

English Rise-Fall-Rise:  
A study in the Semantics and Pragmatics of Intonation\*

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**0. Introduction**

Intonational meaning has only recently begun to receive formal treatment within semantic/pragmatic frameworks, and even so, it is often made to play an outsider's role — kept apart from the realm of “standard” lexical meanings. A question that serves as backdrop for the present investigation is this: “Could the effect of intonation be modeled under precisely the same theory of meaning as the effect of words?”

A long standing observation about English is that intonation can disambiguate an otherwise ambiguous utterance (Jespersen, 1933). In this paper, I'll look at a specific intonation contour, *rise-fall-rise* (RFR), and its ability to disambiguate sentences like the following:

- |                                      |                                       |
|--------------------------------------|---------------------------------------|
| (1) All my friends didn't come.      | (2) I can't do anything.              |
| a. = <i>None of my friends came.</i> | a. $\approx$ <i>I'm powerless.</i>    |
| b. = <i>Not all my friends came.</i> | b. $\approx$ <i>I'm not superman.</i> |

By pronouncing these sentences with a RFR pitch contour<sup>1</sup>, a speaker will unambiguously convey the (b) readings. The narrow goal of this work is to develop an understanding of *how* exactly this disambiguation takes place.

Towards this end, I'll investigate the licensing conditions on RFR *in general*, leading to a proposal for its semantics. I analyze the contour as a focus sensitive quantifier, similar in effect to [only] (see Rooth, 1996b). Unlike [only], however, I argue that the meaning of RFR is a conventional implicature, in the sense of Potts (2003a). This explains both the intonation's

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<sup>1</sup> Audio recordings of the examples in this paper are available at: <http://www.yikes.com/~noah/thesis/>

independence of at-issue entailed content, as well as the fundamentally speaker-oriented nature of its contribution — a commitment to the unclaimability of alternative propositions. In cases of potential ambiguity, any readings where RFR quantifies vacuously are filtered, giving rise to the observed disambiguation effect.

The analysis is largely motivated by the infelicity of RFR on “alternative dispelling” focuses, but simultaneously answers the questions of *when* and *why* the contour will disambiguate. Furthermore, the proposal handles double focus data, which have been a problem for past approaches, leading to the claim by Ward and Hirschberg (1985) that intonation *cannot* disambiguate. I demonstrate that their data conform to my predictions, and more generally that double focus constructions can’t be construed as evidence against the disambiguating potential of RFR.

With the puzzle of disambiguation resolved, I turn to larger questions for the formalization of RFR meaning. In addition to defending Ward and Hirschberg’s classification of RFR as a conventional implicature, I argue that its context change potential must be calculated *late* — specifically after the proposition to which the contour attaches is added to the context. This order of evaluation not only allows for the simple characterization of RFR as a quantifier over assertable alternatives, but also predicts otherwise mysterious interactions between RFR and focus sensitive material like clefts and focus quantifiers.

The empirical success of this focus sensitive account is one step towards the claim that intonational meaning is “nothing new”. In particular, if we can analyze RFR using the well-established tools of alternative semantics and conventional implicatures, this suggests that intonation is just another source of input to a familiar semantic model, and not a class of meaning on its own.

The remainder of the paper is organized as follows. In section 1, I review the phonological makeup of RFR, and draw the line between this and similar contours, including the contradiction contour, and the incredulous retort. Section 2 is a proposal for the meaning of RFR, which I analyze as a quantifier over “post-assertable” alternative propositions, along the lines of [only]. In section 3, I show that the proposal accounts cleanly for the distribution of RFR on “fully informative” elements, and predicts its disambiguating effect without stipulation. With these results in hand, I demonstrate that double focus data can be integrated without loss of generality.

Section 4 addresses a host of remaining issues — connecting to previous work on RFR and related contours, as well as situating RFR meaning within a dynamic semantic model. Specifically, I discuss (a) the source of scalar and rhetorical effects, (b) the relation between RFR and Büring’s contrastive topic contour, (c) the treatment of RFR as a conventional implicature, and (d) the interaction of RFR with other focus sensitive operators.

## **1. Identifying Rise-Fall-Rise**

### 1.1 What is Rise-Fall-Rise?

The rise-fall-rise contour has gone under various names. Ward and Hirschberg (1985, 1988) cite the following: ‘ $^{\circ}2-4-3$  contour’, ‘a subset of Bolinger’s Accent A’, ‘Tones III and V’, ‘falling–rising’, ‘Tone 4’, ‘Bolinger’s Accent B’, ‘fall-rise’, ‘contrastive stress within contradiction contour’, ‘A-rise’, ‘ $^{\circ}2^{\circ}32\uparrow$ ’, and ‘rise-fall-rise’. In more recent work (Büring 2003b, Oshima 2005), the contour has been associated directly with *contrastive topic* (CT). However, this presupposes a semantic unification of RFR and a “full” CT contour, consisting of both topic and focus marking. For specific challenges to this approach, see §4.3.

I adopt Pierrehumbert’s (1980) term “rise-fall-rise” for two reasons. First, it is phonologically transparent — more so than the relatively favored “fall-rise”, in which the prominent rising pitch accent on the stressed syllable of the focus goes unmentioned. Second, the term is semantically neutral, picking out a prosodic element without making reference to its function.

Under the ToBI system for transcribing intonation (Silverman et. al, 1992), rise-fall-rise has usually been identified as either [  $L^*+H L- H\%$  ] or [  $L+H^* L- H\%$  ]<sup>2</sup>. Consider the following example of RFR, where speaker B places focus on the word [expecting]:

- (3) A: Why isn’t the coffee here?  
 B: I don’t know. I was *expecting* there to be coffee...
- $L^*+H L- \qquad H\%$

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<sup>2</sup> The most detailed account of RFR to my knowledge is that of Ward and Hirschberg (1985, 1988, 1992), who argue that [  $L+H^* L- H\%$  ] must be treated as a separate contour (Bing’s A-rise). Oshima (2002), transcribes contrastive topics (lone or otherwise) as [  $(L+)H^* L- H\%$  ]. However, as his main interest is with the semantics of the contour, and he provides no argument for his choice of transcription, I follow Ward and Hirschberg’s notation.

The contour is made up of three pieces, which I'll describe from left to right. First, there is a focused constituent, in this case the single word [expecting], which bears a rising accent L\*+H on its stressed syllable<sup>3</sup>. Second, a low phrase tone L- associates with the stretch of material *between* the focus and the intonation phrase boundary<sup>4</sup>. Finally, the boundary tone H% aligns to the end of the phrase. Note that this low-rising tone is anchored to the *far right* of the phrase, even when the final syllable carries no word stress, as in the [fee] of [coffee] above. Also, since RFR is only specified for one boundary tone, it must occur entirely within a single intonation phrase.

Rather than provide full ToBI style transcription throughout, I'll simply mark the focus and scope of the contour “in-text” as I've done in (3) above, according to the following key:

Notation:

- Underline marks the semantically focused constituent<sup>5</sup>.
- Italics mark the phonologically stressed *word* within the focus.
- An ellipsis ‘...’ marks the low-rise boundary tone.

Here are some examples of rise-fall-rise in action:

- (4) I like *most* kinds of cheese... (but not all).
- (5) She's *sad*... but she's not *miserable*...
- (6) If *your four-year-old sister* liked the movie... I definitely won't like it.
- (7) *I heard the doorbell ring*<sup>6</sup>... are you sure nobody's there?
- (8) Well, at least you didn't *flunk* the test...

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<sup>3</sup> At the phonetic level, this rising pitch accent may be realized over the course of two or even three syllables. While the L\* portion of the accent invariably anchors to the stressed syllable, the rising +H portion can be postponed, provided it doesn't impinge on room for realizing the phrase and boundary tones. Thus, for example, if [John] or [Mary] bears a RFR accent phrase-finally, the entire pitch accent will be realized on the stressed syllable. However, if [Elizabeth] appears in the same position, the L\*+H will likely be spread across at least two syllables.

<sup>4</sup> The extent of this low tone is variable, according to the distance between the focus and the phrase boundary. However, the low target persists, even if the stressed syllable of the focus occurs finally within the phrase. Thus, we may find the entire [ L\*+H L- H% ] realized on a single syllable, as in “I *guess*...”. From my own preliminary production studies, it appears that under-articulation is especially common in these cases — perhaps the result of a constraint against having four tones on a syllable.

<sup>5</sup> It isn't immediately obvious whether a semantic focus needs to be a syntactic constituent or not. While I restrict myself to cases where the focus *is* a constituent, nothing I say will rely on this match-up.

<sup>6</sup> Here, the semantic focus is the entire sentence [ I heard the doorbell ring ].

## 1.2 Danger at the Phono-Semantic Interface

It should be noted that the transcription employed for rise-fall-rise above is overspecified relative to a real sound-utterance. While we can hear the phonologically focused word and the boundary tone, we are left to deduce the *extent* of the semantic focus by pragmatic means. For example, the following homophonous forms are compatible with a wide range of focus structures<sup>7</sup>:

- (9)
- a. She bought a book about bats... (but she didn't buy one about anything else).
  - b. She bought a book about bats... (but she didn't buy anything else).
  - c. She bought a book about bats... (but she didn't do anything else).
  - d. She bought a book about bats... (but nothing else happened).

Conversely, given a semantic focus, it isn't immediately apparent *which* word within the focus will carry the main phonological stress and thus come to bear the initial rise of the contour. However, this problem of main stress assignment is in no way specific to RFR intonation, and has been discussed at length in the literature, by Jackendoff (1972), Selkirk (1995), and Büring (2003a), among others.

For our purposes, it will mostly be possible to avoid examples with this sort of ambiguity at the phonology-semantics interface. For example, since English stress typically aligns to the right edge of a constituent, placing the RFR pitch accent sentence initially often results in an unambiguously narrow semantic focus on the accented word. Moreover, whenever possible, I'll try to provide examples where a unique focus can plausibly be inferred from the context. Finally, the phonetically unrealized underline will always mark the intended reading.

## 1.3 What isn't Rise-Fall-Rise?

A complicating factor in the study of RFR is the presence of similar, sometimes even homophonous contours which nonetheless differ in effect. Consider the examples on the following page (where the focus has been double-underlined, to signal these as a contour distinct from RFR):

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<sup>7</sup> These examples are from Selkirk (1995), modified to support a different contour, but illustrating the same essential point.

- (10) A: So I guess you like [æ]pricots then?  
 B: I don't like [æ]pricots — I like [ei]pricots!  
 L\*(+H) L- H%
- (11) A: John finally managed to solve the problem.  
 B: He didn't manage to solve it — it was easy for him!  
 L\*(+H) L- H%
- (12) A: So, I guess you really loved the movie then, huh?  
 B: Loved it !? I hated it!  
 L\*(+H) L- H%

In each of these examples, B's response is "metalinguistic", in the sense of reflecting or commenting on a particular linguistic item (for more on metalinguistic constructions, see Horn, 1985). Consequently, these uses of intonation are marked by at least three features that distinguish them from the "standard" RFR.

First, the proposition to which the contour attaches is "called off" or "nullified" by the intonation. In (10), for example, B is not committing to the proposition *I don't like apricots*. Rather, she is objecting to a linguistic occurrence — the pronunciation of the word *apricots* — and then goes on to say that she does in fact like apricots. This contour is unlike RFR then, which always adds an independent contribution, never "interfering" with the proposition it attaches to (see section §4.4 for more on the independence of RFR from at-issue content).

Second, these metalinguistic uses differ phonologically from RFR in the optionality of the rising (+H) portion of the pitch accent. That is, (11) conveys roughly the same meaning whether the pitch accent is L\*+H or merely L\*. This is a stark contrast with the examples presented earlier in (4–8), which can't support the L\* accent without a corresponding shift to the metalinguistic interpretation. If the metalinguistic uses are classified under Liberman and Sag's (1974) *contradiction contour* (later identified as L\* L- H%, see Wolter 2002), the only extension we need to make is allowing that contour to have an optionally rising pitch accent. On this view, the fact that the L\*(+H) L- H% of contradiction or incredulity overlaps with RFR is an accident of phonology<sup>8</sup>.

