

Additives pitching in: L*+H signals ordered Focus alternatives*

Alexander Göbel
University of Massachusetts, Amherst

Abstract Approaches to the meaning of intonational contours differ in associating each subcomponent with a meaning that remains invariant across contours or treating a contour as contributing its meaning holistically. This paper argues for a common core of the L*+H pitch accent across two intonation contours, the Rise-Fall-Rise (RFR), and a novel contour coined the Downscale-Contour (DSC). Both contours are analyzed as indicating the presence of an alternative with respect to a scale inferred from the QUD, but differ in the relative strength of this alternative, with the DSC indicating a weaker and the RFR a stronger one. Each contribution is derived compositionally from the meaning of additivity and exhaustification respectively.

Keywords: additive particles, focus, intonation, rise-fall-rise, scalar particles

1 Introduction

The intonation with which an utterance gets produced plays a crucial role for its interpretation. It is an open question, however, whether intonation contours (or tunes) contribute their meaning holistically (Goodhue, Harrison, Su & Wagner 2016; Rudin 2018; Jeong 2018), or whether their meaning can be decomposed into the individual contributions of their prosodic subcomponents (Pierrehumbert & Hirschberg 1990; Bartels 1999; Truckenbrodt 2012; Westera 2017).¹ While the latter option seems *prima facie* preferable on theoretical grounds, it faces obvious empirical challenges. Consider the mapping between boundary tones, sentence types and speech acts as

* The main data of this paper originated from a term paper in my first year semantics class some four years ago, proving that some term papers are in fact worth pursuing. This project has grown through discussions with Pete Alrenga, Daniel Altshuler, Rajesh Bhatt, María Biezma, Seth Cable, Jesse Harris, Jon Ander Mendia, Barbara Partee, Maziar Toosarvandani, and audiences at SNEWS 2016 at Brown University, the UMass Semantics Workshop Spring 2018, and the Linguistics Colloquium at the University at Cologne June 2018. Special thanks to Kristine Yu for help with the pilot study.

¹ Adopting the autosegmental-metrical theory of intonational phonology (Ladd 2008) and the ToBI annotation system (Beckman, Hirschberg & Shattuck-Hufnagel 2005), an intonation contour will be taken to consist of at least one pitch accent (H*, L+H*, L*+H, plus downstep), a phrasal accent (L-, H-), and a boundary tone (L%, H%).

an illustration of this issue. Polar interrogatives like (1a) are marked with a rising boundary tone by default, while declaratives like (1b) standardly receive a fall.² However, so-called *rising declaratives* (Gunlogson 2001) like (1c) are syntactically declaratives but can be used as questions, suggesting that rising and falling boundary tones mark questioning and asserting speech acts respectively. Unfortunately, wh-interrogatives like (1d) are pronounced with a final fall by default, rendering a unified approach to the meaning of boundary tones much less trivial (but see Biezma 2019).

- (1) a. Does Intonation matter? (FINAL RISE)
 b. Intonation matters. (FINAL FALL)
 c. Intonation matters? (FINAL RISE)
 d. What's intonation? (FINAL FALL)

This paper tackles this issue from the angle of pitch accents rather than boundary tones, arguing for a common semantic core of the L*+H pitch accent across two contours in English: the Rise-Fall-Rise (RFR, Ward & Hirschberg 1985; Constant 2012; Wagner 2012; Westera to appear), and a novel contour coined Downscale Contour (DSC). In the proposed analysis, both the RFR and the DSC involve a scalar component modeled analogously to other scalar Focus operators, but differ with respect to indicating the presence of either a stronger (RFR) or weaker (DSC) alternative. These meanings will be compositionally derived from additivity and exhaustification respectively in interaction with an additional constraint on the set of Focus alternatives introduced by the L*+H pitch accent.³

The structure of the paper is as follows. Section 2 presents the empirical puzzle that will serve as motivation for the introduction of the DSC, namely an acceptability contrast between preverbal and sentence-final additive particles, and a pilot elicitation study investigating the role of prosody. Section 3 discusses existing approaches to the RFR and an empirical challenge for them. Section 4 relates the previously discussed data to each other and presents the preliminary formal proposal. Section 5 revisits the initial puzzle and discusses possible explanations in terms of scope, in the process refining the initial proposal. Section 6 discusses some open issues and section 7 concludes the paper.

² All examples where intonation is crucial or non-trivial will have links to recordings with them, as well as in-text labels. Thanks to Emma Nguyen and Bethany Dickerson for contributing their voices.

³ A critical assumption of the work presented here is that the L*+H pitch accent is indeed its own category rather than being a gradient variant of the L+H* pitch accent, contrary to Ladd (1983); Gussenhoven (1984) (see Ladd 2008; Constant 2014 for discussion). While there is little work on the L*+H accent investigating this question (but see Hirschberg & Ward 1992), there are several studies on the difference between the H* and the L+H* pitch accent (see Gotzner 2019 for an overview), which characterize the H* accent as indicating new information, whereas the L+H* conveys a contrastive interpretation. Future work will have to show whether similar differences can be observed for the L*+H (see Braun & Biezma 2019 for German).

