

# Interaction at the Syntax-Prosody Interface

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## Abstract

The goal of this paper is to demonstrate the advantage of integrating sentence-final intonation into the syntactic spine. This addresses a gap in the literature first identified by Truckenbrodt (2012). Our case is built on the similarity of sentence-final particles and sentence-final intonation in Canadian English for Common Ground management. Some sentence final particles, such as Canadian *eh*, encode a request for confirmation of the speaker's belief. These particles contribute to Common Ground management in that they encode the speaker's commitment towards the proposition (*p*) encoded in an utterance. In addition, their prosodic properties also contribute to Common Ground management by engaging the addressee to respond to the utterance. To model this observation, we assume two layers above CP which are responsible for these functions: GroundP and ResponseP (Wiltschko & Heim 2016, Wiltschko 2017). We show that this model can explain the prosodic variation of the sentence-final particle *eh* along with those of different sentence-final contours. With a syntactic integration of GroundP and ResponseP, we can better explain the distributional restrictions of sentence-final particles and their relation to the host clause than models without a syntactic integration of Common Ground managers. Furthermore, a unified analysis for sentence final-particles and sentence-final intonation allows for systematic cross-linguistic comparison between languages that appear to use different linguistic means for Common Ground management. Our analysis is grounded in a conversational model that assumes Common Ground to be the product of a dynamic and complex negotiation between the interlocutors (Brennan & Clark 1991, Farkas & Bruce 2010).

## 1 Introduction

For two (or more) interlocutors to reach agreement (even if it's agreement to disagree) can be a delicate act; but this act is what drives conversations. Accordingly, having a conversation entails the negotiation of Common Ground (CG; Stalnaker 1978). Canadian English employs a sentence-peripheral particle (SPP) *eh* which serves to moderate this act of negotiation. With the use of *eh*, the speaker (S) elicits confirmation from the addressee (A) about their belief. In Wiltschko & Heim (2016), we refer to this SPP and its equivalents in other languages as *confirmational*s. The following study of *eh* and its intonational profile shows that eliciting confirmation is quite nuanced. The dialogue in (1) exemplifies the prototypical function of requesting confirmation about the truth of a proposition (*p*). Here, a response is mandatory. The dialogue in (2) exemplifies a variant of *eh* that projects rather than elicits agreement. Here, a response is possible, but not expected. The dialogue in (3) exemplifies a function of a related, yet different nature. A response is not possible, unless A interrupts S (cf. Derek & Tagliamonte 2016 who provide corpus evidence for this generalization). In all three examples, sentence-final intonation (SFI) is indicated by arrows.

(1) {John runs into his friend Mary who walks her new dog around the block.}

John: You have a new dog, eh↑?

Mary: Yes, I just got him last week.

- (2) {Mary starts daydreaming about a trip to Hawaii, but she keeps coming back to the fact that this will be difficult with her latest addition to the household. John puts an end to her dreaming, and says:}

John: You have a new dog, eh↓.

- (3) {Mary and Anna catch up over a drink after the summer break.}

A: So, I have a new dog, eh↗, and he just doesn't listen!

We note that the examples in (1) to (3) vary in distribution and in prosodic properties. (1) and (2) occur turn-finally; (3) occurs turn-medially. In Canadian English, (1) and (3) both occur with a rise – albeit of different shape<sup>1</sup> – while (2) occurs with a fall. *eh* in other varieties of English may have different prosodic properties. Incidentally, all three uses of SFI can occur without the SFP in the same contexts as above.

- (4) {John runs into his friend Mary who walks her new dog around the block.}

John: You have a new dog↑?

Mary: Yes, I just got him last week.

- (5) {Mary starts daydreaming about a trip to Hawaii, but she keeps coming back to the fact that this will be difficult with her latest addition to the household. John puts an end to her dreaming, and says:}

John: You have a new dog↓.

- (6) {Mary and Anna catch up over a drink after the summer break.}

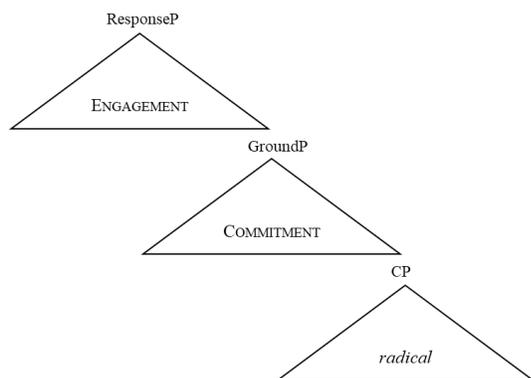
Anna: So, I have a new dog↗, and he just doesn't listen!

Our goal here is to explore the differences between the three different contours in (1) to (3) with and without the SPP. We argue that the contribution of intonation and particles is complex. It can be decomposed into two components: Speaker COMMITMENT and Addressee ENGAGEMENT. This decomposition allows us to derive the similar functions of SPPs and SFI in the negotiation of agreement between interlocutors. We further propose that these functions are best modeled as part of an extended syntactic spine. Specifically, we propose that COMMITMENT associates with the syntactic position immediately above CP. CP is assumed to close-off propositional sentence structures (i.e. the grammar of truth) and to incorporate the descriptive content, i.e. the sentence radical (Lewis 1970, Davis 2011). The extension of the spine we explore here (the grammar of use) consists of GroundP and ResponseP (Wiltschko and Heim 2016, Wiltschko 2016). COMMITMENT is associated with GroundP whereas ENGAGEMENT is associated with ResponseP.

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<sup>1</sup> The rise represented by ↗ has a notably smaller pitch excursion than the rise represented by ↑. The former can be almost completely levelled. Support for this generalization comes from corpus data (Wiltschko et al. 2018) and a small-scale storyboard elicitation with several native speakers of Canadian English.

(7) The extended spine for the Grammar of use



The syntactic integration of SFI and SPPs allows us to understand the complex relationship between SFI, SPPs and their host clauses. Furthermore, it allows us to decompose the contribution of SPPs and SFI into the two components that are necessary to arrive at an agreement between S and A. These components – COMMITMENT and ENGAGEMENT – drive our negotiation of CG and make it efficient.

The remainder of this paper is organized as follows. In section 2, we propose that CG negotiation is best understood as a process where S presents an issue to be added to the CG and also projects a response from A to make CG management more efficient. We refer to the two processes as COMMITMENT and ENGAGEMENT. In section 3, we use these ingredients to explain the prosodic variation associated with the use of the SPP *eh*. In section 4, we expand our proposal to SFI in the absence of SPPs. In section 5, we show that a syntactic integration of CG modifiers has several advantages over approaches that ignore the modifiers in their formal analysis. In section 6, we conclude.

## 2 The Proposal: Modelling Common Ground management

In this section, we discuss and compare the functions of SPPs and SFI for the negotiation of CG. We begin with a discussion of the pragmatic aspects of CG-management (section 2.1.), followed by a proposal how CG-management can be modelled syntactically (section 2.2).

### 2.1 The pragmatics of CG-management

We follow Brennan & Clark (1991) in assuming that the negotiation of CG minimally includes two phases: presentation and acceptance (see also: Weigand 1991). However, we depart from their labels and use the terms *initiation* and *reaction* to reflect the fact that acceptance is not the only option for an interlocutor to react. In the initiation phase, S presents a proposition for negotiation; In the reaction phase, the erstwhile A indicates whether this proposition is accepted into the CG. From this point of view, let us reconsider the example in (1), repeated here as (8).