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<sup>8</sup> Plausibly, there is some weak semantic connection tying these contours together, perhaps involving the creation of alternative propositions (as discussed in §2). Yet, it should also be no real surprise to find lexical ambiguity in the domain of intonation, as we find it in other corners of the lexicon. Whether ...

Finally, in just these metalinguistic cases, the accented focus requires an overt linguistic antecedent. For example, in (12) above — a case of Ward and Hirschberg’s (1988) *incredulous retort* — B’s response becomes infelicitous when the preceding discourse is modified only slightly (by replacing the word *love* with *enjoy*):

- (13) A: So, I guess you really enjoyed the movie then, huh?  
 B: # Loved it !? I hated it!  
 L\*(+H) L- H%

While this anaphoric relationship may in some cases be established through “rough” identity, as in (14) below, the dependence on the preceding discourse is still notable when compared to a non-metalinguistic case of RFR like (15).

- (14) A: I thought the movie was pretty good. And my husband liked it too.  
 B: John liked it !? I thought he hated action movies.
- (15) A: Did your friends like the movie?  
 B: John liked it... the rest of them hated it.

These three common features shared by (10–12) — “calling off” the propositional content, optionality of the rising accent, and dependence on a linguistic antecedent — point to a unitary contour L\*(+H) L- H%, with a metalinguistic effect covering Ward and Hirschberg’s retorts and Liberman and Sag’s contradictions. That non-metalinguistic uses of RFR lack each of these three features is strong evidence for keeping the two contours separate, despite their optional phonological overlap<sup>9</sup>.

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... languages apart from English collapse incredulity, contradiction, and “true” RFR (which we might call a *non-resolution* contour) is a question worthy of further investigation.

<sup>9</sup> A further test for distinguishing the non-metalinguistic RFR contours is the acceptability of a following [but], as in the following examples:

- (a) I didn’t hate the movie... { #∅ | but } I thought it was pretty bad. (= RFR)  
 (b) I didn’t buy [æ]pricots — { ∅ | #but } I bought [ei]pricots! (= contradiction contour)

However, this test is a dangerous one, as it will fail on the *rhetorical* uses of RFR discussed in §4.2, as well as on incredulous retorts with a [but] of “surprise” (as opposed to the usual [but] of “granting”):

- (c) A: Is it going to rain tomorrow? B: Obviously... ( # but I’m not totally sure )  
 (d) A: Mary loved the roast duck. B: Mary liked it !? But I thought she was a vegetarian!

As another difference, Ward and Hirschberg (1985) note that Liberman and Sag’s (1974) syntactic unembeddability diagnostic for the contradiction contour will not hold for RFR<sup>10</sup>. For still further reasons to avoid the collapse of RFR and the contradiction contour, see Ladd (1980), and Wolter (2002). For more on the meaning of the contradiction contour, see also Horn (1985).

In addition to all of these pre-theoretical distinctions between RFR on the one hand, and the contradiction or incredulity contours on the other, we will see shortly that RFR differs in resisting “alternative dispelling focuses” (as defined in §2.3). Since this feature is integral to the coming analysis of RFR — and at the root of the disambiguation effect — it is important that we can keep the metalinguistic cases distinct.

Throughout the paper, I will use “RFR” and the *accent* notation to refer only to the non-metalinguistic uses — cases in which the rising (L\*+H) pitch accent can’t equally well be pronounced with a single low tone (L\*). Since my aim is just to account for the licensing of these “standard” cases, I mark as infelicitous utterances for which only the metalinguistic reading is available. For example:

(16) # All my friends came...

(17) I like most dogs... but not all dogs.

(18) # I like most dogs... who told you that?

Another contour I will keep distinct from RFR is the contrastive topic (CT) contour, as discussed by Büring (1997, 1999, 2003b). This contour typically describes utterances consisting of two intonation phrases — the first containing a rising contrastive topic accent, and the second containing a falling focus accent:

(19) A: What about Fred? What did he eat?

B: [ [Fred]<sub>CT</sub> ]<sub>INTP</sub> [ ate the [beans]<sub>F</sub> ]<sub>INTP</sub>  
           L\*+H L- H%                   H\* L- L%

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<sup>10</sup> Although, syntactic unembeddability *does* seem to hold for incredulous retorts. Ward and Hirschberg (1988) attempt a broad semantic unification of RFR and the incredulous retort, but later (1992) discuss that the two contours can be distinguished phonetically. In any case, by all the diagnostics above, the incredulous retort seems more akin to the contradiction contour than to RFR.

While the CT contour appears to be *related* to RFR in both form and meaning, there remain differences between the two that preclude complete unification at this time. I address some consequences of this potential collapse in §4.3–4.4.

## **2. The Meaning and Licensing of Rise-Fall-Rise**

The desire to attach a meaning to RFR goes back at least as far as Pike (1945), who describes the contour as a combination of “introspection with close attention to some single item”<sup>11</sup>. Other researchers attribute to the intonation a sense of reservation (Halliday, 1967), incompleteness (Bolinger, 1982), or focusing within a set (Ladd, 1980).

Ward and Hirschberg (1985) analyze RFR in terms of scalar speaker uncertainty. On their account, RFR conveys one of the following three types of uncertainty:

- I. Uncertainty about whether it is appropriate to evoke a scale at all.
- II. Uncertainty about which scale to choose, given that some scale is appropriate.
- III. Given some scale, uncertainty about the choice of some value on that scale.

In §4.1, I show how both speaker uncertainty and complex scalar behavior fall out from the claim that RFR is a conventionally implicating quantifier over alternative propositions, evaluated late within a dynamic model.

This generalization, in addition to being simpler to state, is independently motivated by the distribution of RFR on different types of focus. The remainder of this section is devoted largely to this motivation. I begin by introducing Rooth’s semantics for focus interpretation, and go on to define a class of focus that is incompatible with RFR: the “alternative dispelling” focus.

### **2.1 Focus, Alternatives, and [only]**

In this section, I compare RFR to [only], and analyze its semantic contribution under alternative semantics.

Rooth (1985) presents a formal “alternative semantics” for focus. The key feature of this semantics is the creation and manipulation of alternative propositions, summarized by Rooth in the following way (Rooth 1996a, p.2):

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<sup>11</sup> This brief history of RFR is reproduced from Ward and Hirschberg, 1985.

“The role of focus is to evoke contrasting propositions or sets of propositions. [...] [ *These ‘alternatives’* ] are roughly those obtainable from making substitutions in the focus position.”

There have been various implementations of this core idea, aiming at integrating focus alternatives into a compositional semantics (Rooth 1985, von Stechow 1990 and others). However, as my main concern is with RFR intonation, which fails to interact compositionally with at-issue meaning (as shown in §4.4), these formalisms offer no immediate assistance.

Perhaps the quintessential focus sensitive operator is [only]. Various treatments of [only] date back at least to Horn (1969), and make crucial reference to *alternatives* in some form or other. Following Rooth (1996b), [only] quantifies over alternative propositions as follows (simplified for exposition<sup>12</sup>):

[only] combining with a clause yields the assertion that *all* alternative propositions are false (and presupposes the main proposition of the clause).

As a simple example, consider the following pair, differing only with regard to the prosodically marked<sup>13</sup> focus position:

- (20) a. Mary only introduced [Bill]<sub>F</sub> to Sue.  
b. Mary only introduced Bill to [Sue]<sub>F</sub>.

In each case, [only] attaches to a clause whose main propositional content is that *Mary introduced Bill to Sue*. The examples differ, however, as to the form of the alternative propositions. In (20a), alternatives are of the form *Mary introduced { X } to Sue*, whereas in (20b) they are *Mary introduced Bill to { X }*. Since [only] quantifies over these alternative propositions, the sentences are correctly predicted to differ in meaning.

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<sup>12</sup> Here, I depart from Rooth slightly in assuming that the main proposition is *not* part of the alternative set. The formal consequences won't be important for the analysis; the choice merely reflects the intuitive notion that a proposition isn't an “alternative” to itself. Additionally, I correct an apparent typo (Rooth 1996b, p.15) — *only* combining with a clause  $\phi$  yields the assertion  $\forall p [ ( p \in \llbracket \phi \rrbracket^f \wedge \check{p} ) \rightarrow ( p = \llbracket \phi \rrbracket^o ) ]$ .

<sup>13</sup> In these examples, the F-marked constituent is realized with a falling (H\*) pitch accent on its main stress.

Before going on, it will be useful to say something about how the alternative set is instantiated. Consider the following:

(21) I only like [Pomeranians]<sub>F</sub>.

Clearly, if I utter (21), I'm not claiming to dislike *everything* in the world that isn't a Pomeranian. While I've certainly implied that I dislike *something*, it's not clear how broadly my dislikes should be construed. Do I dislike all other dogs? All other pets? All other animals?

The answer, of course, lies in the context. If the issue of which *pets* I like has been raised, then (21) will mean that I dislike all other pets. In fact, the selection of alternatives is virtually unlimited, given sufficient context. For example:

(22) A: Which animals do you like that start with the letter P?  
B: I only like [Pomeranians]<sub>F</sub>.

Formally, Rooth (1992) allows for the context-dependence of the alternative set by requiring simply that it be a *subset* of the larger set delimited by the focus structure. For example, in (22) above, the alternative set must consist entirely of propositions of the form *I like { X }*. However, beyond this restriction, the choice of *which* alternatives are “contextually salient” enough to be accessible to focus operators is left in the hands of a separate pragmatic process.

This general problem of determining the relevant domain of quantification is discussed at length in von Stechow 1995, for a wide range of quantifiers, including [only]. The formal proposal put forth there is that quantifier domains are “free variables” at the semantic level, bound by an anaphoric link to the discourse context. It is reasonable, then, to think that in a case like (22), [only]'s domain of quantification (i.e. the alternative set) will be determined through a pragmatic link to the preceding question.

For our purposes, the important point here is that just because a proposition fits into a particular (syntactic) focus structure doesn't mean that it will be realized in the alternative set. This point will be especially relevant in §4.2–4.3 where we find RFR focus on an entire utterance, leaving *no* syntactic restriction on the alternatives. In such cases, the link to previous discourse (and in particular, a preceding question) is crucial in deciding which alternatives are salient enough to make it into the alternative set.

## 2.2 RFR vs. [only]

On the surface, the contribution of RFR is similar to that of [only]:

- (23) A: Did your friends like the movie?  
B: a. John liked it...  
b. Only John liked it.

Both examples leave us with the impression that the other friends *didn't* like the movie. Thus it's initially tempting to reduce RFR to the status of [only]. However, the following examples show that RFR is weaker in effect:

- (24) A: Did your friends like the movie?  
B: a. John liked it... I don't know about the rest of them.  
b. Only John liked it. # I don't know about the rest of them.

- (25) A: Did your friends like the movie?  
B: a. John liked it... the rest of them didn't show up.  
b. Only John liked it. # The rest of them didn't show up.

In each case, the alternative propositions are of the form  $\{ X \}$  liked it. Example (24b) shows that since [only] quantifies over alternatives to the effect of their *falsity*, it's incompatible with speaker *uncertainty* regarding these alternatives. Similarly, when the alternatives are "undefined" (in the sense that *Mary liked the movie* can't be true or false if Mary didn't go to the movie) [only] is equally bad, as in (25b). RFR, on the other hand, occurs naturally in these contexts, showing compatibility with *uncertainty* and *non-definition* in (24a, 25a) respectively.

For the time being, it will suffice to make the following tentative proposal. Both [only] and RFR quantify over alternative propositions. While [only] asserts that alternatives are false, RFR asserts merely that alternatives *can't safely be claimed*. As we've just seen, there are many reasons for not wanting to claim something — known falsehood, lack of evidence, or meaninglessness (non-definition). In this sense, RFR is *weaker* than [only], in that the speaker's motive for not claiming the alternatives is left open.

