

Prosodic Focus*

Michael Wagner

March 10, 2020

Abstract

This chapter provides an introduction to the phenomenon of prosodic focus, as well as to the theory of Alternative Semantics. Alternative Semantics provides an insightful account of what prosodic focus means, and gives us a notation that can help with better characterizing focus-related phenomena and the terminology used to describe them. We can also translate theoretical ideas about focus and givenness into this notation to facilitate a comparison between frameworks. The discussion will partly be structured by an evaluation of the theories of Givenness, the theory of Relative Givenness, and Unalternative Semantics, but we will cover a range of other ideas and proposals in the process. The chapter concludes with a discussion of phonological issues, and of association with focus.

KEYWORDS: focus, givenness, topic, contrast, prominence, intonation, givenness, context, discourse

Cite as:

Wagner, Michael (2020). *Prosodic Focus*. In: Gutzmann, D., Matthewson, L., Meier, C., Rullmann, H., and Zimmermann, T. E., editors. *The Wiley Blackwell Companion to Semantics*. Wiley-Blackwell. doi: 10.1002/9781118788516.sem133

*Thanks to the audiences at the semantics colloquium in 2014 in Frankfurt, as well as the participants in classes taught at the DGFS Summer School in Tübingen 2016, at McGill in the fall of 2016, at the Creteling Summer School in Rethymnos in the summer of 2018, and at the Summer School on Intonation and Word Order in Graz in the fall of 2018 (lectures published on OSF: Wagner, 2018). Thanks also for in-depth comments on an earlier version of this chapter by Dan Goodhue and Lisa Matthewson, and two reviewers; I am also indebted to several discussions of focus issues with Aron Hirsch, Bernhard Schwarz, and Ede Zimmermann (who frequently wanted coffee) over the years. Thanks also to Meri Arushanyan and Sonora Grimsted for help with proofreading, and to Fiona Sewell for her help during the copy-editing process. This research was supported by funding from the SSHRC Canada Research Chair program.

Contents

1	Prosodic focus and alternatives	3
1.1	Contextual effects on prosodic prominence	3
1.2	Alternatives	5
1.3	The operator \sim	6
1.4	Individual antecedent or antecedent set?	7
1.5	Embedded foci and the scope of \sim	8
1.6	The phonological effect of \sim	9
1.7	Using Rooth's notation as a "normal form"	9
2	Focus types and other notions	10
2.1	Focused, given, new	10
2.2	Narrow vs wide focus	11
2.3	Identificational vs presentational focus	12
2.4	The overtiness of alternatives	13
2.5	Corrective focus and discourse relations	13
3	Empirical issues and theoretical choice points	15
3.1	Presupposed salience or presupposed truth?	15
3.2	Sentence focus and the question under discussion	16
3.3	Syntactic constraints on \sim	18
3.4	Why is focus marking (sometimes) obligatory?	18
3.5	Antecedence through entailment?	20
3.6	Isn't the notion of givenness sufficient?	22
3.7	Is pure givenness marking possible?	24
3.8	The contrastiveness requirement on alternatives	27
3.9	Ubiquitous \sim ?	28
3.10	F-less uses of \sim , or "relative givenness"?	29
3.11	Are all prominence shifts contrastive?	29
3.12	Focus and topicality	32
3.13	Why does given and topical material move?	33
3.14	Is F-marking needed?	34
3.15	Do foci have to move?	35
3.16	Why do some foci move?	36
3.17	Alternatives or Unalternatives?	38
4	Phonological issues	40
4.1	What is focus prosody?	40
4.2	Linear order and focus ambiguities	41
4.3	Further focus ambiguities: arguments and predicates	42
4.4	Syntactic focus projection	43
4.5	Purely phonological contrasts?	43
4.6	No semantic contrast without phonological contrast?	44
5	Association with focus	45
5.1	Is Association with focus obligatory?	45
5.2	Selective association	47
5.3	Association without focus	48
5.4	No association without (some) prominence?	48
5.5	Structured meanings	49
5.6	Syntactic association?	50
6	Do we need a semantic theory of prosodic focus?	51

1 Prosodic focus and alternatives

The prosodic prominence pattern of an utterance can affect its meaning, and sometimes even its truth conditions. Let's consider an example involving a conditional from Dretske (1972, 433). Here, and in the following, constituents that are crucially accented in an utterance will be marked with small caps, and constituents that are crucially reduced in prominence are underlined:

- (1) a. If Clyde doesn't MARRY Bertha, he won't be eligible for the inheritance.
- b. If Clyde doesn't marry BERTHA, he won't be eligible for the inheritance.

The pronunciation in (1a) could be truthfully used in a scenario in which, given the devious will of Clyde's aunt Maureen, Clyde will forfeit his inheritance by failing to legally tie the knot; and (1b) could be truthfully used in a scenario that given a different, but similarly devious will, he would do so by marrying someone other than Bertha. Using these utterances in the opposite scenario respectively would make them false. The difference in prosodic prominence leads to different inferences drawn from the conditional.¹

The pronunciation variants are said to vary in the "location of focus" ("focus on *marry*" or "focus on *Bertha*", e.g. by Halliday 1967b). The semantic interaction between prosodic focus and other parts of an utterance, here the conditional, is often referred to as "association with focus" (Jackendoff, 1972, 247ff.).

The goal of the first part of this paper is to provide an accessible introduction to one particular theory of prosodic focus and association with focus, the Alternative Semantics for Focus presented in (Rooth, 1992a). Another goal of the paper is to provide an overview of the empirical phenomena related to prosodic focus, and to clarify the often confusing terminology that is used to talk about them. Section 2, for example, discusses what we talk about when we talk about "types of focus." A third goal is to outline a variety of other theories, and some of the main theoretical issues in current debates about prosodic focus. We will look at issues concerning the grammar of prosodic focus (section 3), the role of phonology (section 4), and the nature of focus association (section 5).

1.1 Contextual effects on prosodic prominence

The context of an utterance can influence which prominence pattern is preferred. The following assertion would typically be pronounced with a falling intonation and a pitch accent on both *Ede* and *coffee*. In certain contexts, however, a pronunciation with a single pitch accent on the subject *Ede*, as in (2), seems preferable (Rooth, 1996a, 271):

- (2) EDE wants coffee.

Intuitively, the pronunciation in (2) serves the purpose of drawing attention to the subject. In order to achieve this effect, the speaker has to actively control the prominence on *Ede* and on the material of the VP to ensure that the subject is perceived as more prominent than the VP. The last (unreduced) pitch accent of an utterance is called the "nuclear pitch accent". Changes in where the nuclear falls are very salient, as will be discussed in more detail in section 4. The placement of the position of the nuclear pitch accent is often said to "mark focus": the pronunciation in (2), for example, marks that the subject is focused. But what does "mark focus" mean?

In order to felicitously assert (2), the speaker has to consider it true and wish to assert that Ede wants coffee, just as with the "default" prominence pattern with an additional accent on *coffee*. In addition, (2) has an interpretive effect, which appears to encode an anaphoric relation to an antecedent. One way to make it felicitous is to provide an antecedent that is parallel but for a substitution of the subject, as illustrated in (3). The antecedent can be given as part of an assertion

¹More specifically, it seems that the basic meaning of the conditional is enriched in different ways depending on the prosody. See Rooth (1999, 233) for improved versions of these examples, which avoid potential confounds.

(as in the utterance by A), or a question (as in the utterance by A'). Either of these contexts license prosodic focus marking in the response, whether the response goes against the proposition offered in the context (as in the utterance by B), or the responses asserts a proposition parallel to that offered in the context (as in the utterance by B'). Example (3) summarizes four possible dialogues:

- (3) A: Viola wants coffee. A': Does Viola want coffee?
 B: No, EDE wants coffee. "Correction"
 B': EDE wants coffee, TOO. "Parallelism"

Chomsky (1971) and Jackendoff (1972) argued that the anaphoric relationship between prosodic focus and context can be captured by positing that prosodically focused constituents get replaced by a variable, and that prosodic focus conveys that the existential closure of this template (here: *Someone wants coffee*) is presupposed or backgrounded. Rooth (1985, 1992b) builds on this account, and proposes that prosodic focus more generally signals the relevance of particular "alternatives" to an expression, as in the analysis of questions in terms of propositional alternatives in (Hamblin, 1973). Focus signals that there is a set of relevant alternatives to an expression, which can be generated by substituting the focused constituent in an expression (here: *Ede wants coffee*, *Caroline wants coffee*, ...).

Before we turn to the details of this theory, let's look at what others kinds of antecedents can license prosodic focus. The context does not actually have to mention any particular alternative, as illustrated in the following two dialogues:

- (4) A: Who wants coffee? Antecedent question
 A': Someone wants coffee. Antecedent with an indefinite
 B: EDE wants coffee.

The antecedent provided by A consists of a question. Questions are often analyzed as sets of propositions (Hamblin, 1973). A *wh*-question like *Who wants coffee?* can be analyzed as the set of propositions obtained by substituting the *wh*-word with all contextually relevant individuals. Introducing such a set of unspecified alternatives appears sufficient to license focus prominence in the response. If the prosody of B's response conveys that there are alternatives formed by substitutions for the subject, there is effectively a match between the denotation of the question and the focus alternatives evoked by the response. This is why focus licensing with a question is often called "question-answer-congruence."

The antecedent provided by A', on the other hand, is an assertion that expresses that someone wants coffee. As in the question, there is no mention any particular individuals. The two contexts are closely related: *Wh*-pronouns are often analyzed as indefinite pronouns, and some analyses of questions assume that the question uttered by A presupposes the truth of the existential proposition asserted by A' (cf. Krifka, 2019).

So far, we have seen that different types of linguistic substitutions in an antecedent can license focus. An overt linguistic substitution in the antecedent is sometimes not even necessary:

- (5) A: Viola wants coffee. "Evoked Alternatives"
 B: VIOLA wants coffee!
 B': VIOLA wants coffee?

The responses by B and B' in the two dialogues in (5) are possible, as long the speaker is trying to convey that it is remarkable that Viola, of all people, wants coffee. One could describe such uses of focus as "evoking alternatives" (Rooth 1992b called them "suggested contrasts").² Evoking alternatives is not always possible, and we will look at constraints on this in section 3.5.

²For discussions of such "accommodated contrasts" see also Wagner (2005, 254–255), Wagner (2006b, 297), and Rooth (2016).

So far we have only considered contexts that license prosodic focus on the subject. Similar contexts can be created that shift prominence to other types of constituents within a sentence. An example similar to (5) with focus on a modifying adjective is given in (6) (from Klassen and Wagner, 2017, 309):³

- (6) A: I brought an Alaskan wine.
B: An ALASKAN wine !/?

Although no overt substitute for *Alaskan* is mentioned, B’s response clearly evokes alternatives to the modifying adjective *Alaskan*. We can also recreate the other types of antecedents for the adjective case, as illustrated in the following four dialogues:

- (7) *Contexts licensing prominence on Alaska in B’s response:*
A1: They brought a wine from BC. (parallel to 3-A)
A2: Did they bring a wine from BC? (parallel to 3-A’)
A3: What kind of wine did they bring? (parallel to 4-A)
A4: They brought some wine. (parallel to 4-A’)
B: They brought an ALASKAN wine.

In sum, prosodic focus can be used in corrections, in cases of parallelism, in question–answer congruence, in responses to indefinite antecedents, and to evoke alternatives. One of the most widely assumed semantic accounts of prosodic focus treats all of them as a sole phenomenon: The Alternative Semantics for Focus.

1.2 Alternatives

In Rooth’s (1992b) Alternative Semantics, every expression comes with its regular meaning (the “ordinary semantic value”; notation: $\llbracket \dots \rrbracket^O$), and a second meaning representation, a set of alternatives (“the focus–semantic value”; notation: $\llbracket \dots \rrbracket^F$). The focus–semantic value is involved in the interpretation of prosodic focus, and can interact with other operators through association with focus.

The focus–semantic value of an expression is determined by substituting alternative meanings for constituents that are focused. In this theory, these are exactly those constituents that carry a syntactic F-marker. Any constituent that is marked with the syntactic diacritic F varies in the focus–semantic value over alternative meanings of the same semantic type. The focus–semantic value for *Ede* in (2), for example, is the set of individuals D_e :

- (8) $\llbracket \text{EDE}_F \rrbracket^F = \{ y \mid y \in D_e \} = \{ \text{Ede, Caroline, Viola, Gerrit, ...} \}$

The focus–semantic value of an expression without any F-marker just consists of the set containing the regular meaning of that expression:

- (9) $\llbracket \text{wants coffee} \rrbracket^F = \{ \lambda w. \lambda x. x \text{ wants coffee in } w \}$

The focus–semantic value for the entire proposition can be composed from the alternatives of its parts by applying function composition between the predicate *wants coffee* and the alternatives to the subject (see Rooth, 2016, for more details):

- (10) $\llbracket \text{EDE}_F \text{ wants coffee} \rrbracket^F = \{ \lambda w. y \text{ wants coffee in } w \mid y \in D_e \} = \{ \text{Ede wants coffee, Caroline wants coffee, ...} \}$

³See also Wagner (2005, 2006b).

The focus-semantic value is restricted to alternatives which are contextually relevant (e.g., the contextually relevant people who might want coffee). What counts as relevant is constrained by world knowledge, *used* seems like a plausible alternative to *new* when modifying *bicycle*, but not when modifying *boyfriend* (cf. Wagner 2005, 253 and Jackendoff 1972, 242).

Since a constituent marked by F is substituted in the focus semantic value as a whole, nesting F-markers has no interpretive effect. In the following example, substitutions of *wants coffee* may vary in what Ede wants, but they may also include other substitutions of the VP. The embedded F-marker on *coffee* has no semantic effect:

$$(11) \quad \llbracket \text{Ede} [\text{WANTS COFFEE}_F]_F \rrbracket^F = \llbracket \text{Ede} [\text{WANTS COFFEE}]_F \rrbracket^F = \{ \lambda w. \text{Ede } y\text{-es in } w \mid y \in D_{\langle e, t \rangle} \} \\ = \{ \text{Ede wants coffee, Ede is napping, Ede wants tea, ... } \}$$

Effects observed when processing prosodic focus support the idea that focus prosody evokes alternatives. When a sentence carries prosodic focus, listeners show better recall for words which constituted relevant alternatives (Spalek et al., 2014); priming studies suggest that prosodic focus activates alternatives, and not just any semantically related word (Braun and Tagliapietra, 2010). Wagner and Klassen (2015) and Klassen and Wagner (2017) show production evidence that in the absence of appropriate alternatives, prosodic prominence shifts are infelicitous, even if other factors (repetition, predictability) would seem to support reduction. Kim et al. (2015) showed evidence from online processing of the effect of contextual domain restriction on focus alternatives.

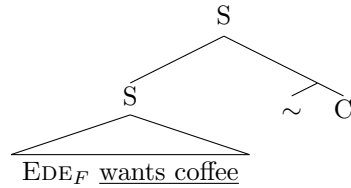
1.3 The operator \sim

Rooth attributes the interpretive effect of the alternatives evoked by prosodic focus to a presuppositional focus operator \sim . It operates over the focus-semantic value of the constituent ϕ it attaches to. \sim also takes an second argument, an unpronounced pronoun C , and introduces the following presupposition:

- (12) The meaning of \sim (Rooth, 1992b, 1996a):
Where ϕ is a syntactic phrase and C is a syntactically covert semantic variable, $\phi \sim C$ introduces the presupposition that C is a subset of $\llbracket \phi \rrbracket^F$ containing $\llbracket \phi \rrbracket^O$ and at least one other element.

The full syntactic representation of (2) under this theory is as follows:

- (13) A: Who wants coffee?
B:



Let's unpack this a bit. Why a hidden pronoun? Alternative Semantics treats prosodic focus marking as a form of pronominal anaphor. Personal pronouns are standardly analyzed as carrying presuppositions about the discourse salience and unique identifiability of antecedents. The pronoun posited in (12), on the other hand, does not pick up an individual antecedent, but a set of alternatives. Most theories of focus are anaphoric, but not all are formalized using an actual pronoun—but this is to some extent just a notational choice. The underlying idea may be that all anaphoric relations are the result of a (sometimes unpronounced) pronoun.

