[1] Some Germanic languages are argued to not use prosody as robustly as others. For example, Icelandic does not deaccent given information (Nolan and 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 arguably are right-dislocated—we do not discuss such cases in this paper.

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 clear 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. The data on which interactions between type of context and language are based is also relatively thin. 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), but there has been only one experimental study showing a direct interaction between type of focus and language type—Cruttenden (2006).

Cruttenden (2006) conducted a production experiment on 12 typologically diverse languages, including English and French, using a variety of contexts. 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, in (1), all 7 English participants shifted prominence in the second conjunct to the name of the team and deaccented *one*, while in French, none of the 14 participants did (instead, all accented *un*, as expected for default accent placement).[3,4]

(1) *Prominence shift in English but not in French* (Cruttenden 2006:325)
   a. A: What was the score?
      B: Liverpool 1, Manchester United 1.
   b. A: Quel était le résultat?
      B: Paris St. Germain un, St. Étienne un.

It is not the case, however, that French simply does not shift prominence. In another dialogue, shown in (2), 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:

(2) *Prominence shift both in English and French* (Cruttenden 2006:324)
   a. A: I did all the work.
      B: You mean your sister did all the work.
   b. A: J'ai fait tout le travail.
      B: Tu veux dire que ta soeur a fait tout le travail.

While Cruttenden's study convincingly showed that there are cross-linguistic differences in accent placement, the study has a number of limitations. There was only one test sentence per

[3] The contexts for French were not provided in Cruttenden (2006); we added the presumable contexts for these examples ourselves, based on the English dialogues provided in the paper.

[4] Another dialogue (item 8) of the same type of focus as (1) in Cruttenden (2006) produced the same results. Similar results were also found for a second dialogue (item 7) of the same type of focus as in (2), where all 7 English speakers shifted prominence and 12/14 French speakers did as well.

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. This is important to know since phonetic differences in the realization of focus have been previously argued to motivate particular accounts of how French and English focus differs grammatically.

Our study differs from Cruttenden's 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 Romance languages indeed reliably mark focus in corrective contexts similar to Germanic languages, but reliably diverge from Germanic in other focus contexts. A direct comparison between French and English will not only establish whether there is indeed a systematic difference between the two languages, but will also establish whether the phonetic cues used when the two languages do mark focus are as different as previously reported.

We include two varieties of French, Québec French and European French. The use of prominence to encode focus has been argued to be an areal feature that spreads through language contact (Xu et al. 2012). The reason it spreads may be due to some sort of adaptive advantage offered by prosodic focus marking, perhaps because it facilitates processing. As Québec French has been in close contact with English for over 400 years, a comparison of Québec French with both English and European French may help to further determine whether the prosodic differences are really part of the grammatical system of focus marking and are as robust as other parts of the grammar in a language contact situation.

Our study goes beyond Cruttenden's in that it carefully controls 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.

The observation that French shifts prominence in a subset of the contexts in which English does (e.g., Lambrecht 1994; Cruttenden 2006; Ladd 2008) has received support through experimental studies of the individual languages (for European French: Di Cristo 1998; Jun and Fougeron 2000; Féry 2001, 2013; Hamlaoui et al. 2012; for English: Eady et al. 1986; Eady and Cooper 1986; Breen et al. 2010; i.a.), but there is disagreement as what the precise conditions are. There has not been any direct empirical comparison between the two languages to test whether they indeed differ when directly compared, and to test between different ideas about the source of these differences.

A direct comparison, however, is crucial in order to validate the claims about differences between languages. A central claim in the prior literature is that French and English differ in *how* they mark focus. It has been claimed that they employ different phonetic means to mark focus, in that intensity plays only a minor role, if any, in French (Jun and Fougeron 2000; Féry 2001,

2013; but see Dahan and Bernard 1996 for evidence to the contrary). These differences have been interpreted as showing that French marks focus via prosodic phrasing (which indirectly affects prominence), using mostly intonational means, while English encodes focus through prominence, which implicates intensity as a crucial factor. Our results show that this is not actually the case—the same acoustic cues are used in French and English, and in very similar ways. Our results suggest that the main differences lie in *when* the languages mark focus, that is, in the types of contexts in which focus marking is possible.

There have been two 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 (2001, 2013) and Hamlaoui et al. (2012) propose an account of the difference in how focus is marked between French and Germanic (English, German) in terms of *phonological size*. The claim is that in French, only constituents that are (at least) the size of a phonological phrase can deaccent. The prosodic system of French is commonly analyzed as being based on phrasing, as opposed to word-level prominence like English (e.g., Jun and Fougeron 2000; Féry 2001). Our data will show, in contrast, that given the right contexts, speakers of French shift prominence even within noun phrases and even 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; Ladd 2008). The basic idea is that languages differ in which *types* of focus are marked prosodically. While this idea has been around for a while, there has not actually been a study yet that directly shows such an interaction between language and focus type when it comes to prosodic focus marking, and our study will be the first to show evidence for such an interaction.

As we will show, there are multiple possible interpretations of such interactions. We make explicit how the intuitive notions of *type of focus* in general and *corrective focus* in particular can be made explicit within a semantic theory of focus. 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 actually distinguish between different types of focus. We discuss how we can make the intuition behind this intuition formally explicit, by positing that French differs from English in the semantic content of the focus operator involved. We also propose an arguably more appealing interpretation of the facts in which the two languages have the same operator, but the operator has different syntactic scope possibilities: 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 underlying the phenomenon, 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), even if some questions regarding the underlying syntactic/semantic differences remain open, and the evidence arbitrating between the Scope Hypothesis and our reconstruction of the Corrective Hypothesis will remain inconclusive.

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 sections, we present the essential elements of Rooth's (1992) alternatives theory of focus. Having an explicit theory about focus will enable us to identify possible dimensions along which languages might differ in how focus is encoded.

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 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 (3a) or object (3b) is marked as focused via F:

(3) 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 (3a) is felicitous in this context while (3b) 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 is. 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.[5] The examples in (3) have the following representations:

(4) a. ~[**John**$_F$ <u>read Moby Dick</u>]
  Focus presupposition: There is an antecedent alternative of the form *x read Moby Dick*

[5] 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.

b. ~[John read **Moby Dick**$_F$]
Focus presupposition: There is an antecedent alternative of the form *John read x*

The two structures differ in the anaphoric requirement that ~ introduces because the alternative sets differ: (4a) involves a set of alternatives of the form *x read Moby Dick,* with varying substitutions for *John,* while (4b) 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 (4a) is satisfied in this context. In this and the following examples, we indicate F-marked material by **boldface**, non-F-marked material in the scope of ~ by underlining, and the antecedent that ~ is anaphoric to by *italics*.

The ~ operator has no overt segmental content.[6] 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:

(5) *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 (6a), or main prominence could fall within the subject (6b), with the VP being deaccented. The difference, in Rooth's theory, is one of scope:

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

The sentence in (6a), where only *man* is reduced, requires an antecedent of the form *the x man*; (6b), where the entire string *man read Moby Dick* is reduced, requires an antecedent of the form *the x man read Moby Dick.* This difference arises through the different scopes of ~, and this difference in scope is reflected in the prosodic rendition of the utterance.

The notion of *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 sometimes called the 'width' of focus (Eady et al. 1986). The width of focus corresponds in Rooth's theory to the attachment site of F within the scope of ~:

(7) a. VP-Focus ('wide'): ~[**John read Moby Dick**] $_F$
b. VP-Focus ('broad'): ~[John [**read Moby Dick**] $_F$]
c. NP-Focus ('narrow'): ~[John read [**Moby Dick**] $_F$]

[6] Rooth (1992, 1996) specifically argues that all uses of focus alternatives involve ~, and *only* and *even* are focus-sensitive operators mediated by ~ and its effect on a variable that is anaphoric to the present context. This is not crucial for the present article.

Wide focus would be licensed by a contextually relevant proposition of any shape (e.g., *Mary is sleeping* in the context *What is everyone doing?*). VP-Focus requires alternatives of the form *John x-ed* (e.g., *John went swimming*). Narrow focus on the object, as in (7c), requires alternatives that only differ in the choice of object (e.g., *John read 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 ~ and not F-marked is marked as *given*;[7] and a constituent that is not in the scope of ~ is neither marked as focused nor given. 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.[8]

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 ~, 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 very unlikely to be already contextually salient, nor can it easily be accommodated: Since this is an idiomatic expression, substituting 'stitch' will lead to an expression that only has a literal meaning.[9]

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, which indeed seems plausible given the striking prosodic differences (e.g., Jun and Fougeron 2000; Féry 2001). Two potential types of phonological sources of variation, or 'P-differences', are listed in (8):[10]

(8) *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.

[7] 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 (2012b) for discussion.

[8] Some prior studies argue for separate notions of focus and givenness marking (e.g., Reinhart 2006; Katz and Selkirk 2011), but whether this complexity is needed remains controversial (cf. Wagner 2005, 2012a). Prince (1981) differentiates additional types of information status, but some of the distinctions, like that 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.

[9] 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 (4), 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.

[10] Another potential P-difference is that languages might differ in the principle relating the scope of ~ and prosody. We know of no concrete proposal along these lines, but alternatives to Truckenbrodt's (1995) constraint in (5) have been proposed. Bader (2001), for example, proposes a different constraint for English, which requires given information to be less prominent than F-marked information, rather than requiring the F-marked constituent to be prominent.

b. A phonological property other than prominence marks the scope of ~.

Our experiment tests two concrete claims about P-differences, one for each of (8a) and (8b).

A different potential source of cross-linguistic variation stems from the syntax and semantics of ~, which we refer to as 'S-differences'. One possibility is that ~ 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 somehow building 'correctiveness' into ~. In this paper, we propose a second possibility, that languages could instead vary in the syntactic scope possibilities of ~. We summarize these two potential S-differences in (9a) and (9b), respectively:

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

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.