2 The Additive Puzzle

The starting point for the investigation into the L*+H is a puzzle about the distribution of the additive particles *also* and *too* in English, which are standardly analyzed as presupposing a salient, distinct alternative to the Focused constituent (e.g. Heim 1992; Krifka 1999). In most cases, *also* and *too* can be used interchangeably without a notable meaning difference, as in (2).

- (2) Emma watches *You're the Worst*.
a. She **also** watches [*Dark*]_F.
b. She watches [*Dark*]_F **too**.

However, there are contexts in which the two particles differ in acceptability, as in (3-4). Informally, we might characterize these cases as involving a suggested incompatibility between the Focused constituent and a previous utterance, which only seems to be expressible with *also* but not *too*.⁴ For (3), the incompatibility would be between being a dog and having superpowers, and between murdering people and being a good person in (4).

- (3) *Context: In the first years office, Alex notices Brandon wearing a t-shirt displaying superheroes from the DC universe alike to the periodic table of elements, with one cell showing a dog. When asked about it, Brandon replies:*
B: This is Krypto the Superdog. He has all the superpowers Superman has.
a. A: He's **also** [a dog]_F.
b. A: #He's [a dog]_F **too**.
- (4) *Context: Annie and Beth are watching Dexter, a TV-show about a psychopath who satisfies his homicidal urges by killing criminals. In one scene, he donates some money to charity before killing someone. While Annie detests Dexter's actions, Beth sympathizes with him. Beth says:*
B: Dexter is such a good person!
a. A: He **also** [murders people]_F.
b. A: #He [murders people]_F **too**.

There are a few things worth noting about this acceptability difference. First, adding *but* to the sentence with the additive seems to make the difference disappear:

⁴ The same contrast holds with *also* in sentence-final position, for those speakers who accept it there otherwise. The issue is thus - at least superficially - syntactic rather than something about the lexical meaning of *also* and *too*. However, for ease of exposition, I will frame the discussion in terms of a contrast between the two particles.

- (5) *Context: As in (4).*
 B: Dexter is such a good person!
 a. A: But he **also** [murders people]_F.
 b. A: But he [murders people]_F **too**.

Second, the difference between *also* and *too* seems to depend on the predicates involved. Although the exchange in (6) might be taken to express a similar kind of argumentative flavor, *too* is no longer infelicitous here. While the exact nature of the difference between the predicates in (3-4) on the one hand and (6) on the other requires further investigation, I will tentatively characterize it as one in terms of individual-level predicates and stage-level predicates respectively (Kratzer 1995).

- (6) A: Omarosa totally supports Trump!
 a. B: She **also** [antagonizes]_F him.
 b. B: She [antagonizes]_F him **too**.

Finally and most importantly, the contrast seems to rely on the speaker attitude and the prosody used to convey it. As shown in (7), the acceptability difference disappears once A's utterance is no longer meant to convey a sentence of incompatibility with B's utterance but is simply adding more information about Dexter.

- (7) *Context: As in (4), only that Anne is indifferent toward Dexter.*
 B: Dexter is such a good person!
 a. A: He **also** [murders people]_F.
 b. A: He [murders people]_F **too**.

In order to further investigate the relevance of intonation, I conducted a small pilot elicitation study, which will be presented in the next subsection.

2.1 Pilot Elicitation Study

For this pilot study, one male native speaker of English was given a context to read silently and was then asked to produce a corresponding target sentence with whatever intonation he considered appropriate given the context. The contexts either specified a contrastive speaker attitude or a neutral one, and the target sentences either contained *also* or *too*. A sample item is shown in (8). There were eight items of this kind, which were evenly split into copula sentences and full verbs to explore the relevance of predicate type. (The full list of items can be found [here](#).)

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(8) Context:

You're watching the TV-show *Hannibal* about the eponymous serial killer from *The Silence of the Lambs* with your roommate Jon.

In one scene, Hannibal gives \$100 to a homeless person. Jon, touched by Hannibal's compassion, says:

"Ah, Hannibal's kindhearted."

a. Contrastive:

However, you believe that doing one good deed doesn't absolve numerous murders. You say:

b. Neutral:

Like your roommate, you are very impressed by Hannibal's nice gesture and realize how being a murderer does not mean you can't do nice things as well. You say:

Target:

a. **"He's also a murderer."**

b. **"He's a murderer too."**

As practice items to familiarize the speaker with the task, two items from (Goodhue et al. 2016) were used. After that, the speaker saw each item in all four conditions in a randomized order, resulting in 32 individual stimuli. Each stimulus was recorded twice with a Samson Go Mic microphone in a silent room and the recording where pitch tracks were more visible was labeled for tones using the ToBI system.

Although there was a reasonable amount of noise in an already small sample, which made a proper quantitative analysis unfeasible, certain pattern emerged, which are illustrated in the representative examples in Figures 1-4. First, the intonation contours for the contrastive contexts differed from the neutral ones in the second pitch accent being downstepped, which was true for both *also* (Figure 1 vs Figure 2) and *too* (Figure 3 vs Figure 4). Second, within contrastive contexts, *also* and *too* differed in the shape of the first pitch accent: while *also* exhibited a L*+H accent on the Focused constituent (Figure 1), there was a L+H* accent on *too* (Figure 3) for most cases. Moreover, this latter pattern was more frequent in the copula items than the full verb items.