Which sets of alternatives count as valid antecedents for this pronoun? This is where \sim comes in. The operator requires that the set of alternatives denoted by the pronoun (which is just the alternative set provided by the antecedent) must be a subset of the focus-semantic value of the

constituent that \sim attaches to. In the case in which \sim attaches to *Ede_F wants coffee*, the focus-semantic value comprises the set of all propositions of the form *x wants coffee*. So the antecedent for the pronoun C has to be a subset of this set or identical to it. In addition, the set has to contain at least the ordinary value (*Ede wants coffee*) and one other alternative. Using the operator \sim will only be felicitous in the presence of an antecedent that meets this condition.

In our example (13), the antecedent for \sim is given in the form of a question, which denotes the set of alternatives of the form *x wants coffee*. This set is identical to the focus-semantic value of *Ede_F wants coffee*, so it meets the condition of being a subset of the focus-semantic value, albeit not a proper subset. It also meets the condition that it encodes more than just the ordinary semantic value of the answer, since it encodes all possible substitutions of *Ede* of the same semantic type, that is, all contextually relevant individuals.

By contrast, the following context does not meet the condition introduced by \sim :

- (14) A: What's up?
B: #Ede_F wants coffee \sim C.

The only available antecedent for C in this dialogue is the question *What's up?*, which denotes the set of all propositions that describe what might be up. This set includes *Ede wants coffee*, but it also includes the proposition *Ede wants tea*, or *It's raining*. The latter two propositions are not members of the focus-semantic value of *Ede_F wants coffee*. In the absence of an appropriate antecedent, the prosody of the response leads to infelicity.

We noted that nesting F-markers has no semantic effect in Alternatives Semantics. Nesting multiple instances of \sim , however, does have an interpretive effect:

- (15) \sim [Ede_F [\sim [wants_F coffee]]].

The outer \sim operator in (15) would require focus antecedents of the form *x wants coffee*. Each alternative including the asserted one introduces a further focus presupposition introduced by the inner \sim -operator, namely that there is a salient antecedent set of the form *y-es coffee*, so the utterance has two focus presuppositions. Such nestings of \sim have been employed in different ways to account for contrastive topics (Wagner, 2008; Tomioka, 2009, 2010; Wagner, 2012a) and second occurrence focus (Rooth, 2010; Büring, 2015a).

The \sim operator is assumed to indiscriminately apply to all alternatives introduced by F-marked constituents in its scope. Once \sim is applied to the focus-semantic value of the constituent it attaches to, the alternative for that constituent are often assumed to be “consumed”, and the focus-semantic value of the overall expression is reset to just the ordinary semantic value. The higher \sim operator in (15) would then not have access to the focus alternatives introduced below the lower operator (the alternatives introduced by *wants_F*. This is often talked about as \sim “binding” the focus alternatives introduced by F-marked constituents, although no binding in the technical sense is assumed.⁴ The analyses of contrastive topics in Tomioka (2009, 2010) and Wagner (2008, 2012a), however, crucially rely on the assumption that \sim does not consume the alternatives, but *can* “pass them up” to a higher \sim operator. See also Bade and Sachs (2019) for a recent discussion of this issue.

1.4 Individual antecedent or antecedent set?

The contribution of \sim is to require a contextually salient antecedent *set* of alternatives. This immediately raises the question of what to do with cases in which focus only provides an individual antecedent, as in (3). Rooth (1992b) actually proposed two separate \sim operators, in order to account for such cases where the antecedent is a single alternative, and distinguished the “individual case” from the “set case.”

⁴Although some theories do in fact analyze focus in terms of variable binding, as we will see in section 5.2.

This additional entry for the individual case will not be of help for cases of evoked alternatives, such as (5) and (6). Pronouncing *Viola wants coffee?* with prominence on *Viola* can “evoke” alternatives, even in the absence of an overt focus antecedent. To explain the possibility of evoking alternatives, we need to assume that in certain contexts, a set of alternatives can be pragmatically constructed. In a theory like Rooth’s in which focus introduces a presupposition this is a case of presupposition “accommodation” (cf. Von Stechow, 2008). Depending on what we know about Viola, we might be surprised that of Viola all people want coffee, and accommodating this would permit us to construe an antecedent set. Similarly, talking about Alaskan wine can easily prompt someone to evoke alternatives to *Alaskan* given our world knowledge about wine.

Once we acknowledge that accommodation of an alternative set is necessary to understand (5) and (6), Rooth’s “individual case” can be dispensed with: The presence of an explicit alternative in (3) should make accommodating such a set even easier than in the case of (5), where no alternative is mentioned, so introducing a special provision for individual antecedents for (3) is unnecessary. Rather, we can assume that \sim in fact *always* requires a set as an antecedent, but that providing one explicit contrastive alternative is usually sufficient to construct such a set. Minimally, it could be the set consisting of the explicit alternative in the antecedent and the regular meaning of the focused constituent, as already argued in Klassen and Wagner (2017).

Reducing the set case to the individual case, on the other hand, would be harder: as we have seen, it is not generally necessary that we can name an actual alternative for prosodic focus to be possible. In the case of (5), for example, I might only believe that Viola is unlikely to want coffee, but not have another specific individual in mind that is more likely to want coffee.

Uses of foci with accommodated antecedent sets (“evoked alternatives”) may be very frequent (Riester, 2015). This raises the worry that a theory that allows accommodation will overgenerate, and cease to be predictive. Clearly, prosodic focus is not always possible, and yet cases like (5) and (6) show that sometimes, accommodation of a focus antecedent is possible. We will return to the question of how accommodation is restricted in section 3.5.

1.5 Embedded foci and the scope of \sim

One major innovation of Rooth’s theory over its predecessors was to attribute the interpretive effect of prosodic focus to a syntactic operator, \sim , which can attach at anywhere in the tree. Prior theories, such as Chomsky (1971) or Jackendoff (1972) assumed that “focus” is always “sentence focus.” In Roothian terms, this means that \sim always attaches to the root, and ranges over alternative sentences or utterances.

If \sim can attach in other places, the exact semantic contribution of \sim will vary depending on the attachment site. This is parallel to other syntactic operators (e.g. *even*, *also*, *too*). The syntactic flexibility of \sim enables the theory to account for a much wider set of phenomena. Chomsky (1971, 205), for example, noted a case of “contrastive intonation” that fell outside of what theories of sentential focus at the time could explain, including the one he was proposing:

- (16) John is neither EASY to please, nor EAGER to please, nor CERTAIN to please, nor INCLINED to please, nor HAPPY to please, ...

Chomsky (1971) states that “In ‘parallel constructions’, in some sense of this notion that has never been quite clear, contrastive intonation is necessary.” Rooth’s “syntactification” of the contribution of focus into the operator \sim provided a way to explicate the notion of “parallel construction”: This example can be analyzed as involving multiple \sim , one for each conjunct, which need to be parallel because they mutually provide antecedence for their respective \sim operators:

- (17) John is neither [easy_F to please] \sim C₁, nor [eager_F to please] \sim C₂, ...

In the following, we will call the constituent that \sim attaches to its “scope”.⁵ When \sim does not attach to the root, we can call this an “embedded focus.” The scope of \sim determines what kind of alternatives are required. When \sim attaches to a node that denotes a proposition, it will require a set of propositions as its antecedent (effectively, a question). In (17), the antecedent of each \sim operator must be a set of predicates.

We can simplify the notation of the focus structure by simply marking the scope of \sim , and omit the operator itself. In the following, we will use “hooks” to indicate the presence of a focus operator and its scope at the same time. We will add a superscript for the index of the hidden pronominal argument where necessary. So (18b) will simply be a shorthand for (18a):

- (18) a. $[[\text{EDE wants coffee}] [\sim C_7]]$
b. $\lceil \text{EDE wants coffee} \rceil^7$

We will continue to refer to the operator as “ \sim ” (pronounced: “squiggle”).

1.6 The phonological effect of \sim

How does \sim affect prosody? Jackendoff (1972, 237) characterizes the phonological effect of focus as follows: “If a phrase P is chosen as the focus of a sentence S, the highest stress in S will be on the syllable of P that is assigned the highest stress by the regular stress rules.”

In Roothian terms, making the generalization tied to the S-node implies that \sim is attaches to the root. Jackendoff’s generalization then requires that the main prominence within the sentence must be within the F-marked constituent. Rooth (1992b) and Truckenbrodt (1995) generalize this idea to embedded foci and argue that \sim constrains the phonological prominence relations in its scope. This is captured in Truckenbrodt (1995, 160) with the following constraint (where “DF” is the scope of the \sim that binds the F):

- (19) If F is a focus and DF is its domain, then the highest prominence within DF will be within F.

A disadvantage of this formulation is that it is not straightforward how to apply this constraint in the presence of multiple F-markers in the scope of \sim . Wagner (2005) presents a recursive account of prosody assignment that results in the following generalization:⁶

- (20) Within the scope of \sim , non-F-marked material is prosodically subordinated to F-marked material.

Prosodic subordination implies that a constituent is metrically less prominent than the constituent it subordinated to, see the discussion of phonological issues in section 4 for more details. See Truckenbrodt (2012) and Truckenbrodt (2013) for a discussion and alternative formulations of the constraint, and also the discussion in section 4.

In our example (2), the constraint in (20) has the effect that it forces the VP to be less prominent than *Ede*.

1.7 Using Rooth’s notation as a “normal form”

To recap: The ingredients of Rooth’s (1992b) theory are the following: It assumes focus-semantic values for all constituents, which are determined by the distribution of F-markers; it assumes a syntactic focus operator \sim which operates over the focus-semantic values; and it assumes a constraint

⁵It is sometimes also called the “domain” of \sim .

⁶Note that this analysis also assumes that every \sim has an F-marked constituent in its scope—we will see later that the constraint needs to change if this is not the case.

that regulates how the focus operator affects the prosodic realization of the material in its scope. This theory makes many empirical predictions, which we will critically explore below.

Apart from contributing a *particular* theory of focus, Rooth (1992b) also provides us with a notation that is useful in clarifying focus phenomena. Common terms like “focus”, “givenness”, or “contrast” often remain undefined, and are used in different ways by different authors. We can make these terms precise in reference to Rooth’s notation.

The notation is also useful in clarifying points of typological variation. Some languages appear not to mark focus prosodically, like certain African languages (Güldemann et al., 2015), or the Mayan language K’iche’ (Burdin et al., 2015). Do these lack \sim altogether, or do they just lack the phonological means to encode the scope of \sim ? Do languages that appear to use focus in more restricted contexts vary in the semantics of \sim , or maybe in the syntactic scope possibilities of \sim (Vander Klok et al., 2018)?

Using Rooth’s notation is of course not a neutral choice, but arguably the notation captures some basic primitives that any grammatical theory of focus will need to include in some form. One of the biggest obstacles in comparing current ideas about focus is arguably that they are formalized in very different ways. Rooth’s notation can be of help here: Our strategy will be to “translate” hypotheses into the Roothian notation. For example, a particular proposal might be characterizable by a difference in the semantic content of \sim , or by a difference in the assumptions about the syntactic distribution of \sim , F, or by differences in the assumed general constraints on alternative sets, or by how \sim exerts its phonological effects.

In reviewing different accounts I will give special attention to the proposals in Schwarzschild (1999) and Wagner (2005, 2006b), but we will also cover a range of other theoretical claims and perspectives, including the recent theory of Unalternative Semantics (Büring, 2015b, 2016a).⁷

I hope it will become clear how expressing different views in Roothian notation can have therapeutic effects. It helps with making theoretical choice points more precise, a useful exercise even if one ultimately prefers a different notation or framework. Roothian notation limits us to grammatical accounts of focus, which are the focus of this chapter—but in the final section we will briefly discuss some “extra-Roothian” approaches, which try to explain prosodic focus purely in terms of processing or pragmatic reasoning.

2 Focus types and other notions

2.1 Focused, given, new

The notion of the “scope” of \sim (i.e., the constituent \sim attaches to) can be used to clarify some important terms. A linguistic expression might have a number of different relations to \sim and F:

- (21) i. *Marked as focused*: Any constituent in the scope of \sim that is F-marked (and not already bound by an intervening \sim)
- ii. *Marked as given*: Any constituent in the scope of \sim that is not F-marked and is not within an F-marked constituent
- iii. *Not marked as given or focused*: Any constituent that is not in the scope of an \sim -operator, or is within the scope of a \sim but within an F-marked constituent

Let’s look at an example:

- (22) A: What about Ede?
- B: \lceil Ede \lceil wants coffee $\rceil_F \rceil$

⁷For discussion of a broader range of phonemata and frameworks see Erteschik-Shir (2007), and see Zimmermann (2016) for an extensive bibliography on information structure.

According to our definitions,, the constituent *Ede* is marked as given in (22): each alternative has to involve *Ede*; and the constituent *wants coffee* is marked as focused: each alternative must include an alternative to *wants coffee*.

The word *wants* in (22), on the other hand, is not marked as either given or marked as focused, since the VP that contains it is F-marked. This means that the focus alternatives that \sim ranges over do not necessarily have to contain this word (which would be true of material marked as given), nor do the alternatives have to include an alternative to this word (which would be true if it were marked as focused). For example, *Ede is away* is a valid alternative, but *is away* is an alternative the entire VP, not to *want*. In an utterance without any \sim , all words and constituents will have this status, and prosody will be determined by the principles that guide default stress.

We will see that these definitions are useful in understanding the linguistic phenomena typically associated with the intuitive notions of being “given,” “contrastive,” or “new.” It is crucial, however, to keep in mind that the linguistic notion of, say, “marked as given” does not directly correspond to the semantic/pragmatic notion of “being given,” just as the tense marked on a verb does not correspond directly to a notion of time.

Different authors have used different definitions of “being given”. The psychological literature (e.g. Garrod and Sanford, 1982; Grosz et al., 1983) characterizes a notion of givenness as cases in which referents/meanings are already in the “focus” of attention (note that this is a different sense of “focus”); Krifka (2008) argues that a constituent is given if it is part of the “immediate common ground”; Schwarzschild (1999) defines a notion of givenness that requires the meaning of an expression to stand in an entailment relation to a linguistic antecedent. The notion of “marked as given” defined here may make it necessary to be “given” in one or all of these senses, depending on how we define the precise contribution of \sim . In our present definition, constituents marked as given simply have to be part of each alternative within the antecedent alternative set.

It has often been argued that one needs to distinguish a scale of degrees to which a constituent can be “given” (Prince, 1981; Baumann and Riester, 2013), or degrees of being contrastive (Calhoun, 2010). Prince (1981, 237) distinguishes between “familiar” entities that were explicitly mentioned (“textually evoked”), or can merely be “inferred.” Baumann and Riester (2013) discuss evidence that such distinctions have prosodic consequences. On the face of it, this suggests that Rooth’s theory is too sparse, and that we have to enrich it in a way that will allow us to define notions such as “marked as inferable” or “marked as textually evoked”. It is possible, however, that such differences can be reduced to variability in the likelihood of marking givenness: a constituent that encodes merely inferable information might just be less likely to be marked as given (in our sense), precisely because it requires an inference to do so.

The sparseness of Rooth’s theory does not imply that a richer taxonomy of pragmatic relations shouldn’t be relevant, but it predicts that we will discover explanations outside of focus theory for their effects. This might turn out to be false. Katz and Selkirk (2011), for example, argue that even within the scope of \sim , we need to distinguish three kinds of constituents, focused, given, and new ones. This goes beyond what can be expressed with Rooth’s formalism as is (see the discussion in Rooth, 2014).