We will refer to manipulations of the context as manipulations in the *type of focus*, emulating the use of this term in earlier literature (e.g., Gussenhoven 2007), even if in Rooth's theory of alternatives, the notion of 'type of focus' plays no direct role. For Rooth, any apparent differences in focus type must be explained as a result of either distinct syntactic scope or semantic content of the focus operator(s) involved; nevertheless, the descriptive terms for types of focus are useful when discussing particular examples.

In the following sections, we review different concrete hypotheses about P-differences and S-differences in more detail.

2.3 The Phrasing Hypothesis

One hypothesis about how phonological differences between languages might explain differences in focus marking in French versus English (and other languages like German) is proposed in Féry (2001, 2013) and Hamlaoui et al. (2012). The claim is that Germanic languages like English encode focus via shifts in stress prominence, while French can encode focus only by means of phonological phrasing. We will call this proposal the 'Phrasing Hypothesis'. Hamlaoui et al. (2012) and Féry (2013) argue that when a constituent is not at least the size of a phonological phrase, it cannot be marked as *given* in French and deaccent. Evidence in support of this idea is presented in Féry (2001), who argues that French does not have the ability to mark prosodic prominence by deaccenting a prosodic word that is *within* a phonological phrase in cases of question-answer congruence. Further evidence comes from two studies examining focus marking in noun-adjective combinations (Hamlaoui et al. 2012) and differences in focus marking between arguments and adjuncts (Féry 2013).

One prediction of the Phrasing Hypothesis relates to the phonetic cues available to mark focus in French. If French only uses prosodic phrasing to negotiate focus marking but does not implicate prominence *directly*, we should be able to observe that it uses different acoustic cues to mark focus than those used in Germanic languages. Specifically, the claim is that we should see

only the cues typically involved in phrasing, like pitch and duration, but not the phonetic correlates of stress and reduction, which include intensity.[11] We summarize the predictions of the Phrasing Hypothesis as follows:[12]

(10) *Predictions of the Phrasing Hypothesis*:
Types of focus: No differences predicted between French and English (i.e., independent of type of focus, a prominence shift should be possible whenever the given constituent is sufficiently large to be mapped to a phonological phrase, but only then).
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.
Phonetic realization: French should exclusively use cues related to phrasing (pitch and duration), while in English, where focus marking is stress-based, stress-related cues like intensity should be used.

The Phrasing Hypothesis assumes that French and English differ due to a P-difference along the lines of (8a). We now turn to a P-difference along the lines of (8b), 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. We refer to this as the 'Initial High Hypothesis'. Di Cristo (1998) reports that an early high peak is the predominant realization of at least some types of foci (see also discussion in Welby 2003).[13] Beyssade et al. (2009) observe a correlation between a phrase initial high and focus, based on data from question-answer congruence. The Initial High Hypothesis predicts the following:

(11) *Predictions of the Initial High Hypothesis:*
Types of focus: Differing assumptions exist in the literature. Di Cristo (1998), for instance, claims that an initial high only happens in certain focus contexts.
Phonological difference: There should frequently be an initial high tone in French at the beginning of the focused word, either instead of or accompanied with a prominence shift to the focused constituent.
Phonetic realization: The initial high tone should cause a pitch excursion at the beginning of focused constituents in French but not in English, where no such initial high tone has been posited.

[11] Note that Poschmann and Wagner (2016) found evidence that intensity is also a relatively reliable cue to phrasing, however, which weakens the premise of this argument.
[12] 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.
[13] It is not entirely clear which types of foci, since 'objective contrastive focus' (vs. 'expressive contrastive focus') that is reported in Di Cristo (1998) to correlate with this strategy is not fleshed out in detail.

The Initial High Hypothesis may be compatible with the Phrasing Hypothesis, since the high tone might be a cue to phonological phrasing. That is, if the high tone marks the beginning of a phonological phrase, then the Phrasing Hypothesis would predict that high tone marking of focus should only be observed on constituents that fit the phonological constraints on prosodic prominence shifts. Alternatively, perhaps the initial high does not require a phonological phrase boundary, such that it could be an *alternative* strategy to mark focus when other tools such as prominence shifts are not available.[14]

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 informally discussed. 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 by rejected by another constituent; rather, a correction is a discourse relationship between alternative assertions.[15] 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 proposition 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:

(12) *Predictions of the Corrective Focus Hypothesis*:
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.
Phonological and phonetic predictions: No focus-related differences predicted (i.e., 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 and Fougeron (2000) present evidence showing that French marks focus prosodically in some types of corrective contexts; specifically, when two entire utterances are contrasted. However, the crucial examples showing evidence for prosodic focus marking involved post-focal constituents that are arguably mapped to separate phonological phrases (namely VPs, while the focus was placed on the subject). These examples would also therefore be explicable by the

[14] Note, however, that initial highs might also occur for reasons other than focus, for example for rhythmic reasons (e.g., Astésano et al. 2007), and the extent to which they are implicated in focus marking remains controversial.
[15] 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. Whether such corrections of entailments of prior utterances also lead to prominence shifts in Romance languages has to our knowledge not been discussed in the literature.

Phrasing Hypothesis. Our experimental design, described below, includes both corrective and non-corrective utterances, and varies phonological and syntactic factors in the focus domain in ways that will allow us to put both the Corrective Focus and Phrasing Hypotheses to the test.

Rooth's (1996) framework allows us to better understand exactly how French and English would differ under the Corrective Focus Hypothesis. In a Roothian account, this hypothesis would have to be expressed by positing a different semantic import to the focus operator ~ involved in marking prosodic focus. The idea is that French would have a corrective operator $\sim_{Fr}$ involved in prosodic focus marking, which encodes that the utterance has to be a correction. Its English counterpart $\sim_{En}$ would not require correctiveness.

There is a semantic issue, however, with stating the hypothesis in this way: Beyond cases where a constituent under corrective focus denotes an assertion, it is not clear what it means for a constituent to be corrective. For example, if ~ attaches to a DP, how would we interpret the requirement that the DP be corrective? 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

The proposed 'Scope Hypothesis' holds that the focus-sensitive operator ~ involved in prosodic focus has a much narrower set of scope possibilities in French compared to English, which results in a narrower set of pragmatic contexts in which focus can be marked. 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.

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 (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 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) and (2)):

(13) 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 (13a), two focus operators are involved, which each take 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 (13b), 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.[16] If in French, ~ can only attach to clausal nodes denoting propositions, focus marking will be possible in examples equivalent to (13b), but it should be impossible in examples like (13a), as illustrated in (14):

(14) a. A: Quel était le résultat?
B: ~$_1$[***Paris St. Germain***$_F$ un], ~$_2$[***St. Étienne***$_F$ un]. *Impossible under Scope Hypothesis*

b. A: *J'ai fait tout le travail*.
B: ~[Tu veux dire que **ta soeur**$_F$ a fait tout le travail.]

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 (15):

(15) *Predictions of the Scope Hypothesis (pre-final version)*:
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.
Phonological and phonetic predictions: No focus-related differences predicted (i.e., no reason to expect different phonological conditions on the marking of focus, or particular phonetic cues for the encoding of focus).

The Scope Hypothesis seems potentially problematic when we consider focus operators other than ~. In the sentence *Seule Marie a lu Moby Dick* ('Only Mary has read Moby Dick'), it seems that *seule* ('only') does not associate with a constituent that denotes a proposition; rather, its sister (and focus) is the DP *Marie*. It would appear, then, that not all focus operators in French are restricted in their scope in the same way as the phonologically null ~ operator responsible for prosodic focus is, as proposed under the Scope Hypothesis. But 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 (often analyzed as a specifier on the functional spine), and the constituent it attaches to plausibly denotes a proposition.[17] Perhaps ~ in English is more like *only* in its syntactic distribution, while ~ in French is more like English *always,* but French *seul* is like English *only*. Another possibility is that the appearance is misleading, and *seul* is actually always a propositional operator (see Büring and Hartmann 2001 for an argument that this is the case for German *nur*).

[16] 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.

[17] See Beaver and Clark (2008) for a discussion of differences between types of focus association, and Wagner (2006) for the claim that the difference in focus association between *only* and *always* is syntactic.

There is independent evidence that the counterparts of some focus operators are syntactically more restricted in French compared to English. Consider the realization of contrastive negation. Beaver and Clark (2008) argue that contrastive negation involves negation scoping over the focus operator ~. In English, contrastive negation can be syntactically expressed on constituents smaller than clauses as well as on clauses (cf. McCawley 1991; Beaver and Clark 2008 for background on contrastive negation):

(16) a. Not ~[John-F] but ~[Mary-F] solved the problem.
b. ~[Mary-F solved the problem], not ~[John-F].

The negation *not* in (16a) arguably attaches to a DP, which is coordinated with the contrastive DP using the connective *but.* In (16b), on the other hand, two clauses are arguably juxtaposed, the second of which is a fragment. Interestingly, in French, only clausal contrastive negation seems to be possible:

(17) a. *****Pas ~[Jean-F] mais ~[Marie-F] a résolu le problème.
b. ~[Marie-F a résolu le problème], pas ~[Jean-F].

Although there is no correspondent to (16a) in French, the following variants are possible in both languages:

(18) a. Not John. Mary solved the problem.
b. Pas Jean. Marie a résolu le problème.

These examples, however, arguably do not involve DP coordination, but rather two separate clauses, the first of which is a fragment. One piece of evidence for this comes from prosody: the first NP in (18) is followed by a prosodic boundary, and is typically pronounced with a final fall; no such boundary is necessary in (16a), and the constituent before connective *but* typically ends with a rise. If Beaver and Clark (2008) are correct in arguing that contrastive negation involves negation scoping over ~, the syntactic distribution in French provides further evidence for the Scope Hypothesis.[18]

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 or to syntactic objects that denote speech acts. Either way, it often makes similar predictions to the Corrective Focus Hypothesis. One 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

[18] The observation that French resorts to marking focus with clefts more often than English (e.g., Lambrecht 1994) could also be seen as evidence for the Scope Hypothesis. 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. There are two caveats though. This would only make sense if we find that ~ in French can attach to proposition-sized constituents, but our results will suggest that it can only attach to the root node (see Section 4). Also, Spanish seems similar to French in its restriction of prosodic focus marking to corrective contexts (Klassen 2015), but it has not been reported to resort to clefts in the way that French does.

experiments were designed to tease the divergent predictions apart, but the results stop short of resolving the issue.