### 2.3 Alternative Dispelling Focuses

We saw above that while RFR and [only] differ as to the *strength* of their quantification, they are parallel in what they quantify over. Thus, it is unsurprising to find that both elements are sensitive to the following restriction.

(26) RFR and [only] are illicit on “alternative dispelling” focuses.

(27) a. The food was good...  
b. The food was only good.

(28) a. # The food was perfect...  
b. # The food was only perfect.

Intuitively, (28a) and (28b) are infelicitous because, while [perfect] is the best the food could have been, the use of intonation or [only] seems to imply that it could have been even better. To capture this intuition more formally, it will help to define a few terms.

(29) A proposition  $p$  **resolves** a proposition<sup>14</sup>  $q$  iff either:

- (a)  $p$  entails  $q$
- (b)  $p$  entails  $\neg q$

(30) A proposition  $p$  is **assertable** with respect to a common ground  $c$  iff *both*:

- (a)  $c \cap p \neq c$              $p$  is “informative”
- (b)  $c \cap p \neq \emptyset$           $p$  is “consistent”

This sense of assertability is due to Stalnaker (1972), and can be understood as one of a proposition’s prerequisites to being added to the common ground. Note also that if  $p$  resolves  $q$ , then adding  $p$  to the common ground (that is, asserting  $p$ ) renders  $q$  unassertable in the resulting context, regardless of the prior discourse.

(31) The focus of proposition  $p$  is **alternative dispelling** iff  $p$  resolves all alternative propositions generated by the focus.

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<sup>14</sup> Alternatively, we can say that  $p$  resolves the *issue* of whether or not  $q$  is true.

Returning to the data in (27) and (28), we find that [perfect] in (28) is alternative dispelling, whereas [good] in (27) is not. Here's why—

In each case, alternative propositions take the form *The food was { X }*. As we saw earlier, the specific choice of alternatives to instantiate focus structure is highly context dependent. However, it is reasonable to assume in these examples that [perfect] and [good] will call to mind alternatives along a Horn scale of quality, including items like [great], [mediocre], [awful], and so on<sup>15</sup>. Crucially, we won't be dealing with alternative propositions like *The food was spicy*.

Given this assumption, we can understand why [perfect] is alternative dispelling in (28). Each alternative proposition *The food was { good / mediocre / bad }* is resolved by the main assertion that the food was perfect. On the other hand, in (27), the fact that the food was good doesn't resolve a relevant alternative like *The food was perfect*. Thus, [good] is not alternative dispelling in this context.

Büring (1997, p.11) makes the related observation that a sentence with topic marking will be 'unpragmatic' when it *implies* all of its alternatives<sup>16</sup>. This leads to a more general claim (p.13) that unavailable readings occur *only* with "extreme" elements that mark the end of some scale ordered by entailment.

It's worth emphasizing, then, that alternative dispelling focuses, as defined above, need not imply their alternatives, nor are they necessarily endpoints on a scale (or scalar in any sense). To be alternative dispelling means simply to *resolve* all alternatives, whether positively or negatively, and makes no reference to scales. Take the following example:

- (32) A: Isn't John's car white?  
B: # It's purple...

In this case, RFR is illicit because [purple] has *negatively* resolved its alternatives. The fact that the car is purple implies that it's *not* white (or green, or any other color), thereby closing the issue of the car's color. Moreover, [purple] can't easily be construed as the extreme element on a scale. Thus, we see that Büring's extreme focuses are only a subset of alternative dispelling focuses. In general, focus quantifiers appear to be sensitive to merely the *presence* of post-assertable alternatives, and resist a focus that dispels its alternatives by any means. Formally, a

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<sup>15</sup> Though here again, we have to control for the context-dependence of the alternative set. For example, in the sentence "The food was perfect... but was it really worth driving to Alaska for?", the context provides a salient alternative to [perfect] which remains unresolved, and RFR is thereby licensed.

<sup>16</sup> For Büring, these are "Topic alternatives"; the distinction won't be important here.

focus can dispel an alternative either by rendering it *uninformative*, or else by rendering it *inconsistent*.

While alternative dispelling focuses aren't necessarily scalar endpoints, there is nevertheless a sense in which they are maximal. To be alternative dispelling, a focus must be maximally *informative*. By resolving all salient alternatives, either positively or negatively, an alternative dispelling focus can be said to have closed the issues raised implicitly by the focus structure.

An illustrative contrast to (32) above is the following:

- (33) A: Isn't John's car some crazy color like orange?  
 B: a. It's purple... (= is that crazy enough?)  
 b. It's only purple. (= purple is not crazy enough)

In this context, [purple] is no longer alternative dispelling, due to introduction of the salient alternative [some crazy color like orange]. Since logically speaking, purple may or may not be such a crazy color, the alternative proposition *It's some crazy color like orange* remains unresolved. On our hypothesis, the contribution of RFR is that the speaker can't safely claim the alternatives. Thus, (33a) expresses *uncertainty* as to whether purple is sufficiently crazy. On the other hand, [only] in (33b) commits the speaker to the *falsity* of the alternatives, resulting in the claim that the car is not "some crazy color", and consequently the sense that purple is less crazy than orange.

The following examples illustrate a variety of alternative dispelling focuses, contrasted in each case with a non-dispelling member of the same alternative set:

- (34) a. Most of my friends liked it... (35) a. John liked it...  
 b. # All of my friends liked it... b. # No one liked it...
- (36) a. John or Mary liked it... (37) a. My bike is ok...  
 b. # John and Mary liked it... b. # My bike is purple...
- (38) a. I saw a dog... (but I don't know if it was your dog).  
 b. # I saw the dog...<sup>17</sup>

---

<sup>17</sup> Deriving the alternative dispelling character of [the] raises a number of issues I won't address here. However, it seems initially plausible that by virtue of narrowing the domain to contain a uniquely ...

Why should it be the case that RFR resists alternative dispelling focuses? Can this fact be derived from more basic assumptions?

Earlier we said that RFR quantifies over alternative propositions. Thus, it is in fact quite natural to think that it would need at least *some* alternatives to quantify over. This requirement is just one instance of a general ban against vacuous quantification, which can be observed in typical quantifiers like [every] and [most]<sup>18</sup>.

If this understanding is correct, it may provide us evidence as to *when* RFR has its quantificational effect. The fact that RFR resists an alternative dispelling focus in the main proposition suggests that its quantification takes place *after* the main proposition has been evaluated. That is, if a proposition resolves alternatives by being added to the common ground, and RFR is sensitive to this resolution, the simplest account is to order RFR's evaluation *late* within a dynamic model<sup>19</sup>.

Additionally, if the contour quantifies to the effect of *unclaimability*, we need to ensure that propositions which are already established don't make their way into RFR's domain. For example, we wouldn't want RFR in the utterance "Most of my friends came..." committing the speaker to the unclaimability of the entailed proposition *Some of my friends came*. Again, one solution is to postpone RFR evaluation until the context has been updated with the proposition the contour appears on — reducing RFR itself to a quantifier over *assertable* alternatives.

Regardless of implementation, we can conclude this section with the descriptive observation that RFR quantifies over just those alternatives which remain assertable after the main proposition is evaluated. Thus, we can say that RFR is a quantifier over "post-claim assertable" or simple "post-assertable" alternative propositions.

### **3. Predictions and Results**

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... identifiable dog, *I saw the dog* would resolve not only alternatives like *I saw a dog*, but also *I saw your dog*, and *I saw all dogs*.

<sup>18</sup> Heim and Kratzer (1998, p.162–172) cite arguments that a quantifier's need for a non-empty domain is presuppositional. On this view, cases of RFR on an alternative dispelling focus would be treated as a presupposition failure. From there, to capture disambiguation data (as discussed in §3.2), we could say that any logical form of an ambiguous utterance is filtered if it results in presupposition failure, where another available LF does not.

<sup>19</sup> This story may be somewhat harder to tell for [only], which also resists an alternative dispelling focus, since [only] has to feed into the recursive semantics. However, the goal doesn't seem unattainable. We'd have to think about [only] waiting for the *evaluation* of an embedded proposition (presumably within an embedded or temporary context), then quantifying over alternatives, and finally feeding back into the composition. In fact, this seems in line with a presuppositional analysis of [only] like Horn 1969, in which the main proposition is a prerequisite on the context to which [only] contributes its quantificational effect.

At this juncture, we've developed a simple theory of rise-fall-rise's contribution, which makes predictions about where the contour will be licensed. Specifically, we take RFR to quantify non-vacuously over post-assertable alternative propositions, to the effect that none of these propositions can safely be claimed.

In this section, I explore the consequences of this analysis on a wider range of data, including cases of disambiguation. The intonation's ability to disambiguate will fall out directly from the licensing conditions already discussed.

Additionally, it should be noted that the proposal for RFR given thus far is already sufficient to predict a variety of subtle effects — scalar effects, rhetorical effects, and complex interactions between RFR and other focus sensitive operators. However, as these findings are not directly relevant to disambiguation, I postpone them to §4.

### 3.1 Downward Entailing Contexts

Intuitively, an item like [perfect] is “fully informative” in that if something is perfect, there's nothing else we need to know about it<sup>20</sup>. More formally, [perfect] is “fully informative” because it resolves its alternatives in a *default* context. Here, by a default context, I mean simply one in which the usual order of entailment holds. Alternatively, since [perfect] denotes a predicate, we could define informativity in terms of cross-categorial entailment.

However, it's not the case that fully informative items are *always* alternative dispelling. Specifically, in a *downward entailing*<sup>21</sup> context (see Ladusaw, 1979), entailments are reversed, and a focus like [perfect] no longer resolves its alternatives. This is illustrated by the following example:

(39) The food wasn't perfect.

The proposition above won't resolve an alternative like *The food was (or was not) good*. Here again, the fact that a proposition can be resolved positively or negatively allows us to treat alternatives as *issues*. This simplifies our lives somewhat, saving us from the somewhat awkward calculation of whether *not perfect* resolves *not good*.

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<sup>20</sup> Or, more specifically, nothing we need to know as concerns the issue raised by [perfect] — namely, how good the thing is.

<sup>21</sup> As defined formally in the appendix.

In (39), [perfect] occurs under negation — a downward entailing operator. In general, it can be shown that fully informative focuses are *never* alternative dispelling in downward entailing contexts. This fact is derived formally in the appendix.

According to our present analysis then, rise-fall-rise intonation should be able to focus [perfect] in any downward entailing context. In precisely these cases, [perfect] will leave unresolved alternatives, thereby providing RFR a legitimate base to quantify over.

This prediction is borne out by the following data, in which [perfect] occurs as RFR focus in a variety of downward entailing contexts<sup>22</sup>.

- |  |                                  |
|--|----------------------------------|
| (40) He's not <i>perfect</i> ...                 | (negation)                       |
| (41) I doubt he's <i>perfect</i> ...             | (inherently negative verb)       |
| (42) Few people are <i>perfect</i> ...           | (D.E. argument of a quantifier)  |
| (43) If he's <i>perfect</i> I'll marry him...    | (antecedent of a conditional)    |
| (44) <i>Perfect</i> men are easy to live with... | (subject of a generic statement) |

Just as a focus like [perfect] ceases to be alternative dispelling in downward entailing contexts, there are focuses that *become* alternative dispelling in these environments. For example, while [edible] is relatively uninformative (with respect to food, at least) in a default context, [not edible] could be construed as maximally informative<sup>23</sup>:

- |  |                        |
|--|------------------------|
| (45) The food wasn't <i>perfect</i> ...  | (but it was good)      |
| (46) The food wasn't <i>good</i> ...     | (but it was edible)    |
| (47) # The food wasn't <i>edible</i> ... | (but it was ____ ??? ) |

### 3.2 How does RFR disambiguate?

We just saw that “fully informative” items like [perfect] are alternative dispelling only in *non*-downward entailing (default) contexts. Putting this together with the fact that RFR resists alternative dispelling focuses, we can now elegantly account for disambiguation of a sentence like

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<sup>22</sup> To be precise, (43) and (44) are not strictly downward entailing. However, they are Strawson entailing (see, e.g. von Stechow, 1999), and these contexts are known to pattern with downward entailing contexts, with respect to NPI licensing, for example. Thank you to Kyle Rawlins for pointing this out to me.