While more quantitative work is necessary to validate these findings, the pattern suggests that the pitch accent plays a crucial role in the additive puzzle and the prosody involved, with the L*+H accent as a potential culprit. Based on the data, I will characterize the relevant contour as [L*+H L+!H* L- L%] prosodically (although there could also be a L- after L*+H) and refer to it as Downscale-Contour (DSC).

In order to investigate the contribution of the L*+H pitch accent, the next section turns to another contour which has been argued to feature this accent, namely the Rise-Fall-Rise.

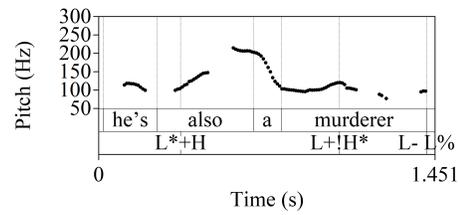


Figure 1 Sample pitch track for *contrastive+also* (AUDIO).

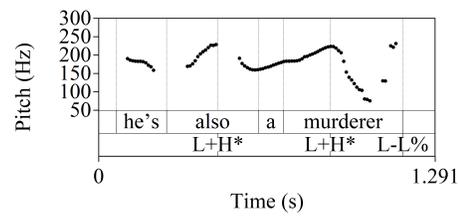


Figure 2 Sample pitch track for *neutral+also* (AUDIO).

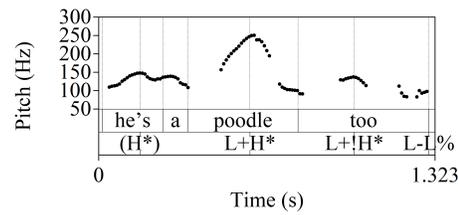


Figure 3 Sample pitch track for *contrastive+too* (AUDIO).

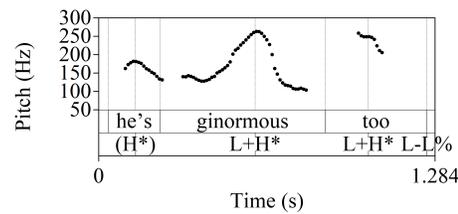


Figure 4 Sample pitch track for *neutral+too* (AUDIO).

3 The Rise-Fall-Rise

The Rise-Fall-Rise (RFR) can be informally described as conveying a sense of uncertainty or incompleteness and has been prosodically characterized as [L*+H L-H%] (Ward & Hirschberg 1985). An example illustrating the contour is given in (9). In the account by Ward & Hirschberg - who focus on RFR in replies to questions - the contour is taken to involve a scalar relationship with the context and some notion of speaker uncertainty, either concerning the scale, the relevant value, or its invocation. For a case like (10), the relevant scale would be one ranking how much of *Infinite Jest* has been read and the speaker uncertainty targeting whether the provided answer is sufficient.

- (9) A: Alan's such a klutz.
 B: He's a good badminton player. (RFR)
- (10) A: Have you read *Infinite Jest*?
 B: I read the first chapter. (RFR)

In a more recent account, Constant (2012) is concerned with how the RFR behaves with respect to logical entailments as in (11). Here, the RFR is infelicitous on endpoints of the logical scale, but not on a mid-value. Constant accounts for this pattern by proposing that the RFR triggers a conventional implicature that no assertable alternative to the prejacent can be safely claimed - thus ruling out *none*, since it wouldn't leave any alternatives open - in addition to a restriction against non-vacuous quantification - thus ruling out *all*, since weaker alternatives are already entailed. The formal analysis is shown in (12).

- (11) A: Did you feed the cats?
 B: I fed { #none / some / #all } of them. (RFR)
- (12) $\llbracket \text{RFR } \phi \rrbracket^{ci} =$
 $\forall p \in \llbracket \phi \rrbracket^f$ s.t. p is assertable in C : the speaker cannot safely claim p .

A quite similar analysis comes from Wagner (2012), proposing that the RFR indicates that at least one alternative to the prejacent can be asserted. However, Wagner relativizes this contribution to speech acts rather than propositions in light of data like (13), which is argued to allow the RFR in an embedded clauses with speech act potential. The analysis is shown in (14).

- (13) John - who likes sweets - was an obvious suspect.⁵
- (14) $\llbracket \text{RFR} \rrbracket = \lambda S. \exists S' \text{ in } \llbracket S \rrbracket_a^g, S \rightarrow S'$ and performing S' might be justified: S

⁵ I have not been able to re-intuit the intended intonation such that a recording has to be omitted here.

While both these accounts are able to capture data like (11) involving logical scales, there is an asymmetry in the RFR when it comes to contextual scales that poses a challenge. Consider the exchanges in (15) in the Dexter context from earlier. Informally, the difference between (15a) and (15b) can be described as the first utterance providing either a positive or a negative evaluation, which the second utterance provides a counterpoint to. However, only with an initial negative evaluation is the RFR felicitous.⁶ This pattern is unexpected if all the RFR requires are alternatives left open, since both replies are in principle compatible with the previous characterization, as shown in (16).

(15) *Context: As in (4).*

a. A: Dexter is such a horrible person! - B: He gives to charity. (RFR)

b. B: Dexter is such a good person! - A: #He murders people. (RFR)

(16) a. Dexter gives to charity but he's a horrible person.

b. Dexter murders people but he's a good person.