2.2 Narrow vs wide focus

Sometimes the term *contrastive focus* is used simply to describe utterances in which a single word or constituent within a sentence is singled out prosodically (cf. Gussenhoven, 2007). Ferreira (1993) reports on an experiment comparing utterances with and without “contrast” (as indicated by orthography):

- | | | | |
|------|----|--------------------------------------|---------------------|
| (23) | a. | The crate contains the missing book. | Neutral condition |
| | b. | The CRATE contains the missing book. | Prominent condition |

From the point of view of Rooth’s account of focus, we can distinguish these by the attachment site of the F-marker:

- (24) a. $\sim \lceil [\text{The crate contains the missing book.}]_F \rceil$ (neutral condition)
 b. $\lceil \text{The } \text{CRATE}_F \text{ contains the missing book.} \rceil$ (prominent condition)

We can define a richer inventory of terms relating to the “breadth” of focus (Ladd, 1980, 75), such as “narrow”, “broad” (e.g. Eady et al., 1986), or “wide”, just based on where F attaches:

- (25) Explicating focus breadth
- a. *Narrow focus on subject* $\llbracket \text{EDE}_F \text{ wants coffee} \rrbracket^F = \{\lambda w. y \text{ wants coffee in } w \mid y \in D_e\}$
 - b. *Narrow focus on object*
 $\llbracket \text{Ede wants } [\text{COFFEE}]_F \rrbracket^F = \{\lambda w. \text{Ede wants } y \text{ in } w \mid y \in D_{\langle e, t \rangle}\}$
 - c. *Broad focus’ (VP-Focus)*
 $\llbracket \text{Ede } [\text{wants COFFEE}]_F \rrbracket^F = \{\lambda w. \text{Ede } y\text{-es in } w \mid y \in D_{\langle e, t \rangle}\}$
 - d. *Wide focus*
 $\llbracket [\text{Ede wants coffee}] \rrbracket^F = \{\lambda w. y \text{ holds in } w \mid y \in D_{\langle s, t \rangle}\}$

The attachment site of F might also characterize some other “types of focus”. At least according to Richter (1993), Samko (2016) and Goodhue (2017, 2018), the notion of *polarity focus* (also called “verum focus”) can be characterized simply as F attaching to the head expressing polarity with the corresponding \sim operator attaching to the node denoting the proposition.

“Wide focus”, as in (25d), may in fact simply reflect the *absence* of a \sim operator in the structure altogether. Note that the focus-semantic value of wide focus as in (24b) and (25d) would be the set of all possible propositions. In such cases, the constraint imposed by \sim , namely that the context is a subset of the set of all possible propositions, is so weak that it is arguably equivalent to not having a focus operator at all. It is not clear that given Rooth’s theory “wide focus” and “no focus” are empirically distinguishable here, since the effect of \sim would not be felt. This might be generally true when the constituent that \sim attaches to is itself F-marked (see also the discussion in Rooth, 2014).

2.3 Identificational vs presentational focus

É. Kiss (1998) distinguishes a notion of “identificational focus” from a notion of “presentational focus”. Evidence comes from Hungarian, where fronted foci (which Kiss argues to be “identificational”) differ in from in situ foci (which Kiss argues to be “presentational”) in the meaning they contribute. Fronted foci, as already observed in Szabolcsi (1981), receive an exhaustive interpretation, similar to clefts in English.

This distinction seems to go beyond what we can express within the confines of Rooth’s formalism. However, Horvath (2007) attributes the interpretive effect of focus-fronting to an exhaustifying operator that associates with focus and triggers the movement. Identificational focus might therefore be similar to uses of prosodic focus with *only*, and involve a focus-sensitive operator that contributes additional meaning (see section 5 for focus association and why this might correlate with movement). If this is the right characterization of focus fronting in Hungarian, then identificational focus should be treated as a separate “type of focus” only to the same extent that one could talk about “only focus” or “even focus”. The added semantic effect does not call for an enrichment of our account of prosodic focus (see also the discussion in Horvath 2007, and Zimmermann and Onea 2011).

How could we characterize the notion of “presentational focus” within Alternative Semantics? One way to think about presentational focus is that it simply comprises all material that is neither marked as given (contained in the antecedent) nor marked as focused (having a substituted alternative in the antecedent). So “presentational focus” might just be the term we use to indicate the absence an anaphoric requirement on an expression.

Focus fronting is also possible in English, but does not lead to a cleft-like semantics, unlike in Hungarian:

(26) 「COFFEE_F Ede wants」

The use of this construction is restricted, but not in the way focus fronting is in the Hungarian. Birner and Ward (1998) argue that using focus-fronting (as well as topicalization) requires the fronted constituent to create a “link” to the prior context. For example, the utterance in (26) should only be felicitous if *coffee* can act as a link, which means that there must be a set that includes both *coffee* and some other element that is already discourse salient. In Rooth’s theory, it is unclear how one would prevent this condition to be fulfilled whenever focus can be marked, since prosodic focus always requires a discourse salient set. It seems then that the theory falls short of explaining the use-conditions of (26).

It is possible, however, that the preference for the canonical word order, and the restrictions on the use of the marked word order in (26), can be explained in terms of processing. Speakers have been shown to choose non-canonical word-orders only when they enable them to plan more accessible constituents earlier relative to those that are less accessible (see Wagner, 2016, for a review). Maybe the word order in (26) is in principle generally available, but only chosen if the fronted constituent (in this case *coffee*) was made accessible by the context while *Ede* is less accessible. This would be compatible with the generalization proposed in Birner and Ward (1998) that focus fronting requires a discourse link, but in addition it predicts that *coffee* must be accessible relative to other material in the utterance. Otherwise, constituents that encode subjects, agents, and human referents like *Ede* are simply more accessible and planned earlier, which means that there is no reason not to use the canonical word order. This could in principle explain intuitions about the discourse constraints on using fronted constituents, without enriching the theory of focus.⁸

2.4 The overtiness of alternatives

The term “contrastive focus” is sometimes used simply to describe a situation in which a particular alternative is mentioned in the context, as in (3). We argued that nothing special needs to be said about such cases in Rooth’s theory, since even in those cases the salience of a set of alternatives can be assumed. However, if overt alternatives led to a different phonological realization focus, this would not be expected by Alternative Semantics.

Wagner et al. (2010) report an experiment where the presence of alternatives was manipulated and the discourse relation held constant, and found that focused constituents were in fact slightly reduced when a whole set of alternatives including the asserted one were previously mentioned. This reduction effect might just be a low-level repetition effect. I’m not aware of a study that tested whether focused words are boosted when one or more explicit alternatives are mentioned in the context, but the asserted alternative has not been, while holding other factors constant.

See Repp (2016) for a more extensive discussion of “overtiness” and the role it may play in defining different notions of “contrast”.

2.5 Corrective focus and discourse relations

Ladd (2008, 233–234) notes that in Italian, prominence relations are often not changed in situations where they would be in English (see Swerts et al., 2002, for experimental evidence). One type of case in which Ladd reports prominence is shifted in Italian are corrective utterances, that is, utterances

⁸Fanselow and Lenertová (2010) note a further complication when looking at focus fronting: apparent fronted foci in some languages may not actually correspond to what is in focus, but rather be able to signal wide focus, in addition to conveying that the utterance is an exclamation.

which contradict and “correct” a previous assertion. This use of prosodic focus is sometimes called “corrective focus” (also called “contrastive focus” in Chafe 1974).

Vander Klok et al. 2018 show experimental evidence that the situation in French is similar to what Ladd observes for Italian: embedded foci similar to (16) are not prosodically marked in French (as shown in (27a), the prominence remains on *froide*). However, focus is marked prosodically in corrective situations (as shown in (27b), prominence shifts to *soupe*):

- (27) a. *Antecedent within same sentence: No Prominence shift*
 A: J’ai entendu dire que Guillaume irait à un pique-nique.
 ‘I heard that Guillaume will go to a picnic.’
 B: Ouais, il va apporter une salade FROIDE et une soupe FROIDE.
 ‘Yeah, he is going to bring a cold salad and a cold soup.’
 b. *Antecedent in prior, corrected statement: Prominence Shift*
 A: Pour le pique-nique de cet après-midi, Guillaume va apporter une salade froide.
 ‘For the picnic this afternoon, Guillaume is going to bring a cold salad.’
 B: Non, il va apporter une SOUPE FROIDE.
 ‘No, he’s going to bring a cold soup.’

Suppose the use of prosodic focus was indeed restricted to corrective statements: what would that tell us about focus marking? It could be that the presupposition introduced by \sim in such a language somehow directly requires that the focus is corrective. Gussenhoven (2007, 91), for example, argues that corrective focus “marks a constituent that is a direct rejection of an alternative.” But constituents can hardly reject each other, so what must be meant here is that the focus antecedent is required to come from a prior utterance that stands in a corrective discourse relation to the present one. Note that standing in a corrective discourse relation is orthogonal to whether there is an antecedent for focus marking:

- (28) A: Are they singing? B: No, it’s a recording.

Ladd’s concept of corrective focus requires a focus antecedent (as in English), and the present utterance has to stand in a corrective discourse relation to the one containing the antecedent (unlike English). This could be accomplished by enriching the semantics of \sim to restrict the discourse relation in which utterances stand in, in addition to introducing a focus presupposition. Vander Klok et al. (2018, 11) suggest that corrective focus might “suggest an amendment to a previous speech act”. In order to be able to build this into \sim , the operator would need to have access to the speech act type of the utterance. Vander Klok et al. (2018) argue that a ‘corrective focus’ in this sense therefore requires that \sim attaches very high, arguably to the root of an utterance.

This way of looking at corrective focus opens another possibility, however: maybe \sim in French does not actually restrict the discourse relation. Rather, its difference from English may be that \sim is syntactically restricted to attach to the root. This may seem like a non-starter, since other focus operators, such as the equivalent of *even* or *only*, are happy to attach within an utterance instead of at the root. But as we will see in section 5, the relationship between focus operators and \sim is more tenuous than often assumed, and they may well obey different syntactic constraints.

Vander Klok et al. (2018) tried to test this “scope hypothesis” against (their reconstruction of the) “corrective focus hypothesis” in French, with somewhat inconclusive results. Klassen et al. (2016) explore the same question for Spanish, based on corrective imperatives, and find evidence that also in Spanish, focus is only prosodically marked in corrective utterances. This shows that the generalization is not tied to corrective assertions alone.⁹

⁹Yet another possibility is that French and Spanish differ from English in that \sim has existential force in English but universal force in Romance languages—so *all* alternatives have to have a certain shape for prosodic focus to be licensed. More studies will be needed to tease apart these possibilities.

Gussenhoven (2007) points out, based on evidence from Frota (1998), that in European Portuguese, corrective foci get a distinct intonational realization. This raises yet another possible analysis of why focus marking is sometimes impossible: Could it be that only certain intonational tunes allow for prominence shifts for focus reasons? Goodhue et al. (2016) show that in English, choosing the contradiction contour over a falling intonation can sometimes void the need to shift prominence for focus reasons; and Schlöder (2018) argues that choosing the rise-fall-rise contour interacts with prominence placement as well. Unless we can explain such effects based on the meaning of the tune and how that interacts with focus alternatives, this might require a revision of Alternative Semantics, since the use of \sim should be blind in principle to the choice of tune. Schlöder (2018), however, proposes explaining such interactions by positing several, tune-specific semantic entries for \sim .

Other discourse relations than that of corrections maybe be relevant for focus prosody. Zimmermann (2008, 354) defines a notion of “contrast” as follows: “Contrastive marking on a focus constituent α expresses the speaker’s assumption that the hearer will not consider the content of α or the speech act containing α likely to be(come) common ground.” It seems plausible that this discourse relation could be relevant for focus marking, and Zimmermann (2008) shows evidence from a range of languages that it is. This notion is orthogonal in principle to the question of whether an utterance is corrective. It is possible that whether and how prosodic focus is marked varies depending on the discourse relation, at least for some languages or some tunes. If so, this might require changes to Rooth’s theory.

This concludes our incomplete review of “focus types”. It should be clear from the previous sections that the term “contrastive focus” is best avoided, since it has been used in so many different senses. See Repp (2016) for a discussion of other definitions of “contrast”, and additional discussion of the role of discourse relations.

3 Empirical issues and theoretical choice points

3.1 Presupposed salience or presupposed truth?

Unlike many other presuppositional operators, the presupposition of the \sim operator is about the salience of the antecedent, not about truth or the “common ground,” i.e. the context set comprising the shared knowledge in a conversation (usually defined as a set of possible worlds, following Stalnaker, 1978). In the words of Chafe (1974), it is about what the speaker is “conscious” of. What is presupposed as true often cannot be marked as given, and material can be marked as given without any truth conditional presupposition. Consider first the complements of factive predicates, which are standardly assumed to encode presupposed information, and yet their prosodic prominence depends on salience, not presupposed truth, and yet their prosodic prominence depends on salience, not presupposed truth (Wagner, 2012b, 108):

- (29) Mary wanted to go swimming in the lake.
 - a. She didn’t realize that it was too COLD.
 - b. She didn’t REALIZE that it was too cold.

The pronunciation in (29b) would be felicitous only in a context where the lake being too cold has been made salient beforehand. Both (29a) and (29b), however, presuppose that the lake is too cold. The prosodic reduction of the complement has been shown to modulate whether the presupposition arises for certain factives like *notice* (Tonhauser, 2016), but generally, prosodic focus marking appears to be orthogonal to the presence of a factive presupposition (and the prosodic intuitions in our example are the same with *know*).

Similar examples showing that presupposed content is not automatically prosodically reducible can be constructed with other presupposition triggers like clefts (Wagner, 2012b) and definite descriptions (Wagner, 2012b; Büring, 2016b). Information that is part of the common ground is not

automatically salient enough to be prosodically reduced.

Conversely, prosodic focus does not imply truth. Take A’s question below. The use of the negative-polarity *any* suggests that whether someone dropped a ball is not established. And yet focus-marking in the response is possible. In fact, as already observed by Jackendoff (1972, 246), prosodic focus is possible in the very utterance that denies the alleged presupposition of prosodic focus in B’:

- (30) A: Did anyone drop the ball?
 B: 「JANE did」.
 B’: 「NO ONE did」.

The presupposition of prosodic focus appears not to relate to truth in the common ground, but rather to salience. While this insight is not new (see, e.g., Jackendoff, 1972; Rochemont, 1986), recent proposals have given us new tools with which to model what this might mean. Roberts (1996, 2012) uses a notion of “Question under discussion” (QUD); Farkas (2010) a notion of “being on the table”; Zimmermann and Onea (2011) discuss a notion that focus might single out an *evaluation set* in the common ground against which an utterance is evaluated; Ciardelli et al. (2018) discuss a notion of “issue” that is used in accounting for focus-related phenomena.

Another perspective on why salience matters is that prosodic focus requires a linguistic antecedent. The salience requirement of prosodic focus is similar to the anaphoric requirement introduced by pronouns or VP ellipsis. Prosodic focus is less similar to presupposition triggers like *again* and more similar to presupposition triggers like *too*, which Kripke (2009) showed is inherently anaphoric. Heim (1990) captures this by positing a hidden pronoun for *too*, similar to the one posited for \sim in Rooth (1992b). Similarly, Hankamer and Sag (1976) argue that VP ellipsis requires a linguistic antecedent, and report the following judgment:

- (31) (Hankamer attempts to stuff a 9-inch ball through a 6-inch hoop.)
 a. Sag: It’s not clear that you’ll be able to do it.
 b. Sag: # It’s not clear that you’ll be able to.

Merchant (2004), among others, disagrees with the judgment, and shows various naturally occurring examples similar to (31). It seems that antecedents can be accommodated in contexts that make the intended ellipsis as obvious as (31). Hankamer and Sag (1976) are correct, however, in their claim that accommodating an antecedent for ellipsis is much more restricted than for certain other types of anaphors. Prosodic focus marking seems similar to the case of VP ellipsis in this regard. Of course, outright ellipsis raises issues of recoverability on the listener’s side that prosodic reduction does not. For parallels and differences between ellipsis and prosodic reduction see Rooth (1992a), Merchant (2001), and Tancredi (1992), and the discussion in the next section.