(8) {John runs into his friend Mary who walks her new dog around the block.}

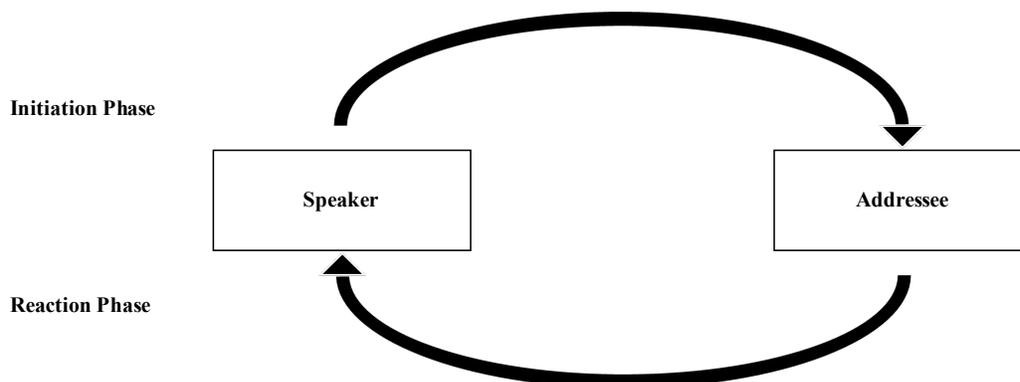
John: You have a new dog, eh↑?

Mary: Yes, I just got him last week.

Here, John presents a proposition and – by employing the confirmational – puts it up for discussion. Mary’s reaction – by employing a response particle – marks the proposition as accepted into the CG. In naturally occurring conversations, this process is not always as brief and straightforward (Clark & Brennan 1991). Acceptance is merely the unmarked option. For example, the initiation phase can be prolonged if the proposition requires further clarification. Similarly, the reaction phase can be prolonged if the interlocutors

need to exchange arguments whether the proposition can enter the CG or not. Figure 2 visualizes these discourse moves as a process of going back and forth between S and A. What is crucial for our purpose is that each interlocutor must be assumed to hold an individual set of beliefs (S’s ground and A’s ground). Propositions that are present in both grounds can be considered part of CG.

Figure 1: Initiation and reaction phase



CG negotiation is still more complex than depicted in Figure 1. In particular, we note that the request for acceptance is already projected by S. This is evident in (1) through the presence of the SPP. The particle *eh* does not only put up the proposition up for discussion; it also anticipates a positive response: S is biased toward the belief that the proposition is true. Specifically, John did not know about Mary’s new dog before their encounter. Entering the conversation, he may assume that the dog she has with her is indeed her dog and hence that that she has a new dog. But he can only know for sure after Mary confirms, hence this is an instance of an uncertain Belief ( $Bel_{uncert}$ ). To capture the conversational properties of  $eh\uparrow$  and other CG modifiers, we adopt Thoma’s (2016) notion of an *epistemicity matrix*. It summarizes the (publicly accessible) epistemic states that need to hold for the utterance to be well-formed. It separates S’s and A’s epistemic state, and it recognizes two different times: the time of the conversation ( $t_u$ ), and a time prior to the conversation ( $t_{>u}$ ). As we shall see, confirmations may be sensitive to a difference in timing (i.e., it matters when relative to the time of the conversation the belief has been established; Burton and Wiltchko 2016). As summarized in Table 1, a felicitous context for the use of *eh* involves a new belief on behalf of S that the proposition is true. In addition, S has to have reasons to believe that A will be able to confirm this belief.

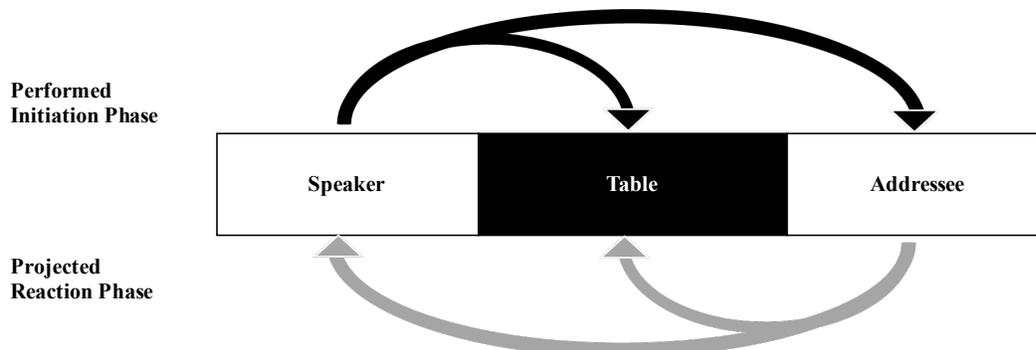
Table 1: Conversational properties of  $eh\uparrow$

$t_{>u}$		$t_u$	
S	A	S	A
-	$Bel\ p$	$Bel_{uncert}\ p$	$Bel\ p$

Auer (2002) takes projection to be a reason for the effectiveness of human communication. If S did not project agreement, conversation would be much more disfluent, making room for A to negotiate every statement of S. We therefore take acceptance to be the default response by A (Walker 1996). With the use of the SPP *eh*, S marks that he does not take acceptance to be the default; instead it marks that the proposition needs confirmation before it can enter CG. For propositions that require negotiation before they can enter the CG, we adopt Farkas & Bruce’s (2010) concept of the *table*. The table can be viewed as a virtual platform for negotiation: S can put propositions on the table to request confirmation for her belief. Similarly, A can respond by putting other propositions on this table. This is a form of disagreement. Hence,

the model in Figure 2 needs to be expanded to include the table, as in Figure 2. It illustrates that to negotiate CG, the interlocutors do not just hand over propositions; they are putting them up for discussion.

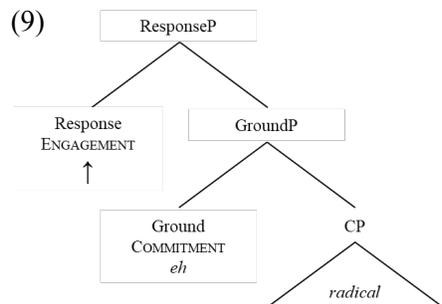
Figure 2: Negotiating CG (abstract model)



According to the proposal we develop here,  $eh\uparrow$  is complex. In Wiltschko & Heim (2016), we propose that the SPP is combined with a call-on-A (Beysade & Marandin 2007), which is encoded by rising intonation. We here argue that  $eh$  encodes COMMITMENT, and the contour encodes ENGAGEMENT and we show that both components (COMMITMENT and ENGAGEMENT) come in different degrees. The rise on  $eh$  encodes only one type of ENGAGEMENT, namely full ENGAGEMENT. Other degrees of ENGAGEMENT are encoded in different ways, as we will see in the discussion of the different variants of  $eh$  in section 3.

## 2.2 The Syntax of CG management

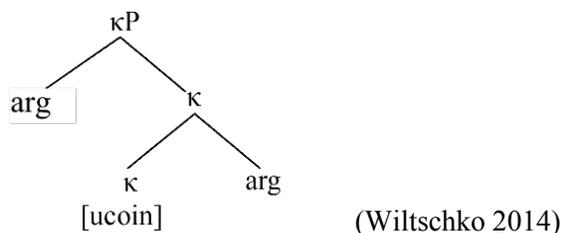
In the previous section, we proposed that COMMITMENT and ENGAGEMENT interact with each other (e.g., A is asked to engage with S's commitment to the proposition). In this section, we argue that their close relationship can be modelled syntactically. Assuming that CG management is syntactically encoded allows us to account for the fact that the conversational properties of  $eh$  depend on properties of its host clause. For example, if  $eh$  is hosted by a declarative clause, it is the declarative which contributes the propositional content of S's COMMITMENT. The rise on  $eh$  marks the expectation that A will provide that resolution. In contrast,  $eh$  cannot be used in the context of a (true) interrogative (though  $eh$  is compatible with rhetorical questions). This suggests that there is a tight connection between clause type (by hypothesis encoded in C), COMMITMENT (encoded in Ground) and ENGAGEMENT (encoded in Response). Specifically, we assume that this relation is a matter of syntactic selection. In other words, each of these functions is represented as a functional category in an extended spine as illustrated in (9).<sup>2</sup>



<sup>2</sup> For the derivation of the linear order, in which  $eh$  occurs sentence-finally, see section 5. In brief, we assume a role-up operation after which the sentence radical ends up in the specifier position of ResponseP. There is evidence for the structure in (9) in languages that allow both sentence-initial and sentence-final particles (see Heim 2015).