Interestingly, the case in (15b) that renders the RFR infelicitous is exactly where the DSC was used earlier. The next section pursues this connection between the two contours and presents the proposal to capture the data.

4 Proposal: RFR and DSC as mirror images

The previous section showed that the RFR is felicitous in reply to a negative statement but not a positive one. The example in (17) shows that the DSC behaves the opposite way. We already saw that the DSC can appear in response to a positive statement, as in (17a), repeated from (4a), but it is infelicitous in response to a negative statement, shown in (17b), constituting the mirror image to the RFR.

(17) *Context: As in (4).*

a. B: Dexter is such a good person! - A: He also murders people. (DSC)

b. A: Dexter is such a horrible person! - B: #He also gives to charity. (DSC)

Moreover, neither the RFR nor the DSC can be used in replies that don't seem to show any opposition, either positive (18) or negative (19).

⁶ This asymmetry was already noted by Ward & Hirschberg (1985) (see de Marneffe & Tonhauser 2019 for a relevant experimental study). A potential counterexample to this generalization might be the one below from Satoshi Tomioka (p.c.), where the RFR seems to express some opposition relative to a positive value. I will have to leave it to future work to see whether this example is reconcilable with the account proposed here or makes modifications necessary.

- (i) A: Biden might not be the most progressive guy, but I think at heart he's still a good person.
B: He's pro Israel.

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- (18) *Context: As in (4), but both Beth and Annie sympathize with Dexter.*
B: Dexter is such a good person!
a. A: #He also gives to charity. (DSC)
b. A: #He gives to charity. (RFR)
- (19) *Context: As in (4), but both Beth and Annie detest Dexter.*
A: Dexter is such a horrible person!
a. B: #He also murders people. (DSC)
b. B: #He murders people. (RFR)

One way to conceptualize these data is in terms of scales, in line with Ward & Hirschberg's (1985) original insight. For the Dexter scenario, we might think of a "goodness"-scale that Dexter is being placed on, either toward the bottom by Annie or toward the top by Beth. What the intonational contours in interaction with the content of the utterance then do is relate the new utterance to the existing scalar value. From this perspective, the RFR seems to be only felicitous in response to a value toward the bottom of the scale with respect to which its prejacent implies a higher value. The DSC, on the other hand, requires a value toward the top of the scale with its prejacent implying a *lower* value. This characterization is illustrated in Figure 5 below.

We might wonder on what semantic level this scalar contribution is made. Although both contours convey a sense of opposition, following up with a direct denial of this inference seems rather odd, as shown in (20). A more natural reply would be using *so*, as in (21), but what seems to be under discussion here is what counts as a good or a bad person, not that murdering people or giving to charity are bad and good respectively.

- (20) a. (*in reply to (17a)*) B: #That's not true, murdering people doesn't make him a bad person!
b. (*in reply to (15a)*) A: #That's not true, giving to charity doesn't make him a good person!
- (21) a. (*in reply to (17a)*) B: So? Murdering people doesn't necessarily make him a bad person!
b. (*in reply to (15a)*) A: So? Giving to charity doesn't necessarily make him a good person!

These data suggest that the scalar contribution of each contour is not at-issue, in line with previous accounts to intonational meaning. In the proposed formalizations in (22-23), this contribution is implemented as a presupposition, in analogy with the Focus semantics resembling that of scalar Focus particles like *even*, according

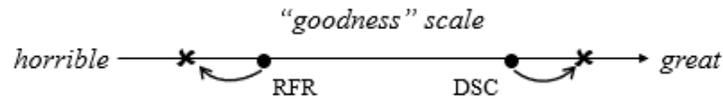


Figure 5 Illustration of scalar contribution of RFR and DSC in Dexter scenario.

to which both contours are treated as propositional operators, which only differ in the relative strength of the presupposed alternative. Additionally, the relevant set of alternatives is conceptualized as a question here rather than the standard C variable (see Beaver & Clark 2008) to allow some flexibility concerning what kind of scale is at play. This flexibility is meant to capture the contrast between replies of the RFR to questions, as in (10), where the relevant notion seems to be one of informativeness, and assertions, as in the Dexter scenario, that might be taken to evoke a degree question, here of the form *How good is Dexter?*

$$(22) \quad \llbracket \text{RFR} \rrbracket (Q_{\langle s, \langle \langle s, t \rangle, t \rangle \rangle})(p_{\langle s, t \rangle})(w): \\ \exists q[q \in Q(w) \ \& \ p \not\Rightarrow q \ \wedge \ \mathbf{q} < \mathbf{p} \ \wedge \ q(w)]. \ p(w)$$

$$(23) \quad \llbracket \text{DSC} \rrbracket (Q_{\langle s, \langle \langle s, t \rangle, t \rangle \rangle})(p_{\langle s, t \rangle})(w): \\ \exists q[q \in Q(w) \ \& \ p \not\Rightarrow q \ \wedge \ \mathbf{q} > \mathbf{p} \ \wedge \ q(w)]. \ p(w)$$

On this view, the opposing flavor that comes with either contour is an implicature, since - as illustrated in (20) - its use does not imply that a previous statement is false, but merely that it implies a scalar value that is stronger or weaker than one the prejacent implies. This characterization is supported by the fact that the contradictory flavor can be cancelled, as in (24).⁷

- (24) a. A: He also murders people... But you're right, he's got a good heart.
 b. B: He gives to charity... But you're right, he's a real scumbag.