3.2 Sentence focus and the question under discussion

We advertised as an advantage of Alternative Semantics that is able to account for both unembedded foci and embedded foci. There are indeed many examples of prosodic focus in which root-attachment of \sim (which is essentially what theories of sentence focus were previously assuming) will not yield the correct result. The response in (32), for example, requires an appropriate antecedent of the form *x wine*. The material in the VP, however, seems irrelevant in determining whether or not we are able to shift prominence within the subject. This can be captured by positing that \sim can attach to the subject, as indicated by the ‘‘hooks’’ in (32), as opposed to attaching to the root:

- (32) A: I brought an Alaskan wine.
 B: 「ALASKAN wine」 is the BEST!

The focus representation in (32) only calls for an antecedent with a set of alternatives of the form *x wine*, but it seems counterintuitive to call this the “sentence focus.” The prominence pattern would be viable as the answer to the question *Tell me something about wine*. What focus prosody conveys here is simply that a set of alternatives of the form [x wine] is relevant to the interpretation of the response, it does not require that this is the main information contributed by the answer.

While (32) could in principle have been analyzed as having \sim at the root, and F-marking both on *Alaskan* and on *is the best*, such an analysis is impossible in (16), or the following example (Rooth, 1992b, 80):

(33) \lceil [An AMERICAN_F farmer]₁ \rceil^2 was talking to \lceil [a CANADIAN_F farmer]₂ $\rceil^1 \dots$

But there is a price that comes with this wide applicability of Alternative Semantics. The intuition behind linking prosodic focus to “sentence focus” is in part that it plays a role in negotiating the flow of the discourse. When \sim attaches to a proposition-denoting node, then the alternatives will be a set of propositions in Rooth’s theory, so effectively a question; but when it attaches to a node with a different kind of denotation, there is no notion of question involved. Some theories have taken issue with this view, and proposed that prosodic focus always involves an anaphoric relation to a question under discussion (QUD).

According to the discourse model of Roberts (1996, 2012), for example, the notion QUD is central to the understanding of prosodic focus. In this theory, focus alternatives reveal which questions are under discussion. The discourse in (32) implicitly involves the sub-question *What kind of wine?*, as part of the larger strategy of answering a question like *What can you tell me about wine?*. We could call this the QUD-version of Alternative Semantics (see also Beaver and Clark, 2008, for such an approach to prosodic focus).

What would be gained, however, by saying that the focus prosody in (33) on *Canadian farmer* is a reflection of an implicit QUD (presumably *What kind of farmer?*), rather than just saying that it reflects the contrast to *American farmer* (which is all we need to say in Rooth’s theory)? If the QUD-account of prosodic focus is correct, then we should be able to construct arguments in favor of it showing discourse constraints on what counts as a proper antecedent for focus marking.

Let’s see what such an argument could look like. AnderBois (2014) shows evidence that sluicing is subject to a discourse condition: The question that the sluice denotes must be an “issue,” essentially a QUD. This is formalized using the framework of inquisitive semantics. The evidence comes from examples like (34a):

- (34) a. #The valiant knight, who defeated a masked enemy, still wonders who. (AnderBois, 2014, 888)
 b. The valiant knight defeated a masked enemy, but still wonders who.

The antecedent for the ellipsis is part of the appositive relative clause. Appositive clauses do not contribute at-issue content, in AnderBois’s terms, it does not make an inquisitive contribution (see also Schlenker 2020). Such not-at issue content does not appear to be available to license sluicing, in contrast to at-issue content, as illustrated in (34b). We can use AnderBois’s example to see whether prosodic focus marking is similarly subject to a QUD condition:

(35) The valiant knight, who defeated a masked enemy, still wonders \lceil WHO he defeated \rceil .

Based on related examples, AnderBois (2014, 906) concludes that prosodic focus marking is not, in fact, subject to a QUD constraint, unlike sluicing. One could argue that deaccentuation enables accommodating of the QUD, while ellipsis does not, but if this is so, then it appears that the QUD fails to constrain prosodic focus marking. AnderBois’s observation shows that the antecedent to prosodic focus marking does not need to be a QUD. However, the notion of QUD or “issue” may be important in understanding the limits of *accommodating* antecedents for focus marking. We return

to this question in section 3.5.

3.3 Syntactic constraints on \sim

What, if any, are the constraints on the syntactic scope of \sim ? Goodhue and Wagner (2018) discuss a generalization pointed out to us by Michael Rochemont (p.c., 2017), which says that focus marking cannot span multiple sentences. I am not aware of any other discussion of such a restriction on focus marking in the literature, and therefore suggest naming it “Rochemont’s Conjecture”:

- (36) Rochemont’s Conjecture
If prosodic focus marking spans two constituents, they must be part of the same sentence.

Consider the following contrast:

- (37) Does she like coffee?
a. \lceil She DOES_F like coffee \rceil .
b. \lceil She does_F \rceil . \lceil She LIKES_F coffee \rceil .
c. $\#$ \lceil She DOES_F. She likes coffee \rceil .

Shifting prominence into the previous sentence in (37c) appears to be odd. The utterance may simply seem redundant, but it is no more redundant than (37b). Consider also:

- (38) Does she not like coffee?
a. \lceil YES_F she likes coffee \rceil .
b. $\#$ \lceil YES_F she doesn’t like coffee \rceil .

Goodhue and Wagner (cf. 2018) use (38a) and the contrast to (37c) as an argument that *yes* can serve as an adverbial that forms part of a sentence (rather than being a separate fragment sentence). This seems to be impossible or at least harder when the polarity of the following sentence is negative, as in (38b).

If Rochemont’s conjecture is correct, then we can use prosodic focus as a “Rochemont test” for whether two constituents form part of the same sentence. If true, this generalization provides evidence that prosodic focus is not simply the superficial marking of contrasting speech chunks, but rather is syntactically constrained in just the way expected if a syntactic operator is involved. Just like other operators such as *only* or *always*, \sim cannot take scope over multiple sentences.¹⁰

There may be further constraints on the scope of \sim . Spathas (2010), for example, argues for a constraint on focus interpretation that can be expressed in Roothian terms by requiring that \sim can only attach to certain nodes (to syntactic “phases”), to which we return in section 3.11. And as already mentioned, Vander Klok et al. (2018) argue that the scope of \sim may be a point of cross-linguistic variation. More research will be needed in order to understand better the interaction between syntax and prosodic focus in general constraints on the scope of \sim in particular.

3.4 Why is focus marking (sometimes) obligatory?

Prosodic focus marking is often obligatory when possible. In the following two dialogues, the VP is obligatorily reduced:

- (39) A: Viola wants coffee. A’: Who wants coffee?
B: $\#$ EDE wants COFFEE.

¹⁰One may ask why focus operators are restricted in this way. Roger Schwarzschild (p.c.) asks whether this could indicate that there is no syntax above the sentence-level. It might, but maybe English simply hasn’t developed the syntactic tools to operate over them in this way.

Why would this be? The prosody in B’s response is the default accent pattern that would be expected if there was no focus operator in the structure. What could force the presence of a focus operator, and furthermore force the F-marker to be placed on the subject?

Williams (1997) proposes a competition-based explanation based on the principle “Don’t overlook anaphoric possibilities,” which is a pragmatic principle that enforces anaphoric uses of non-default prominence whenever possible. The \sim operator in Alternative Semantics is a presuppositional operator, so one possibility within this theory is that William’s condition is just a particular effect of the general principle “Presupposition.” This is the explanation assumed in Sauerland (2005) and Wagner (2005).

Maximize Presupposition was first introduced in Heim (1991) to explain the obligatory choice of a definite article over an indefinite article whenever its maximality presupposition is met (hence: *#A sun is rising*). It has also been implicated in the pressure to use additive operators like *also* or *again* whenever they are licensed (Eckardt and Fränkel, 2012) (but see Bade, 2016, for a different view).¹¹

Under this account, utterances that only differ in the strength of the presupposition they encode compete with each other (or at least those that are sufficiently structurally similar do). For the purposes of focus marking, maybe all possible focus structures for an utterance are considered.¹² An account in terms of Maximize Presupposition can explain why the default pronunciation becomes unusable when focus presupposition could have been encoded: It is enriched with an “anti-presupposition” (Percus, 2006), such that using *Ede wants coffee* with default prominence is not usable when there is an antecedent that would license shifting prominence to the subject, as we saw in (39). This is a blocking effect: we should have used the competing utterance that encodes the focus presupposition.

There is evidence that not just the presence of \sim is obligatory, but also that its scope is maximized (Truckenbrodt, 1995, 171):

- (40) A: Does an American farmer like Mary?
 B: $\#$ No, \lceil a CANADIAN_F farmer \rceil likes MARY.
 B’: No, \lceil a CANADIAN_F farmer likes Mary \rceil .

Only the utterance in which \sim takes wider scope and encodes a stronger presupposition is felicitous; it takes as its antecedent a set of alternatives of the shape *an x farmer likes Mary*. The presence of such a set entails that there is also a set of the shape *an x farmer*, but the reverse does not hold. The presupposition encoded by (40) is hence stronger. Citing unpublished work by Roger Schwarzschild, Truckenbrodt (1995) proposes a “maximality-requirement for the choice of the domain” of \sim to explain this.

This principle does not appear to be quite general enough. It seems that sometimes, the *number* of \sim -operators is also maximized:

- (41) A: An American farmer asked me who likes Mary.
 B: \lceil \lceil A CANADIAN_F farmer \rceil _F likes Mary \rceil .

Two separate instances of \sim seem necessary here: there is no salient antecedent of the form *An x farmer likes Mary*, but there are antecedents of the form *an x farmer* and *x likes Mary*. Both occurrences of \sim are obligatory. A more general principle than maximizing the domain of \sim is needed, and Maximize Presupposition could do the job.

It is not clear, however, that an account in terms of Maximize Presupposition always makes

¹¹It is not so obvious whether “presupposition” is the right concept for \sim , since as we have seen, focus and givenness require their antecedents to be salient, but not true. Perhaps this is why Büring (2016b, 26) proposes a principle “Maximize Information Structure” instead, which requires maximizing the amount of material that is marked as given (in our terms), and appears similar in its effects of Maximize Presupposition.

¹²Although maybe the candidate set has to vary in more than just the focus structure; see the discussion in Mayr (2010).

the right prediction. Consider the following examples involving a coordinated antecedent (from a production experiment reported in Klassen and Wagner 2017):

- (42) A: Yesterday, Jolene and Dolly pitched the tent. What happened today?
 B: (This time,) JOLENE pitched the tent.
 B': (Again,) JOLENE pitched the TENT.

In the absence of the adverbials *this time* and *again*, the choice of prosody is optional, and speakers vary in how they pronounce the response. Klassen and Wagner (2017) argue that speakers have a choice of using *Jolene pitched a tent* as its antecedent, resulting in no prominence shift since it is not a contrasting alternative, or using either *Jolene and Dolly pitched the tent* or *Dolly pitched the tent*, each of which provide a contrast. Once the adverbs are added, the optionality vanishes, and almost all speakers will choose the pronunciations as indicated in (42). The choice of adverb arguably reveals the choice of antecedent.

The puzzle for Maximize Presupposition that (42) poses resides in the optionality when the adverbs are absent: Shouldn't one of the two prosodies be preferred, because it encodes a stronger presupposition? One difficulty in evaluating the situation is that it is not obvious which focus presupposition, if any, B's response encodes, since it shows default prominence relations. If the utterance had wide focus, as in B's response in (43), the presupposition would be very weak, and B's response should be preferred:

- (43) B: $\lceil \text{JOLENE}_F \text{ pitched a tent} \rceil$.
 B': $\lceil [\text{JOLENE pitched A TENT}]_F \rceil$.

Could it be that the set of competitors for Maximize Presupposition only comprises all focus structures given the choice of a certain antecedent? Schwarzschild (1999) discusses some related cases and argues that the rhetorical relation in discourse is taken into account in choosing antecedents (see also Rochemont, 2016). But this raises the question why in (41), one can't just choose to only mark one focus relation. Many questions remain open about how exactly to explain why (and when) focus and givenness marking appear to be obligatory.

3.5 Antecedence through entailment?

Based on observations by Georgia Green, Lakoff (1971) and Clark and Haviland (1977) use variations of the following example to illustrate that presuppositions can sometimes be satisfied through inferences (prosodic annotation added):

- (44) John is a Democrat. BILL is honest, TOO.

It seems that *is a Democrat* can serve as the antecedent for the prosodic reduction of *is honest*.¹³ Haviland and Clark (1974); Clark and Haviland (1977, 6) argue that such cases involve an "indirect antecedent," which is established through an "inferential bridge." The speaker here expects the listener to buy into the assumption that being a Democrat entails being honest, and therefore *John is a Democrat* can serve as an antecedent marking for the focus marking on *Bill* in the following sentence (as well as the presupposition of *too*).

Antecedence through entailment was also implicated in examples in which hyponyms can be antecedents for more general terms, for example *gorilla* can make the noun phrase *animals* given (example from: Rochemont 1986, 50; see also: Allerton 1978, 142; Baumann 2006):

- (45) A: I saw some GORILLAS in the SUBWAY today.
 B: Oh, really? We saw some animals at the ZOO today.

¹³Lakoff was more concerned with the presupposition of the additive particle *too*.

Antecedence through entailment raises an apparent tension with the idea that focus antecedents have to be salient rather than true, and part of the common ground. After all, entailments are typically about truth conditions. Rochemont (1986) was the first to sketch a solution. Rochemont (1986, 47) defined a notion of “c-construable”: A linguistic expression (or “string”) *P* is c-construable if it has a “semantic antecedent” in the discourse. A semantic antecedent is defined as a linguistic expression that has been “recently uttered in the current and on-going discourse” such that this expression contextually “entails the mention of *P*.” So antecedence through entailment is construed as an entailment by a previously mentioned linguistic expression (as opposed to entailment by the common ground). The precise nature of this entailment is left somewhat imprecise, however.

One of the central contributions of Schwarzschild (1999) is to define a formal notion of entailment between linguistic expressions of various semantic types, and hence provide a way to understand how antecedence through entailment from a salient linguistic antecedent works. We will not discuss the details of his givenness notion here, but the strategy involves replacing *F*-marked constituents with variables, existentially closing them, and lifting the meaning of all expressions to that of a proposition by existentially closing all open argument slots, such that entailment relations can be checked (cf. Rochemont, 2016, for a recent discussion).

This entailment model of antecedence (as opposed to an identity-model of antecedence) appears to imply that antecedence through entailment should be “automatic.” Focus marking should be possible whenever an antecedent is entailed by a salient expression. This does not always appear to be the case, however. Consider the following example (Büring, 2016b, 119):

- (46) (For years now, Kim has refused to learn any musical instrument. And now...)
- a. #SAM won't practice piano.
 - b. SAM won't practice PIANO.
 - c. SAM won't practice.

Someone refusing to learn any musical instrument entails that they won't practice piano, and yet this does not seem to be quite good enough to license the prosodic reduction of the VP in (46a)—while maybe not outright infelicitous, using default prominence in (46b) at least seems more likely.

One reason why (46a) might be difficult is that the context makes salient an entire set of musical instruments, which will include instruments other than pianos. It's possible, then, that the focus structure of (46b) is actually (47), with focus on *Sam* and *piano*, and that this structure, which signals alternatives to *piano*, is preferred over just marking the VP as given, as in (46a):

- (47) $\ulcorner \text{SAM}_F \text{ won't practice PIANO}_F \urcorner$.

What could be the source of a preference of (47) over (46a)? Maybe the observed preference has something to do with the fact that (46a) competes with (46c). If the choice of instrument matters, then (47) might be preferable (it draws attention to the fact that it's a piano as opposed to some other instrument); if it does not, then (46c) might be (why bring up the piano at all if the choice of instrument does not matter?).¹⁴

So maybe, even if antecedence through entailment is possible in principle, it might not always create new focus marking opportunities since other structures may be preferred. However, Keshet (2015), discussing related examples, and argues against (direct) antecedence through entailment. Instead, indirect antecedence is only possible when a relevant (sub-)question under discussion that can be accommodated that provides an appropriate antecedent for focus marking.