The syntactic integration of discourse-related components has its precedence in Ross's (1970) performative hypothesis, according to which the sentence radical is embedded in a *speech act structure*. On Ross' view, however, speech act structure is a type of propositional structure made up of the same ingredients as the sentence radical: it contains run-of-the mill lexical items (*I, tell, you*) and is assembled in the same way (Subject Verb Object). Contemporary analyses that postulate a dedicated speech act structure view this structure not as another layer of propositional structure but instead as an extension of the functional architecture of the clause (Speas & Tenny 2003, Haegeman & Hill 2013; *inter alia*). The details of the syntactic configuration we propose here are based on the conceptualization of categories developed in Wiltschko (2014). According to this view, all categories are composed of a universal categorizer (see Figure 3) with the following properties: i) it is transitive; ii) it relates two (abstract) arguments. The higher argument in the specifier is always pronominal; and iii) its head is intrinsically associated with an unvalued coincidence feature [*ucoin*]. If the coincidence feature is positively valued (by an appropriate lexical item), then the category asserts that the two arguments coincide (e.g., present TENSE indicates that the reference time coincides with the utterance time). If the coincidence feature is negatively valued, then the category asserts that the two arguments do not coincide (e.g., past TENSE indicates that the reference time does not coincide with the utterance time).

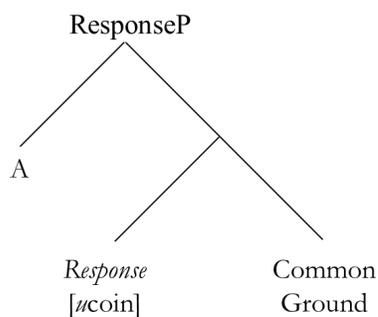
Figure 3: Universal categories



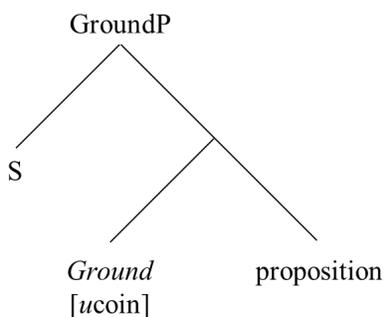
By hypothesis, the functional categories dedicated to CG management adhere to this scheme. The pronominal arguments can be linked to the interlocutors. For GroundP, the coincidence feature captures the relation between S and the proposition. For ResponseP, it captures the relation between A and the S's ground. This is schematized in Figure 4 below:

Figure 4: Schematic configurations

a.



b.



Our conversation model in Figure 2 (see. Section 2.1) allows for three possible locations of the proposition. It can be in the ground of S, the ground of A, or under discussion (on our virtual table). Corresponding to

the three locations, we assume three degrees of COMMITMENT and ENGAGEMENT. For each degree of COMMITMENT and ENGAGEMENT, there is a specific syntactic configuration in GroundP and ResponseP. The individual configuration depends on the valuation of [*u*coin]. In GroundP, a positive valuation corresponds to a belief in S’s ground that *p* is true. A negative valuation corresponds to a situation where S does not believe *p*. This is the case when S believes  $\neg p$  or when *p* is not at all part of S’s set of beliefs. Hence it can encode disagreement or ignorance. The latter typically results in an expression of surprise. One property that differentiates between the grammar of truth and the grammar of use is that in the latter, but not the former, [*u*coin] may remain unvalued. Specifically, if features in the grammar of truth remain unvalued, then truth conditions cannot be assigned. However, this does not hold true for the grammar of use where the fact that a feature remains unvalued is interpretable. To see this, consider the example in (10). The use of *oh* indicates a change of (cognitive) state (James 1972, 1974; Heritage 1984, 1998, Schiffrin 1987; a.o), in this case a new proposition enters the speaker’s ground. This change of cognitive state is critical for the felicity of the SFP *huh*, which has a different context of use than *eh*.

(10) Oh, so you have a new dog, huh? I didn’t know that.

In this context, the use of *huh* requests confirmation for a proposition that is not (yet) in the speaker’s belief set. This is further corroborated by the fact that the follow up (*I didn’t know that*) is well-formed. We thus assume, following Wiltschko (in prep.) that *huh* signals an unvalued coincidence feature in Ground<sub>Spkr</sub>. This is consistent with the fact that *huh* is incompatible with a proposition which the speaker must have first-hand knowledge of as in (\*\*). People typically know whether they have a dog and therefore the use of *huh*, which signals the absence of *p* in the speaker’s belief set is ill-formed.

(11) I have a new dog (#huh)?

Just as the coincidence feature in Ground<sub>Spkr</sub> can remain unvalued, so can the coincidence feature in RespP. Here, it signals the absence of instructions for response and hence A may or may not respond. While by default S will continue, A can easily engage by interrupting the turn or by backchanneling. The different feature valuations for GroundP and ResponseP are summarized below:

Table 2: COMMITMENT and ENGAGEMENT and in GroundP and ResponseP

	Degree	Meaning	Projection	[ <i>coin</i> ]	Arguments
COMMITMENT	FULL	S believes <i>p</i>	GroundP	+	S, <i>p</i>
	UNMARKED	S is agnostic about <i>p</i>		<i>u</i>	
	NO	S does not believe <i>p</i>		-	
ENGAGEMENT	FULL	S engages A	ResponseP	+	A, Bel( <i>p</i> )
	UNMARKED	Engagement is possible <sup>3</sup>		<i>u</i>	
	NO	S engages nobody		-	

### 3 Application: Decomposing SPPs

In this section, we show how the analysis introduced in the last section can account for the different uses of SPPs and SFIs, respectively.

<sup>3</sup> A typical form of engagement would be backchanneling. No response is projected and the default it for S to continue the turn. Nevertheless, it is quite natural for A to nod, backchannel or even interject if (s)he does not follow.

### 3.1 Rising *eh*

We begin our discussion of SPPs with the most frequent variant of *eh*, namely when it is realized with rising intonation. For an analysis of its conversational properties, consider again the example in (1), repeated below as (12).

(12) {John runs into his friend Mary who walks her new dog around the block.}

John: You have a new dog, *eh*↑?

Mary: Yes, I just got him last week.

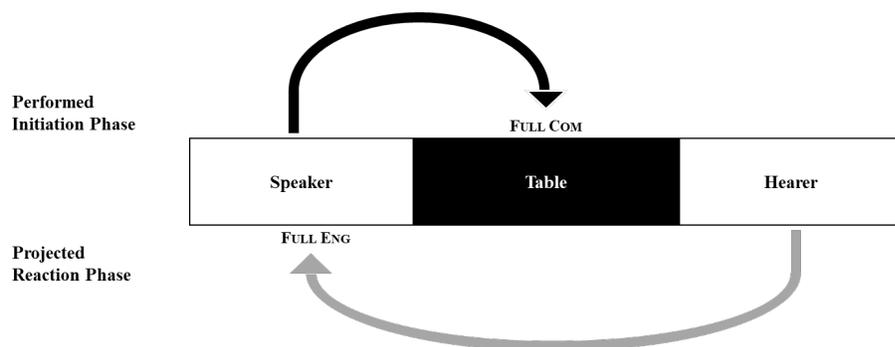
Before John runs into Mary, there is a clear asymmetry in the belief set of the interlocutors. Mary knows about her new dog; John does not. The fact that Mary is walking a dog at the moment of their encounter suggests that she now has a dog. To exclude alternative explanations for the fact that Mary is walking a dog, John requests confirmation of his tentative belief. This is summarized in the epistemicity matrix in Table 1, repeated from Section 2.1 for convenience.

Table 1: Conversational properties of *eh*↑

$t_{>U}$		$t_U$	
S	A	S	A
-	Bel $p$	Bel <sub>uncert</sub> $p$	Bel $p$

The use of *eh*↑ is felicitous, if S can only commit partially to believing  $p$ , for lack of sufficient evidence. In our conversational model this means that S places the proposition on the table. Thus, *eh* marks the presence of an issue under negotiation on the table. In addition, S projects for A to respond in a way that resolves the issue: Hence, S fully engages A. The request for full ENGAGEMENT is only licensed if S assumes that A knows whether the proposition is true. For the example in (13), this is not a far-fetched assumption as typically we assume that people know whether they own the dog they walk.