5 The Additive Puzzle Revisited

With the proposal in place, we can come back to the additive puzzle from Section 2 and the question why *too* seems to be unacceptable in contexts where the DSC gets expressed with *also*. An obvious difference I will take as a starting point is their syntactic position and furthermore assume that this difference correlates with their ability to take scope. This assumption is supported by facts reported by Rullmann (2003), namely that *too* tends to scope below negation, illustrated in (25a). In contrast, preverbal *also* can easily take wide scope, shown in (25b).

⁷ This behavior also suggests that a treatment in terms of discourse commitments, as used in recent work by Rudin (2018) and Jeong (2018) with respect to steep rising contours, would be unattractive.

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- (25) Emma doesn't like Mad Men.
 a. ?? She doesn't like Game of Thrones **too**.
 b. She **also** doesn't like Game of Thrones.

In the following subsections, I will discuss two ways in which this difference between *also* and *too* may be leveraged to account for the acceptability difference in DSC contexts. Unfortunately, neither is without problems such that a more satisfying solution will be left for future research, but hopefully the discussion will help in advancing such an investigation.

5.1 Acceptability Contrast in DSC Contexts

5.1.1 Multiple Operator Approach

On the first approach, *too* and *also* are taken to contribute their additive meaning in addition to the DSC. The difference then comes about through different scope possibilities in line with the data in (25). The semantics I assume for the additive operator is shown in (26), which functions similar to the RFR and the DSC, except that it presupposes the truth of a proposition in the question set that is not entailed by the prejacent without any additional scalar component.

$$(26) \quad \llbracket \text{ADD} \rrbracket (C_{\langle s,t,t \rangle})(p_{\langle s,t \rangle})(w): \exists q[q \in C(w) \ \& \ p \not\Rightarrow q \wedge q(w) = 1]. \ p(w)$$

For *too*, the additive would take narrow scope relative to the DSC, as shown in the LF in (27a). Thus, the set of alternatives, here simplified to C , is different for ADD and DSC in that for ADD it only includes the prejacent (underlined) in addition to the previous utterance (27c). In contrast, the set of alternatives for DSC embeds these propositions under ADD (27d). For *also*, the situation is reversed in that ADD takes wide scope over DSC, shown in (27b), so that the alternatives for DSC are now as in (27c), but those for ADD now including DSC (27e).

- (27) a. $\text{DSC}_{C1a} [\text{ADD}_{C2} [\text{Dexter} [\text{murders people}]_{F1,2}]]$
 b. $\text{ADD}_{C1b} [\text{DSC}_{C2} [\text{Dexter} [\text{murders people}]_{F1,2}]]$
 c. $C_2 = \left\{ \begin{array}{l} \underline{\text{Dexter murders people}}, \\ \text{Dexter is a good person} \end{array} \right\}$
 d. $C_{1a} = \left\{ \begin{array}{l} \text{ADD}_{C2} [\underline{\text{Dexter} [\text{murders people}]_{F2}}], \\ \text{ADD}_{C2} [\text{Dexter} [\text{is a good person}]_{F2}] \end{array} \right\}$
 e. $C_{1b} = \left\{ \begin{array}{l} \text{DSC}_{C2} [\underline{\text{Dexter} [\text{murders people}]_{F2}}], \\ \text{DSC}_{C2} [\text{Dexter} [\text{is a good person}]_{F2}] \end{array} \right\}$

While such an approach might be a possibility, it suffers from several issues that make it unattractive. First, it makes several non-innocent assumptions, namely that presupposed content is part of the computed alternatives, as well as that operators contributed by lexical items can trivially interact with operators contributed by prosodic means. More crucially, it is unclear how the account could explain the difference between *also* and *too*. Even if we were to conceptualize ADD in (27d) as conjoining the proposition that satisfies its presupposition in (27c) with the bare prejacent, thus rendering the other proposition no longer stronger as the prejacent, the same should apply to (27e) and make it crash as well. Thus, it does not seem like taking (27) as the right analysis is promising to explain the acceptability difference.

Moreover, a crucial assumption of this account is that a single Focus can associate with two operators. However, it is controversial to what extent such a case should be possible to begin with, both empirically and theoretically. Beck & Vasishth (2009) provide experimental data for cases like (28) suggesting that they are in fact unacceptable (but see Francis 2019 for a discussion of why differences in the meanings of Focus particles may matter).

- (28) A: You only showed [the photos]_F to Carol.
 B: Right. I also only showed [the photos]_F to Robin_F.

Thus, a different way of appealing to the scope difference as an explanation might be to say that there is only one Focus that can be used for an operator, which will then be reserved for the one taking narrow scope, while the other applies vacuously. While such an explanation seems more attractive than one where both operators contribute their meaning, it raises the question what it would mean for a word to become meaningless in this way. Moreover, there is a more general issue unaddressed in the discussion so far, namely how an operator contributed by an intonational contour can vary in scope relative to an operator contributed by a lexical item. Given these issues, I will tentatively conclude that a multiple operator approach seems unattractive and move on to the single operator alternative.