Let's consider again the original statement about Democrats in (44). The inference required here seems both more contrived and more informative than the one in the piano example. It rests on the background assumption that being a Democrat automatically entails being honest—an assumption that most people, irrespective of where they fall on the political spectrum, are unlikely to share.

¹⁴Thanks to Dan Goodhue for discussion of this example.

The speaker’s choice of prosody in (44) crucially relies on this background assumption, and therefore *conveys* that the speaker makes this loaded assumption. So maybe (44) seems felicitous in part because the required accommodation step—the added work we have to put in to make the prosody work—draws attention to an important background assumption, and signals that the listener is intended to draw this inference. In other words, the accommodation step itself is informative.

Consider also the following example (Wagner, 2005, 253), in which there is no entailment relation between the overt linguistic antecedent and the deaccented constituent.

- (48) A: Why do you think he hasn’t played soccer before?
 B: He \uparrow THREW_F the ball into the goal.

The alternative set that needs to be accommodated here is *throw/kick the ball into the goal*. This seems easy, and it is intuitively clear why: it is an important part of the speaker’s message that he threw the ball rather than kicking it (see Büring, 2016a, for a discussion of “rather than” and its relation to focus effects). The prosody in (48) makes the inference from “throw” to “didn’t kick” salient, and this inference is part of the argument of the speaker.¹⁵

It seems then that entailment relations are neither sufficient nor necessary to guarantee that an “indirect antecedent” will be construable. Consider also the following example, where it is possible to deaccent *living in Boston* (although it is also possible to accent it):

- (49) She moved to California, after having lived in Massachusetts for over a decade. But she never LIKED living in Boston.

Here, antecedence through an inferential bridge is possible even though the apparent entailment relation is reversed. The examples discussed here seem compatible with Keshet (2015)’s conclusion that entailment relations merely play an indirect role in bridging inferences, in that they affect what questions can or cannot be considered given the discourse as being under discussion. We have already seen evidence that prosodic focus is not restricted to antecedents that form QUDs (section 3.2), but maybe QUDs constrain the accommodation of indirect antecedents.

There may be another way of looking at the constraints on accommodation: Maybe accommodation is only possible if the alternatives that are accommodated can then be used to make an inference about excluding certain alternatives that is relevant to the argument that is being made (see Anscombe and Ducrot 1976 for a notion of “argument” that may be helpful here).

In sum: It is clear that accommodation of focus antecedents is sometimes possible, and it is equally clear that we need a restrictive theory of when. Various factors seem to influence the ease of a bridging inference, including entailment relations. Haviland and Clark (1974) and other studies since have shown evidence that bridging inferences take time and are costly. It seems that a theory is needed in which entailment relations modulate the difficulty of such bridges, but antecedence through entailment should not come for free, as it appears to do in the Rochemont/Schwarzschild view of antecedence through entailment.

3.6 Isn’t the notion of givenness sufficient?

The antecedents in (3)–(5) all had one thing in common: they provided a linguistic antecedent for the VP *wants coffee*. They varied in the substitutions for the subject *Ede*. What if the prosodic reduction of the VP (and shift in prominence to the subject) actually just requires the salience of the

¹⁵This example also illustrates that in cases of “evoked alternatives” both the given material as well as the focus substitutions can be accommodated, while in the original examples illustrating evoked alternatives (examples 5 and 6) the material marked as given was previously mentioned. Büring (2016a) discusses cases of accommodated contrast, but claims that material marked as given must be mentioned, while contrastive alternatives can be accommodated. This example raises an apparent problem for this view.

VP meaning? Maybe only the absence of prominence is interpreted, while the presence of prominence is not. Schwarzschild (1999) develops a theory that is based on this idea.

In this account, what the prosody in (2) requires is that there is a salient antecedent that denotes or “entails” (in the weakened sense defined by Schwarzschild) the unaccented material, but does not require alternatives:

(50) $\exists x.x$ wants coffee

This theory is not formalized using Rooth’s notation, but we can translate the theory into it. The differences between Schwarzschild (1999) and Rooth (1992b) can be stated as follows:

(51) Schwarzschild’s 1999 theory:

- a. *Antecedence through Entailment*: Antecedence can be established through entailment.
- b. *Ubiquitous \sim* : \sim attaches to all nodes that are not F-marked.¹⁶
- c. *F-less uses of \sim* : The scope of \sim does not need to contain an F.
- d. *Alternative-free F-substitution*: F-marked constituents do not require alternatives
- e. *AvoidF*: The reason focus and givenness marking is obligatory is because the number of F-markers must be minimized.

Let’s look at these proposals one by one. We have already discussed some problems for (51a). The assumption in (51b) means that in Schwarzschild’s theory, there can be no constituent that is not F-marked and also not in the scope of \sim . In other words, our third information status, not being marked as given or focused, does not exist in Schwarzschild’s account. As we will see, to make this work, we crucially need to allow for uses of \sim without any F in its scope, assumption (51c).

What about constituents that are intuitively “new,” that is, that are neither contextually given nor do they seem to be contrastive? For Schwarzschild, there is no difference in the treatment of such “new” constituents and constituents that we would intuitively called focused or contrastive. Any constituent that is not given must be F-marked. For some of these F-marked constituents, there may salient contrastive alternatives, but for others there may not be. In this theory, F-markers are de facto used as diacritics that prevent unintended givenness presuppositions. Assumption (51d) assures that F-marked constituents do not require alternatives (see also the discussion in Wagner, 2005, 251). This fundamental difference in the role that F-markers play in Schwarzschild’s as opposed to Rooth’s theory lead Beaver and Velleman (2011) (who adopt Schwarzschild’s theory) to use “N” (for “new”) instead of “F” (for “focus”) as the syntactic diacritic.

In order to enforce focus prosody when possible, Schwarzschild uses a constraint AvoidF that penalizes using F-markers in his formalization. In our Roothian restatement of Schwarzschild’s theory, we can use the principle Maximize Presupposition with equivalent results. Given the other assumptions of this theory, Maximize Presupposition will require dropping as many F-markers as possible, and thus maximizing the material marked as given. This can be done by recursively checking which F-markers (if any) can be omitted.

Let’s look at an example: in our original example (2), we can drop all but one F-marker, leading to the following representation, with a single accent on Ede (F-marked constituents must be accented in this theory):

(52) $\lceil \lceil \text{EDE}_F \rceil \lceil \lceil \text{wants} \rceil \lceil \lceil \text{coffee} \rceil \rceil \rceil$

The meanings of the constituents *wants*, *coffee*, *wants coffee*, and *x wants coffee* are all contextually salient and hence can be marked as given. The root node is also not F-marked, and therefore must

¹⁶ Assumption (51a) can possibly be strengthened: if focus variables can be interpreted freely with any constituent of the same type, then adding a \sim to a constituent that is F-marked might only introduce a trivial presupposition, and $\sim [a]_F = [a]$. If this is the case, then we can restate Schwarzschild’s theory as just saying that a \sim attaches at every node. See Büring (2008) for a discussion of Schwarzschild (1999) that makes this assumption.

be given. This is where it is crucial that F-marked constituents are replaced by a variable and existentially closed, without the need for alternatives. So what has to be given is not *Ede wants coffee* but just (50). In all our contexts that license the prosody in (2), the VP meaning *wants coffee* is made contextually salient, and hence the presuppositions introduced by the representation in (52) are fulfilled.

It is crucial to understand that the representation in (52) in Schwarzschild’s theory imposes very different conditions on the context than it would based on Alternative Semantics: This is because F-substitution is assumed to not require any salient alternatives. In Rooth’s theory, the representation that would have the same meaning as (52) is (53a) (with a \sim attached to VP, and without F in its scope), and not (53b). This representation (53a) does not require alternatives to *Ede*; the representation in (53b), on the other hand, *would* require alternatives to *Ede*, and is hence not equivalent to the meaning of (52) in Schwarzschild’s theory:

- (53) a. EDE \ulcorner wants coffee \urcorner
 b. \ulcorner EDE_F wants coffee \urcorner

We can call the effect of the F-marking in (52) “pure givenness marking,” since all it requires from the context is that the VP meaning is contextually given, but no alternatives are at play. Schwarzschild’s system is specifically designed to make pure givenness marking of any constituent possible: We can always just F-mark all other constituents (although that might even not always be needed). Because F-substitution does not require alternatives, the effect of this will result in pure givenness marking. Let’s look at whether this is a desirable result.

3.7 Is pure givenness marking possible?

Schwarzschild’s theory is designed to make it possible to mark any constituent as “purely given,” that is, there will always be a way to assign F-markers elsewhere such that the only presupposition will be that the meaning of that particular constituent must be given. Shifting prominence to the subject, for example, can be achieved with a representation like (52), which only requires the VP meaning to be given. This section shows evidence that this is incorrect: shifting prominence to the subject necessarily requires alternatives.

A first argument comes from dialogues that involve coordinated antecedents. Schwarzschild (1999) already discusses a relevant case:

- (54) Q: Did Karen get the money or did Marc get the money?
 a. A: KAREN got the money.
 b. #A’: Karen got the MONEY.

Since *x got the money* is given, as well as *Karen got the x*, either pronunciation should satisfy AvoidF: each one only requires a single F-mark (either one on *Karen* or one on *money*). AvoidF does not choose between the two representations (nor does Maximize Presupposition), so either should in principle be fine. But actually, Schwarzschild (1999) proposes in addition that when AvoidF/MP does not decide between representations, then default stress should be used. The reason is that in this case, the constraints that negotiate default stress take over. This can be observed in “all-given” utterances:¹⁷

- (55) Q: Did Karen get the MONEY?
 a. ?#A: Yes: KAREN got the money.
 b. A’: Yes: Karen got the MONEY.

¹⁷Note that A’s response is fine, but only if the speaker intends to evoke alternatives, but it is infelicitous if not—see further discussion below.

This proposal, which is meant to account for all-given utterances, makes things even worse for (54): Given this provision, the theory does no longer predict optionality, it predicts A' to be the only felicitous response in (54). Schwarzschild (1999) proposes that the reason for the preference for A' is that the question under discussion is the preferred antecedent for givenness marking (the assumption is that the question *who got the money* is the actual QUD).¹⁸

Relating the preference in (54) to the QUD is not sufficient, however. Wagner (2005, 2006a) shows that similar problems arise when the QUD does not help to pick the right antecedent. Consider the following example:

- (56) Last week the newspaper reported that after the game all that happened was that the coach or the manager—I forget which—praised John. I wonder what happened after this week's game.
- a. #The coach praised JOHN.
 - b. The COACH praised John.

What's relevant here appears to be that an alternative to *the coach* is mentioned. The example contrasts with a case in which there is alternative to the coach in the context, in which case prominence default prominence ensues. This is as expected if subject-prominence requires alternatives to the subject: in the absence of alternative, no focus can be marked, and default prominence prevails. Alternative semantics also explains (55), without further stipulations: In the absence of a contrast, \sim can be used, and hence default prominence is expected.

The facts are more complicated, however, than suggested in Wagner (2005, 2006a): When there is a coordinated antecedent, and the question under discussion is not explicit, prosodic prominence placement is often optional. Klassen and Wagner (2017) show experimental evidence for this, using examples like (42). Crucially, however, the choice between prosodies is meaningful: In the experiment, adverbs such as *again* or *this time* to manipulate where speakers will place prominence. What this adverbs do in the examples in (42) is that they manipulate which alternatives are relevant. The choice between one prosody over another is not proscribed by a preference in grammar for default prominence, but rather by a speaker's choice of which alternatives to quantify over. Given Schwarzschild (1999), there is no reason why the choice of adverb should interact with the alternative sets in the way it does.

The argument based on coordinated antecedents has more ingredients than one might wish, however. Maybe one could resort to accommodation of different QUDs to explain these cases. Here's a new argument, that avoids these issues:

- (57) Solving this problem won't be easy. I know one thing:
- a. If ONE OF MY STUDENTS solves the problem, there will be a PARTY.
 - b. If one of my students solves the PROBLEM, there will be a PARTY.
 - c. If one of my students SOLVES the problem, there will be a PARTY.

Schwarzschild's (1999) theory predicts that givenness marking of the VP *solves the problem* should be possible, since *solving this problem* was mentioned in the context (one entails the other after existential closure). In fact, marking the VP as given as in (57a) should be obligatory, since an F-mark on *one of my student* results in the minimal number of F-markers in the utterance, and leads to the strongest presupposition possible. The alternative pronunciations in (57b) and (57c) both require more F-markers (at least one on the accented word and one on the subject *one of my*

¹⁸It is unclear where such a condition on question-answer congruence should come from given this theory. Schwarzschild (2019) hence introduces an additional type of F-feature, one that *does* requires alternatives, in order to account for this type of example, as well as cases of association with focus. This second F-marking system is used in addition to the one proposed in Schwarzschild (1999), which allows for alternative-free F-substitution (or rather N-substitution, since "N" is used to distinguish the two types of diacritics).

students).¹⁹

Here's the problem: the response in (57a) implies and makes it salient that there will be no party if other people solve the problem. This effect is due to conditional strengthening Geis and Zwicky (1971), which we have already observed in (1). What's important here is that this strengthening necessarily takes alternatives to *one of my students* into account when the prosody in (57a) is used. By contrast, when the prosody in (57b) (default prosody) or (57c) is used, no such implication is necessarily made. These utterances are compatible with there maybe also being a party if someone else solves it: the speaker may just not consider that a relevant scenario here. This intuition is unexpected in Schwarzschild's theory: there is no reason why alternatives to *one of my students* should necessarily come into play in the interpretation of (57a). The givenness of the VP should make a prominence shift possible and obligatory even when no such contrast is intended.²⁰

For Rooth (1992b), where F-substitution requires alternatives, this is as expected: at least one alternative to *one of my students* is necessarily involved when prominence is shifted as in (57a), and we take these alternatives into account when interpreting the conditional. No alternatives to *one of my students* are required in (57b) or (57c), and hence no implications about what happens when other people solve it are necessarily made.

We can also see that alternatives are necessarily at play in subject focus also by looking at an adapted version of a famous example from Rooth (1996a, 82):

- (58) My roommates Steve and Paul and I took a quiz in our self-paced calculus class, which the instructor promised would be easy to pass. George asked me how it went. My answer was:
- a. I passed.
 - b. I PASSED.

A prominence shift to the subject as in (58a) seems to necessarily trigger the implicature about some other people not having passed, or at least the speaker's uncertainty about them. But there is no reason why such an implicature should be expected here in Schwarzschild's theory: the predicate *pass* is given (this is the crucial difference from Rooth's original example). Since the VP is given, no alternatives to the subject should have to come into play.

Stevens (2013, 50) presents evidence against the claim that subject focus necessarily requires alternatives, and more generally against the claim in Wagner (2005, 2006a) that pure givenness marking is not possible. Consider the following example:

- (59) Mary went swimming. In fact, 「EVERYBODY went swimming」.

The second sentence entails the first, and Stevens (2013) argues that *Mary went swimming* should therefore not be a "true" alternative in the sense of Wagner (2005, 2006b) (more on this notion of "true alternative" below). However, this argument has force only if we assume that *Mary went swimming* cannot be enriched to *Mary and no one else went swimming* or *Mary but not everyone else went swimming*. However, this would clearly be an implicature of the first sentence when uttered by itself. The use of *in fact* in (59) seems to signal that the second sentence backtracks on such an enriched interpretation of the first. Wagner (2012b) discussed examples involving entailment relations in which this kind of strengthening is not possible for pragmatic reasons, and then focus marking is indeed impossible, just as predicted. A full discussion of Stevens's 2013 other arguments is not

¹⁹ An earlier version of this. example used *Viola* as the subject. Dan Goodhue pointed out to me based on feedback from his seminar on focus at University of Maryland that in this case one could plausibly accommodate *Viola* as contextually given, in which case the entire TP would be given and default stress might be expected.