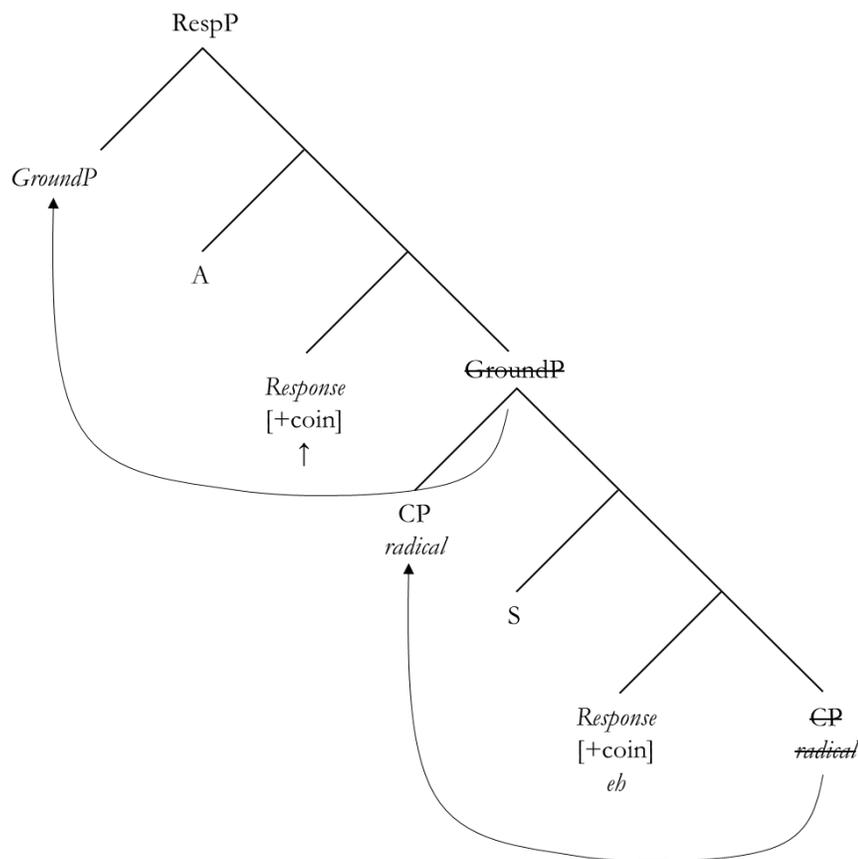
Figure 5: Negotiating CG in the context of *eh*↑



As for the syntax of *eh*↑, we propose that the partial COMMITMENT is a consequence of a positive feature evaluation of [*ucoin*] in GroundP, which marks the bias of S toward  $p$ . S encodes that  $p$  is in his Ground, and hence that he believes  $p$ . We further assume that CP moves into the specifier of GroundP.<sup>4</sup> As for ResponseP, we argue that full ENGAGEMENT comes about via a positive evaluation of [*ucoin*]. The utterance is thus asserted to be in A's Response set (hence A is expected to respond). We further assume that GroundP moves into the specifier of RespP. The derivation of (12) is illustrated in (13).

<sup>4</sup> For the purpose of this paper we simply assume movement to derive the observed linear ordering (see also Haegeman & Hill 2013). An exploration of the motivation for this movement has to await future research.

(13)



The final rise in *Response* associates with the rightmost overt constituent, namely *eh*.

### 3.2 Falling *eh*

Not all speakers of Canadian English use *eh* with falling intonation (*eh*↓).<sup>5</sup> The restricted use of *eh*↓ in Canadian English may be related to the fact that in this dialect its context of use is far more restricted than that of *eh*↑. To exemplify the conditions of use for *eh*↓, consider again example (2), repeated below as (14).

(14) {Mary starts daydreaming about a trip to Hawaii, but she keeps coming back to the fact that this will be difficult with her latest addition to the household. John puts an end to her dreaming, and says:}

John: You have a new dog, *eh*↓.

Here, *eh*↓ is not used to request confirmation of S's belief that *p*. Rather, S and A both know that *p*. It is only that the deliberations of Mary initially do not reflect her knowledge of the truth of *p*. Given the epistemic states of the interlocutors – as summarized in Table 3 – *eh* is used in this context assuming that A does not know *p*.

Table 3: Conversational properties of *eh*↓

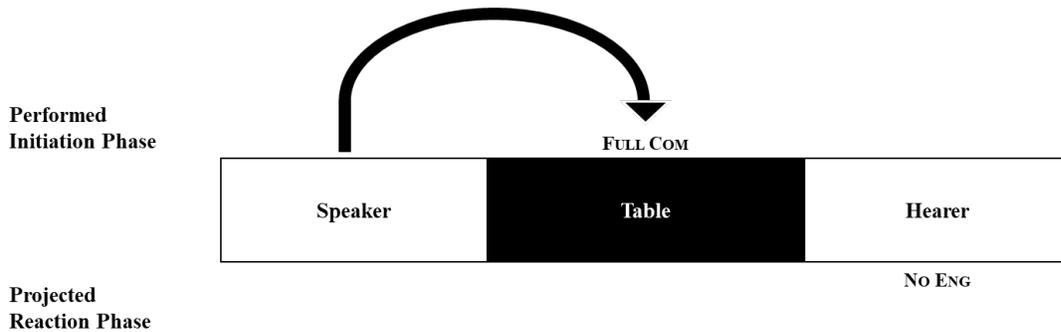
$t_U$	$t_U$
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<sup>5</sup> The falling variant is the unmarked form of the confirmational in New Zealand English (Meyerhoff 1994).

S	A	S	A
Bel p	(Bel p)	Bel p	Bel p

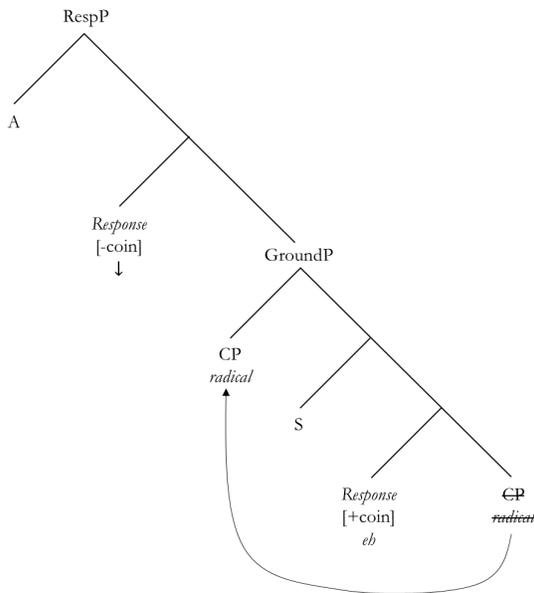
By decomposing the contribution of  $eh\downarrow$  into two components (COMMITMENT and ENGAGEMENT), our model can account for the pragmatic differences between the variants of  $eh$ . The use of  $eh$  signals to A that there is an issue on the negotiation table. Negotiating the truth of  $p$  would be redundant given that both interlocutors in (13) know that Mary has a new dog. What is negotiated is not the truth, but the relevance of  $p$ . By choosing a fall over a rise, S does not engage A: no response to resolve the issue is required. Instead, S projects the relevance of his statement. The most likely response, if any, would be a confirmation of the relevance with a marker that indicates agreement (e.g. *oh, you're right*).

Figure 7: Negotiating CG in the context of  $eh\downarrow$



In terms of the syntactic analysis, we propose that the two arguments in ResponseP are asserted not to coincide: the utterance is not placed into A's response set. The absence of a call-on-A to engage – we argue – is encoded by the falling intonation on  $eh$ . The configuration for GroundP, however, remains the same as for the SPP with a rise. This is illustrated in Figure 8, where CP moves to the specifier left of S.

(15)



As before, the fall in *Response* associates with the rightmost overt constituent, i.e. CP.