<sup>23</sup> Depending, I suppose, on whether the food's non-edible properties are to be considered alternatives.

(48) below. Intonation aside, (48) has the two potential logical forms shown in (49) and (50). However, with RFR focus on [all], as in (51) the sentence only has reading (50):

(48) All my friends didn't come.

(49)  $\forall$  friends-of-mine,  $x [ \neg ( x \text{ came } ) ]$       “None of my friends came”

(50)  $\neg [ \forall$  friends-of-mine,  $x ( x \text{ came } ) ]$       “Not all my friends came”

(51) All my friends didn't come...

$\neq \forall$  friends-of-mine,  $x [ \neg ( x \text{ came } ) ]$

$= \neg [ \forall$  friends-of-mine,  $x ( x \text{ came } ) ]$

Disambiguation falls out directly from what we already know about RFR, by the following chain of reasoning. First, [all] is “fully informative”, since it resolves positively (entails) each of its alternatives in the cross-categorical sense — [all]  $\subset$  [most]  $\subset$  [some]. We can also verify this by plugging these items into a simple non-downward entailing context. So, for example, *All my friends came* implies that *Most of my friends came*.

Recall that fully informative focuses cease to be alternative dispelling in downward entailing contexts. Since negation is a downward entailing operator (e.g. *John hasn't eaten dog* implies *John hasn't eaten Chihuahua*), we expect that [all] will be alternative dispelling on reading (49), but not reading (50). This prediction is verified when we construct the alternatives for each reading:

(49.a) for { *most, some, ...* } friends-of-mine,  $x [ \neg ( x \text{ came } ) ]$

(50.a)  $\neg [$  for { *most, some, ...* } friends-of-mine,  $x ( x \text{ came } ) ]$

Reading (49) resolves all its alternatives in (49.a) — that is, *None of my friends came* resolves all propositions {  $X$  } of *my friends came*. However, reading (50) does not resolve the alternatives in (50.a). As a trivial example, *Not all my friends came* doesn't resolve whether or not *Most of my friends came*.

Finally, we saw in §2.3 that RFR requires unresolved alternatives to quantify over. Having predicted, and verified that [all] dispels its alternatives on reading (49), we can understand why this reading is unavailable. Reading (50), however, in which RFR's quantificational demands are satisfied, is permitted, and thus is the only available interpretation.



Second, a prerequisite to analyzing (52–53) above is an understanding of [any] sufficient to assign logical forms to the readings in question. In light of continuing debate on the number of [any]’s and their semantics (see, e.g. Horn 2005), I defer this investigation to future research. I note, however, that the parallel between examples like the following seems to be compelling evidence for treating [any] as a maximally informative item, like [every]. In each of the ambiguous (54) and (55), RFR on the determiner disambiguates toward the reading in (56b):

(54) I can’t answer every question.

(55) I can’t answer any question.

(56) a. *There is no question I can answer.*

b. *There is some question I can’t answer.*

### 3.3 But can RFR really disambiguate?

The fact that rise-fall-rise intonation can resolve scope ambiguity has been observed<sup>26</sup> by Jespersen (1933), Jackendoff (1972), Ladd (1980), Büring (1995), Horn (2005), and surely others. However, this long attested ability has been called into question by Gussenhoven (1983), and later by Ward and Hirschberg (1985).

Recall from the previous section that in sentences with a universal quantifier and negation, RFR focus was licensed on the quantifier only when it scoped *under* negation. That is, RFR was compatible with the configuration  $\neg\forall$ , but not with  $\forall\neg$ . The fact that this disambiguation was *guaranteed* by our theory of RFR is strong evidence in its favor. Conversely, it would seem to bode poorly for our analysis if RFR were found to be licensed on an undominated universal quantifier.

Following Gussenhoven’s lead, Ward and Hirschberg argue that it’s context, rather than intonation, that has the power to disambiguate. Their case rests on precisely the examples we

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... directly from the contour’s pragmatics. An alternative is to say that CT *does* show up in questions and conditionals, but with a distinct phonetic realization. This would parallel the oft-noted (e.g. Pierrehumbert and Hirschberg, 1990) variation in focus accents between assertions and polar questions in American English — H\* vs. L\* accents respectively. A good candidate for CT within a question would be the example below. Also, for evidence of questions with CT marking in Czech, see Sturgeon 2006, §2.7.

(a) Okay, we know Fred ate the beans, but what about ELIZABETH? What did SHE eat?

<sup>26</sup> Of course, not all of these authors identify RFR directly as such. However, they each point to the disambiguating effect of intonation on examples that could now be classified as having a RFR contour.

hoped never to find — examples where RFR is unexpectedly licensed on the *high scope* reading of a universal quantifier. From Ward and Hirschberg (1985):

- (57) A: The union rep wants to know which union meeting some of the men missed.  
B: All of the men didn't go to the last one...

(58)  $\forall \text{ men, } x [ \neg ( x \text{ went to the last one } ) ]$

On its most natural reading, B's response in (57) has the logical form indicated in (58). The subsequent claim is that this instance of RFR on a high scoped universal closes the book on the possibility that intonation *ever* disambiguates — a result that would have to leave us wondering where so much previous work had gone wrong.

Implicit in this argument is the view that, if RFR disambiguates at all, it was somehow “born to disambiguate”. Indeed, if all the contour did was to resolve scope ambiguity, then we would be hard pressed to explain a single case of its failure to do so. However, under our current understanding, disambiguation is a mere side effect of the contour's quantification over alternatives generated by the focus structure. Thus, it isn't a given that this side effect will take place across the board.

The missing piece of the puzzle is the overlooked (but mandatory) *second* focus on [last] in (57). This double focus structure generates alternatives of the form shown below:

(59) { *most / some / ...* } of the men didn't go to the { *first / second-last / ...* } one.

In this case, to be completely alternative dispelling, the main proposition would need to resolve a great number of alternatives. Specifically, we would have to know exactly how many of the men came to each meeting.

In the case of (57), the combination of [all] and [last] isn't alternative dispelling on *either* scope reading. We can paraphrase the two potential readings in English as follows:

(60) It isn't true that all of the men went to the last meeting.

(61) None of the men went to the last meeting.

Intuitively, it's clear that (60), the low scope reading, is relatively uninformative. In particular, it resolves *none* of the alternatives in (59) above. The interesting fact though, is that

due to the complexity of the alternative set, even reading (61) fails to resolve more than a fraction of the alternatives. For example, *None of the men went to the last meeting* doesn't resolve whether or not *Some of the men went to second-last one*.

Since neither reading of (57) is alternative dispelling, RFR is licensed in both cases, and neither logical form is filtered. The contour's "failure to disambiguate" here is better understood simply as the focus structure's provision for *some* post-assertable alternatives on each reading. Since RFR has its quantificational needs met, there is no reason either reading would be ruled out.

It's worth noting that in (57), as in any case of true structural ambiguity, the listener relies heavily on the context for resolution. This may explain Ward and Hirschberg's intuition that disambiguation is a matter of *context*. However, the following example shows that the context can only be seen as a "last resort" measure. Whenever RFR *does* disambiguate, no amount of context can overpower the intonation (producing nonsense at best):

(62) It's not just that some of my students didn't sign the petition...  
# All of them didn't sign... Not a single one!

But, just as the second focus in (57) remedied RFR on the reading where [all] scopes over [not], a second focus can easily license RFR on [all] even in the complete absence of a downward entailing context:

(63) A: How many of your students signed the petition?  
B: All of them wanted to...

Here, [wanted to] presumably gives rise to the highly salient alternative [did], or in semantic terms, the property "signed the petition". In this double focus structure, as before, [all] ceases to be alternative dispelling. Specifically, *All of them wanted to* doesn't resolve the issue of whether or not *All of them did*.

Generally speaking, what we're seeing is that the more focuses are introduced, the richer the alternative set becomes — to the point where it becomes difficult to resolve every alternative. Nevertheless, double focuses *can* still dispel all of their alternatives, just in case each focus is individually alternative dispelling. For example:

- (64) A: Who went to which meetings?  
B: a. # *Everyone* went to *all* the meetings...  
b. # *Nobody* went to *any* of them...

To summarize, these double focus data illustrate a new pattern of RFR distribution, which nevertheless conforms entirely to the analysis of RFR laid out in §2. The contour's need for post-assertable alternatives predicts a tight connection between RFR licensing and focus structure, accounting for the otherwise anomalous behavior of double focus constructions.

Furthermore, these findings demonstrate that RFR isn't inherently tied to the "task" of disambiguation. Rather, the disambiguating effect is reflex of a general filter against vacuous quantification. Any logical form which (in Büring's terms) "yields unreasonable implicatures" is filtered.

That said, we have been able to resolve the debate as to whether RFR can or can't disambiguate. The answer is this — RFR, by virtue of the requirements it places on the alternative set, *can but does not always* force a particular reading of an ambiguous sentence.

### 3.4 Minor Conclusions

Thus far, I've accounted for the potential of RFR to resolve scope ambiguity in terms of independently motivated licensing conditions on the contour's use. These licensing conditions, in turn can be derived from the meaning of RFR.

Noteworthy is the small number of claims needed to capture the complex distribution of RFR. These indispensables are the following:

- (65) a. RFR is a focus quantifier over assertable alternatives.  
b. RFR resists vacuous quantification.  
c. RFR takes effect after the main proposition is evaluated.

Combining (65a) and (65b), we find that RFR needs *some* alternatives to quantify over. Adding in (65c), we see that these alternatives must remain assertable, through the evaluation of the main proposition — that is, they can't be resolved by it. This grounds RFR's need for post-assertable alternatives, and explains the unique behavior of alternative-dispelling focuses.

While RFR shows sensitivity to whether its focus is a scalar endpoint, I've shown that nothing inherently "scalar" needs to be stipulated in its semantics. Scalar behavior falls out from the general facts of focus and alternative resolution.

From the above licensing condition stems disambiguation of any sentence whose focus is alternative dispelling on only one of multiple readings. On this view, RFR is in no way "tied to disambiguation"; rather the capacity to disambiguate is a side effect of the contour's general requirements on logical form. Finally, because disambiguation is epiphenomenal, nothing special has to be said about double focus construction to capture their seemingly exceptional status.

## **4. Related Work and Remaining Work**

### **4.1 Scalar Uncertainty**

Ward and Hirschberg (1985) present a pragmatics for RFR which is inherently scalar. The crux of their analysis is that RFR conventionally implicates *speaker uncertainty* with respect to some *scale*. In §4.4, I'll argue that RFR is indeed a conventional implicature. However, in this section, I show that the alternative-based account of RFR already predicts scalar effects, and (when necessary) uncertainty, thereby removing the need to stipulate these features directly.

As an example of the contour's scalar behavior, take the following<sup>27</sup>:

- (66) A: We need someone really good. Is your GPA above 3.5?  
B:     a. It's a 3.4 ...  
       b. # It's a 4.0 ...  
       c. # It's a 1.0 ...

On Ward and Hirschberg's analysis, speaker B conveys (type III) uncertainty as to "the choice of some value on a scale". Specifically, in (66a) B is uncertain whether "3.4" qualifies as "good enough", on the scale of GPA's. In (66b) and (66c) however, there would be no reason for uncertainty — 4.0 is clearly good enough, while 1.0 clearly is not. Thus, the contour is unlicensed.

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<sup>27</sup> The reader may note that (66b), in fact does have a licit interpretation. It would have to mean something rude like "It's a 4.0. Is that good enough for you?". We'll return to this rhetorical device in the following section, §4.2.