²⁰ The same issue arises for Schwarzschild (2019): The representation *[one of my students]_N solves the problem* should lead to subject prominence, without any need for subject-alternatives, since N-substitution is alternative-free. While Schwarzschild (2019) introduces a second type of F-marker that requires alternatives, there is nothing that would force one to use that alternative-sensitive F-marker over an N-marker here.

possible here.

We can conclude that a prominence shift to the subject necessarily involves alternatives. This is unexpected by the theory in Schwarzschild (1999), because of the possibility of alternative-free F-substitution (assumption (51d))²¹, or any theory that freely allows pure givenness marking. We now turn to a different kind of argument based on adjective prominence.²²

3.8 The contrastiveness requirement on alternatives

Wagner (2005, 2006b) argues that \sim imposes a requirement that alternatives must be “true” alternatives, namely the alternative set must form a partition. The evidence in favor of such a “contrastiveness requirement” comes from prominence shifts to modifying adjectives.

Because of alternative-free F-substitution, the following F-marking only introduces the presupposition that *bicycle* be given Schwarzschild’s 1999 account (cf. Wagner, 2005, 302), without any necessity for alternatives for the adjective:

(60) [A new_F bicycle]_F

Consider now the following examples (see Wagner, 2005, 2006b; Büring, 2008):

- (61) a. *No Antecedent*
Guess what John’s aunt, who is incredibly generous, brought for his birthday: a new BICYCLE!
- b. *Contrastive Antecedent*
Guess what John’s aunt, who deals with used bicycles, brought for his birthday: a NEW bicycle!
- c. *Non-Contrastive Antecedent*
Guess what John’s aunt, who produces expensive bicycles, brought for his birthday: a new BICYCLE!

The examples in (61a) and (61b) seem unsurprising: the word *bicycle* is reduced when it is contextually given. But (61c) suggests that in order to reduce *bicycle*, givenness is not enough: The alternative to *new* in the context has to be a “true” alternative, one that is incompatible with it, and is part of a partition. But we usually don’t partition bicycles into *new* vs *expensive*. An obvious actual alternative, *used*, does not appear salient or relevant, and hence it is not easily accommodated: if the aunt is so rich, why bring up used bicycles? Evidence from a production study for this generalization is reported in Wagner (2016), see also evidence from a corpus study in Riester (2015).

A speaker may well evoke (and expect the interlocutor to accommodate) alternatives and shift prominence even in the absence of any adjective in the antecedent:

(62) I want a bicycle. A \lceil NEW bicycle \rceil .

This example makes it look as though all that is needed is that *bicycle* is given, but arguably an alternative set is accommodated here. This is why the examples in (61) are set up such that accommodating an alternative would lead to pragmatically odd inferences. For example, Wagner (2005, 2006b) points out that if the target answer in (61) contained *used* instead of *new*, prominence would very likely be shifted in (61c), since it seems plausible then that the speaker might be evoking the alternative *new*, maybe as part of an argument that the aunt is not generous. The difference

²¹This problem is shared by the theories presented in Beaver and Velleman (2011) and Schwarzschild (2019), which share this assumption.

²²Further arguments for alternatives from variations of so-called “all-given” utterances are discussed in (Goodhue, 2017). Arguments from double contrast-sentences that raise related issues are discussed in Kehler (2005) and Büring (2008). Additional insightful discussion of Schwarzschild (1999) can be found in German (2009).

between these cases based on pragmatic plausibility shows that appealing to accommodation in order to explain (62) is not circular: The theory is still predictive in that implausible accommodation should be impossible. Remember also that in order to account for examples like (5) and (6), *any* theory will have to allow for accommodation (or some equivalent mechanism) that distinguishes these cases from ones that are infelicitous due to a lacking antecedent.

The paradigm in (61) shows that there is a constraint on what counts as licit alternatives for focus antecedents. This shows that alternative-free F-substitution must be impossible here. See Büring (2008), Katzir (2013), and Büring (2016b) for further discussion of this observation. So for prominence shifts both to subjects and adjectives, alternative-free F-substitution must be ruled out, and Wagner (2005, 2006b, 2012b) argues that all prominence shifts in fact necessarily involve alternatives and are contrastive, a claim we explore further in section 3.11.

3.9 Ubiquitous \sim ?

Schwarzschild’s (1999) account holds that every non-F-marked constituent must be contextually given. In our Roothian translation, this is accomplished by requiring that \sim attaches to every node (or at least every node that does not bear an F-mark), an assumption we called “ubiquitous \sim ” in (51b).

Here’s an example that shows why this assumption is essential for this theory. In the following example from (Tancredi, 1992, 87), both *slapped* and *John* are contextually given, but not *slapped John*:

- (63) John slapped Sue, then...
 a. SUE slapped JOHN.
 b. #SUE slapped John.

While each individual word is given, there is no antecedent of the form *x slapped John*, hence the prosody in (63b) is not felicitous. If it was possible to simply omit the \sim at the VP and the root node in Schwarzschild’s theory, then the prosody should be acceptable. If \sim attaches to the root node or the VP, the infelicity is as expected: it follows because *slapped John* is not given.

In Schwarzschild’s own formalization, this effect of (51b) is achieved by a constraint that requires non-F-marked constituents to be given, which is equivalent to the postulation of ubiquitous \sim in our Roothian restatement of the theory. In Rooth’s account, the only way to achieve the prosody in (63b) is to place a \sim on the entire sentence, so the problem does not arise: the prosody in (63b) is not felicitous because there is no alternative *x* different from *Sue* such that *x slapped John* is salient, which would be required to be able to shift prominence to the subject.

When looking at a broader range of examples, we see that the assumption of ubiquitous \sim is problematic. Let’s consider an argument that to my knowledge is novel, based on a case in which a VP expresses the same meaning as an antecedent VP, but uses different words:

- (64) John gave up. Then SUE threw in the towel.

The constituents *threw*, *towel*, *threw in* are not given here, hence the lack of prominence on the VP should be infelicitous according to Schwarzschild’s theory. These lack of accents on *threw in the towel* shows that these words are not F-marked. Hence \sim must attach to each of them, introducing the requirement that each is given. The prosody in (64) should be infelicitous. And yet the whole expression *threw in the towel* is happily marked as given and prosodically reduced.

This is as expected based on Rooth’s theory: at the level at which \sim attaches, the only requirement is that there is an antecedent with the meaning *John threw in the towel*. There is indeed such a salient antecedent, since the idiomatic meaning of *throw in the towel* is equivalent to *give up*. Nothing in Alternative Semantics requires the individual pieces of that constituent to be contextually salient. A related argument based on epithets is presented in Wagner (2012b, 111).

3.10 F-less uses of \sim , or “relative givenness”?

Once we abandon Schwarzschild’s (1999) assumption of ubiquitous \sim placement in (51b), we can no longer maintain the notion of F-less uses of \sim in (51c). The reason is that otherwise, pure givenness marking should be freely available after all in the examples we’ve discussed.

Remember that in accounting for (2), an F-marker was only necessary on *Ede* because it prevented that constituent from having to be given. This was necessary because adding the \sim marker at the root was obligatory because of the ubiquity of F-markers. Once this is abandoned, and we allow for uses of \sim without F in its scope, we should be able to just mark the givenness of VPs and nominal predicates as follows:

- (65) a. *Ede* ‘wants coffee’.
 b. A new ‘bicycle’.

Sauerland (2005) proposes a theory of givenness employing a G-operator that is essentially the Roothian \sim without Fs in its scope. This account makes some desirable predictions, which we will not explore here, but it fails to explain the obligatoriness of alternative prominence shifts, since it would allow for the representation in (65) (cf. Wagner, 2006b).

In discussions of Schwarzschild (1999), there is often a lot of vagueness with respect to just how it differs from Rooth’s theory, if at all (apart from its proposal on how to derive focus antecedents by entailment). One reason is that it is formalized in a way that is so different that it makes a direct comparison difficult. Translating it into the Roothian formalism identifies individual claims and makes a comparison possible. We’ve now seen evidence that the proposals (51b)–(51d) of our Roothian reconstruction of Schwarzschild’s theory are problematic, and, and (51e), the constraint AVOIDF, arguably needs to be replaced by a more general pragmatic principle such as Maximize Presupposition. If our reconstruction is valid, then we need a different theory.

The “relative givenness” theory of focus and givenness proposed in Wagner (2005, 2006b) rests on the premise that givenness marking is always relative, and involves focus alternatives for some other constituent. The theory is distinct from Rooth (1992b) in making the following claims:

- (66) Wagner (2005, 2006b)
- a. *Antecedence through Entailment*: Entailed antecedents are allowed (following Schwarzschild 1999)
 - b. *No F-less \sim* : \sim always has at least one F-marker in its scope
 - c. *Contrastiveness requirement*: Alternative sets must be partitions
 - d. *Locality*: each F has to be in the immediate scope of a \sim
 - e. *Maximize Presupposition*: The reason focus and givenness marking is obligatory is because of Maximize Presupposition

Conditions (66b) and (66c) together predict that all prominence shifts must be contrastive, and involve alternatives. In other words, what we have called “pure givenness marking” should be impossible in all syntactic contexts, not just the ones we have discussed so far. Section 3.11 explores whether this can be maintained. In section 3.14, we will see a reason why the locality condition in (66d) seems desirable, because it would allow us to abandon F-marking altogether; but we also review evidence that it cannot be correct as is. The discussion of this account will also provide an opportunity to talk about focus and givenness movement, and issues relating to the notion of “topic.”

3.11 Are all prominence shifts contrastive?

We have seen that at least in some syntactic configurations, pure givenness marking is impossible, and alternatives are necessarily at play. This is as expected based on the theory in Wagner (2005, 2006b). But is this true in all syntactic configurations?

If yes, this would fit with Williams’s (1997, 599) claim that it “...is impossible to destress one thing without stressing another, and the stress that falls on the other is loaded, not empty.” In Roothian terms, this could be implemented by requiring every \sim operator to c-command at least one F-marker. This was proposed in Wagner (2005, 2006b). But Consider the following examples:

- (67) a. A: Why don’t you have some French Toast?
 B: I’ve forgotten how to MAKE French Toast. (Ladd, 1980, 53)
 b. A: Has John read Slaughterhouse-Five?
 B: John doesn’t READ books. (Ladd, 1980, 55)

Gussenhoven (2007) interprets these cases as encoding “counter-presuppositional focus,” where prominence on the verb denies the presupposition of a previous utterance, such as the presupposition *John reads books* in the case of (67b). However, if this presupposition were really salient enough to serve as a focus antecedent, then the following example with polarity focus should be felicitous in this context as well, contrary to fact:

- (68) A: Has John read Slaughterhouse-Five?
 B: # John DOESN’T read books.

The prosody in the assertions in (67) simply seems to require that the direct object is given. Consider also the following example, which is not easily amenable to an analysis in terms of a counter-presuppositional focus, since the first utterance does not presuppose that the speaker does not like paintings:

- (69) I bought a painting last week.
 I really LIKE paintings. (Chafe, 1976, 32)

Even if the responses in (67) can be *used* to deny a presupposition in these particular instances, the prosody doesn’t require such a reading, and they cannot be reliant on using that presupposition as a focus antecedent given the infelicity of (68).

Most focus theories allow for some way of deaccenting constituents without requiring a contrast elsewhere (Selkirk, 1984; Tancredi, 1992; Rooth, 1992a; Selkirk, 1995; Schwarzschild, 1999; Reinhart, 2006; Féry and Samek-Lodovici, 2006; Beaver and Velleman, 2011; Büring, 2016b; Kratzer and Selkirk, 2018; Schwarzschild, 2019). In Roothian terms, this involves using \sim without any F in its scope, as Rooth (1992b, ex. 4, notation adapted):

- (70) We are supposed to take statistics and [semantics] this term, but I don’t like \lceil semantics \rceil .

If such F-less uses of \sim are possible with direct objects (and maybe all DPs), this raises a syntactic question in light of our earlier discussion: why is pure givenness marking apparently possible with direct objects, but not in cases in which a VP is deaccented, as in (57), or a nominal predicate, as in (61)? There are several conceivable answers.

First, it could be that the examples in (67) all have narrow focus on the verb. We can test this out by looking at a case where accommodating such an alternative predicate should lead to infelicity. Consider the following example, where it is unclear what alternative to *ate* could possibly be substituted without resulting in oddness (from Wagner, 2005, 2006b, reporting an example due to Ad Neeleman):

- (71) A: Would you like some quiche?
 B: I already ATE some food.

A second possibility is that only constituents of a certain semantic type (maybe individual-denoting expressions) can be marked as purely given, but certain others (maybe constituents that denote

predicates, such as adjectives and VPs) cannot. But what needs to be given in (69) is arguably the predicate *painting*, not any individual paintings.

A third possibility is that only constituents of a certain *syntactic* type can be marked as purely given, maybe DPs. Arguments against this view come from accentuation patterns in coordinate structures, discussed in Wagner (2005, 2006b), but this may be an option worth pursuing further.

A fourth possibility is to assume with Spathas (2010) that the scope of \sim is restricted such that it cannot directly attach to head nouns, as in (72a), but it can attach to DPs, as in (72b). In this account, in order to explain a prominence shift to the adjective, an F-marker is necessary, since \sim cannot attach to the nominal predicate within a DP (as in 72a), while \sim can directly attach to direct objects, and it does in the examples in (67):

- (72) a. *A NEW \lceil convertible \rceil .
 b. \lceil A NEW_F convertible \rceil .

However, while imposing a syntactic restriction on \sim seems plausible, it does not appear sufficient to explain the full syntactic generalization. As we saw in (57), a stress shift from the VP to the subject also necessarily evokes alternatives. At least for Spathas (2010), the *vP* should be a possible attachment site for \sim , leaving it unexplained why an alternative to the subject is necessary:

- (73) a. VIOLA \lceil wants coffee \rceil . (no alternative required \rightarrow too weak!)
 b. \lceil VIOLA_F wants coffee \rceil . (alternative required)

A fifth possibility is proposed in Wagner (2005, 2006b). The claim is that the actual presentation (71) is one in which the object moves, and the remnant is what is F-marked:

- (74) \lceil $[\lambda x$. I already ATE $x]$ _F some food \rceil .

The focus structure in (74) should only require a salient alternative property applying to *some food*, but does not require an alternative transitive predicate to *ate*. Such an antecedent can be provided by (71), or simply by the following context, which directly introduces a set of propositions involving *some food* (see Wagner, 2006b, 303):

- (75) What about (some) food?

All that is needed is a salient set of alternative properties applying to the meaning of *food*. The syntactic generalization should then be as follows: constituents that can move and attach to a node denoting a proposition can be marked as purely given (by moving and marking the remnant with F); but not constituents that cannot move (nominal predicates can't move out of a DP, stranding a modifying adjective).

This section has outlined a set of facts that poses a syntactic puzzle: which constituents can be marked as given without requiring a contrast (or appear to be anyway), and which cannot? The analysis in Wagner (2005, 2006b) exploits interactions between movement and focus marking to solve this puzzle. The idea is that it is an illusion that pure givenness marking is ever possible; it arises because movement of a constituent to a propositional node can weaken the presupposition that is encoded by marking it as given.

A potential problem of this analysis is that the proposed movement appears not to have scopal effects. This raises questions about the level of representation at which this movement occurs: does it happen after the regular meaning of an expression has been computed? Or does it reconstruct at LF, after the focus presupposition has been added? Similar issues arise with certain types of movements that obligatorily reconstruct (Smeets and Wagner, 2018). The added issue here is that the proposed movement is string-vacuous. Buring (2016b) points out that this analysis faces another important problem as well, which we turn to in the next section. See Stevens (2013) for further objections.