2.7 Variation in the cues used to mark focus

The Corrective Focus and Scope Hypotheses make claims about when a prosodic prominence shift should and should not be possible, but not about how such a shift should be phonologically or phonetically achieved. Both hypotheses are in principle compatible with there being different acoustic cues used to encode which constituent is F-marked or in the scope of ~ across languages. By contrast, the Phrasing Hypothesis predicts that in French, only cues for prosodic phrasing (pitch and duration) should be used to mark focus. If the results of our experiment show that French only uses phrasing cues for focus and does not use cues typically employed for stress (intensity, along with pitch and duration), this would be an argument in favor of the Phrasing Hypothesis. If, on the other hand, focus in French is marked by stress cues, this would speak against the Phrasing Hypothesis, at least in its present formulation.

The Initial High Hypothesis makes a specific claim about the phonological correlate of focus in French, but not about prominence shifts. It is orthogonal to the other hypotheses in this regard, although not entirely, since it could be that initial high accents are used *instead* of prominence shifts; that is, there could be a trade-off relationship.

Regarding phonetic cues for focus, several studies have examined the effect of *pitch* in French and have found that the focused item has a final rise-fall contour, while post-focus constituents tend to be compressed in pitch and relatively flat (Di Cristo 1998; Jun and Fougeron 2000; Féry 2001). The post-focal pitch compression described for French is not unlike that observed in English (Xu and Xu 2005; Breen et al. 2010; i.a.). *Duration* has also been reported to be used as a cue for marking focus in French, but only through increased duration on the focused item (Dohen and Loevenbruck 2004), and according to various prior studies of European French, *intensity* does not play a significant role in marking focus at all (cf. Féry 2001; Dohen and Loevenbruck 2004; Hamlaoui et al. 2012). In English, by contrast, duration and intensity have been reported to mark both focus and givenness in addition to pitch (Breen et al. 2010; i.a.), and some have argued that loudness is the main cue to prominence (Kochanski et al. 2005). To date, however, no study has directly compared the phonetic cues to marking focus in English and French. As we will see, such a comparison leads to very different conclusions than the ones currently assumed in the literature.

3 Experiment 1: Adjectival modification

The Scope Hypothesis holds that French differs from English in that ~ must take scope over a constituent that is at least clausal, while English allows for ~ to take scope over embedded nodes as well. If this is true, then sub-clausal antecedents should be sufficient to induce prominence shifts in English, but not in French. In order to test this hypothesis, our experiment examined instances of adjectival modification in different types of focus contexts: corrective focus, contrastive focus, and syntactic 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 and Rialland 1999; Féry 2001, 2013; Hamlaoui 2009).

3.1 Stimuli

We created 16 item sets which varied across the five conditions (corrective focus, contrastive focus, syntactic 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 'items' (see Appendix for a complete list).

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. Note that each condition is expressed in terms of Roothian formalism. Thus, any apparent differences in focus type are explained as a result of distinct syntactic scope (or semantic content) of the focus operator(s) involved.

In *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 reject the previous asserted proposition. 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:[19,20]

(19) *Corrective focus*:
   a. *Yesterday, Jordan bought a blue bike.*
      No, ~[yesterday, he bought a **red**$_F$ bike].
   b. *Pour le pique-nique de cet après-midi, Guillaume va apporter une salade froide.*
      'For the picnic this afternoon, Guillaume is going to bring a cold salad.'
      Non, ~[il va apporter une **soupe**$_F$ froide].
      'No, he's going to bring a cold soup.'

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

(20) ~ [(assert) yesterday he bought a **red**$_F$ bike]

A corrective statement contrasts entire propositions (or 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 (21a), and *une salade froide* with *une soupe froide* in (21b). 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 is identical modulo substitution of the focus:

[19] We assume that 'No' constitutes its own speech act, and hence does not have to be within the scope of ~, even in French.
[20] All of our corrective focus items involve wide scope, and not contrastive negation as in (16) and (17).

(21) *Contrastive focus*:
   a. Yesterday, Jordan bought a *blue bike*.
      Really? Yesterday, my friend bought a **red** bike.
   b. Pour le pique-nique de cet après-midi, Guillaume va apporter une *salade froide*.
      'For the picnic this afternoon, Guillaume is going to bring a cold salad.'
      C'est vrai ? Marie va apporter une **soupe** froide.
      'Really ? Marie is going to bring a cold soup.'

In the contrastive condition, the focus operator takes narrower scope than in the corrective condition. In the present case, ~ could be scoping over the VP or DP:

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

Based on the Scope Hypothesis, this type of representation should be possible in English but impossible in French, since ~ should not be able to attach to a DP or a VP in this language.

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. We will call such instances *parallelism*, since a constituent with parallel structure appears in the same utterance:

(23) *Parallelism*:
   a. I heard that Jordan is into cycling.
      Yeah, the other day, he bought a *blue bike* and a **red** bike.
   b. J'ai entendu dire que Guillaume irait à un pique-nique.
      'I heard that Guillaume will go to a picnic.'
      Ouais, il va apporter une *salade froide* et une **soupe** froide.
      'Yeah, he is going to bring a cold salad and a cold soup.'

This is the only condition in which both the focused item and its antecedent are within the same utterance. 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:

(24) He bought ~$_1$[$_{DP}$ *a* ***blue***$_F$ *bike*] and ~$_2$[$_{DP}$ *a* ***red***$_F$ *bike*].

Based on the Scope Hypothesis, a representation like (24) would be ruled out in French.

Parallelism within an utterance gives us precise control over the scope of ~. If there are differences in the scope of ~, we might be able to detect them by varying the size of the parallel constituent that is coordinated in this condition. To test whether the phonological or syntactic size of a constituent matters in addition to the attachment site of ~, we varied both of these factors in our stimuli, which we describe in the following section.

The predictions of each focus condition for the four accounts we consider can be summarized as follows. Note that the Phrasing and Initial High Hypotheses make the same predictions across all types of focus examined.

(25) *Predictions of the Scope Hypothesis and Corrective Focus Hypothesis*:
Corrective focus: English and French should pattern the same, and mark corrective focus prosodically.
Contrastive focus: There should be no prosodic marking of focus in French (based on (22)), while in English, focus should be marked prosodically.
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.

(26) *Prediction of the Phrasing Hypothesis*:
Holds for all types of focus: 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.

(27) *Prediction of the Initial High Hypothesis*:
Holds for all types of focus: 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; i.a.). One salient difference between the two languages is that clefts are used more frequently in French, in particular for subject focus as they provide clear phrasing (Clech-Darbon and Rialland 1999; Féry 2001, 2013; Hamlaoui 2009). We therefore included a *cleft* condition, with an *it*-cleft in English, (28a), and a *c'est*-cleft in French, (28b). The type of focus we used with clefts is corrective.

(28) *Cleft*:
a. *Yesterday, Jordan bought a blue bike.*
No, ~[it was a **red**$_F$ bike that he bought yesterday].
b. Pour le pique-nique de cet après-midi, Guillaume va apporter une *salade froide*.
'For the picnic this afternoon, Guillaume is going to bring a cold salad.'
Non, ~[c'est une **soupe**$_F$ froide qu'il va apporter].
'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 analyses. The reason for including clefts was to establish their naturalness compared to non-cleft realizations of focus given the concern 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 *control* condition in which there is no potential antecedent for focus marking, as shown in (29).

(29) *Control*:

a. Jordan is always purchasing cycling stuff.
   Yeah, yesterday, he bought a red bike.
b. Guillaume ira à un pique-nique.
   'Guillaume is going to a picnic.'
   Ouais, il va apporter une soupe froide.
   'Yeah, he's going to bring a cold soup.'

By design of the experiment, discussed in section 3.2, the participant is forced to respond with a particular 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. 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. A phonological or perhaps syntactic size effect in French could potentially provide evidence for Féry's (2001, 2013) proposal that focus in French is mediated by phrasing, where only constituents of at least the size of a phonological phrase can be prosodically reduced. While the Phrasing Hypothesis does not specifically take into account syllable count, Ladd's original comments are compatible with it playing a role. Could it be that French, perhaps due to the different prosodic system it has compared to English, only allows larger constituents to deaccent?

As a first test of this, we varied the phonological size of the given material between items within our 16 adjective-noun items: 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. Below are examples of the adjective-noun cases in the corrective focus condition showing the given word as 1 vs. 2 syllables:

(30) *Adjective-noun item with given word of 1 syllable*:
a. Last week Johanna polished the *silver knives.*
   No, she polished the **steel** knives.
b. Hier soir, Natalie a nettoyé le *plafond bleu*.
   'Last night, Natalie cleaned the blue ceiling.'
   Non, elle a nettoyé les **murs** bleus.
   'No, she cleaned the blue walls.'

(31) *Adjective-noun item with given word of 2 syllables*:
a. Last week when Tracy went to the zoo, she saw an *ugly giraffe*.
   No, she saw a **cute** giraffe.
b. Hier, Lisette a acheté une *veste mignonne*.
   'Yesterday, Lisette bought a cute coat.'
   Non, elle a acheté une **jupe** mignonne.
   'No, she bought a cute skirt.'

It could also 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 but with post-nominal adjectives, liaison with the preceding noun is

more variable (Durand and Lyche 2008). It seems plausible that the two cases differ in their prosodic phrasing: *adjective+noun* may be obligatorily phrased together as one domain, while *noun+adjective* may be phrased as two domains (cf. Post 2000). Although the idea of a close link between liaison and prosodic phrasing has been challenged (Pak and Friesner 2006; Côté 2011),[21] there are syntactic differences between pre- and post-nominal modifiers, so it seems plausible that there could be an interaction with focus marking. To test for this, we manipulated noun-adjective order in our French stimuli: we included 4 items with pre-nominal adjectives and 12 with post-nominal adjectives, exemplified in (32).[22]

(32) *Post-nominal adjectival modification in French*:
a. Hier soir, Natalie a nettoyé le *plafond bleu*.
'Last night, Natalie cleaned the blue ceiling.'
C'est vrai? Mireille a nettoyé les **murs** bleus.
'Really ? Mireille cleaned the blue walls.'