### 3.3 Level *eh*

Next, we turn to the variant of *eh* which is realized with level intonation (*eh*↗). Under the term ‘level intonation’, we subsume contours that come with a slight rise or with a continuation of the preceding tone (cf. Halliday 1967). The most notable difference between the context of use of *eh*↗ and the other variants we have discussed thus far is that S, not A has the authority over the truth of *p*: A is not (in any obvious way) a source for the truth of *p*. *eh*↗ is licensed where S believes *p* and assumes that *p* is plausible to A. For the sake of A, S tables *p* – with the intention to move on. Note that S holds the turn after uttering *eh*↗: the *eh* clause is followed by another statement. It follows that the contribution of the rise cannot be to project a response. If it did, S would have to give up her turn.

(16) {Mary and Anna catch up over a drink after the summer break.}

Anna: So, I have a new dog, *eh*↗, and he just doesn’t listen!

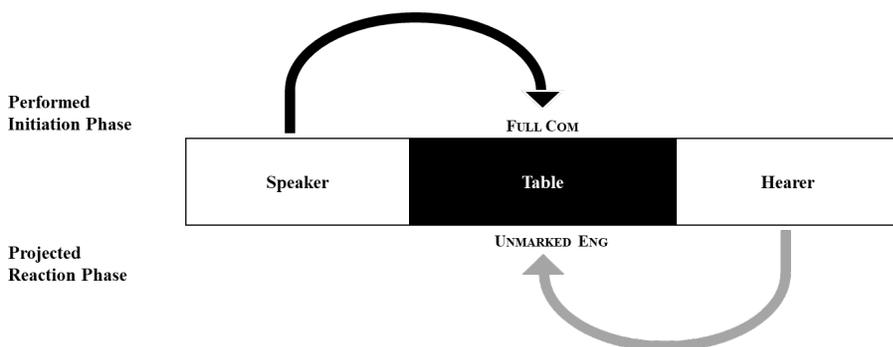
Following Avis 1972, Wiltschko & Heim (2016), refer to this variant of *eh* as the *narrative eh* because it is typically employed in narrative contexts. Table 4 summarizes the conversational properties of narrative *eh*:

Table 4: Conversational properties of *eh*↗

t>U		tU	
S	A	S	A
Bel p	-	Bel p	-

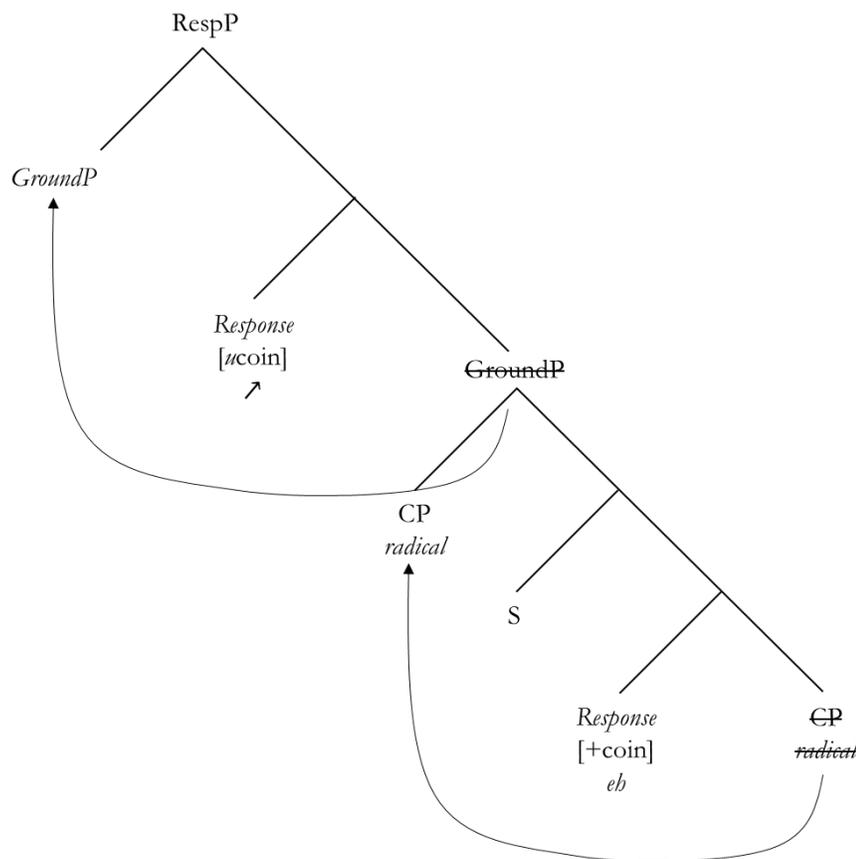
*eh*↗ is employed when the negotiation is suspended. A is not expected to engage because S plans to continue. Nevertheless, S offers for A to intervene if what is presented requires clarification. Narrative *eh* signals that what is on the table is taken to be agreeable but will undergo further modification. The most appropriate response – if any – is backchanneling: S responds without engaging with *p* as backchanneling is merely a way to signal that A is listening (Gardner 2001).

Figure 9: Negotiating CG in the context of *eh*↗



The syntax of example (15) reflects the different use of the rise: it is employed to signal that engagement is possible but not necessary. [*u*coin] in ResponseP remains unvalued. We further assume that GroundP moves to the specifier of ResponseP signalling that both S and A are asked to engage. At the prosodic level this corresponds to a notable difference in pitch height of the rise in narrative *eh* compared to confirmational *eh*.

(17)



Note that the narrative function and the confirmational function of *eh* is not identical. While the valuation of GroundP is the same, the valuation of [ucoin] in RespP is different, which in turn encodes a difference in the degree of ENGAGEMENT. In a narrative context, agreement is typically achieved by silence. The turn stays with S. By inviting A to backchannel, the confirmational function is still present in the narrative context of use. The confirmational function is more pronounced in combination with a full rise. Here, A is engaged fully – because S lacks evidence for her belief. We have therefore seen three different forms of negotiating CG. They differ first and foremost by the way S projects A’s response. The degree of ENGAGEMENT is clearly marked by the contour. For *eh*↑, S engages A for a ratification of her belief. For *eh*↓, S does not engage A, because it is A who should know *p* in the first place. For narrative *eh*↗, S commits to *p*, puts it on the table to make sure that A follows, and plans to move on in the conversation. Table 5 summarizes the role of each variant of *eh* for the negotiation of CG.

Table 5: Interactive properties of *eh*

Variant	S( $t_{>u}$ )	A( $t_{>u}$ )	S( $t_u$ )	A( $t_u$ )	COMMITMENT	ENGAGEMENT
<i>eh</i> + ↑	-	Bel <i>p</i>	Bel <sub>uncert</sub> <i>p</i>	Bel <i>p</i>	FULL	FULL
<i>eh</i> + ↗	Bel <i>p</i>	-	Bel <i>p</i>	-	FULL	UNMARKED
<i>eh</i> + ↓	Bel <i>p</i>	(Bel <i>p</i> )	Bel <i>p</i>	Bel <i>p</i>	FULL	NO

#### 4 Expansion: Decomposing SFI

In this section, we explore the relation between SFIs and SPPs. We show that both fulfill similar functions in the negotiation of CG. We argue that this similarity in function derives from the fact that they have

identical syntax. In particular, we can adopt the analysis for intonational properties of SPPs developed above and apply it to utterances without SPPs. We begin by demonstrating that the interactional properties of SFIs can be captured by the same means as those that we needed for the description of the properties of SPPs. We then propose that COMMITMENT can be encoded independently of SPPs by means of the duration of the final contour. We also explore the question how SPPs like *eh* can contribute to a level of meaning that cannot be directly encoded with SFI.

Consider the examples in (18), which are the same as the ones discussed above, with the only difference that the SPP is missing. Instead the SFI is realized on the clause itself. Example (17a) is typically referred to as a rising declarative (Gunlogson 2004). Analogously, we refer to example (17b) as a falling declarative. These examples will demonstrate how our model accounts for a number of different contours discussed in the literature. We can distinguish up to nine different functions of SFIs: each degree of COMMITMENT has three possible combinations with different degrees of ENGAGEMENT.