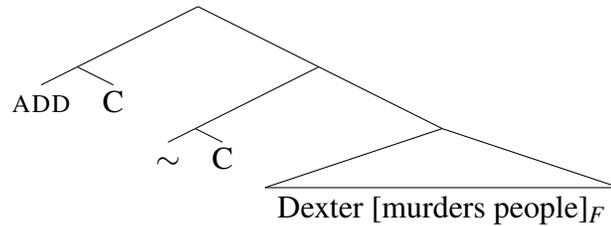
5.1.2 Single Operator Approach: Deriving DSC and RFR

One way of avoiding some of the issues that arise for a multiple operator approach would be to find a way to derive the meaning of the DSC from the meaning of the additive operator in combination with something separately contributed by the L*+H accent in a compositional fashion. However, achieving such a goal is far from trivial such that I will not be able to provide a perfect solution here but hope to take a step in the right direction nonetheless.

Let's take a step back and see how association with Focus is captured in what we might consider the standard Roothian approach. According to (Rooth 1992),

the effects of prosodic Focus are modeled through the ‘ \sim ’ operator, which operates over the invoked Focus semantic value of a constituent ϕ and a covert variable C representing the set of alternatives, and introduces the presupposition that C consists of $[[\phi]]^f$, including $[[\phi]]^o$ and at least one other alternative. In case there is a Focus-sensitive expression like *also* or *too* present, C then serves as the first argument for the corresponding operator. The LF for the DSC example we are concerned with here, leaving the intonational meaning aside, would then look as in (29).

(29)



Now, one way to implement the scalar component associated with the L*+H accent argued for above would be in terms of an additional restriction on the shape of C , namely as a presupposition that the set of alternatives is ordered. We can think of this as a special squiggle operator ‘ \sim^* ’, defined as in (30), with the new scalar restriction underlined (see Ward & Hirschberg 1985 for a detailed definition of a scale).⁸

$$(30) \quad [[\sim^*]] = \lambda C : C \subseteq [[\phi]]^f \ \& \ [[\phi]]^o \subset C \ \& \ |C| > 1 \\
\ \& \ \underline{\forall p \forall q [p, q \in C \ \& \ p \neq q \rightarrow p < q \vee p > q]} \cdot C \\
(= \text{for all distinct propositions } p, q \text{ in } C, p \text{ is either ranked below or above } q)$$

How could this restriction in combination with the meaning of an additive particle as defined in (26) amount to the meaning proposed for the DSC in (23)? Crucially, additivity requires the alternative presupposition to be not entailed by the prejacent. If we assume that this notion of entailment is sensitive to the properties of the scale set up by \sim^* , it would exclude all weaker alternatives, as well as anything equal to the prejacent. As a consequence, only a stronger alternative would be able to satisfy the additive presupposition, which would render ADD equivalent to DSC and allow us to derive the meaning of the DSC without introducing a primitive operator.

While this account seems preferable to one that simply stipulates the meaning of the DSC, the crucial question is how it could explain the difference between *also* and *too*. Again leveraging the scope difference, we might argue that \sim^* is not a primitive but derived through application of a distinct operator contributed by the L*+H pitch accent, call it OP_{L^*+H} , which adds the scalar restriction before C is fed to ADD. This effect would then be blocked because *too* takes scope over C before

⁸ The approach thus resembles data from Italian reported by Bianchi, Bocci & Cruschina (2016), where a difference in prosody can be used to convey mirativity.

OP_{L^*+H} can apply. The respective LFs are illustrated in (31). A relevant data point supporting this idea comes from another difference between *also* and *too*, namely in terms of their prosodic structure. Sentence-final *too* is able to carry its own - intuitively vacuous - RFR in a case like (32), which is not possible for *also*.⁹ We could thus stipulate that the L^*+H operator needs to be part of the same intonational phrase as the Focus operator its modifying, which *too* may not be.

- (31) a. $ADD_{also} C [OP_{L^*+H} C [\sim C [Dexter [murders people]_F]]]$
 b. $OP_{L^*+H} C [ADD_{too} C [\sim C [Dexter [murders people]_F]]]$
- (32) A: Emma watches *You're the Worst*.
 B: She watches *Lovesick* too. (DOUBLE RFR)

Additionally, we can derive the meaning of the RFR in a similar fashion from the meaning of the covert exhaustification operator EXH (Chierchia, Fox & Spector 2011), if we follow Bade (2016) in assuming that Focus needs to be used and thereby enforce the insertion of such an operator into the structure, whose semantics is given in (33). Now, if we consider the effect of EXH in the context of OP_{L^*+H} , there is no visible change in meaning since all entailed (i.e. weaker) alternatives to the prejacent remain untouched while all others are false. However, if we take into account that the only other proposition in C is weaker than the prejacent, we indirectly get the meaning of the RFR from (22). Thus, RFR can be derived from EXH using the same tools as for DSC.¹⁰

- (33) $\llbracket EXH \rrbracket (C_{\langle st, t \rangle}) (p_{\langle s, t \rangle}) (w). \forall q [q \in C(w) \ \& \ p \not\Rightarrow q \wedge \neg q(w)] \ \& \ p(w)$

However, this account also raises new issues. In the Roothian system used above, the C that serves as argument for a Focus-operator and the one that \sim applies to are not necessarily identical because the relationship is an indirect one (see Wagner to appear). Rendering it more direct, for instance via selective binding (Wold 1996), might overgenerate for cases of multiple association, whose empirical status remains controversial (see discussion of (28) above). I will thus leave it to future work to assess the ultimate feasibility of the single operator approach.