Pre-nominal adjectival modification in French:
b. Hier soir, Martin a joué avec son *vieux chat*.
'Last night, Martin played with his old cat.'
C'est vrai? Gabriel a joué avec son **jeune** chat.
'Really? Gabriel played with his young cat.'

In order to maintain comparability between the two types of items, the focused word always came first in linear order (**focused word** > given word). In addition, a prominence shift away from the sentence end is easier to perceive, thus providing stronger cues for focus marking.

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 4-5. 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, 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 (33):

(33)

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!*

[21] Optionality in phrasing in the case of post-nominal modification might reflect syntactic differences, such as between adjectival modification vs. reduced relative clause modification. Our items were not designed to test this.
[22] The unbalanced number of pre- vs. post-nominal adjectives reflects the fact that pre-nominal adjectives are very limited in French.

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.

After filling out a consent form and language questionnaire, participants read the instructions, which appeared on the first computer screen; 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 (33) above, and were asked to 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 to the participants because, otherwise, they might have already pre-planned a response with a particular prosody, and then have gotten 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 via email invitations to participants of prior studies 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.[23] This is because, as mentioned above, there is evidence from language contact, between Chinese and neighboring languages, that prominence marking of focus 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

[23] 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.

analyzed is thus: 35 English speakers, 12 European French speakers, and 16 Québec French speakers.[24]

3.4 Measurements

Our approach is to look for quantitative differences in focus effects across conditions, and then to compare across languages to see whether any differences in prosodic effects can be observed. For example, in the following dialogue for corrective focus, we are interested in quantitative measures correlating with prominence on the target constituents **steel** and knives.

(34) 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 and Weenink 2011), we extracted duration, intensity, and pitch measurements on the **focused** constituent and the following given constituent; in (34), **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 than as differences in absolute values (e.g. Breen et al. 2010).

3.5 Results of Experiment 1: Adjective-noun items

In this section, we present the results of Experiment 1, which directly compares adjective-noun 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 (corrective focus, contrastive focus, or parallelism). If P-differences 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?

[24] 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.

Figure 1 shows the means for relative measures of prominence depending on focus condition for English (Eng), Québec French (QuF), and European French (EuF).[25] As mentioned, we cannot include the cleft in this analysis since the syntax of the focused constituent is not comparable to the other conditions. That is, we cannot directly compare the prosody of constituents at the beginning of the sentence (cleft) with constituents at the end of the sentence (other conditions). We discuss 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, while in French, only corrective focus is consistently different.[26]

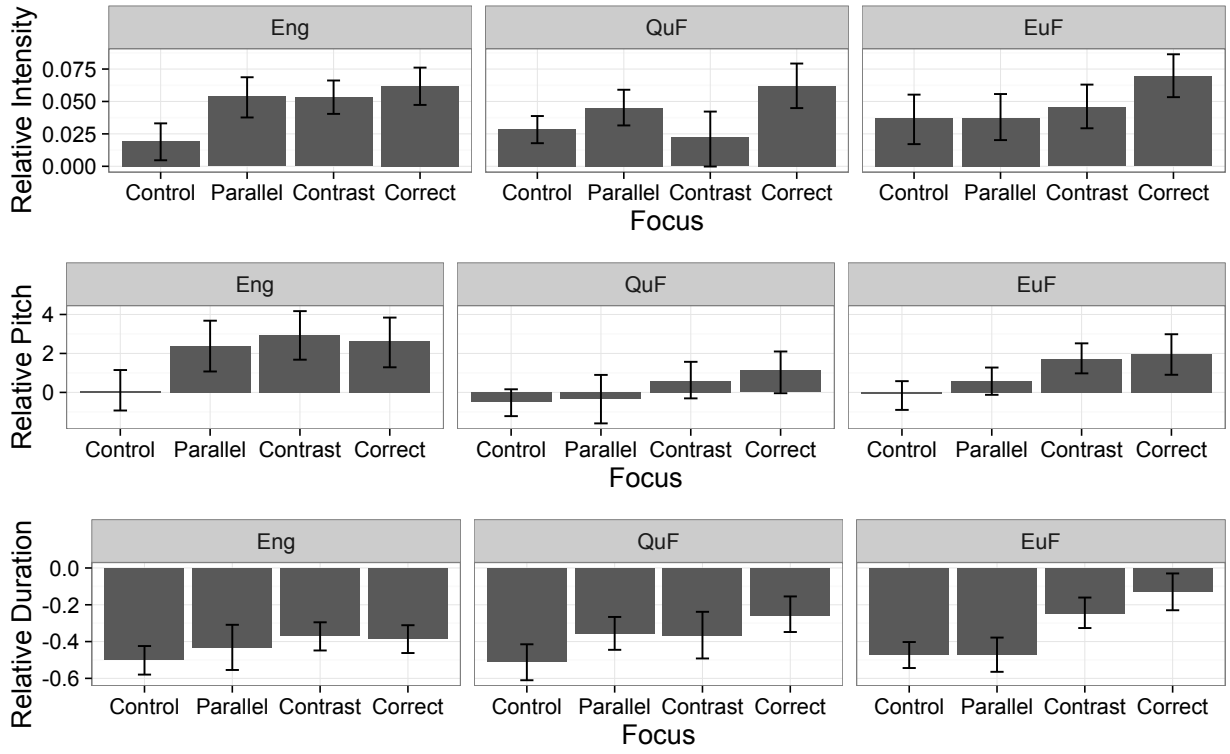

Figure 1. Relative intensity, pitch, and duration by focus condition in English, Québec French, and European French.

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 European and Québec French together.

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

[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 an utterance (Poschmann and Wagner 2015), which is 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 why relative pitch tends to be positive even in the absence of focus marking.

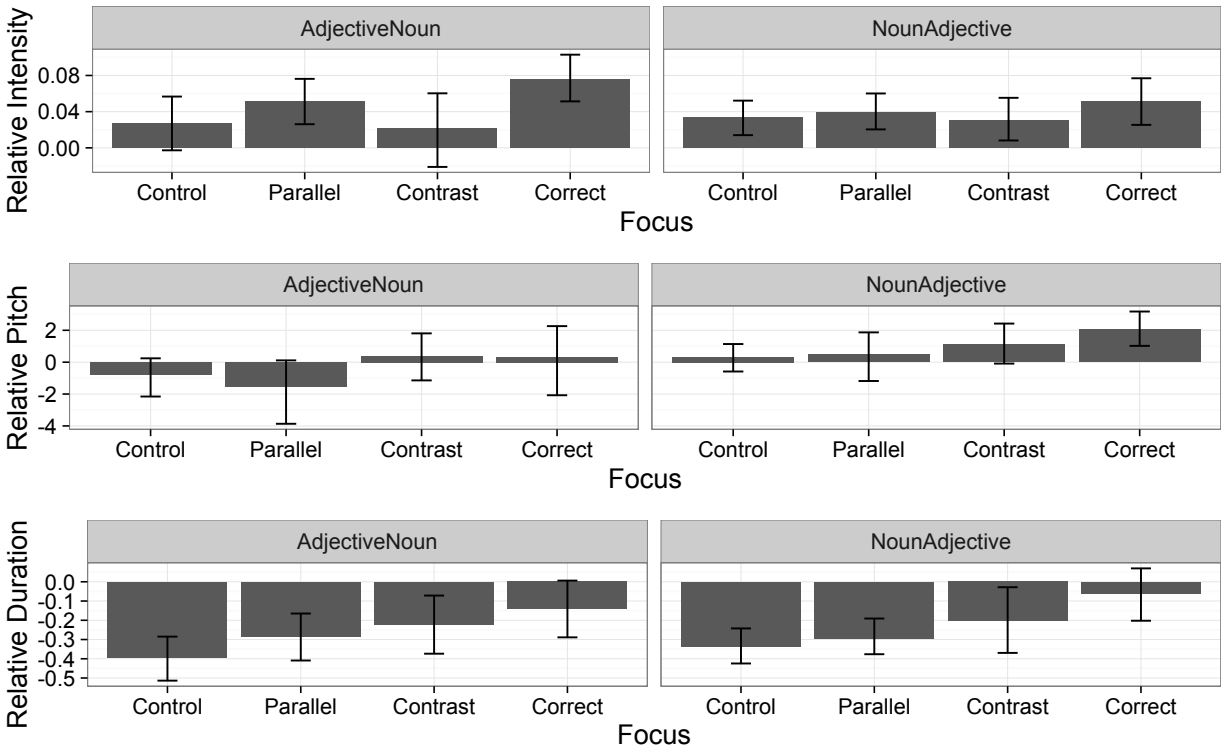

Figure 2. Relative intensity, pitch, and duration values for adjective-noun and noun-adjective word order in French (Québec and European French pooled together).

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 adjective-noun items by syllable count. We do not observe any overall distinctions between monosyllabic and disyllabic given items in French (nor in English).