- (18) {John runs into his friend Mary who walks her new dog around the block.}
- a. John: You have a new dog<sup>↑</sup>?
  - b. John: You have a new dog<sub>↓</sub>.

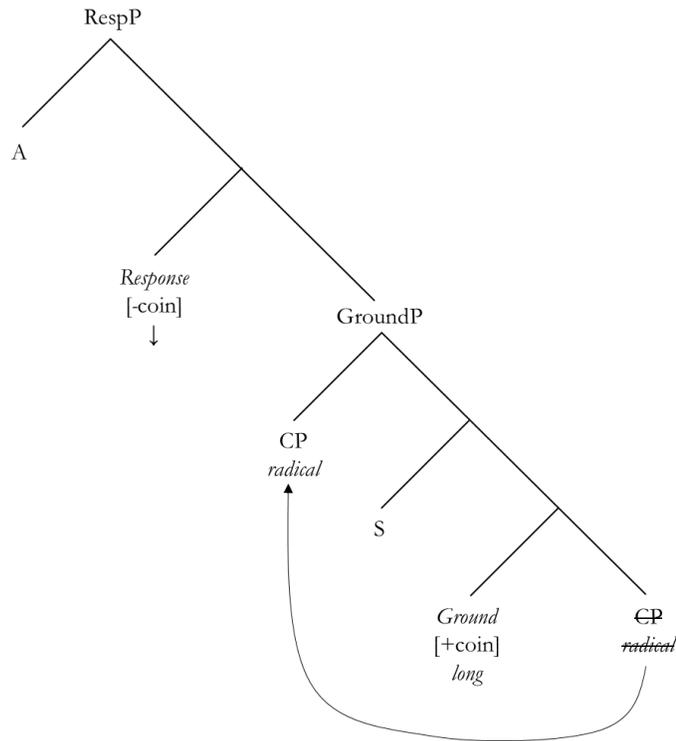
We begin with a comparison of the licensing conditions for rising and falling declaratives. Both types of declaratives come with some degree of COMMITMENT. Gunlogson (2004, 2008) proposes that COMMITMENT can be associated with different interlocutors, depending on the SFI. In a falling declarative, S commits to *p*; in a rising declarative, S shifts the COMMITMENT to A. However, we argue that this is an over-simplification. It is both the Commitment and the call on the addressee that changes: The degree of COMMITMENT changes since the belief expressed is uncertain. Moreover, by requesting a response (i.e., FULL ENGAGEMENT) S indicates to A that he needs additional evidence that allows him to believe with certainty. So rather than shifting COMMITMENT, S projects a response from A that elicits confirmation of his bias. Table 6 lists the interactive properties of rising and falling declaratives.

Table 6: Interactive properties of rising and falling declaratives

Variant	S( $t_{>u}$ )	A( $t_{>u}$ )	S( $t_u$ )	A( $t_u$ )	COMMITMENT	ENGAGEMENT
Rising declarative	-	Bel <i>p</i>	Bel <sub>uncert</sub> <i>p</i>	Bel <i>p</i>	UNMARKED	FULL
Falling declarative	Bel <i>p</i>	-	Bel <i>p</i>	-	FULL	NO

At the time prior to the utterance ( $t_{>u}$ ) rising and falling declaratives have a strong asymmetry of knowledge: only S knows *p*. At the time of utterance ( $t_u$ ), this changes because of the new information introduced at that point. Specific to example (17a), S has enough evidence to believing that *p* is true due to the presence of a dog that he did not know of before the encounter with his friend. The syntactic analysis for falling declaratives is provided in (20) with [+coin] in GroundP and [-coin] in ResponseP reflecting the pragmatic properties summarized in Table 6 above. The consequence of [*u*coin] in GroundP is that the belief set of S is unspecified, so only CP, not S is in the specifier of GroundP; the consequence of [-coin] in ResponseP is that the response set of A remains empty, so GroundP stays low. Hence, the fall in *Response* associates with GroundP, including the information about the duration of the fall.

(19)



For rising declaratives and declaratives with  $eh\uparrow$ , the degrees of ENGAGEMENT are the same, reflecting the identical shape of the final rise. What differs, however, is the degree of COMMITMENT – and as a consequence: the target of COMMITMENT. While a rising declarative targets  $p$ ,  $eh\uparrow$  targets COMMITMENT:

Table 8: Interactive properties of rising declaratives and  $eh + \uparrow$

Variant	S( $t_{>U}$ )	A( $t_{>U}$ )	S( $t_U$ )	A( $t_U$ )	COMMITMENT	ENGAGEMENT	TARGET
Rising declarative	-	Bel $p$	Bel <sub>uncert</sub> $p$	Bel $p$	UNMARKED	FULL	$p$
$eh + \uparrow$	-	Bel $p$	Bel $p$	Bel $p$	FULL	FULL	COM.

The fact that  $eh$  targets COMMITMENT is evident in contexts where S enters the conversation with a bias. A bias present at  $t_{>U}$  is only compatible with  $eh$ , not with rising declaratives. This is shown in (20).

(20) {John notices a post of his friend Mary on Instagram where she holds a dog. Hours later, he runs into her walking that dog}.

- a. \*John: You have a new dog $\uparrow$ ?
- b. John: You have a new dog,  $eh\uparrow$ ?

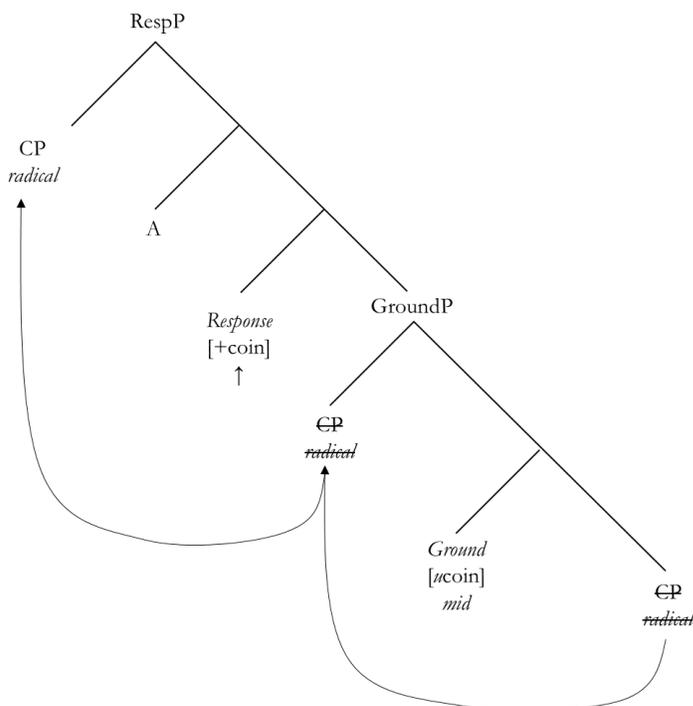
The context in (20) is such that S already has some belief about the dog before the start of the conversation. John wants confirmation about his belief; not about the truth of  $p$ . Compare this with our previous example, repeated here in (21) where S enters the conversation without any previous knowledge of a dog. Here, both  $eh$  and the rising declarative are acceptable, because belief and truth both materialize at  $t_U$ .

(21) {John runs into his friend Mary who walks her new dog around the block.}

- a. John: You have a new dog $\uparrow$ ?
- b. John: You have a new dog,  $eh\uparrow$ ?

We propose that the different targets of COMMITMENT in rising declaratives and declaratives including  $eh\uparrow$  correspond to a difference in syntactic configurations. Specifically, suppose CP moves to SepcRespP indicating that the proposition itself, rather than the Belief that  $p$  is in the response set.

(22)



We have now seen that intonation has (unsurprisingly) similar effects independent of whether it associates with an SPP or with a clause without an SPP. On our analysis, this results from the assumption that SFI associates with the response structure of an articulated spine. It has the same function no matter whether the Grounding structure is or is not occupied by an SPP.