Let's see how these facts would fall out from our alternative-based account. First, we calculate the alternative propositions to (66a,b,c) — giving us in each case, the set of propositions *It's { X }*, where [it] is understood as B's GPA. Since this set is virtually unconstrained syntactically, we need to look for *salient* alternatives. In this case, the context provides one highly salient alternative of this form — something like *It's good enough*. If we take this to be the sole alternative, the response in (66a) conveys both that 3.4 *might* be good enough (or else the alternative would be dispelled by the proposition), and simultaneously that B can't claim 3.4 is good enough — whence uncertainty. In (66b) and (66c) however, B's intonation requires some unresolved alternative, but it isn't clear what salient issue of the form *It's { X }* remains disputable with such a solidly splendid or abysmal GPA.

While the alternative-based account captures the uncertainty in the case above, it doesn't treat uncertainty as an integral part of RFR meaning. This turns out to be an advantage when it comes to data like the following, adapted from Oshima 2005:

- (67) A: Did your friends pass the test?  
B: *Charles* passed... Patrick and Ginevra flunked.

Here, it seems that B has all relevant information, and provides it to A in a straightforward manner. Thus, it is unclear where we would locate the uncertainty Ward and Hirschberg stipulate as an essential feature of RFR.

#### 4.2 Non-Resolving Answers and Rhetorical Effects

Does our theory of RFR developed so far predict the following distribution?

- (68) A: Is it going to rain tomorrow?  
B: a. *Maybe*...  
b. # *Yes*...  
c. # *No*...

The first step to answering this question is determining the alternatives to (68a,b,c). Unfortunately, Rooth's alternative semantics tells us little about such cases. If an entire utterance

is focused, we predict no structural restriction on the alternative set. This leaves the choice of alternatives entirely in the hands of the pragmatics — whichever propositions are “salient”.

Rather than digress into a general theory of saliency, it will suffice for our purposes to recall the clear effect of a preceding question on alternative selection, as previewed in §2.1. Thus, in (68) above, the salient alternative is just the open issue of whether *It will rain tomorrow*. Given this, our current understanding of RFR can easily capture the difference between (68a,b,c). Since the [yes] and [no] answers are alternative-dispelling, they can’t bear RFR. However, [maybe] leaves the alternative unresolved, so RFR is licensed.

In general, RFR is licensed on what we might call “non-resolving” answers. By this I mean simply any response that leaves a part of a larger question unresolved. This sense is distinct then from Groenendijk and Stokhof’s (1984) “partial answers”, in that a non-resolving answer need not bring us any closer to a complete answer. Also, it appears that a non-resolving answer isn’t necessarily “relevant” in Büring’s sense, in that a response of “Maybe” doesn’t affect the likelihood of the positive or negative answer.

Given the distribution above, it is somewhat surprising to find RFR permitted on a response like the following:

- (69) A: Why don’t you talk to Michael about it?  
B: Wait, isn’t he in Togo?  
A: I had lunch with him twenty *minutes* ago...

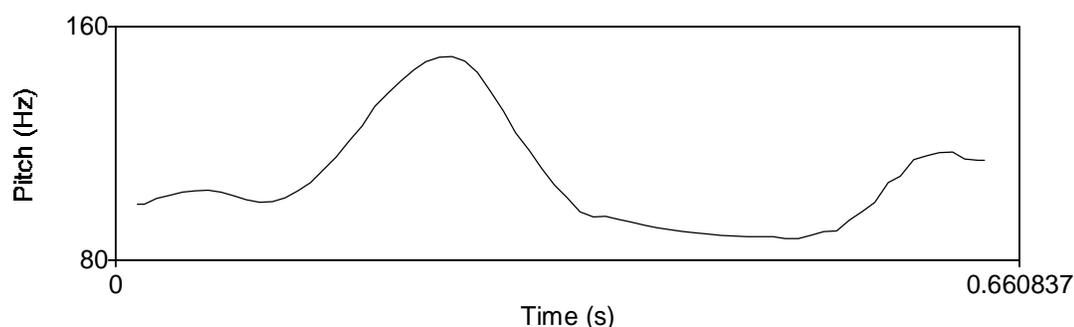
Here, A’s final response could be taken as complete commitment to the fact that Michael is not in Togo. Is it problematic then that RFR is licensed on this seemingly *resolving* answer?

Examples like these show a *rhetorical* use of non-resolution. While we can easily infer from A’s answer that Michael is not in Togo, the intonation marks the answer as noncommittal. The result is an implicit rhetorical question — something like “...is that enough evidence for you?”. In general, purely rhetorical uses of RFR provide sufficient information to resolve an issue, but push the resolution itself onto the interlocutor. This explains the fundamentally condescending nature of RFR on an apparently complete answer. The speaker, as if talking to a child, says “The answer is obvious. Do you see it?”

If example (69) is best understood rhetorically, the same explanation extends perfectly to cases like the following:

- (70) A: Is it going to rain tomorrow?  
 B: a. *Obviously...*  
 b. *Duh...*

In both responses, B is completely committed to its raining tomorrow, leaving the issue open only for rhetorical effect. While the effect of (70a) is condescending, it is still judged as “less committal” than the non-RFR counterpart — “Obviously!”, pronounced with falling intonation. [Duh], on the other hand, appears to be *lexically* specified for RFR, as evidenced by the following pronunciation, taken from Webster’s online dictionary:



As the relevant meaning of [duh], Webster’s offers this: “used derisively to indicate that something just stated is all too obvious, or self-evident”. This meaning is directly compatible with the pragmatics hypothesized above. A speaker uses [duh], *not* to commit to an answer, but rather to imply that the listener should be able to figure it out on their own.

With this rhetorical effect in mind, we can also understand otherwise mysterious uses of RFR on seemingly alternative dispelling focuses:

- (71) A: <*obliviously*> Oh, is Mary sad?  
 B: She’s *miserable...*

According to our theory of RFR licensing, we would expect B’s response to be licit only if [miserable] didn’t entail [sad]. Yet, this appears to be exactly the common sense knowledge that B is rhetorically calling into question. The effect of the utterance is chiding, as if to say:

“She’s miserable... it *that* sufficient for you to conclude she’s sad?”. Perhaps B’s purpose here is to reproach A’s obliviousness — Mary is clearly miserable, but A hasn’t even noticed she’s sad.

In some cases, the availability of this rhetorical device can give rise to subtle ambiguities, where a response could either be interpreted as either *genuinely* non-resolving, or else merely non-resolving for rhetorical effect. For example:

- (72) A: Is John home?  
 B: a. His lights are on... (= probably)  
 b. His lights are on... (= obviously)

All in all, the rhetorical effects discussed here, while puzzling at first, can be seen as a natural extension of RFR’s *non-resolution* into the realm of hyperbole, irony, and other pragmatic devices that to go against everything the logician holds dear.

#### 4.3 Büring’s Contrastive Topics

In this section, I discuss the possibility of treating rise-fall-rise as a special case of the contrastive topic (CT) contour, as described in Büring (2003b). Since RFR could be argued to share both a semantic and phonological core with CT, this collapsing of the two contours is attractive. However, the path to this goal also presents certain challenges, as we will see.

Büring (1997, 1999, 2003b) is primarily concerned with the German contrastive topic contour, which he defines as a CT accent followed by a focus (F) accent<sup>28</sup>, or schematically CT+F. Translated into ToBI, these accents are as follows (though it should be noted that each “accent” actually defines an entire intonation phrase, consisting of a pitch accent, phrase tone, and boundary tone):

- (73) CT = L\*+H L- H%  
 F = H\* L- L%

- (74) A: What about Fred? What did he eat?  
 B: [Fred]<sub>CT</sub> ate the [beans]<sub>F</sub>.  
 L\*+H L- H%      H\* L- L%

---

<sup>28</sup> In Jackendoff’s (1972) terms, this would be a B accent followed by an A accent.

The foundation of Büring’s proposal is that CT marks a special type of congruence between an utterance and a move in a discourse tree (D-tree) — a hierarchical representation of the questions, sub-questions and answers making up a discourse<sup>29</sup>. Formally, CT-congruence is as follows:

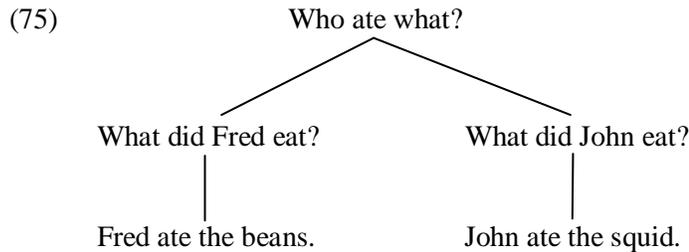
CT-congruence (Büring 2003b)

An utterance U containing a contrastive topic can map onto a move  $M_U$  within a d-tree D only if U indicates a strategy around  $M_U$  in D.

U indicates a strategy around  $M_U$  in D iff there is a non-singleton set  $Q'$  of questions such that for each  $Q \in Q'$  — (i) Q is identical to or a sister of the question that immediately dominates  $M_U$ , and (ii)  $\llbracket Q \rrbracket^o \in \llbracket U \rrbracket^{ct}$ .

Informally, CT marks a response to a question which is part of a larger strategy (a set of questions) delimited by the CT value of the response. The CT value of an utterance, in turn, is the set of alternatives (again, building from Rooth’s semantics of focus), given by making substitutions in *both* the focus and the topic positions.

To take a concrete example, the CT value of “[Fred]<sub>CT</sub> ate [the beans]<sub>F</sub>” is the set of questions { *What did X eat?* }<sup>30</sup>. The utterance, therefore, will be licit only in a discourse containing a multi-question strategy within this set. Represented as a D-tree, such a discourse could look something like this:



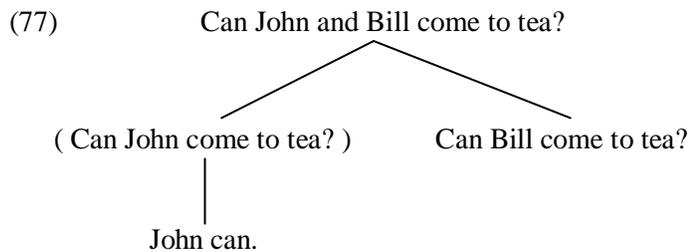
<sup>29</sup> This coverage is far from sufficient to reconstruct the insights of Büring’s analysis. For the details, the reader is referred to Büring 2003b.

<sup>30</sup> Büring is careful to have the F values vary “before” the CT values, giving a set of questions *sorted by topic*. This ensures, for example, that “[Fred]<sub>CT</sub> ate [the beans]<sub>F</sub>” and “[Fred]<sub>F</sub> ate [the beans]<sub>CT</sub>” will have different CT values. To the degree that the second configuration is well-formed (my preference would be to topicalize syntactically), I agree with Büring that these would have to differ in discourse function, one indicating a strategy composed of questions { *What did X eat?* }, and the second indicating a strategy consisting of { *Who ate X?* }.

Strikingly, German doesn't allow CT marking without a following F accent<sup>31</sup>. However, Büring (2003b) mentions that English does allow these cases (here I transcribe redundantly with both CT and RFR notation):

- (76) A: Can John and Bill come to tea?  
 B: [John]<sub>CT</sub> can...  
 L\*+H L- H%

A major question is whether the pragmatics of lone contrastive topics can, in general, be accounted for using the D-tree technology designed for CT+F patterns. For (76) above, B's response does indeed map onto a highly plausible D-tree:



Note that the sub-questions here are contained<sup>32</sup> in the CT value of B's response — namely,  $\llbracket [\text{John}]_{\text{CT}} \text{ can} \rrbracket^{\text{ct}} = \{ \text{John can, Bill can} \}$ . Furthermore, since the strategy-initial question “Can John come to tea?” is *implicit* in this case, Büring would predict (correctly, I believe) that CT marking is *mandatory* in (76).

However, a puzzling aspect of Büring's proposal is that the corresponding German pattern “[Johan]<sub>CT</sub> [kann]<sub>F</sub>” will differ not just prosodically, but also *semantically* from the English case above, getting a topic value of  $\{ \{ \text{John can, John can't} \}, \{ \text{Bill can, Bill can't} \} \}$ . As English CT+F and lone CT are in complementary distribution, it is unclear why German would lack not only the prosodic, but also the semantic counterpart to English lone CT.