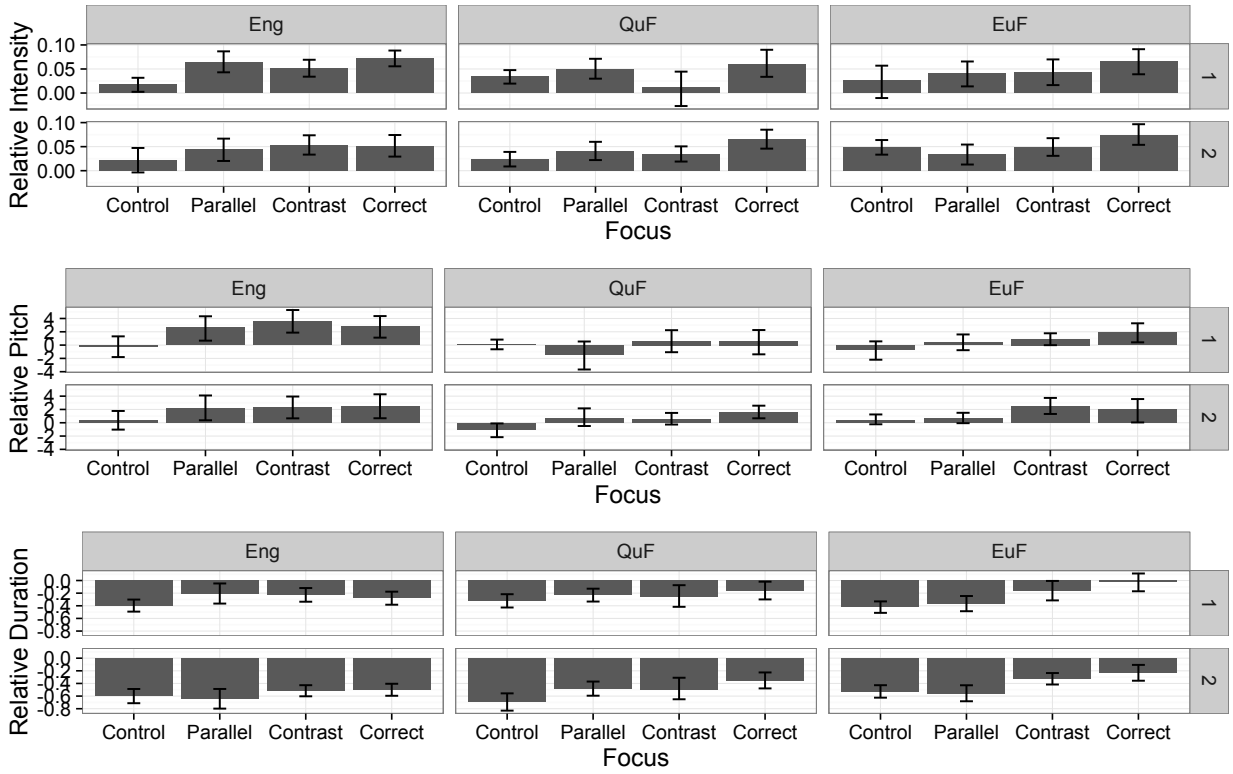

Figure 3. Relative intensity, pitch, and duration values for monosyllabic and disyllabic given items in English, Québec French, and European French.

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 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). 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.

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

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

	English	Qu	Eu
(Intercept)	0.02 (0.02)	0.03 (0.01)**	0.04 (0.02)
focusParallel	0.04 (0.01)***	0.02 (0.01)	−0.00 (0.01)
focusContrast	0.04 (0.01)***	−0.01 (0.02)	0.01 (0.02)
focusCorrect	0.05 (0.01)***	0.04 (0.01)**	0.04 (0.02)*
size1.vs.2.syllables	0.00 (0.03)	0.00 (0.02)	−0.01 (0.04)
focusParallel:size1.vs.2.syllables	0.01 (0.02)	−0.01 (0.03)	0.04 (0.03)
focusContrast:size1.vs.2.syllables	−0.00 (0.02)	−0.02 (0.03)	−0.00 (0.03)
focusCorrect:size1.vs.2.syllables	0.01 (0.02)	−0.02 (0.03)	−0.00 (0.03)
focusControl:wordOrderAdjNoun.vs.NounAdj		0.01 (0.02)	−0.01 (0.04)
focusParallel:wordOrderAdjNoun.vs.NounAdj		0.03 (0.02)	−0.03 (0.03)
focusContrast:wordOrderAdjNoun.vs.NounAdj		−0.02 (0.04)	0.00 (0.03)
focusCorrect:wordOrderAdjNoun.vs.NounAdj		0.04 (0.03)	0.01 (0.03)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 1. Models of relative intensity measures of adjectival modification items.

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 'focusParallel' in **Table 1**, for example, reports the statistical comparison of parallelism with the control. The columns for language ('English', 'Qu', and 'Eu') report the estimates and standard errors for the relevant predictors as well as their significance.

Beginning with the English results, 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 varieties, only corrective focus is significantly different compared to the control. In other words, intensity encodes focus only in corrections. This is expected under the Scope and Corrective Focus Hypotheses, but unexpected under the Phrasing and Initial High Hypotheses, where types of focus are not expected to play a role. Also, the use of intensity provides evidence that French employs stress-related cues to mark focus, which is unexpected under the Phrasing Hypothesis. Finally, there was no interaction with syllable count, comparable to English.

In French, we had an additional between-item manipulation, whether the adjective was pre-nominal 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**.

	English	Qu	Eu
(Intercept)	0.02 (0.63)	−0.73 (0.50)	−0.49 (0.64)
focusParallel	2.19 (1.05)*	−0.67 (1.25)	0.77 (0.71)
focusContrast	2.81 (1.03)**	1.29 (0.90)	1.68 (0.89)
focusCorrect	3.04 (1.23)*	1.10 (0.89)	2.17 (0.87)*
size1.vs.2.syllables	−0.57 (1.18)	1.75 (1.05)	−0.34 (1.15)
focusParallel:size1.vs.2.syllables	1.35 (1.65)	−2.20 (2.33)	1.02 (1.37)
focusContrast:size1.vs.2.syllables	1.72 (1.86)	−1.17 (1.66)	−0.26 (1.45)
focusCorrect:size1.vs.2.syllables	1.93 (2.30)	−1.52 (1.62)	0.50 (1.45)
focusControl:wordOrderAdjNoun.vs.NounAdj		−1.07 (1.20)	−1.66 (1.39)
focusParallel:wordOrderAdjNoun.vs.NounAdj		−3.04 (2.36)	−1.45 (1.29)
focusContrast:wordOrderAdjNoun.vs.NounAdj		−0.70 (1.76)	−1.60 (1.27)
focusCorrect:wordOrderAdjNoun.vs.NounAdj		−2.80 (1.74)	−0.98 (1.65)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 2. Models of relative pitch measures of adjectival modification items.

The results for pitch are qualitatively similar to those for intensity in that they show that English marks all types of focus, while French does not, other than corrective focus. One difference is that the comparison between corrective focus and control (focusCorrect) in Québec French did not reach significance. Perhaps pitch does not play as big a role in Québec French as in European French. What stands out, though, is that only corrective focus is significantly different in European French; these results are hence compatible with the Scope and Corrective Focus Hypotheses. Like intensity, the interaction of pitch with syllable count is not significant in English nor in 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**.

	English	Qu	Eu
(Intercept)	−0.53 (0.09)***	−0.48 (0.08)***	−0.52 (0.07)***
focusParallel	0.11 (0.06)	0.12 (0.06)	0.06 (0.07)
focusContrast	0.15 (0.03)***	0.07 (0.08)	0.21 (0.08)**
focusCorrect	0.16 (0.04)***	0.23 (0.08)**	0.32 (0.08)***
size1.vs.2.syllables	0.23 (0.19)	0.34 (0.15)*	0.20 (0.12)
focusParallel:size1.vs.2.syllables	0.12 (0.11)	−0.13 (0.13)	0.06 (0.12)
focusContrast:size1.vs.2.syllables	0.04 (0.06)	−0.12 (0.14)	0.06 (0.14)
focusCorrect:size1.vs.2.syllables	0.02 (0.08)	−0.16 (0.15)	0.06 (0.15)
focusControl:wordOrderAdjNoun.vs.NounAdj		0.07 (0.17)	−0.17 (0.15)
focusParallel:wordOrderAdjNoun.vs.NounAdj		0.02 (0.16)	−0.07 (0.18)
focusContrast:wordOrderAdjNoun.vs.NounAdj		−0.04 (0.21)	−0.19 (0.20)
focusCorrect:wordOrderAdjNoun.vs.NounAdj		0.02 (0.22)	−0.16 (0.22)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 3. Models of relative duration measures of adjectival modification items.

The results for duration are more complex. First, duration does not appear to encode focus in cases of parallelism, even in English. In both varieties of French, as in English, it provides a significant cue for corrective focus. Duration also encodes focus in cases of contrastive focus in English and European French.

That duration is a significant cue for contrastive focus in European French is unexpected under the Corrective Focus and Scope Hypotheses. However, since prior mention alone can effect a reduction in the duration of a word even without deaccentuation (Lieberman 1963; Bard et al. 2000; Wagner et al. 2010; Kahn and Arnold 2012; Wagner and Klassen 2017), this difference is not necessarily reflective of a shift in prominence to the focused constituent.

Across all phonetic cues, one reliable result is that French does not appear to encode focus in parallelism. Further, Québec French does not mark contrastive focus with any of the cues. However, it is not sufficient to test only for the presence or absence of effects within each sub-group; we also need to test whether the languages are truly significantly different by looking for an interaction between focus and language. We coded the factor Language using Helmert coding, where the first comparison juxtaposes English and French (i.e., Québec and European French pooled together), and the second compares Québec French with European French. We report models for each of the acoustic cues in **Table 4**. To ensure that the model did not fail to converge, we did not include the factors Syllable count and Word order.