A remaining question arises, however, with regard to how the different degrees of COMMITMENT are encoded in the absence of a SPP. We propose that degree of COMMITMENT is encoded by means of the duration in which the contour unfolds (Heim, *in prep.*). That is, the longer the duration of the contour, the lower the degree of COMMITMENT. For Engagement, the different pitch heights correspond to the three contour types discussed before: fall, rise and a modified/leveled rise.

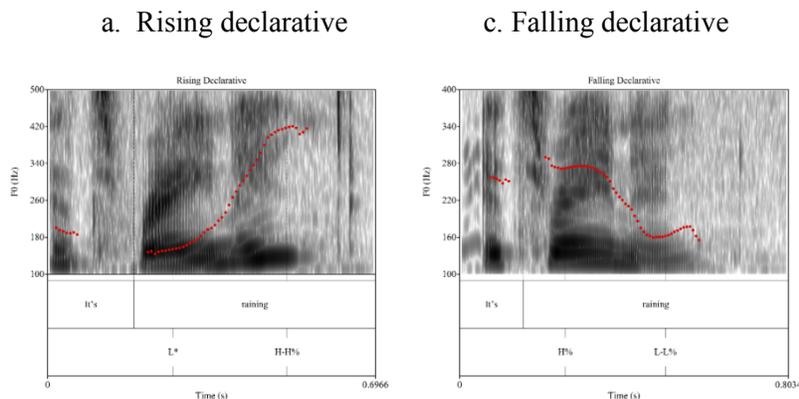
Table 9: Architecture of negotiating CG

Type	Degree	[coin]	SFI
COM	FULL	+	long
	UNMARKED	<i>u</i>	mid
	NO	-	short
ENGAGEMENT	FULL	+	high
	UNMARKED	<i>u</i>	mid
	NO	-	low

For the constructions exemplified in (19), this means that the duration of the final contour will decrease from the rising declarative to the falling declarative. In other words, the degree of COMMITMENT correlates

with the duration of the sentence-final contour. Below we illustrate the contours of a falling declarative and a rising declarative with the same lexical content produced by a native speaker of Canadian English. We see that the duration from the onset to the offset of the final movement is higher for falling declaratives than for rising declaratives, which corresponds with the increase of COMMITMENT:

Figure 11: Contours encoding different degrees of COM



The duration of the rise on the last syllable in Figure 11a is 217ms; the duration of the fall in Figure 11c is 224ms. Hence, a the rising declarative that express the some uncertainty is slightly shorter than the falling declarative that expresses no uncertainty. A change in durations simply points to the speed in the change in fundamental frequency. The greater the duration, the less certain the speaker. Further support comes from Tomlinson & Fox Tree (2011) who report for Californian English that longer duration can negatively correlate with perceived expertise. We suggest that these findings correspond to what is generally known as hesitation. How this relates to the observations reported in Brinton & Brinton (2010) is presently unclear. They report that short falls encode attenuation and long rises express questioning.<sup>6</sup>

What we propose here for Canadian English is that COMMITMENT can be either encoded by SFPs or by the duration of SFI. SFI can be decomposed into pitch range and duration, which are the phonetic realizations of two intonational morphemes associated with the spine: COMMITMENT associates with *Ground*, while ENAGEMENT associates with *Response*. Together these morphemes define the shape of the SFI. The compositional nature of the shape of the SFI proposed here differs from other analyses which seek to syntacticize SFI. Previous approaches associate meanings directly with level tones or tonal configurations. Davis (2011), for instance, proposes that Japanese *yo* is in complementary distribution with a rise. There is some similarity to our model, nevertheless, since *yo* can combine with a subsequent fall or rise. Davis assumes, however, that SFI is one single morpheme. If *yo* occupies the usual host for SFI, a higher projection serves as its host. Hence, *yo* can combine with either a rise or a fall. Trinh & Crnić (2011) also assume that rises and falls correspond to individual morphemes. These morphemes function as a 1<sup>st</sup> and a 2<sup>nd</sup> person inflection on an ASSERT operator on declaratives, which heads the sentence radical. 1<sup>st</sup> person is encoded by a fall and 2<sup>nd</sup> person is encoded by a rise. Both Davis (2011) and Trinh & Crnić (2011) relate the tonal configurations to speech-act functions or roles. A different approach is taken by Truckenbrodt (2012) – both in terms of form and function. Adopting the autosegmental-metrical framework (Pierrehumbert 1980), Truckenbrodt proposes that a high pitch accent (H\*) marks new information and that a high phrase accent (H-) marks questions. Hence, the form corresponds to individual tones, which may or may not coincide with SFI, and their function is associated with two different aspects of Common Ground.

<sup>6</sup> For a more detailed discussion of the encoding of COMMITMENT and possible differences between rises and falls, see Heim (2019b), which includes some quantitative evidence.

Newness is a label that applies to the content of Common Ground; questioning is a function that has only indirect consequences for the management of Common Ground.

As for the syntactic integration of these tones, Truckenbrodt (2012) postulates that these morphemes are right-adjoined to a syntactic constituent, typically an unembedded sentence. The formal definitions of the two morphemes are given below.

(23) Let English have the intonational morphemes  $\langle H^*, new_j \rangle$  and  $\langle H-, question_j \rangle$ , where  $j$  is an index of type proposition. Let these morphemes right-adjoin to a syntactic constituent  $\alpha$ . Then (ignoring the phonology in the semantic interpretation):

- a.  $[[\alpha \langle new_j \rangle]]^{g.S.A}$  is defined as  $[\alpha]^{g.S.A}$  iff  $S$  is adding  $g(j)$  to the common ground of  $S$  and  $A$ .
- b.  $[[\alpha \langle question_j \rangle]]^{g.S.A}$  is defined as  $[\alpha]^{g.S.A}$  iff  $S$  is putting up  $g(j)$  for question

(Truckenbrodt 2012: 2051).

Proposing that intonational morphemes are right-adjoined is justified by assuming that these tones need to occur linearly after the syntactic constituent to have scope over it. This assumption seems mainly to be a consequence of the choice of the phonological framework. There is no syntactic motivation for associating right-adjunction (as opposed to left adjunction) with scoping. Independent of the nature of adjunction, however, we agree that a peripheral position seems the appropriate choice for a morpheme scoping over a proposition. Truckenbrodt (2012) leaves the host of these morphemes unspecified. In general, the precise formal details regarding the nature of the syntactic integration of intonation are left unspecified in most proposals, including Truckenbrodt's. One specific problem is that Truckenbrodt remains vague about the type of the syntactic constituent a tone adjoins to. Index  $j$  in (18) cannot be propositional in nature. Pitch and phrase accents frequently occur with constituents that are too small to be considered propositions.<sup>7</sup>

Our proposal regarding the syntactic integration of SFI overcomes the shortcomings of previous accounts by associating prosodic properties with notions of Common Ground modification. Specifically, we propose that the the prosodic information is hosted by two projections, GroundP and ResponseP, which directly relate a proposition to the future development of the Common Ground. By positing that SFI is hosted in a complex Speech Act structure above CP, we explain how SFI can serve to modify the Common Ground. This mechanism provides the missing details for Truckenbrodt's (2012) proposal of the syntactic integration of intonational morphemes. Instead of stipulating right-adjunction, we propose movement of the radical into GroundP and the subsequent movement of GroundP into ResponseP. We follow Truckenbrodt, however, in assuming that syntax serves as a mediator between prosodic form and pragmatic function.

## 5 Evidence for the syntactic integration of Common Ground modifiers

To motivate the syntactic integration of SFI, we have thus far used the functional similarity of SPPs as a window into the formal properties of intonational morphemes. This was necessary since formal computations are impossible to trace for intonational morphemes. We review here two further arguments put forth in previous publications that suggest SPPs undergo the same syntactic computations that are present in the clause proper. We show that SPPs can be marked for agreement and are subject to word order constraints, and thus show a mirrored peripheral distribution. Both findings can be readily explained with

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<sup>7</sup> The definitions in (18) also are also inconsistent from a phonological point of view. Truckenbrodt's (2012) account considers only accent and tones that are part of the "nuclear tune". This tune, which corresponds to our term of SFI, holds no specific status in the autosegmental-metrical tradition. Pitch accents are identical in function independent of whether they occur before or inside the nuclear tune (see esp. Pierrehumbert & Hirschberg 1990).

the syntactic model proposed above. Moreover, this approach can also explain the distributional restrictions on *eh*.