Buring (2016b) proposes instead that two separate mechanisms are needed, namely focus marking

and givenness marking, similar to many prior approaches that made this assumption (Tancredi, 1992; Selkirk, 1995; Reinhart, 2006; Féry and Samek-Lodovici, 2006; Katz and Selkirk, 2011; Stevens, 2013; Kratzer and Selkirk, 2018; Schwarzschild, 2019). More specifically, Büring (2016b, 224) proposes a “Givenness Condition” separate from a “Focus Condition,” and introduces two sets of syntactic markers, F-markers and G-markers. Let’s restate this account in Roothian terms. It involves two separate operators, \sim_1 and \sim_2 . The operator \sim_1 requires an F-marked constituent in its scope (essentially the operator from Rooth 1992b); the operator \sim_2 never has an F-marker in its scope, but otherwise has the same meaning as \sim_1 . We say that the constituent that \sim_2 attaches to is “G-marked.” This raises an empirical question: What explains the syntactic distribution of pure givenness marking? Why are contrasting alternatives sometimes necessary and sometimes not? For a discussion of two accounts that face similar problems, Selkirk (1995) and Reinhart (2006), see Wagner (2005, 2012b).

3.12 Focus and topicality

We saw that pure givenness marking is impossible in certain syntactic configurations. Here’s a problem for the claim that *all* givenness marking requires contrastive alternatives: as Büring (2016b) points out, the alternatives created by substituting the adjective have to be mutually exclusive in cases like (61), while the purported set of alternatives to *I ate x* in (74) appears to be entirely unrestricted. Büring suggests that we will therefore not be able to use the same tools to explain both cases. But is deaccenting the direct object really unrestricted by considerations of contrast? Requiring a set of propositions such as in (75) might still impose constraints. Consider the following example:

- (76) A: My quirky aunt Jocelyn, who owns a Vespa factory, sometimes worries me. She flew to Heraklion, just to see Knossos. But there’s a strike, and I have no idea how she will get there from the airport.
- a. B: She BROUGHT a Vespa!
- b. B’: She brought a \bar{V} ESPA!

The basic observation is that not shifting prominence is at least as felicitous as shifting prominence to *brought*. Shifting prominence away from Vespa seems to imply that A’s story is *about Vespas*. Correspondingly, the preference seems to shift toward deaccenting *Vespas* if we preface the story with *I love Vespas*, and omit our worries about the aunt. This suggests that deaccenting *Vespa* requires an antecedent like the question *What about Vespas?* to be salient, and not just the salience of the predicate *Vespas*. In other words, shifting prominence away from a direct object is not as unrestricted as a theory that allows for pure givenness marking of *Vespa* would predict. This does not fully address Büring’s objection, but is a step in this direction.

The example also illustrates how the movement analysis of certain instances of givenness marking in Wagner (2005) can capture a certain notion of topicality. Topicality is often related to the notion of the “psychological subject” (von der Gabelentz, 1869), which refers to the “object” a speaker is thinking about, versus the “psychological predicate”, which refers to what is predicated about it. The psychological subject is what the utterance is “about”. Related notions of *theme* and *rheme* in the Prague school of information structure (cf. Krifka, 2008, for discussion), which feature prominently in the account of intonation in Steedman (2014).

The representation in which *Vespa* moves and is marked as given can be related to these intuitions about “topicality” and “theme.” The following presentation effectively marks *a Vespa* as topical, since it requires a salient set of propositions involving *a Vespa*:

- (77) $\lceil \lambda x. \text{She BROUGHT } x_F \rceil \text{ a } \underline{\text{Vespa.}}$

It requires an antecedent equivalent of what the following question provides (Wagner, 2006b, 2012b):

(78) What about Vespas?

The combination of \sim plus movement thus derives a presupposition quite similar to but slightly stronger than the one introduced by the topic operator proposed in von Fintel (1994, 53):

- (79) Topic operator
- a. $\llbracket \phi \approx \Gamma \rrbracket^O = \llbracket \phi \rrbracket^O$ (no effect on assertion)
 - b. $\llbracket \phi \approx \Gamma \rrbracket^F = \llbracket \phi \rrbracket^F$ (no effect on focus)
 - c. Presupposition:
 $\llbracket \Gamma \rrbracket^O \subseteq \{p : \exists \pi (p = \llbracket \phi \rrbracket^O(\pi), \text{ with } \pi \text{ of the lowest type such that } \llbracket \phi \rrbracket^O(\pi) \text{ or } \pi(\llbracket \phi \rrbracket^O) \text{ is of type } t).$

This topic operator requires a single contextually salient proposition involving ϕ , and \sim with movement requires a set of propositions involving ϕ (assuming \sim comes with a contrastiveness requirement).

von Fintel (1994) claims that we need \approx in addition to \sim . Here’s an example that von Fintel (1994, 57) uses to argue that both operators are needed:

- (80) We sat around the campfire last night, telling all sorts of stories about bats. Then, today, guess what happened?
 $\sim[\text{MARY bought a BOOK about } \approx[\text{bats}]]_F]$.

However, this utterance could simply be represented simply using two nested \sim -operators:²³

- (81) $\sim[\text{MARY bought a } \sim[\text{BOOK}_F \text{ about bats}]]_F]$.

Of course, there are many different notions of *topic*, and some require much more than what \sim can offer. Consider Krifka (2008, 265)’s definition of topic constituent:

- (82) The topic constituent identifies the entity or set of entities under which the information expressed in the comment constituent should be stored in the CG content.

This presumes a notion of “stored under x in the common ground content,” which takes us beyond Rooth’s theory into the realm of theories of discourse. Constraints on discourse and discourse coherence may influence which focus antecedents are salient in particular contexts (Kehler, 2005). It is not clear though whether accounting for the prosodic effects of focus will have to directly refer to such notions, or whether they might just indirectly guide our choices of focus antecedents.

In this section, we have seen that once we take movement into account, we can account for a certain type of topicality, just by using \sim . This seems like a desirable outcome. A further notion of “topic” is the *contrastive topic* discussed in Büring (2003). We will not discuss these here, but simply point out that there are analyses that view these as nested uses of two \sim operators (Wagner, 2008; Tomioka, 2009, 2010; Wagner, 2012a). See also Constant (2014) for a different account that maintains a separate topic operator. See also Tomioka (2020).

3.13 Why does given and topical material move?

Cross-linguistically, given and topical constituents (e.g. pronouns) often move higher in the syntax (usually to the left). The type of givenness/topic movement we have discussed in the prior two

²³In fact, the \sim attaching to the root could just as well be omitted in (80) and (81), since the presupposition it introduces may be imperceptibly weak. Note that this representation requires either alternatives of the form *an x about bats*, or covert movement out of the DP to weaken the presupposition such that an antecedent of the form *What about bats* would also suffice. See Wagner (2012b) for an argument that an alternative to the head noun may be necessary, suggesting that extraction from the DP for givenness purposes is not possible.

sections provides a motivation for why given material might move, since it facilitates encoding a focus presupposition. The schema of the movement we have been considering above is the following:

- (83) Givenness movement: $\lceil \text{XP } [\text{ }_{VP} \dots t \dots]_F \rceil$

This could be the motivation behind one type of scrambling in languages like German:

- (84) a. König Ubu hat $\lceil [\text{die Krone}] [\text{ }_{VP} \text{ wahrscheinlich } t \text{ VERLOREN}]_F \rceil$.
king Ubu has the crown probably lost
‘King Ubu probably lost the crown.’

In a context in which we have talked about the crown, shifting prominence to the verb is preferable, even if there is no salient alternative to the predicate *verloren* ‘lost’. In the analysis of Wagner (2005, 310), this is because (84a) involves movement of *die Krone* to adjoin to a proposition-denoting node, and then marking it given relative to the remnant VP. The adverb *probably*, which can presumably attach to any proposition-denoting node, can attach in fact either below the moved *die Krone* in (84a), or above. Moving a constituent and marking the remnant as focused can create anaphoric possibilities of marking a focus presupposition where otherwise no focus presupposition could have been marked.²⁴

Related accounts of givenness movement are presented in Kučerová (2012) and Stevens (2013). They differ crucially in that they posit a givenness operator separate from the focus operator \sim . The givenness operator proposed in Kučerová (2012), for example, can be adjoined anywhere in the syntax. It has the effect that all constituents within a certain domain that are syntactically above the attachment site are presupposed to be given. The givenness operator does not introduce any requirement for contrast or alternatives. The insertion and choice of attachment site of this operator is again driven by Maximize Presupposition.

Within this theory, a separate \sim operator is needed in addition to the givenness operator to account for (contrastive) focus. This comes with empirical challenges. Šimík and Wierzba (2015), who explored word order and prosody in Czech experimentally, argue that givenness movement cannot be as obligatory as predicted by Kučerová (2012). Given constituents happily stay in situ if they were marked as given prosodically.

Neeleman and van de Koot (2008) discuss related word order facts in Dutch, and propose an account in terms of “discourse templates” that constrain the syntactic relation between focus, background, and topics. This theory makes different predictions, which will not be discussed here.

3.14 Is F-marking needed?

How local are decisions about whether prominence is shifted? The obligatoriness even of embedded foci suggests that in deriving the prosody of an utterance, we must recursively evaluate for every node whether a prominence shift is possible or not. Wagner (2005, 2006b) pursues a particular hypothesis about this: the claim is that at every step, it is sufficient to consider the meaning of two sisters (and the context) in order to decide whether a prominence shift is possible (and hence required, due to Maximize Presupposition). This is the assumption about locality in (66d), see also Williams (1997) for a related analysis. This hypothesis makes decisions based on focus/givenness-based about prominence more similar to the way default stress assignment works: Default stress is standardly assumed to be derived recursively evaluating the relationship between sister nodes (Chomsky and Halle, 1968; Arregi, 2002).

A translation of this locality claim into Roothian notation was provided in Wagner (2005, 2006b): every F must be attached to a constituent in the immediate scope of the \sim that binds it. The

²⁴Neeleman and Reinhart (1998) propose instead that this kind of scrambling has a prosodic motivation. See Wagner (2005) for some discussion.

assumption is that exactly one of the two daughters of the node that \sim attaches to must be F-marked.²⁵

But why would locality hold? It seems like an ad hoc syntactic stipulation. However, Wagner (2005, 2006b) substitutes \sim with a two-place operator (called “Relative Givenness,” which takes a focused constituent as one argument (equivalent to the F-marked constituent in Roothian terms), and a second constituent that is “marked as given relative to it” as its second argument (equivalent to an un-F-marked constituent in the scope of \sim). The account thereby abolishes F-marking altogether.²⁶

This locality hypothesis about the relation between \sim and F is compatible with a surprising range of facts (Wagner, 2005, 2006b). It turns out, however, that it is too restrictive. Consider (Katzir, 2013, 8):

- (85) Mary was required to bring an expensive convertible.
 a. And John is required to bring a CHEAP convertible.
 b. And John is required to bring a RED convertible.

Example (85b) is most natural with prominence shifted to *red*. Earlier, we had seen similar cases in which it was not sufficient to have an antecedent to license a stress shift onto an adjective that is not mutually exclusive with the adjective used in the antecedent (61). Intuitively, it is clear what is going on here: while being *red* does not exclude being *expensive*, being required to bring a *red* convertible can contextually exclude being required an *expensive* convertible (being expensive is not the criterion for the requirement).

We can account for this example if \sim attaches to the VP above *require*, but we cannot account for it if \sim attaches below. Crucially, in evaluating whether *red* is a valid alternative to *expensive*, we need access to the embedding predicate *require*. This, however, is incompatible with the strict locality hypothesis in Wagner (2005, 2006b).

It seems that F does not have to be in the immediate scope of \sim . While alternatives can be introduced locally, the evaluation of whether a prominence shift will be possible and felicitous in a particular context cannot always be very locally.²⁷

3.15 Do foci have to move?

Chomsky (1976, 344) observed that the following sentence with an interpretation in which *he* refers to *John* appears odd if the proper name is focused:

- (86) a. #The woman he_i loved betrayed JOHN $_i$.
 b. The woman he_i loved BETRAYED John $_i$.

Chomsky (1976) uses this contrast to argue that focused constituents move covertly, resulting in what Wasow (1972) called a “weak crossover” effect. This contrast is often cited as evidence for obligatory focus movement.

Moulton et al. (2018), however, show that the contrast in (86) disappears if the context provides an antecedent for *John*. Williams (1997) argues that cataphoric anaphors need to be licensed not by the following antecedent, but rather by a stipulated prior antecedent in discourse that both pronoun and *John* are coreferent with. Moulton et al.’s results are compatible with this claim (but differ

²⁵This hypothesis is stronger than the one that \sim has at least one F in its scope, which is also assumed in this account, as already discussed.

²⁶Note that the implicit assumption is that \sim cannot actually attach to a node that has a single daughter, and givenness/focus marking is therefore argued to always be relational, following similar ideas in Williams (1997). For each node with two daughters, we need to check whether the “Relative Givenness”-operator can be inserted, and if it can, then it must be.

²⁷Katzir (2013) actually makes a different theoretical point based on these examples, which we will not discuss here.

from Williams’ own interpretation of the contrast). Moulton et al. (2018) attributes the contrast in (86) (in the absence of such a context) to the fact that deaccentuation of *John* helps with the accommodation of a prior antecedent. The experimental evidence is compelling, and suggests that (86) does not provide an argument for obligatory focus movement.

This conclusion is compatible with Rooth’s theory of focus, which is designed to make it possible to interpret focus in situ. It is important, however, not to confound the question of whether free foci necessarily move (Chomsky’s 1976 claim), with the question whether focus association involves movement. Here, we have only discussed the former question, while we turn to the latter question in section 5.6.

3.16 Why do some foci move?

In Alternative Semantics, there is no reason why foci would *have to* move. But we still need to say something about why foci in many languages *do* move, or at least can do so optionally.

Rizzi (1997) provides a syntactic account of why foci may move, positing a focus projection in the left periphery, and the focused constituents moves to its specifier position. The complement of the focus head Foc is marked as the “background,” which corresponds to what we defined as “marked as given”:

$$(87) \quad [\text{XP}_{\text{Focus}} [\text{Foc YP}_{\text{Background}}]]$$

Under Rooth’s theory we can accomplish the same interpretive effect and a similar syntactic configuration by moving an F-marked constituent just below the attachment site of \sim and leaving the sister without an F-mark (see Wagner, 2005, 311). Here is an example of focus fronting in English:

$$(88) \quad \lceil \text{A COFFEE}_F [\lambda x. \text{Ede wants } x] \rceil.$$

We could analyze focus movement more generally as follows:

$$(89) \quad \text{Focus movement: } \lceil \text{XP}_F [\underbrace{\text{YP} \dots \text{t} \dots}_{\sim}] \rceil$$

This perspective on focus movement makes different syntactic predictions than Rizzi’s account, since the syntax of \sim is assumed to be unrestricted in Alternative Semantics. It predicts that any restructuring based on movement can in principle feed focus marking, unconstrained by the precise location of focus projections in the functional sequence of heads. The possible relationships between focus and “background” are entirely configurational in this theory.²⁸

Can this theory offer a reason why foci should move? This would be desirable also in Rizzi’s account, since we need to understand why a derivation with optional focus movement would ever be chosen. However, the representation in (88) predicts the same focus presupposition as the following structure in which *a coffee* stays in situ:

$$(90) \quad \lceil \text{Ede wants COFFEE}_F \rceil.$$

So what could motivate choosing (88) over (90)? And more generally, what is the motivation for focus movement if the same meaning can be achieved without movement?

Remember that Wagner (2005, 311) proposes a constraint on the possible relations between \sim and F: every F has to be immediately dominated by a \sim . This has the effect that the strength of the presuppositions that can be marked with or without movement is sometimes very different.²⁹

²⁸See Wagner (2012a) for a discussion of how certain properties of focus movement vs topic movement that Rizzi observed can be derived under this theory.

²⁹There are interactions with definiteness that are relevant here, but which we cannot get into in this paper (cf. Diesing, 1992).