Because CT and F marking each occupy an entire intonation phrase, the CT+F pattern of Büring's interest limits his investigation to cases of CT marking an entity- or event-sized phrase

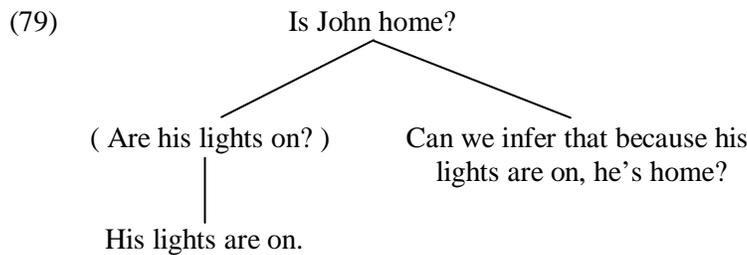
<sup>31</sup> It is presumably due to this restriction that Büring transcribes many English examples as CT+F, where a lone CT (or RFR) would almost certainly be preferable.

<sup>32</sup> Assuming, as Büring does, that the meaning of a polar question is the singleton set containing its literal meaning — e.g.  $\llbracket \text{Can John come?} \rrbracket^{\text{o}} = \{ \text{John can come} \}$ .

(syntactically, a DP) within a larger utterance. Expanding our view to lone CT marking, we would also expect to find proposition-sized contrastive topics. These examples, as in the following, provide another useful test case for the D-trees theory:

- (78) A: Is John home?  
 B: [ His lights are on ]<sub>CT</sub>...

Here, B's response clearly *does* answer a sub-question within a larger strategy aimed at determining whether John is home. We could tree one possible discourse as follows:



At first glance, it appears unlikely that the two disparate sub-questions above could be contained within the strategy-defining CT value of B's utterance. However, recalling that the *entire* CT marked constituent is to be varied, we actually find complete syntactic freedom in the alternative set —  $\llbracket [\text{His lights are on}]_{\text{CT}} \rrbracket^{\text{ct}} = \{ \text{All propositions} \}$ . Thus, examples like these constitute a degenerate case of CT-congruence. With no restriction on the *form* of the strategy, CT marking would seem to indicate nothing more than the existence of other sub-questions — that the marked response is not, in itself, a complete answer to the question under discussion.

Finally, an open prediction of Büring's is that since English allows lone CT's, it will also allow CT+CT patterns (with no focus). If the pitch accent of RFR is taken to be a contrastive topic, these would be exactly the double focus data discussed in §3.3. Worth mention, however, is that these double focus examples contain two pitch accents within a *single* intonation phrase. Thus, the direct association between CT and [ L\*+H L- H% ] needs to be weakened to state that a contrastive topic is a rising accent (L\*+H) within *some* low-rising phrase (L- H%).

All these findings bode well for the incorporation of RFR into a theory of CT. However, one significant problem for the unification of CT and RFR is their differing potential for *closing* a strategy. Büring (1999, p.9) claims that a sentence with CT marking requires a topic alternative

to remain disputable *after* utterance — remarkably similar to our condition on RFR! However, the possibility of CT on the final move in a strategy shows that this constraint is not correct:

- (80) A: What did John and Bill do yesterday?  
B: [John]<sub>CT</sub> [went out dancing]<sub>F</sub>. [Bill]<sub>CT</sub> [stayed home]<sub>F</sub>.

In later work, this problematic constraint is dropped from Büring’s analysis. Thus, the D-trees account (2003b) *will* allow CT marking on [Bill] above, requiring nothing more than some *sister* question within the strategy (delimited by the utterance’s CT value), regardless of its linear precedence.

RFR (or a single CT), on the other hand, *does* appear to be sensitive to linear order:

- (81) A: Can Elizabeth and Persephone come over tomorrow?  
B: [Elizabeth]<sub>CT</sub> can...  
C: a. # [Persephone]<sub>CT</sub> can...  
b. # [Persephone]<sub>CT</sub> can too...  
c. [Persephone]<sub>CT</sub> can [too]<sub>F</sub>.

The need for a third speaker in this example stems from the conditions we’ve already seen on RFR. Specifically, B’s response implies the speaker’s inability to claim the alternative *Persephone can*. Thus, the prediction is that even (81c) would be illicit as a continuation for B (barring, of course, a sudden recollection between one utterance and the next).

These data show us that RFR is licensed on a non-final response within a strategy but not on a final one. However, adding the nearly vacuous [too] with F-marking transforms (81b) into a “full-fledged” CT contour (with topic *and* focus), thereby allowing it as the closing response to a strategy<sup>33</sup>.

These findings then indicate that RFR has stricter licensing requirements than Büring would predict for a single CT — so that English speakers are forced to a German-style CT+F pattern when providing a strategy-final response containing a semantic topic and no semantic focus.

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<sup>33</sup>Although remarkably, English doesn’t allow “[Persephone]<sub>CT</sub> [can]<sub>F</sub>” here — presumably because [can] isn’t being contrasted with [can’t]. It would be interesting to see whether German differs in this respect.

I suspect that this issue of finality within a strategy warrants a closer look at boundary tones. For example, it seems relevant that the final item of a list always receives falling intonation:

- (82) A: What do you want from the store?  
 B: Broccoli... asparagus... and artichokes.  
           L\* L- H%      L\* L- H%      H\* L- L%

If this most basic case of listing can be generalized to prosodically complex responses within a discourse strategy, it might shed light on the infelicity of RFR (which, by definition has a rising boundary tone) on a strategy-closing response.

Similarly, the tendency for a rising boundary tone on a *non*-final list element would be a welcome explanation for not only the licensing of RFR, but also for the prosodic variability of traditional contrastive topics in mid-strategy positions:

- (83) [Elizabeth]<sub>CT</sub> ate [the gazpacho]<sub>F</sub>, and [Persephone]<sub>CT</sub> ate [the tamales]<sub>F</sub>.  
 a. L\*+H L- H%                    H\* L- L%                    L\*+H L- H%                    H\* L- L%  
 b. L\*(+H)                            L\*(+H) L- H%                    L\*+H L- H%                    H\* L- L%

While Büring’s theory predicts (83a) as the only possible reading, a more natural production would be (83b), where a rising topic and a low or rising focus are squeezed into a single intonation phrase. This “atypical” CT contour highlights the importance of the boundary tone in determining the shape of pitch accents within a phrase. Within a compositional model of intonation<sup>34</sup> (e.g. Pierrehumbert and Hirschberg 1990 or Steedman 2003), we could specify CT as a rising accent within a rising phrase, and let the distribution of rising and falling phrases fall out from potentially unrelated factors. Within this picture, one could imagine an optimality theoretic account of why (83b) is preferred, since it “makes use” of an existing rising phrase (licensed by non-finality), rather than constructing more intonation phrases than necessary.

On the whole, providing a unitary account of RFR and CT appears to be a promising path for future research. That both contours contain an [ L\*+H L- H% ] portion, and both make

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<sup>34</sup> I suggest a compositional model here so that H% distribution can derive from its independent meaning. However, it isn’t clear that either of the models cited will support the dependence of a pitch accent on its containing phrase type for phonetic realization. The underlying assumption of these authors is that pitch accents, phrase tones, and boundary tones are both semantically and phonologically orthogonal.

reference to alternative propositions and the structuring of discourse hardly seems like a coincidence. However, any such work will have to address fundamental distinctions between the contours as well. For example, the requirement that alternatives remain disputable *following* the intonation marked utterance is unique to RFR, and must be better understood before CT and RFR can be leveled.

#### 4.4 Rise-Fall-Rise as a Conventional Implicature

Throughout, I've maintained that rise-fall-rise quantifies over “post-assertable” alternative propositions. This provides a simple explanation for why the contour resists an alternative dispelling focus, and even disambiguates away from any logical form without post-assertable alternatives. However, this minimal analysis leaves open a number of questions:

- A. What class of meaning does RFR's quantification contribute?
- B. What is the force of its quantification ( $\forall$ ,  $\exists$ , ...)?
- C. What is the “effect” of its quantification (its nuclear scope)?

Because it's difficult to answer any one of these questions independently of the others, let's adopt for the moment the informal proposal from §2.2 — namely, that RFR conveys that *all* the alternative propositions *can't be safely claimed*. Now, we can ask, is this meaning an at-issue entailment, a presupposition, or an implicature?

Previous work on RFR and the related contrastive topic contour (Büring, 2003b) has disagreed as to the class of the intonational meaning. Ward and Hirschberg (1985) argue that RFR contributes a *conventional implicature* (CI). Büring (2003b), on the other hand claims that CT (which he intends to collapse with RFR), gives rise to a *conversational* implicature. Finally, Oshima (2005), in attempting to unify RFR and CT, concludes that the contour contributes a *presupposition*. Clearly, this problem of meaning class deserves a closer look.

First, let's examine Büring's *conversational* implicatures. The claim is that, on hearing a CT contour, the listener makes certain logical deductions about the speaker's choice of utterance, as compared to other potential utterances, based on the maxims of conversation (Grice, 1975). This explanation is directed at the following data:

- (84) A: Who ate what?  
B: [Fred]<sub>CT</sub> ate the [beans]<sub>F</sub>.

Here, Büring observes that speaker A can infer that other people ate *different* things. The logic behind A's deduction is that if Elizabeth ate the beans as well, it would have been more economical for B to reply with "Fred and Elizabeth ate the beans". However, as a conversational implicature, this inference is easily cancelable:

- (85) A: Who ate what?  
B: [Fred]<sub>CT</sub> ate the [beans]<sub>F</sub>. [Elizabeth]<sub>CT</sub> ate the beans [too]<sub>F</sub>.

Importantly, Büring is not claiming that the *meaning* of contrastive topic is a conversational implicature. Indeed, this would be a surprising stance; how could an overt lexical item correspond merely to a logical deduction of the interlocutor? In Büring 2003b, the meaning of CT is formulated as the congruence condition between CT marked utterances and corresponding moves in a D-tree — the condition we saw in §4.3. However, it isn't immediately apparent how CT-congruence should be situated within a formal semantics. Should we expect a host of lexical items corresponding only to restrictions on the mapping from utterance to discourse move? Büring's proposal is that CT carries no "meaning" in the narrow sense — that it has no effect on truth conditional or presuppositional content. Once an utterance is successfully mapped onto a move in a discourse tree, the CT marking is irrelevant.

On this account, illicit CT marking is a *new* kind of infelicity — a mapping failure. This addition to our framework may turn out to be a necessity. However, two points are certainly worth careful consideration. First, can these cases of infelicity be captured using preexisting tools? Second, if CT and RFR are unified, will this same mapping condition cover every aspect of RFR's meaning?

Oshima (2005), in moving to collapse the two contours, challenges the status of Büring's conversational implicatures, on the grounds that this type of implicature (as an inference of the listener) should be *deniable* by the speaker, whereas the contribution of RFR is not<sup>35</sup>:

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<sup>35</sup> It should be noted that (87) is permissible, just in case the speaker's memory has been suddenly jogged between one sentence and the next. However, as (86) is subject to no such restriction, the contrast remains. The important thing for the present analysis is that a use of RFR is illicit when, *at the time of utterance*, the speaker can safely claim the alternatives.

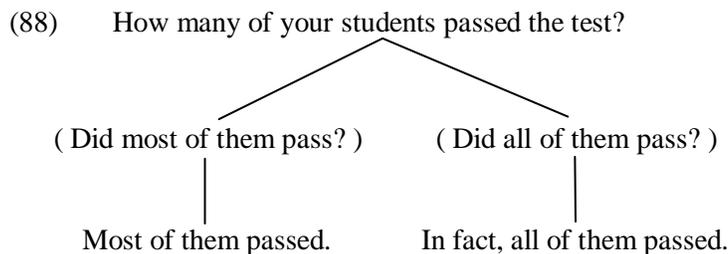
(86) Most of my students passed the test. In fact, all of them did.