In Wiltschko & Heim (2016), we report that Upper Austrian German has SPPs that show agreement with A. The SPP *goi*, a particle with similar pragmatic properties as Canadian *eh*, inflects for the formal 2<sup>nd</sup> person singular and for some speakers even for 2<sup>nd</sup> person plural. The data in (24) show that agreement is not marked for the arguments of the verb, which are 3<sup>rd</sup> person in (24c).

- (24) a. *Ea hot an neichn Hund, goi*  
He has a new dog, conf.2informal
- b. *Ea hot an neichn Hund, goi-ns*  
He has a new dog, conf-2formal
- c. *Ea hot an neichn Hund, goi-ts*  
He has a new dog, conf-2pl

Addressee agreement as in (24) is not an isolated phenomenon. Hill (2007) reports vocative inflections and prefixes for so-called particles of address in Romanian, Bulgarian and Ubuntu (cf. also Miyagawa 2017 for a recent account of allocutive agreement). We thus propose that Common Ground modifiers are hosted in projections that are accessible to the checking mechanisms of  $\phi$  features in the same way these features are checked inside the verbal domain. We can rule out the verbal domain since agreement is checked for third person here. The agreement mechanism must therefore be located higher. We propose that the 2<sup>nd</sup> person inflections are a result of agreement with A in GroundP. In the spirit of Trinh & Crnić's (2011) proposal, we can also extend this proposal to agreement of the interlocutors with SFI: The degree of Engagement encoded by the pitch height reflects whether or not A is engaged to respond.

Another piece of evidence for the syntacticization of speech act properties stems from word order restrictions. For example, Haegeman & Hill (2013) report such restrictions for West-Flamish SPPs and vocatives. Independent of whether the particles occur sentence-finally or -initially, the vocative *Valère* follows the particle *né* or *wè*. The data in (25) suggests that the sequence of particle and vocative is impenetrable:

- (25) a. *Né Valère, men artikel is gereed (wè).*  
b. *\*Valère né, men article is gereed (wè).*  
c. *(Né) Men artikel is gereed wè Valère.*  
d. *\*(Né) Men artikel is gereed Valère wè.*
- ‘(Here you are) my article is finished (you know)’

To account for these ordering restrictions, Haegeman & Hill (2013) propose a complex speech-act structure (similar to our grounding structure) that can host both the vocative and the SPP. The word order where both particle and vocative follow the sentence radical is derived by moving ForceP into the specifier of a complex speech act projection. The optional particle *né* in the sentence-initial position and the sentence-final particle *wè* mark the landing site:

- (26) [<sub>saP1</sub> [<sub>sa1</sub> *né*]<sub>SAP1</sub> [<sub>SA1</sub> *né*]<sub>saP2</sub> ForceP]] [<sub>sa2</sub> *wè*]<sub>SAP2</sub> Valère [<sub>SA2</sub> *wè*]<sub>ForceP</sub>]]

We have adopted the idea of a roll-up operation to account for our own analysis of Canadian *eh* above.

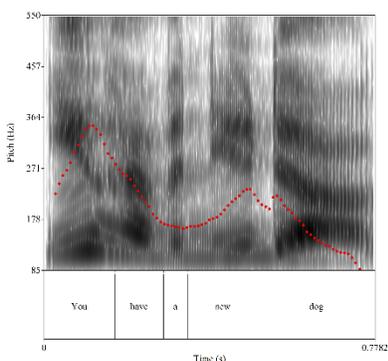
Finally, a syntactic integration of CG modifiers such as presented here can explain some of the distributional restrictions attested. Consider the three contours in Figure 12 that represent the prosodic information of the Falling declarative in (27a), the rising declarative in (27b), and the declarative containing *eh*↑ in (27c).

Given the similarity of conversational properties of a rise with and without an SPP, we expect that the prosody of both declaratives should be similar in form:

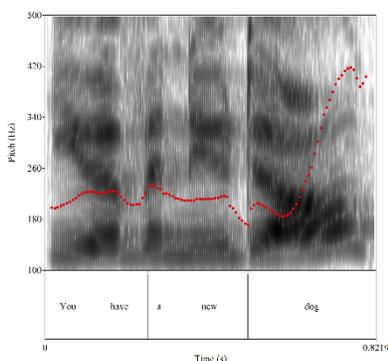
- (27) a. You have a new dog↓.  
 b. You have new dog↑?  
 c. You have a new dog, eh↑?

Figure 12: Contours of three types of declaratives

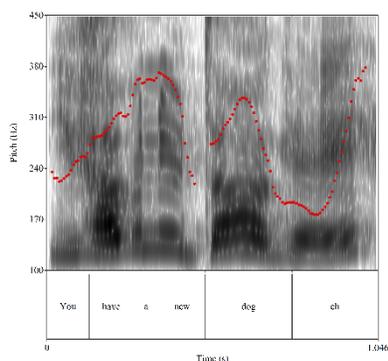
a. Falling declarative



b. Rising declarative



c. Declarative + eh↑



The comparison of the contours in Figure 12 shows two interesting patterns. Firstly, the rises of the rising declarative (Figure 12b) and of the declarative with *eh*↑ (Figure 12c) have a similar shape and pitch height. This is in line with our assumption that the two constructions share the same degree of COMMITMENT and ENGAGEMENT. Secondly, the falling declarative in Figure 12a and the declarative with *eh*↑ in Figure 12c have a similar contour leading up to the nuclear tune. The latter is particularly obvious when we compare them to the rising declarative in Figure 12b. It appears that the declarative with *eh*↑ is better conceived as a falling declarative that occurs with a SPP which comes with a rise rather than a rising declarative that occurs with an SPP. Our syntactic analysis can explain the distributional pattern summarized in (28):

- (28) a. Declarative + *eh* + ↑  
 b. Declarative + ↑  
 c. \*Declarative + ↑ + *eh*

To account for the unacceptability of (28c), we simply need to assume that CP cannot move through the specifier of GroundP into the specifier of ResponseP if *eh* is present in *Ground*. This is a reasonable assumption since GroundP would otherwise contain *eh* without the propositional content in CP. In a rising declarative, S projects for A to engage with the proposition. In a declarative with *eh*↑ S projects for A to engage with both *eh* and the radical. A rising declarative with *eh* following is unacceptable since the intonational morpheme associates with the element in the response set (in the specifier of ResponseP).

## 6 Conclusion

The goal of this paper was to demonstrate that a syntactic integration of intonation is both possible and advantageous. An underlying assumption has been that syntax is well-equipped for mediating between the form and function of any type, hence incorporating prosodic and pragmatic information. This assumption allowed us to provide a uniform account of both SPPs and SFI with a small set of ingredients. We proposed

that CG-management is best understood as a negotiation between interlocutors that builds on the notions of COMMITMENT and ENGAGEMENT. The degree of both of these notions can be encoded by prosody alone or – to point directly to the need for negotiation – a combination of SPP and its prosodic properties.

An area that requires further research is the linearization process of CG modifiers. While the phenomena discussed in this paper all appear at the end of a sentence or phrase, cross-linguistic research suggests that these modifiers can also occur sentence-initially and -medially (Lam 2015, Heim et al. 2016, Thoma 2016). While sentence-initial and sentence-medial particles are well-attested, nuclear tones typically occur at the end of prosodic phrases. This aspect complicates the relation of SPPs and SFI, unless we assume that even sentence-medial speech act particles are associated with heads in the grounding structure above CP (see Thoma 2016 for details). The pragmatic consequences of the linear order of modifiers and host-clauses seems also worth investigating. Associating the presence of CG modifiers in one or the other periphery with a specific pragmatic function may seem appealing (cf. Beeching & Detges 2014), but seems unlikely considering the overall distribution of CG modifiers (see Heim 2015 for a uniform treatment of SPPs).

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