	Intensity	Pitch	Duration
(Intercept)	$0.03\ (0.01)^{**}$	$-0.22\ (0.43)$	$-0.49\ (0.06)^{***}$
focusParallel	$0.02\ (0.01)^{**}$	$1.09\ (0.60)$	$0.09\ (0.03)^{**}$
focusContrast	$0.01\ (0.01)$	$1.93\ (0.54)^{***}$	$0.15\ (0.03)^{***}$
focusCorrect	$0.04\ (0.01)^{***}$	$2.18\ (0.52)^{***}$	$0.24\ (0.03)^{***}$
languageEnglish.vs.Other	$-0.02\ (0.02)$	$0.18\ (0.81)$	$-0.05\ (0.12)$
languageQuFrench.vs.EuFrench	$-0.01\ (0.01)$	$-0.48\ (0.86)$	$-0.03\ (0.05)$
focusParallel:languageEnglish.vs.Other	$0.03\ (0.01)^{**}$	$1.89\ (1.14)$	$0.02\ (0.06)$
focusContrast:languageEnglish.vs.Other	$0.04\ (0.01)^{**}$	$1.51\ (1.04)$	$-0.00\ (0.05)$
focusCorrect:languageEnglish.vs.Other	$0.01\ (0.01)$	$1.03\ (0.99)$	$-0.11\ (0.05)^{*}$
focusParallel:languageQuFrench.vs.EuFrench	$0.02\ (0.02)$	$-0.37\ (1.60)$	$0.08\ (0.08)$
focusContrast:languageQuFrench.vs.EuFrench	$-0.01\ (0.02)$	$-0.50\ (1.46)$	$-0.11\ (0.07)$
focusCorrect:languageQuFrench.vs.EuFrench	$0.00\ (0.02)$	$-0.32\ (1.40)$	$-0.07\ (0.07)$

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 4. Models examining interactions between Focus and Language.

Of interest to us are the interactions between Focus and Language.[29] With respect to intensity, the comparison between parallelism and control is significantly different in English but not in French, as is the comparison between contrastive focus and control. There is no significant difference, however, in the interaction between corrective focus vs. control and Language. This is exactly what the Scope and Corrective Focus Hypotheses predict, and shows that French is truly different from English in the case of parallelism and contrastive focus, but not in the case of corrective focus. It also shows that there is no evidence that French uses intensity differently from English when it does mark focus, as in the corrective condition.

The differences we observed above between languages in the use of pitch and duration do not lead to significant interactions—from a statistical point of view, we cannot be sure whether the languages really differ for those cues in how focus is encoded. There is a significant interaction, however, in the case of duration, suggesting that in French, the difference in duration between corrective focus and control is smaller than in English.

Finally, the apparent difference in duration we observed in Table 3 between Québec and European French in how contrastive focus is marked might not be indicative of a true difference between them, since the interaction between contrastive focus effects and the difference between

[29] In the statistical analysis, 'Other' (in Table 4 and below) groups together Québec and European French.

the two varieties of French was not significant (Table 4). That is, we cannot conclude that Québec and European French differ with respect to how they use duration to mark contrastive focus.

These results are compatible with the Scope Hypothesis. In the case of corrective focus, ~ can attach to the entire clause, while in the case of parallelism, it would attach to a DP:

(35) English: ~ [(assert) He bought a **red**$_F$ bike].
French: ~ [(assert) Il va apporter une **soupe**$_F$ froide].

(36) English: He bought ~$_1$[*a* ***blue***$_F$ *bike*] and ~$_2$[*a* ***red***$_F$ *bike*].
French: Grammar disallows ~ to scope below the root clause:
* Il va apporter ~$_1$[*une* ***salade***$_F$ *froide*] et ~$_2$[*une* ***soupe***$_F$ *froide*].

With respect to contrastive focus, shown again in (37), 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. Besides impossible narrow scope for ~ in contrastive focus, there is a possible representation that involves a ~ operator with widest scope, namely when the subject is also F-marked, as illustrated in (38a).

(37) *Contrastive focus in French* (repeated from (21b)):
Pour le pique-nique de cet après-midi, *Guillaume va apporter une salade froide*.
'For the picnic this afternoon, Guillaume is going to bring a cold salad.'
C'est vrai ? Marie va apporter une **soupe** froide.
'Really ? Marie is going to bring a cold soup.'

(38) *Possible wide scope ~ for contrastive focus in French with double focus*:
a. ~ [**Marie**$_F$ va apporter une **soupe**$_F$ froide]

Impossible narrow scope of ~ for contrastive focus in French (cf. (22) for English):
b. * Marie va ~ [apporter une **soupe**$_F$ froide]
c. * Marie va apporter ~ [une **soupe**$_F$ froide]

Since our stimuli were not created to rule this out (as we did not anticipate this possibility beforehand), 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 (38a), while others chose not to mark the contrast with double focus, as in (38b) or (38c).

3.5.2 Is focused 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 and Loevenbruck (2004) report an increase in duration on the focused item; Jun and Fougeron (2000) report that European French reduces the

duration on the given item. In English, on the other hand, lengthening and shortening duration is used to mark both focus and givenness respectively (Breen et al. 2010; i.a.). In earlier literature, cross-language comparison has been hindered by the fact that results such as these come from separate 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. Overall, however, 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. Both English and French employ cues on the focused and given constituents to achieve the relative prominence differences we observed earlier and there is no clear overall difference between the languages in which strategy (boost, reduction, or both) is used to convey a prominence shift.

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 results on English (e.g., Breen et al. 2010). Crucially, English and French significantly differed in parallelism and contrastive focus, but not in corrective focus (either for the focused or given word). This result is consistent with our prior findings based on the relative measures, and is of interest since previous studies have claimed that, at best, intensity plays only a minor role in encoding focus in French (e.g., Féry 2001; Dohen and Loevenbruck 2004; Hamlaoui et al. 2012).

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.

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. These results speak against one argument used in favor of the Phrasing Hypothesis; namely, that French only uses phonetic cues associated with phrasing but not those associated with stress, according to Féry (2013).

3.5.3 What about initial high?

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 adjective-noun items. This measure should directly correlate with whether or not there is an initial high target at the beginning of the focused constituent, although it would also be affected by an overall pitch boost due to focus. Thus, while a significant difference in this measure might not necessarily reflect an initial high, the absence of an effect would indicate that there is no initial high on the focused constituent.

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 to mark focus.

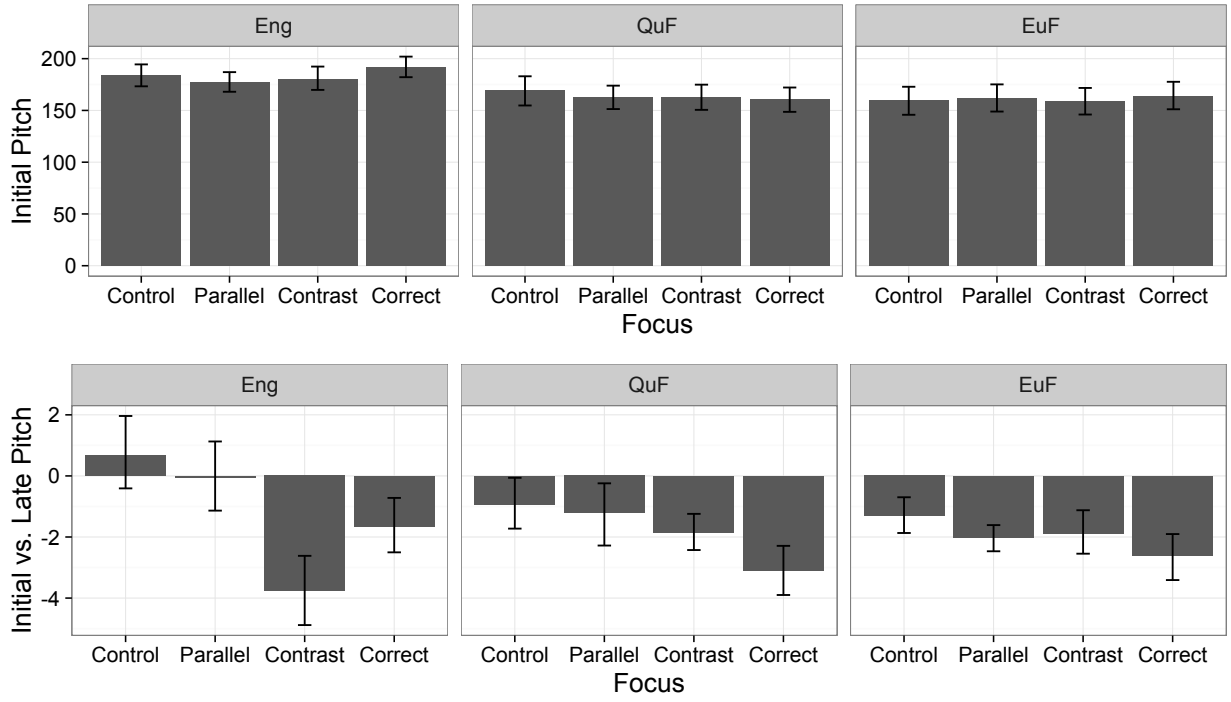

Figure 4. Maximum pitch in the first quadrant of the focused word across conditions in English, Québec French, and European French.

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 averages for each 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.[30] 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. There is also some indication that pitch on the focused word is higher in English in the contrastive and corrective conditions. In short, we see no indication that there was an initial high marking focus in French when we compare the focus conditions to the control condition.[31]

[30] 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.

[31] 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.

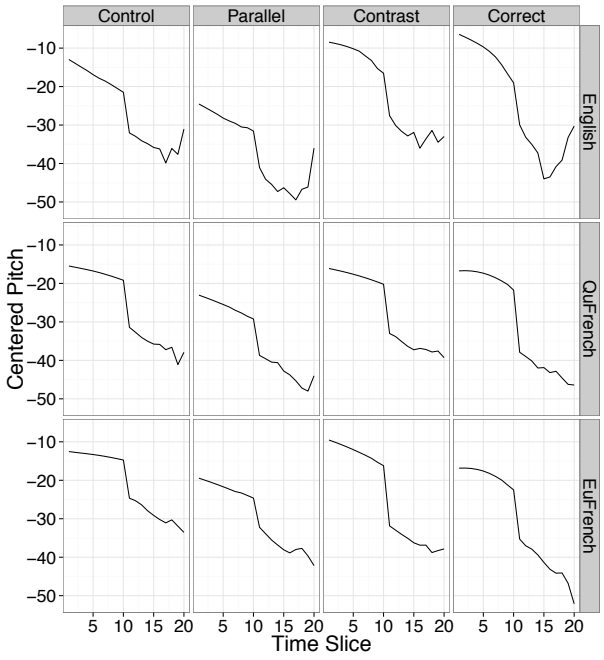

Figure 5. Average pitch plots for 20 time slices (slices 1-10: focused word; slices 11-20: given word).