(87) [*Most*]<sub>CT</sub> of my students passed the test... # In fact, all of them did.

Note that the intonation in (87) *commits* the speaker to a claim that was only conversationally implicated in (86) — that not all students are known to have passed (or, if we take the speaker to be well informed, that not all the students passed). This is indeed strong evidence that RFR contributes something stronger than a conversational implicature.

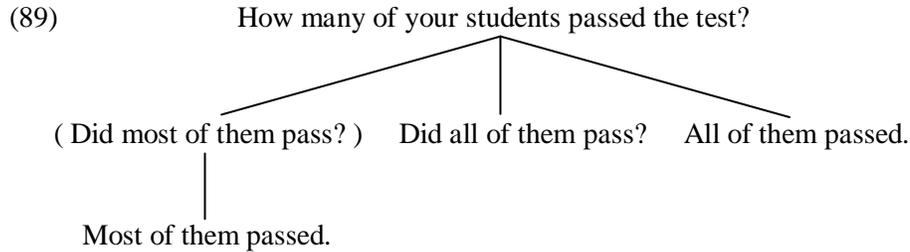
However, I believe that Büring’s theory has a chance of extending to such data, if correctly interpreted. The intonation in (87), regardless of Grice’s maxims, makes the utterance congruent only with a discourse strategy consisting of sub-questions of the form { *X* } of *my students passed the test*. Thus, if the problematic follow-up in (87) violates CT-congruence, Büring would capture its infelicity (though again, the *class* of this infelicity would be unclear).

In fact, Büring goes to some trouble to rule out a tree like the one below — a potential mapping candidate for (87) above — as a valid discourse. Specifically, he would require the response *In fact, all of them passed* to attach directly to the root question, since it is a complete answer to that question. This restriction on the formation of D-trees is the “principle of highest attachment” (Büring 2003b, p. 534).



This principle of highest attachment (over which Büring casts a wary eye, stating that he “sees no particular reason why it should hold”) is what prevents CT from marking a scalar endpoint under the D-trees theory. In any case, the effect is that a discourse corresponding to tree (88) will be barred if [all] is CT marked.

Unfortunately, there is nothing to prevent the formation of the following malformed discourse tree:



Here, the principle of highest attachment is satisfied, guaranteeing that [all] will not be CT marked in the final response. But, even *without* CT marking, the response is illicit:

- (90) A: How many of your students passed the test?  
 B: [Most]<sub>CT</sub> of them passed...  
 A: Did all of them pass?  
 B: # All of them passed<sup>36</sup>.

Given both the challenge of unifying RFR and CT discussed in §4.3, and now the difficulty of representing RFR’s meaning in the D-tree theory, it’s worth considering a simpler line of thought — that “[Most]<sub>CT</sub> of my students passed...” just *commits* the speaker to the unclaimability of the alternative propositions. Returning to our original question, if this is the meaning of RFR, what is the class of this meaning?

Could we say that RFR produces an at-issue *entailment*? This would be to say that the meaning of RFR interacts compositionally with its surroundings — for example it could be interpreted under negation.

- (91) John didn’t come...                    ≠ ¬ [ John came... ]  
 (92) It’s not true that John came...       ≠ ¬ [ John came... ]

While (92) is a clear example of RFR in a syntactically embedded context, neither of these sentences shows semantic embedding of the intonation’s meaning. If this compositionality were available, we would expect (91) to mean something like *It’s not true that [ John came and I can’t claim the others came ]*. These truth conditions would be satisfied in a context where it’s

<sup>36</sup> Of course, this response cancels a generalized conversational implicature (*most* implicates *¬all*), regardless of whether there is CT marking on [most]. What’s important, as in (87) above, is that CT marking generates a *non-defeasible* commitment.

known that everyone came. Not only is (91) infelicitous in such a context, but tellingly, even (92), a frame supporting “metalinguistic negation” (Horn, 1985), doesn’t allow this reading.

The pair in (93) and (94) below reiterates RFR’s inability to scope under negation, illustrating a contrast with [only], which contributes to the building of at-issue entailments. The facts are parallel under verbs of propositional attitude or speech report, as shown in (95–98).

(93) It’s not true that only John came... other people came too!

(94) It’s not true that John came... # other people came too!

(95) Mary thinks that only John liked it. = Mary thinks that [ only John liked it ]

(96) Mary thinks that John liked it... ≠ Mary thinks that [ John liked it... ]

(97) Mary said that only John liked it. = Mary said that [only John liked it ]

(98) Mary said that John liked it... ≠ Mary said that [ John liked it... ]

At this point, we can safely conclude that RFR doesn’t take part in the composition of at-issue meaning. However, this means we’re running short on options. We’ve seen that RFR isn’t a conversational implicature, nor is it a standard entailment. What else could it be? Oshima (2005) deduces that RFR (which he collapses with contrastive topic) makes a *presupposition*. But while the presuppositional analysis is largely consistent with the observations above (uncancelability, and unembeddability under negation), there are two major problems for it.

First, by definition, a presupposition is a *prerequisite* to the interpretation of at-issue content. To take a standard example, *Mary stopped smoking* can’t be evaluated without first acknowledging that Mary used to smoke. This is quite different from the situation with RFR:

(99) John liked it...

Note that the main content of (99) can be extracted and evaluated without first accepting the “extra” meaning — that others can’t be claimed to have liked the movie. This appears to be a case of *multidimensionality*, in the sense of Potts (2005), where separate meanings have been conveyed along separate channels.

Secondly, we know from Karttunen (1973) that presupposition projection is subject to filtering properties of the subordinating predicate. While a verb like [know] lets presuppositions

through, a verb like [say] *plugs* presuppositions of the embedded clause. For example the entire sentence *John said Mary stopped smoking* doesn't presuppose that Mary ever smoked.

If RFR is a presupposition we would expect it to be blocked by *plugs*. However, this isn't the case, as the intonational meaning (the unclaimability of alternatives) surfaces uninhibited in the following<sup>37</sup>:

(100) John said that Mary came... (but he didn't say anything about Susan)

At this point, we've determined that RFR is neither a conversational implicature, nor an at-issue entailment, nor still a presupposition. Our last hope, it seems, is that class of meanings "born into neglect" — the *conventional* implicature (CI). Conventional implicatures, discussed recently in Potts 2005, have these defining properties:

- (101) a. CI's are commitments arising from lexical meaning.  
b. CI's are always speaker oriented.  
c. CI's are logically and compositionally independent of at-issue entailments.

As we've already seen, the unclaimability of alternative propositions conveyed by RFR has each of these properties. First, it is a non-defeasible commitment (arising from the lexical meaning of an intonational morpheme). Second, as Ward and Hirschberg (1985) observe, RFR is always speaker oriented. And finally, the speaker's inability to claim the alternatives always surfaces uninhibited by syntactic embedding — that is, the RFR meaning is evaluated independently of at-issue content.

From these findings, I conclude, with Ward and Hirschberg (1985), that RFR is a conventional implicature. Unlike Ward and Hirschberg, however, I connect RFR to a class of focus sensitive operators. Thus, for example, [only] and RFR have access to the *same* alternatives, produced by Rooth's alternative semantics. In the next section, we'll see that this tight connection captures various interactions between RFR and other focus operators. But, even

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<sup>37</sup> An interesting side-note about this type of example is the potential for RFR to "grab" an embedded proposition's alternatives to quantify over. For example:

- (a) A: Who came to the party?  
B: John said Mary came... (but I don't know who else came)

Here, the quantification is not over propositions of the form *John said { X } came*, as we might expect, but over propositions of the form *{ X } came*. This seems possible only if John is a trusted source. Thus, "John said Mary came..." is reducible to "Mary came...", as far as the discourse is concerned. Crucially though, while the *input* to RFR is an embedded proposition, RFR's meaning (*output*) is still not embedded.

on abstract grounds, it seems preferable to collapse RFR with “known” operators, rather than to stipulate its meaning entirely through a complex licensing condition. Similarly, saying that both [only] and RFR are quantifiers, just one in the at-issue dimension, and one in the CI dimension, is simpler than designing a new framework where intonation constrains the mapping from utterance to discourse. Put simply, if intonation can be treated within existing frameworks, it should.

Having postulated that RFR is a conventionally implicating focus quantifier, we might still consider formalizing its effect in a compositional semantic framework. One reviewer suggests an implementation using Kratzer’s semantics for epistemic modals to capture “speaker unclaimability”. The reason I have steered away from this approach is that it seems unnecessary and potentially misleading to provide a compositional semantics for an item that does not interact compositionally. As a conventional implicature, RFR meaning is never “picked up” by any other element — for example, it can’t be embedded under negation or an attitude predicate. While the alternatives that constitute the *input* to RFR are formed within the syntax and semantics, its *output* is never reincorporated by these modules. Thus, if RFR contributes a structured meaning to any component of the grammar, this would be a pragmatic component, not a purely semantic one.

These issues are reminiscent of the questions Potts raises (2003b, p.18) surrounding the placement of expressive content (e.g. *damn*) within a semantic model. Much like expressive content, the contribution of RFR can’t be judged as true or false, suggesting independence at a fundamental level of theory.

Finally, I summon von Stechow’s (1995, §2.2.3) arguments for keeping the semantics and pragmatics as autonomous as possible, with the points of contact highly circumscribed. I agree with von Stechow, in particular, that since an autonomous model is more restrictive, the burden of proof lies with proponents of more permissive theories. The conservative claim would be that once meaning leaves the recursive semantic component (e.g. through a conventional implicature) it doesn’t come back. As RFR can be modeled within this restrictive theory, I hypothesize that its effect is purely discourse-oriented.

Clearly, the task of formalizing the meaning of RFR and conventional implicatures in general is an important one. However, it might not be as easy as providing a traditional semantic denotation for these items. While the *licensing* of RFR, and the construction of the alternatives it references can be discussed in semantic terms, the correct formulation of RFR’s *effect* depends largely on choices of the proper representation of *discourse*. Büring’s strategy-centered D-tree

model of discourse is one framework that is plausibly sufficient to model RFR's effect. However, deciding between one such model and another is beyond the scope of this work.

Finally, we reach the question of whether RFR quantification is universal or existential. In support of the existential line, Oshima (2005) points out that RFR is licensed on any number of consecutive responses, save for the final one:

- (102) A: How did Elizabeth, Persephone and Antonio do on the test?  
B: Elizabeth passed... (?) Persephone passed... # Antonio passed...

On the surface, this seems to indicate that "Elizabeth passed..." doesn't imply that *all* others aren't known to have passed, but just that *someone* isn't known to have passed. However, I submit that B's use of RFR on [Persephone] above is highly restricted, depending on a sudden recollection during the pause between one utterance and the next. In this case, we can maintain that RFR commits to the unclaimability of *all* alternatives, and simply allow for changes in what a speaker is willing to claim over time.

Note that the sense of B speaking and recollecting simultaneously in (102) is absent from (103), where the pitch accents have been changed to simple low targets (though the rising boundary tone still rules out the final item of the list):

- (103) A: How did Elizabeth, Persephone and Antonio do on the test?  
B: Elizabeth passed, Persephone passed, # Antonio passed.  
L\*        L- H%    L\*        L- H%        L\*        L- H%

Another potential hazard — this time to both the existential and universal camps — is the repetition of RFR throughout an *entire* list, as in this example:

- (104) A: Did John pass the test?  
B: Elizabeth passed... Persephone passed... Antonio passed...  
I'm sure he did fine.

However, in this case, the issue under discussion is restricted to just whether *John* passed. Thus, each item in B's list can be seen as *evidence* that John passed — qualified in each case by RFR as being *non-resolving* as to the specific issue at hand. As long as we maintain that

alternatives only make their way into the alternative set by discourse salience (as argued for previously), these data pose no problem.

In any case, little of the analysis presented here rests on the *force* of RFR quantification. In particular, the contour's distribution on differing focus types, the disambiguation behavior, and the interaction with focus operators (discussed in §4.5) all stem just from the need for post-assertable alternatives, not from the specifics of quantification.