5.2 Remaining Data

Before concluding this section, there are two more data points relevant to the additive puzzle that warrant further discussion, namely the exceptions to the acceptability

⁹ Thanks to Michael Wagner for this observation.

¹⁰ This approach would furthermore tighten the relationship between additivity and exhaustification in terms of being counterparts to each other observed with cases where additives seem to be obligatory (Bade 2016; Göbel 2018) and suggest an answer to the question why the DSC meaning would be associated with additives.

difference between *also* and *too* when inserting *but* or using what I described as stage-level predicates. To account for the first case, I will adopt Toosarvandani's (2014) analysis of *but* which treats *but* as relating two propositions that entail answers of opposite polarity to a common QUD. In the Dexter scenario, this QUD would be *Is Dexter a good person?*, with the initial statement implying a positive answer and the additive reply a negative one. A possible explanation for why this should make the acceptability difference disappear would be that *but* is able to convey the intended contrast independently of the DSC, such that the inability of *too* to do so no longer arises and thus does not result in unacceptability.

Secondly, for the stage-level predicates it could be the lack of an inferrable scale that makes the use of *too* possible such that the superficial distinction between individual-level vs stage-level predicates boils down to scalar vs non-scalar predicates. While this characterization requires further research, it would be in line with the data from the elicitation study where the crucial L*+H occurred less frequently with full verbs that served as proxies for stage-level predicates.

To sum up the main part of this paper, I have argued for treating the RFR and the DSC as mirror images of each other and provided the first steps to a compositional derivation of the DSC that might be able to explain the additive puzzle in terms of different scope configurations. The next section is dedicated to two open issues related to the proposal.

6 Open Issues

6.1 RFR vs Contrastive Topic

The first issue concerns the relationship between the RFR and contrastive topics (CT). In light of the similarity between the L*+H and the L+H* pitch accent (see footnote 3), the RFR is often discussed in the context of - and even equated with - CTs, which share the final rising tone with the RFR but can associate with a single constituent in addition to a plain Focus accent, resulting in a contour resembling a hat or bridge (Büring 1997), illustrated in (34). Constant (2014) argues for a unified account of both phenomena, treating the RFR as an instance of "lone" or "sentential CTs". While the similarities between the two phenomena are certainly striking and warrant attempts of unification, I will argue against Constant and suggest that at least for now it seems better to treat the phenomena separately.

- (34) A: What about Fred? What did he bring?
B: [Fred]_{CT} brought the [beans]_F.

Constant's account treats CTs as indicating partial answerhood by virtue of invoking a sorted question in the discourse, as made overt in (34), where the Focus addresses

the implicit question *What did Fred bring?* and the CT indicates the existence of parallel questions subsumed under the super-question *Who brought what?*. This account - if extended to the RFR - is able to capture responses to questions as in (35) in a way similar to what was proposed here. The reply in (35a) is infelicitous because it does not leave an alternative answer to the indicated question *How much of Infinite Jest did you read?* open. In contrast, (35b) leaves some questions open, for instance *Did you read the second chapter?*, and is thus licensed.

- (35) A: Did you read Infinite Jest?
 a. B: ??I read the whole book. (RFR)
 b. B: I read the first chapter. (RFR)

However, the CT account runs into the same problem as Constant (2012) when it comes to capturing the asymmetry with respect to responses to assertions. That is, it is unclear why the RFR should be restricted to replies that provide a positive counterpoint to a negative initial statement and exclude negative replies to a positive statement, as in (15), since the status of the question should remain either unresolved or closed regardless of the direction of the argumentation.

In addition to this empirical issue, there are two further points worth noting. The first concerns Constant's appeal to cross-linguistic data, arguing that the existence of *-wa* in Japanese and *ne* in Mandarin, which are both assumed to be CT-markers, in what corresponds to sentential CT cases in English suggests a unified core. While this argument might motivate a unified approach, the data Constant provides fails to support it. For instance, an informal comparison of the RFR with *ne* shows that they differ in their distribution. In the context in (36), Mandarin speakers either accept a positive or a negative reply, but neither would license the RFR.¹¹

- (36) A: Alan is the most agile person ever!
 B: Ta yumaoqiu da de { henhao / hench } ne.
 he badminton play ADV.MARKER very.good very.bad TOP
 'He's a { great / bad } badminton player.'

Finally, it is not clear whether Constant is justified in not distinguishing between L+H* and L*+H. While there are no recordings of the discussed examples, the pitch tracks he provides for lone CT and full CT, shown in Figure 6, suggest that the pitch accents are not identical. In his Figure 2.1, the pitch starts to rise at the beginning of the second syllable, but is flat until the middle of the same syllable in Figure 2.4, which would warrant treating each as L+H* and L*+H respectively.