The absence of an effect on initial pitch in the French data does not mean that there were no initial high tones in our data, but rather that the presence of an initial high did not systematically correlate with focus. It could be that our averaged acoustic measures are still too coarse-grained to capture an initial high. However, it would be surprising if the systematic presence of a high tone target did not at least lead to a numerical difference in pitch. These results suggest that the Initial High Hypothesis is not supported for French. Crucially, an initial high tone alone cannot account for the prosodic effects of focus in French, given that French patterns with English in corrective focus, but not in other focus contexts tested in this study.

3.6 Discussion of Experiment 1

Our results confirm previous findings that French can shift prominence at least under certain discourse circumstances (e.g., Di Cristo 1998; Féry 2001; Cruttenden 2006; Ladd 2008), and more specifically, Jun and Fougeron's (2000) finding that European French marks corrective focus. They also confirm findings in earlier literature that English shifts prominence in all focus contexts (e.g., Eady et al. 1986; Eady and Cooper 1986; Cruttenden 2006; Ladd 2008; Breen et al. 2010). Importantly, our results show for the first time that there is an indeed interaction between focus type and language when it comes to the marking of prosodic focus. While such interactions are implicitly assumed in the description of the languages (e.g. in Ladd 2008), no study has actually directly shown them to be attested.

Our results clearly show that French and English both prosodically encode corrective focus, 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 the 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 in the adjective-noun items (irrespective of focus condition). No independent evidence for the Phrasing Hypothesis was found in investigating word order (pre- vs. post-nominal adjectives) or the syllable size of the given word (one vs. two syllables). Our results also show that the way focus is marked when it is marked at all is remarkably similar phonetically across the two languages. 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 of shifting prominence.

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: complex sentences. For these examples, the potential focused constituent is the matrix subject of a subordinate clause and the given material comprises the rest of the clause:

(39) *Examples of a complex sentence item in the corrective condition*:
   a. *Francis thinks that Lori is cute*.
      No, **Steve** thinks that Lori is cute.
   b. *David a mentionné qu'il promenait des chiens pour gagner sa vie*.
      'David mentioned that he walks dogs for a living.'
      Non, **Bertrand** a mentionné qu'il promenait des chiens pour gagner sa vie.
      'No, Bertrand mentioned that he walks dogs for a living.'

The adjective-noun 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 but the latter does not. Recall that the Scope Hypothesis is stated as requiring that ~ in French can attach to any node that denotes a proposition. According to this formulation of the Scope Hypothesis, we would expect focus marking in these items to be possible in French even in cases of parallelism, as in (40b). In contrast, the Corrective Focus Hypothesis should

disallow focus marking in parallelism since the semantic content of the corrective ~ focus operator restricts it precisely to corrective focus cases.

(40) *Focus marking possible in Parallelism even in French where ~ attaches to clausal nodes:*
a. $\sim_1$[***Francis***$_F$ *thinks that Lori is cute*] and $\sim_2$[***Steve***$_F$ *thinks that Lori is cute*.]
b. $\sim_1$[***François***$_F$ *trouve que Lori est jolie*] et $\sim_2$[***Jean***$_F$ *trouve que Lori est jolie*.]

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, 2013), 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 (e.g., the VP underlined in (38b)). 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 (39) above.

4.1 Results

We analyzed the complex sentence data in the same way as the adjective-noun 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** below look similar to the adjective-noun 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 adjective-noun data.

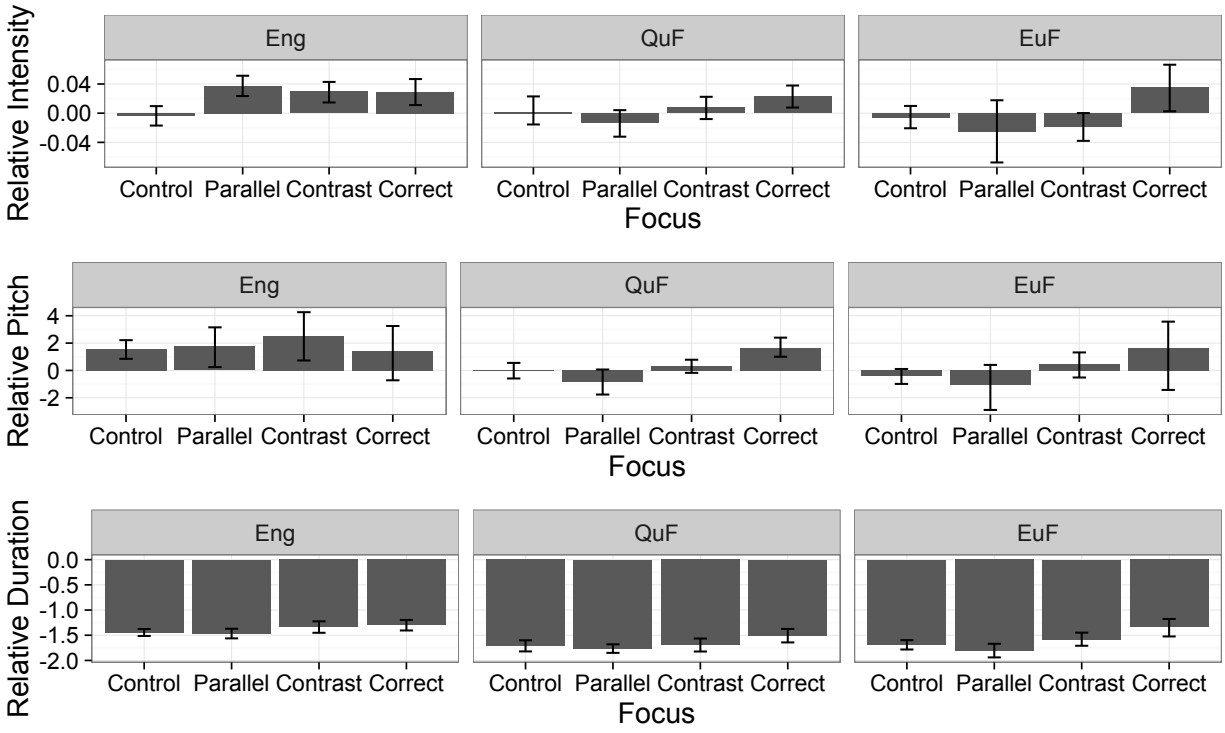

Figure 6. Relative intensity, pitch, and duration values for complex sentences involving embedding across conditions in English, Québec French, and European French.

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 adjective-noun items. Note that given the low number of items, we could not fit by-item random slopes for this data set. **Table 5** shows the results.

	Intensity	Pitch	Duration
(Intercept)	−0.00 (0.01)	0.34 (0.29)	−1.61 (0.06)***
focusParallel	−0.00 (0.01)	−0.41 (0.54)	−0.04 (0.05)
focusContrast	0.01 (0.01)	0.80 (0.50)	0.04 (0.05)
focusCorrect	0.03 (0.01)**	1.24 (0.76)	0.19 (0.05)***
languageEnglish.vs.Other	0.00 (0.02)	1.74 (0.54)**	0.21 (0.12)
languageQuFrench.vs.EuFrench	0.01 (0.01)	0.45 (0.69)	−0.02 (0.06)
focusParallel:languageEnglish.vs.Other	0.06 (0.02)***	1.03 (1.00)	0.09 (0.10)
focusContrast:languageEnglish.vs.Other	0.04 (0.02)*	0.49 (0.98)	0.02 (0.09)
focusCorrect:languageEnglish.vs.Other	−0.00 (0.02)	−2.23 (1.42)	−0.05 (0.09)
focusParallel:languageQuFrench.vs.EuFrench	0.00 (0.02)	−0.40 (1.32)	0.04 (0.09)
focusContrast:languageQuFrench.vs.EuFrench	0.01 (0.02)	−0.49 (1.25)	−0.11 (0.08)
focusCorrect:languageQuFrench.vs.EuFrench	−0.03 (0.02)	−0.54 (1.91)	−0.09 (0.09)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 5. Models of relative intensity, pitch, and duration with the fixed effects of Focus, Language, and their interaction for complex sentences.

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. Corrective focus seems to be marked similarly in French as in English. The results thus appear to support the Corrective Focus Hypothesis.

These results speak against the Scope Hypothesis, under 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 (40) above—and, thus, for French to be similar to English. This prediction is not borne out.

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, (40b) would be impossible in French because ~ is attaching below the root node. 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:

(41) *Predictions of the Scope Hypothesis (~ restricted to root nodes) and Corrective Focus Hypothesis for complex sentences:*
Contrastive focus and Parallelism: no focus marking
Corrective focus: focus will be prosodically marked

Finally, the results also speak against the Phrasing Hypothesis, which would predict focus marking in all conditions in the complex sentence cases (as summarized in (42)) and, as outlined above, no focus marking in any condition in the adjective-noun 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:

(42) *Predictions of the Phrasing Hypothesis (and the Scope Hypothesis; ~ restricted to proposition-size nodes) for complex sentences:*
Holds for all types of focus: focus will be prosodically marked

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

5 Experiment 3: Relative clause modifiers

We also examined relative clause modification—again, using the same focus types. We included 8 such items. An example in the corrective condition, with focus on the head of the relative clause, is shown in (43).

(43) *Examples of a relative clause item in the corrective condition*:
a. Yesterday, John cut down an *elm that was rotten*.