To briefly summarize the findings of this section, the proposal that RFR is a conventionally implicating universal quantifier of assertable alternative unclaimability is not only maintainable across a wide range of data, but can be seen as favorable in several ways to the complete collapse of RFR and CT under a D-tree theory.

#### 4.5 The Interaction of RFR with other Focus Sensitive Operators

The demand of RFR for post-assertable alternative propositions predicts various interactions between RFR and other focus sensitive operators. In this section, I point out a few such interactions, and discuss the implications of these findings for the placement within a dynamic semantics of RFR specifically, and conventionally implicated meanings in general.

We saw before that [only] contributes to the composition of at-issue entailed meaning, by negating all salient alternative propositions generated by Rooth's model of focus. Of course, this leaves open a number of important questions as to the semantics of [only]. For example, the issue of which parts of [only]'s meaning are presupposed, entailed or implicated is still widely debated (see Roberts, 2005 for a useful characterization of this debate). Yet, regardless of its precise denotation, it's clear that [only] has access to alternative propositions *during* the process of regular semantic composition. Recall, for instance, that [only] can be interpreted under negation, whereas RFR cannot:

(105) It's not true that only John came... other people came too!

(106) It's not true that *John* came... # other people came too!

As a conventional implicature, we know that RFR is an independent, speaker oriented commitment, which always takes widest scope. However, we might still wonder *when* this implicature is evaluated, under a dynamic model such as Heim's (1983) file change semantics.

Intuitively, since RFR needs access to the alternatives which are formed through the composition of the main proposition, we might already expect its implicature to be evaluated *after* the proposition itself. Logically, however, it's equally possible that the main proposition "hands over" the alternatives without updating the context, and waits for the intonation's conventional implicature to go through before making its own contribution.

Earlier, we saw one good reason to think that RFR is in fact evaluated *after* the proposition it attaches to — namely, RFR is sensitive to the existence of alternatives which remain *assertable* after the proposition's context change is calculated. Thus, within a dynamic model, the simplest approach is to hypothesize that RFR takes effect after the main propositional content is already incorporated into the common ground. Consequently, the domain of RFR quantification could be minimally stated as "assertable alternative propositions".

One way to test this theory is to combine RFR with operators that would resolve all alternative propositions "prematurely", leaving RFR nothing to quantify over. For instance, our ordering hypothesis finds support in the interaction of [only] and RFR in the following example<sup>38</sup>:

(107) # Only *John* liked it...

Here, since [only] forms part of the proposition's at-issue entailed meaning, we predict that RFR quantification must take place *after* [only]'s quantification. However, if this is the case, then [only] by *negating* the alternatives will render RFR vacuous, giving infelicity. If, on the other hand RFR were allowed to take effect first, then [only] would be licensed, since it resolves the alternatives that RFR leaves merely unclaimable. In fact, we see a more direct confirmation of the proposed ordering of events in a pair like this:

- (108) a. *John* liked it... Only John liked it.  
b. Only John liked it. # *John* liked it...

One technical note here is that if RFR and [only] share a focus, their domain of quantification *must* be the same — otherwise, we would predict their licit co-occurrence in (108b), provided that RFR chose a domain containing some element that [only] had failed to quantify over. Generally, this seems to point to the focus exponent, rather than the focus operator, as the locus of the pragmatically bound "free variable" responsible for domain restriction.

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<sup>38</sup> Here, as usual, we have to ignore metalinguistic readings (in this case, the incredulous retort).

Cleft constructions provide another interesting testing ground for our investigation of RFR's dynamic effect. Specifically, the exhaustivity imposed by a cleft on its focus could be expected to dispel alternative propositions much like [only], thereby ruling out RFR focus on the clefted element. This prediction is borne out in the following data:

(109) # It was John who ate the gazpacho...

(110) # What John ate was the gazpacho...

Without embarking on a full-scale investigation of clefts<sup>39</sup>, we can hypothesize that wherever a cleft's exhaustivity takes effect, it's *early* enough to dispel the alternatives that would license RFR on the focus. This picture would be compatible, for instance, with Horn's (1981) proposal that cleft exhaustivity is presuppositional (that is, a precondition on the context).

Here, one could imagine a counter-argument — that RFR and clefts are in some more fundamental conflict, aside from their competition over alternative propositions. However, the example below shows that a clefted item *can* get RFR focus, just in case there is a second focus later in the utterance. In fact, this exactly parallels the cases of a second focus licensing RFR on a maximal focus in §3.3, highlighting once again the close connection between RFR and alternative semantics.

As before, the second focus enriches the alternative set to the point where resolving all alternatives is not so easily accomplished. In the following example, the cleft's exhaustivity is no longer alternative dispelling, and RFR is licensed on the cleft focus<sup>40</sup>:

(111) A: I can't believe the atrocities going on in Nicaragua.

B: Well, it was us who gave them their weapons...

Here, the predicted meaning of B's response is something like "We were the (unique) ones who gave them their weapons, but I remain unresolved as to whether we or other people did other salient (presumably bad) things". While this meaning is perhaps suspiciously vague, it

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<sup>39</sup> For a summary of various implementations of cleft exhaustivity, see Vallduví 1990, p.167–168.

<sup>40</sup> This example is due to Rebecca Tamar (p.c.).

explains the sense that the speaker isn't claiming that we're *entirely* at fault for the atrocities, or is at least leaving the issue open rhetorically<sup>41</sup>.

In any case, this further example of a second focus licensing RFR on an otherwise alternative-less element is a welcome confirmation of the analysis of double focuses given in §3.3, and strengthens the broader claim that RFR is a focus operator.

In addition, these examples bring up an interesting question concerning the interaction of clefts and focus. Would we expect a cleft's exhaustivity hold only over the main proposition, or *also* over its alternatives? The test case would be something like this:

- (112) A: Who dropped the class?  
B: It was *Elizabeth* who was *thinking* of dropping...

Here, A's question could be interpreted either as presupposing a unique class-dropper, or else as a request for *all* droppers. Does B's clefted response force an exhaustive interpretation of A's question? In lieu of solid judgments, I leave this problem for future research.

Returning to the larger picture, we've seen that a variety of causes can be at the root of RFR infelicity — yet what these sources have in common is their resolution of the alternative propositions which RFR would quantify over. A maximally informative focus like [perfect] will be *inherently* alternative dispelling when it occurs in a default (non downward entailing) context. An at-issue focus operator like [only] will, through its own quantification, dispel alternatives. Finally, a cleft, by virtue of its (perhaps presuppositional) requirement of exhaustivity, will demand a context in which the alternatives are already resolved. Symmetrically, in each of these cases, the addition of a second focus augments the alternative set to the point where the “dispeller” is no longer able to resolve all alternatives, so RFR is licensed<sup>42</sup>.

To reiterate, all of these effects are automatic, on the assumption that RFR (a) quantifies over assertable alternatives, and (b) takes place *after* at-issue content is evaluated. Having identified this late evaluation as a key feature of RFR, a natural question to ask next is this — can/must all conventional implicature meaning be evaluated late within a dynamic model?

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<sup>41</sup> For a relevant contrast, consider: “Come on! It was us who gave them their weapons!”, with falling pitch accents on [us] and [weapons].

<sup>42</sup> The only case we haven't seen so far is a second focus licensing RFR on the focus of [only], as in:

- (a) A: Are the parties here always this packed?  
B: Only *Elizabeth* came to *the last one*...

## 5. Conclusions

Previous accounts of English rise-fall-rise intonation are “inventive”— designing novel tools to capture the contour’s distribution and pragmatic effect. I have argued, however, that RFR is best understood in familiar terms: as a focus sensitive quantifier over assertable alternatives, taking its effect in the conventional implicature dimension.

If conventional implicatures are calculated late in a dynamic model, this minimal analysis immediately covers a great deal of ground. First, the contour is predicted to resist a focus that resolves its own alternatives, since this would leave the quantifier with an empty domain. Not only will this account handle scalar endpoints like [all] and [none], but it extends to the infelicity of RFR on a *negatively* resolving focus like [purple]. Second, we are led to expect a complex pattern of RFR distribution on maximally informative elements. Specifically, occurring *either* in a downward entailing context *or* with a second focus will keep these elements from dispelling their alternatives, thereby licensing RFR.

In turn, this distribution gives us the potential for disambiguation. In cases of scopal ambiguity between two operators, whenever only one scope relation is alternative dispelling, the use of RFR will disambiguate towards the inverse scope relation. More generally, the effect is the filtering of any logical form whose domain of RFR quantification is empty. Tangentially, this finding underscores the fundamentally semantic nature of alternatives — since these must be calculated independently per logical form.

Through double focus data we see most clearly that disambiguation is a side effect, and not a “function” of RFR. With this understanding, on the one hand we’re no longer surprised to see cases of ambiguity left unresolved by RFR. On the other hand, being able to predict *when* the contour disambiguates allows us to hold by the claim that RFR *can* disambiguate, lending credence to a long line of intonational work.

To get the benefits of the alternative-based analysis, I’ve shown it’s necessary to first distinguish the contours of contradiction and incredulity, which appear similar to RFR on the surface. This separation is driven crucially by these contours’ *compatibility* with an alternative dispelling focus. However, closer inspection reveals a range of supporting distinctions: the non-RFR contours are metalinguistic in meaning, optionally differing in a prosodic form, and tied to a linguistic antecedent. Thus, their failure to fall in with the given account can be seen as further evidence of their already unique character, and need not be treated as exceptional.

While the analysis doesn't stipulate scalar behavior or speaker uncertainty directly, these effects are captured through the meaning of RFR quantification — that alternative propositions can't be claimed. Furthermore, this meaning predicts the sensitivity of RFR to the linear ordering of the discourse, which is a problem if we try to adapt theories of contrastive topic to RFR data.

The deep ties between RFR and CT are hard to overlook, and certainly warrant further investigation. Yet, just as RFR doesn't fit perfectly into a D-tree, I suspect that most theories of CT wouldn't be entirely comfortable calling [duh] a contrastive topic. Thus, much work remains to be done. One promising research path is to isolate the effect of final boundary tones, so that they may be factored out of the equation. For example, since the prosody of RFR demands an utterance-final rise, we might reasonably expect additional restrictions on its distribution. With these issues in mind, the common core of RFR and CT may become more apparent.

Still, without taking on this larger project, it is remarkably effective to treat RFR as a “regular” conventional implicature. The profile is perfect — a speaker oriented commitment, unembeddable, undeniable, and independent of at-issue content. Then, in addition to offering support for the reintroduction of CI's into semantic theory, we can maintain a simple focus-oriented account of RFR itself.

I am confident that treatments of rise-fall-rise in the “usual” semantic/pragmatic terms will lead to a clearer picture of intonation in general, from which this key feature of language can be explored as less of an anomaly.

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## Appendix

PROOF: Fully informative focuses aren't alternative dispelling in downward entailing contexts.

Suppose we have fully informative focus  $x$ , with a distinct alternative  $y$ .

(If the focus doesn't have a distinct alternative, there's no need for focus)

[0] Definition: A context  $f$  is downward entailing (D.E.) iff for any  $\alpha \subset \beta$ ,  $f(\alpha) \supset f(\beta)$ .

[1] A fully informative focus resolves all its alternatives in a "default" (= non-D.E.) context.

[2] Therefore, either  $x \subset y$ , or  $x \subset \neg y$  (where ' $\subset$ ' stands for cross-categorical entailment).

Case A:  $x \subset y$

[3] For  $f$  a downward entailing context,  $f(x) \supset f(y)$ , by the definition of D.E.

[4] Therefore  $f(x)$  doesn't resolve  $f(y)$ .

Case B:  $x \subset \neg y$

[3] For  $f$  a downward entailing context,  $f(x) \supset f(\neg y)$ , by the definition of D.E.

[4] Therefore  $f(x)$  doesn't resolve  $f(\neg y)$ , and consequently doesn't resolve  $f(y)$ .

[5] Thus, in a downward entailing context,  $x$  is not alternative dispelling.