¹¹ Thanks to Sherry Chen for gathering the judgments.

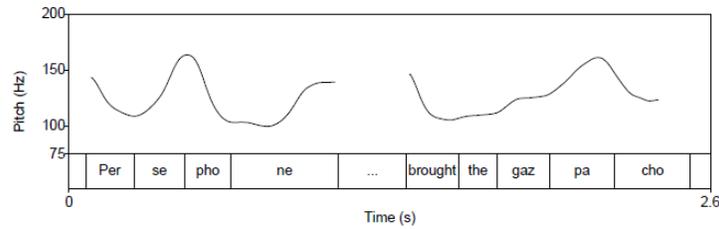


Figure 2.1: Pitch track of “[PERSEPHONE]_{CT} ... brought [the GAZPACHO]_{Exh.}”
L+H* L-H% H* L-L%

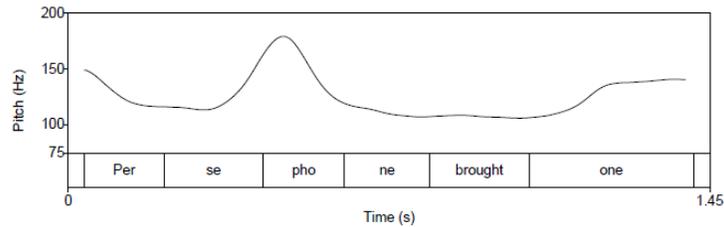


Figure 2.4: Pitch track of “[PERSEPHONE]_{CT} brought one...”
L+H* L-H%

Figure 6 Constant (2014), Figures 2.1 and 2.4.

To sum up, while there are striking similarities between the RFR and CT which serve as motivation for studying them together, the arguments presented above warrant to keep them as separate categories, both in terms of their prosody and their meaning.

6.2 L*+H elsewhere

Secondly, given that the L*+H has not received much attention in the semantics literature, it is worth asking where else it does occur outside the RFR and the DSC. There are two cases I’d like to put forth as potential empirical extensions to the work presented here, both pertaining to different readings of Focus operators.¹²

The first case concerns *at least*, which has been argued to be able to express both an epistemic reading, illustrated in (37a), and a concessive reading, shown in (37b) (Biezma 2013; Alrenga 2018). In addition to syntactic position constituting a disambiguating factor, the readings also seem to differ in the preferred pitch accent, with the epistemic reading preferring a flat H* or L+H* and the concessive reading most naturally occurring with a L*+H. While this may not be a strict requirement, the difference is illustrated on the ambiguous (38), where the epistemic reading

¹² A third, potentially relevant case might be that of meta-linguistic negation, depending on whether the relevant pitch accent is treated as L+H*, as in Meyer (2015), or L*+H.

seems sadly true, while the concessive reading simply concerning.

- (37) a. Joey beat Jason **at least** [twenty-eight]_F times in a row.
 b. **At least** Liverpool won the [Champions League]_F.
- (38) **At least** [some]_F people voted for Trump. (EPIST vs CONC)

A similar effect can be observed with *only*. While *only* is most widely discussed as an exclusive particle, it can also receive an evaluative scalar reading closer to *just*, illustrated in (39) (Alxatib 2017). As with *at least*, it seems that prosody can push the interpretation in one or the other direction in cases like (40), where a neutral L+H* merely asserts that John was the only person who came, whereas the L*+H additionally suggests that John's coming did little to contribute to the party.

- (39) J.D. Salinger **only** published [five]_F books in his life. (*≈ five isn't a lot*)
- (40) A: Who came to the party?
 B: **Only** [John]_F came. (EXCL vs SCALAR)

While these data resemble the prosodic effect on the meaning of *also* in the DSC, extending the proposed account to *at least* and *only* goes beyond the scope of the paper and will thus be left for future research.

7 Conclusion

This paper started with a puzzle about an acceptability difference between *also* and *too* and the role of prosody in contexts that gave rise to it. By comparing the distribution of two intonational contours, the Rise-Fall-Rise (RFR) and the novel Downscale-Contour (DSC), I argued for an analysis that treats their contribution as mirror-images. While the RFR presupposes the presence of a stronger alternative in the discourse, the DSC presupposes a weaker alternative, implemented as scalar Focus operators resembling *even*. To tackle the additive puzzle, I argued for a solution in terms of distinct scope options and furthermore suggested a way to derive the DSC and the RFR from additivity and exhaustification respectively in a compositional fashion by proposing an operator introduced by the L*+H pitch accent that requires the set of alternatives to be ordered.

A remaining task to render the account purely decompositional is to account for the difference in final boundary tones between DSC and RFR in a way that is extendable to other contours. One deeper issue could be that pitch accents and boundary tones might apply on different levels of meaning, in line with current trends to treat pitch accents in terms of Focus semantics - as done here - and boundary tones in terms of commitment (Jeong 2018; Rudin 2018, but see Biezma 2019; Westera 2017). Future work will have to show whether such approaches can be unified.

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Alexander Göbel
Department of Linguistics
N408 Integrative Learning Center
University of Massachusetts Amherst
650 North Pleasant Street
Amherst, MA 01003
agoebel@umass.edu