No, he cut down an **oak** that was rotten.

b. Émilie a rencontré un *Brésilien qui était végétarien*.
'Emily met a Brazilian who is vegetarian.'
Non, elle a rencontré un **Russe** qui était végétarien.
'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 to 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 as follows:

(44) *Predictions of the Phrasing Hypothesis for relative clauses:*
Holds for all focus types: focus will be prosodically marked

(45) *Predictions of the Corrective Focus Hypothesis and the Scope Hypothesis (where ~ is restricted to propositional nodes or root nodes) for relative clauses:*
Contrastive Focus and Parallelism: no focus marking
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 contrastive 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.**

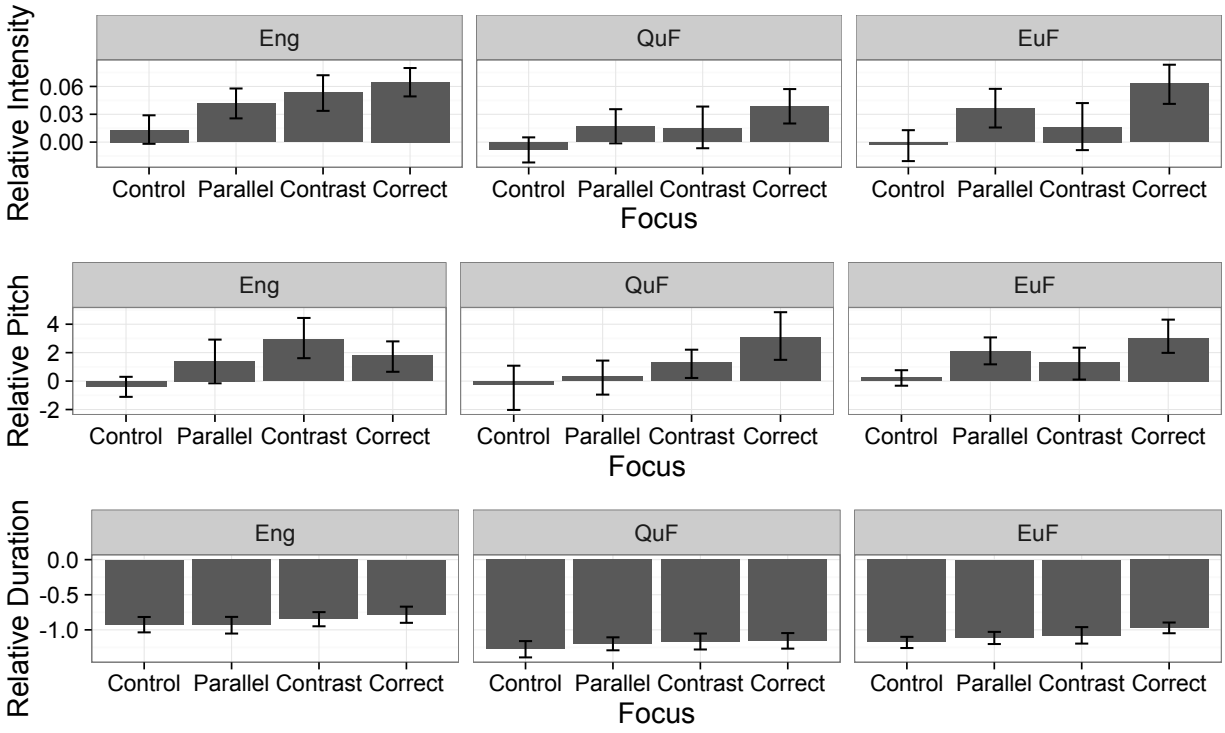

Figure 7 Relative intensity, pitch, and duration values for relative clause items across conditions in English, Québec French, and European French.

Again, we tested for significance using mixed effects models, reported in **Table 6** below.

	Intensity	Pitch	Duration
(Intercept)	0.00 (0.01)	−0.16 (0.42)	−1.14 (0.08)***
focusParallel	0.03 (0.01)***	1.49 (0.70)*	0.06 (0.03)*
focusContrast	0.03 (0.01)**	1.98 (0.52)***	0.11 (0.03)***
focusCorrect	0.05 (0.01)***	2.84 (0.59)***	0.17 (0.03)***
languageEnglish.vs.Other	0.02 (0.02)	−0.47 (0.81)	0.28 (0.16)
languageQuFrench.vs.EuFrench	−0.00 (0.01)	−0.60 (0.81)	−0.09 (0.05)
focusParallel:languageEnglish.vs.Other	0.00 (0.01)	0.71 (1.33)	−0.05 (0.06)
focusContrast:languageEnglish.vs.Other	0.02 (0.02)	2.04 (1.00)*	0.01 (0.06)
focusCorrect:languageEnglish.vs.Other	−0.00 (0.02)	−0.59 (1.12)	−0.01 (0.06)
focusParallel:languageQuFrench.vs.EuFrench	−0.01 (0.02)	−1.13 (1.49)	0.02 (0.07)
focusContrast:languageQuFrench.vs.EuFrench	0.00 (0.02)	0.43 (1.31)	−0.00 (0.08)
focusCorrect:languageQuFrench.vs.EuFrench	−0.02 (0.02)	0.60 (1.33)	−0.11 (0.08)

$^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$

Table 6. Models of relative measures of items involving relative clauses.

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 the Corrective Focus and Scope Hypotheses. In part, this may be a power issue, as we are

considering less data compared to the case of adjectival modification (8 vs. 16 items).[32] However, given that the complex clauses (6 items) replicated our basic finding, we expect that this is not the full story.[33]

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 looked at. While the interpretation of these results remains unclear, the findings may 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 phonological phrase or perhaps 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 (adjective-noun 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* types of items? Third, why do the relative clause examples in French use intensity to mark focus? We expected that intensity would not be used to mark focus here, but we also did not find this comparison to come out as significant.

Clearly, the results we have found for relative clause modification pose a challenge for our account under 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 the results from the adjective-noun 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 (42) and (45) above). 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

[32] 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.

[33] One possibility (pointed out by a reviewer) is that the relative clauses 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 relative clause 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's not clear that that this would solve the problem for the Scope Hypothesis.

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 unclefted corrective focus condition. The rating results in **Figure 8** below 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.

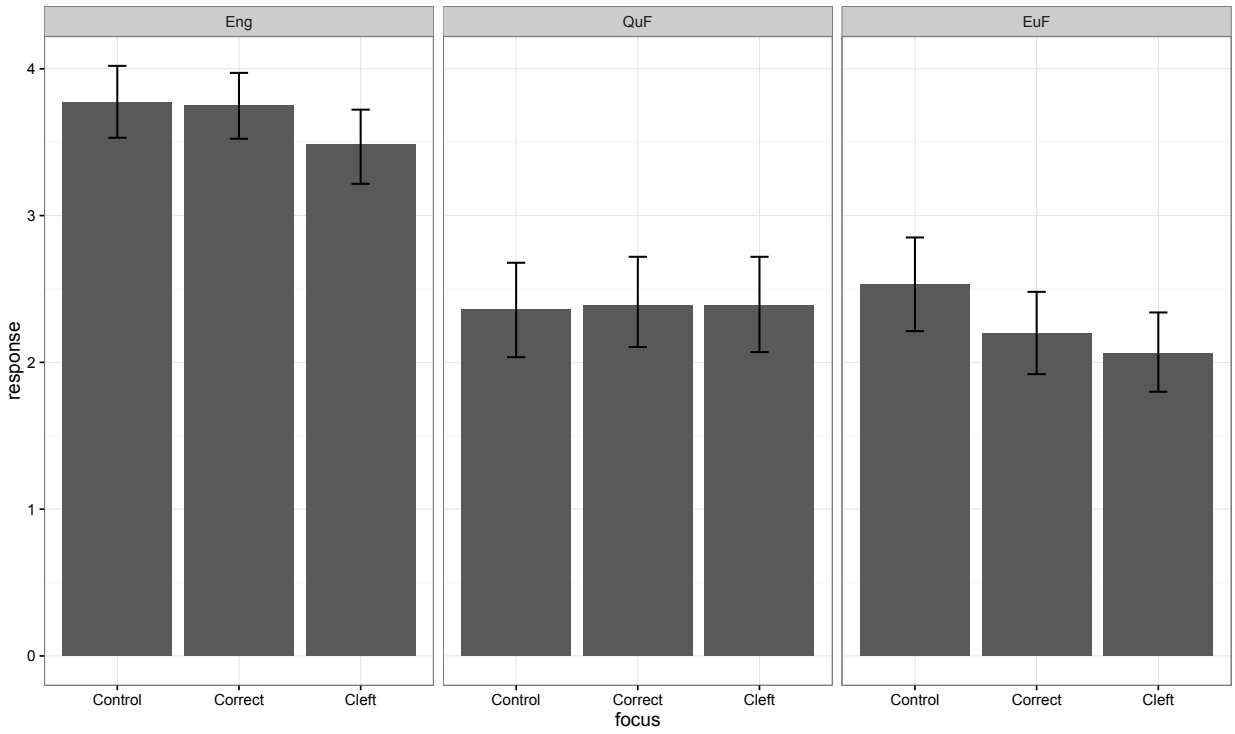

Figure 8. Acceptability ratings for English, Québec French, and European French, comparing corrective focus in a non-cleft and cleft with the control condition. 1=completely unnatural; 5=completely natural.

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 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.[34]

One might question 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: 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 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 data differed from 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.

Further 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

[34] 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).

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.

If the Scope Hypothesis is correct, then the difference between edge-marking languages and 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 many 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, corrective focus, and contrastive 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 and 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, and focus appears not to be marked prosodically in those cases.

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 is 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, under which 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. Finally, we found that a stressed-based cue, intensity, is used to mark focus in French, contrary to the expectations of the Phrasing Hypothesis. We did not find a systematic correlation between the presence of a high tone and the focus constituent, as it 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 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 ~ can attach to any clause-sized constituent in French. In view of this, we argued for a more restrictive version of this hypothesis, which holds that it is not 'proposition-sized' constituents (i.e., constituents that denote propositions) that ~ 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 is as compatible with our experimental results as the Corrective Focus Hypothesis, but seems preferable for theoretical reasons.

Our experiments were not designed to tease apart the Corrective Focus Hypothesis from this revised version of the Scope Hypothesis. 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 on another), this would support the Scope Hypothesis but not be predicted by the Corrective Focus Hypothesis.

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), while Italian speakers tend to shift prominence in a slightly wider range of contexts. Closer examination of these contexts with respect to the scope or content of ~ seems to be a promising avenue for further research.

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