- (91) a. König Ubu hat wahrscheinlich \lceil [die KRONE] \rceil_F verloren \rceil .
 King Ubu has probably the crown lost
 b. König Ubu hat \lceil [die KRONE] \rceil_F wahrscheinlich t verloren \rceil .
 King Ubu has the crown probably lost
 ‘King Ubu probably lost the crown.’

The moved variant in (91b) seems odd at first, but it is odd only if there is no contrasting antecedent of the form *probably lost x*. The focus presupposition in (91b) is stronger since *probably* is part of the material marked as given. In the presence of such an antecedent, the sentence is fine.

Earlier we saw that movement plus givenness marking of the moved constituent can weaken the focus presupposition and hence facilitate prosodic focus marking; focus movement here can be motivated as a strategy to strengthen the focus presupposition. What differs between the two types of movements is “which element is given relative to which” (Wagner, 2005, 311).

This interpretive motivation for focus movement unfortunately only works based on the syntactic locality constraint on the relation between \sim and F proposed in Wagner (2005), since otherwise the same focus meanings can be introduced in situ. We have already found in section 3.14 that this constraint is too restrictive, however.

Maybe a different constraint on the relation between \sim and F than the one proposed in Wagner (2005) could save the analysis. We can reconstruct Rizzi’s proposal as just such a constraint, and restate it in Roothian terms as follows: \sim can only attach at certain points in the functional hierarchy, and the left-hand daughter of the node it attaches to is F-marked (the specifier of this focus head) while the right-hand daughter is not (the complement of the focus head, or “background”). If \sim is restricted in this way, maybe focus movement systematically encodes different presuppositions than in situ focus. Conversely, we could also try to restate Wagner (2005)’s account in Rizzian terms: A functional focus head can be inserted anywhere, and either the specifier of it is the focus and the complement given, or vice versa. This is essentially what is proposed in Wagner (2005) with the two-place “relative givenness” operator.

The step of translating different frameworks into a single notation can be useful: the project of evaluating whether cartography or Rooth’s approach overall provides more insight into focus in some global sense seems daunting, whereas the project of evaluating which types of relations there are between \sim and F seems at least tractable. From a cartographic point of view, it seems like an implausible claim to have a functional head of this type;³⁰ Rizzi’s claim about the distribution of focus heads, on the other hand, looks cumbersome when stated in Roothian terms. The ultimately correct syntactic theory should provide a natural explanation for whichever empirical generalization we discover. See Stevens (2013) for an insightful exploration of relevant facts from a perspective more like the one taken here, and Bocci (2010) for one from a cartographic perspective.

Yet another syntactic generalization is proposed in Neeleman and van de Koot (2007), who, like Wagner (2005), present an account that tries to motivate focus movement based on maximizing the amount of material that is part of the background. This account, as mentioned before, posits a level of representation of “discourse templates,” which constrain the relation that focus, background and topic can have with respect to each other within a syntactic tree. We cannot compare the accounts in details of his definition here, but see Wagner (2009, 2012a) for a discussion of some crucial data points that distinguish the theories.

Some types of focus movement may be motivated not by the interpretive effect they have, but rather by their prosodic effects. Several accounts have tried to account for certain types of focus movement as being motivated by the need of the focused constituent to receive prominence. Examples include Zubizarreta’s 1998 proposal of p-movement, Neeleman and Reinhart’s 1998, approach to

³⁰ But note that Cinque (1999) already acknowledged that the syntax of *only* falls outside of what the functional hierarchy can explain, and \sim may just be in the same class of operators as *only*.

scrambling, or Szendrői’s 2003 account of focus movement in Hungarian. It is controversial, though, whether in all of these cases the relationship between the movement in question and prosodic prominence is really the driving factor. We have seen that in the case of scrambling, prominence can be placed either on the scrambled constituent or on the remnant, depending on which is marked as given relative to which. As for Hungarian, Horvath (2005) argues that focus movement is not directly driven by prosody either. See Szendrői (2016) for more discussion, and a comparison of the prosodic account and the cartographic approach.

3.17 Alternatives or Unalternatives?

Unalternative Semantics (Büiring, 2015b, 2016a) also attempts to do away with F-marking, and also provides a theory of focus/givenness marking in which decisions about the prominence relation between sisters are made in a recursive and local manner, similar to the account proposed in Wagner (2005).³¹

We focus here on one distinctive property of this theory: we have seen several competition-based proposals to explain why focus and givenness marking is often obligatory when possible, namely the accounts involving AvoidF, Maximize Presupposition, and Williams’ “Don’t overlook anaphoric possibilities.” Unalternative Semantics can be characterized as a theory of focus that “builds in” the effect of Maximize Presupposition into the semantics of focus, without any need for competition. Take an utterance with default prominence (Büiring, 2015b):

(92) SMITH ordered BREAKFAST.

The default stress pattern is in principle compatible with any contextual focus set, but according to Unalternative Semantics it nevertheless involves a focus operator \sim . This version of \sim has the effect that the pronunciation in (92) is infelicitous in contexts in which it would have been possible to shift prominence to a non-default prominence relation. For example, it cannot be used in contexts in which narrow focus on *ordered* can be marked, which would have made it possible to shift prominence to *ordered*. Neither can (92) be used in a context that would have allowed us to mark focus on *Smith*. The fact that the prominence relation between *ordered* and *breakfast* is the default prominence rather than the one with prominence on *ordered* adds the condition that alternatives of the form *x breakfast*, where *x* stands for alternative predicates, are “unalternatives.”

It is important to realize that being an unalternative does not mean that no alternative of the form *x-ed breakfast* can play into the interpretation of (92). Consider the following example, which shows default prominence on the direct object within the VP:

(93) A: Ready to go?
B: I’ve only ordered BREAKFAST so far.

A may well infer from B’s statement that B hasn’t been served breakfast, started to eat it, or finished it. These inferences show that alternatives of the form *x-ed breakfast* are still considered. But one could also infer that B has still not checked out of the hotel. What the prosody in (93) rules out, according to Unalternative Semantics, is that *all* alternatives to the VP are of the shape *x breakfast*, because this would have allowed a non-default prosody. In a way, the theory could more appropriately be called “Unfocus Semantics,” since it recursively adds constraints to a representation specifying what cannot be focused.

In Unalternative Semantics, there is no need for competition since constraints on the possible antecedents for focus marking are recursively added based on the prominence relations at each node (every non-default prominence relations adds an Unalternative restriction). Every lost opportunity

³¹Thanks for comments to the attendees of a McGill Semantics Group meeting in June 2016, where this material was first presented.

to switch to a marked prominence relation at a given node imposes the constraint that the focus-semantic value of that node cannot vary only by substitutions of the non-prominent daughter (which should have received focus prominence otherwise).

In the recursive account based on Maximize Presupposition in Wagner (2005, 2006b) (and also in Williams 1997), there is a competition at every node. If there is a competing alternative that encodes a stronger presupposition, the meaning of an expression that fails to mark the presupposition gets enriched with the “anti-presupposition” that the presupposition cannot be fulfilled.

The effect of the competition-based model is equivalent to Unalternative Semantics in many cases. One difference is that in a theory based on Maximize Presupposition, the enrichment with anti-presuppositions only comes about when there is a valid competing expression with a stronger meaning. Sometimes, however, prominence shifts are impossible for phonological reasons. Consider the case of focusing on the past tense in English:

- (94) She’s not going to depart, she DEPARTED.

The morpheme *-ed* in English is not easily accented. The prosodic realization of focus on the past tense in (94) requires placing a pitch accent on the verb stem instead—but this is the default stress location for the verb.³² Since there is no valid competitor that would mark narrow focus on the past tense (a stronger presupposition), the default pronunciation is not enriched by the anti-presupposition that the tense cannot be the focus.

As predicted by a competition-based account, the facts change when the tense is expressed with an accentable morpheme. When using *used to* or in the presence of *do*-support, placing the pitch accent on the stem seems infelicitous as a way to focus tense:

- (95) She’s not going to depart,
 a. she USED TO/DID depart.
 b. #she used to/did DEPART.

These data show that the notion of competition is central to predicting when default prominence is and is not enriched with anti-presuppositions.

The same point can be made based on the interaction of focus and accenting in in Lekeitio Basque. Main prominence (marked with “^” by Hualde et al. 1994) typically falls on the constituent directly preceding the main predicate of a sentence. Within that constituent, prominence normally falls on the first lexically accented word, in this case *book*; otherwise it falls on the last syllable of the last unaccented word. However, it is possible to shift prominence within that constituent to a different word if there is a contrast, just as in English (Hualde et al., 1994, 62):

- (96) a. LIBÛRU barriža ekarri-dot
 book new.ADJ bring-AUX
 ‘I brought the new BOOK.’/‘I brought the new book.’
 b. libúru barrižâ ekarri-dot
 ‘I brought the NEW book.’

The rendition in (96a) with prominence on the work for *book* is compatible with several focus possibilities (focus on book, on the DP, on the VP, . . .), while the rendition with prominence on *new* in (96b) requires an appropriate antecedent of the form *x book*. Interestingly, one cannot shift prominence in Lekeitio Basque to a word that is lexically unaccented. In the presence of unaccented words, the “default” prominence pattern is the only one possible. Precisely then, default prominence is compatible with a broader range of focus possibilities (Hualde et al., 1994, 62):

³² Accented *-ed* seems possible, but feels metalinguistic and arguably involves focusing the phonological content rather than the meaning. See section 4.5.

- (97) a. etxe barrizâ ikusi-dot, es subi barriža
house new.ADJ see-AUX no bridge new.ADJ
‘I saw THE NEW HOUSE, not the new bridge.’
b. *etxê barriža ikusi dot, es subi barriža
‘I saw the new HOUSE, not the new bridge.’

The word for *house* is lexically unaccented, hence default stress falls on *new* in this case (97a). Even though the word for *house* is contrastive here, it cannot carry the main prominence (see Arregi, 2016, for more discussion of the Basque data).

In the competition-based account, *Ede wants coffee* with default prominence cannot be used in a context that licenses a prominence shift to the subject, because using this pronunciation would have encoded a stronger presupposition. If the competitor with subject prominence was knocked out for phonological reasons, the competition-based account would predict that default prominence is compatible with subject focus. There is no enrichment with an anti-presupposition without a valid competitor.

This pattern is not expected in a theory that assigns a uniform meaning to particular prominence relations, as is done in Unalternative Semantics. It seems that at each recursive step, an assessment has to be made whether one could actually shift prominence. We could revise Unalternative Semantics to include the notion of competition, but then this aspect of it will be equivalent to the analyses in Williams (1997) and Wagner (2005). Unalternative Semantics has other features that distinguish it from other accounts, but that we will not review here.

4 Phonological issues

4.1 What is focus prosody?

Focus prosody seems to serve the purpose of highlighting constituents marked as focused and background constituents marked as given. In writing, the effect of focus prosody is often mimicked by capitalization. It appears, then, that focus prosody is about “prominence.” But not just any prominence. There are alternative strategies to make a word or constituent stand out more, but they do not lead to the same meaning as prosodic focus. The following utterances do not convey the same meaning as focus prosody does:

- (98) Viola wants coffee?
a. EDE, EDE, EDE wants COFFEE!
b. EEEEEEEEEDE wants COFFEE!

What is important for focus prosody appears to be the metrical prosodic prominence between words. The realization of metrical prominence results in focused constituents (which are metrically prominent) tending to be realized with pitch accents and boosted in intensity and duration, compared to constituents marked as given (and metrically less prominent), which tend to remain unaccented and are reduced phonetically (see Breen et al., 2010, for experimental evidence and citations). But accents are possible even in the post-focal domain, although these have to be sharply reduced in pitch range, such that the perceived prominence nevertheless remains on the constituent marked as focused. Recent experimental evidence for pitch accent realization on constituents that are marked as given (according to our definition) in the post-focal domain can be found in Kügler and Féry (2017). Also, constituents may be focused without any pitch accents, for example in cases of second-occurrence focus. This why a representation in terms of metrical prominence seems preferable to tying focus effects to the presence or absence of pitch accents, as is sometimes done.

In the following, we can only give a minimal amount of background on the realization of focus, and will then proceed to discuss a few key insights from the prior literature on how focus and phonology

interact. For more comprehensive introductions see Gussenhoven (2004), Ladd (2008), and Féry (2017).

Since Liberman (1975), prosodic prominence is often represented using a metrical grid, which encodes how prominent a syllable is relative to others. Focus prominence can be seen as having the effect that material marked as focused projects higher on the grid than material marked as given (which are metrically “subordinated” in the terminology used in Wagner 2005). If only the syllables associated with the highest grid marks are realized with pitch accents (Pierrehumbert, 1980), this type of representation can be used to account for the distribution of pitch accents. See Büring (2016b) for a recent proposal on how to represent focus prominence using metrical structure. As already discussed in section 3.14, Wagner (2005) proposes a set of principles that recursively decides which of two sisters will be metrically more prominent, checking whether focus presuppositions can be marked at each node in the tree. This leads to the generalization about focus prosody we described in (20).

The assumption in Alternative Semantics is usually that focus only affects metrical prominence. The focus on prominence is justified by the fact that, at least in English, focus seems to leave phrasing intact for the most part (see Norcliffe and Jaeger 2005, Kügler and Féry 2017, and Wagner and McAuliffe 2019 for experimental evidence). See Truckenbrodt (1995), Féry and Ishihara (2009), and Büring (2016b) for discussions of how phrasing may actually be used as a way to adjust prominence, and Hamlaoui and Szendroi (2017) for a recent model of how syntax, phrasing, and focus vary typologically.

There may be other ways in which the phonological realization of focus goes beyond metrical prominence. Many previous studies have argued that there are contrastive pitch accents (e.g., LH* in English) that differ from non-contrastive ones (e.g. H*). See Turnbull et al. (2017) for evidence and a review. Krahmer and Swerts (2001) point out, however, that the studies that provided evidence for contrastive accents often confounded accent type with metrical prominence, because they compared instances of focus in which prominence was shifted and an accent fell on an earlier word to wide focus cases in which an accent fell on the final word. Once accent location and focus status are un-confounded, as in the experiment reported in Krahmer and Swerts (2001), the evidence for a distinct contrastive pitch accent is not so clear.

Apart from focus, other factors affect metrical prominence, and can lead to similar phonological effects as focus prominence. The default metrical representation of an utterance—the pronunciation that does not introduce a focus presupposition—is derived by a set of principles (sometimes called “the nuclear stress rule”) that we will not review here. These principles have the effect that arguments, for example, tend to be metrically more prominent than the predicates that select them (see Schmerling, 1976; Arregi, 2002).

4.2 Linear order and focus ambiguities

There is a linear asymmetry in the realization of focus prosody. In the following examples, a context that licenses prosodic focus on the object is compatible with a pitch accent on the subject, but the reverse is not true:

- (99) a. A: What does Ede want?
 B: \lceil EDE wants COFFEE \rceil_F .
 b. A: Who wants coffee?
 B: $\# \lceil$ EDE \rceil_F wants COFFEE \rceil .

The reason for this asymmetry is arguably that an accented constituent later in the utterance will be perceived as more prominent than an accented constituent earlier (Newman, 1946; Truckenbrodt, 1995). So even the rendition in (99a) will fulfill the constraint in (20) in that the object is more prominent than the subject, but (99b) will not (see discussion in Truckenbrodt, 1995).

This has the effect that default final prominence often appears to be compatible with a wider range of contexts than constituents that show shifted prominence. Chomsky (1971, 200) observes the following example:

- (100) It wasn't an ex-convict with a red SHIRT that he was warned to look out for.

Chomsky (1971) argues that this sentence realized with a single accent on *shirt* is compatible with a wide variety of contexts:

- (101) Was he warned to look out for
- a. an automobile salesman?
 - b. an ex-convict wearing dungarees?
 - c. an ex-convict with a carnation?
 - d. an ex-convict with a red tie?

Chomsky (1971) proposed that the constraint about which constituent can be interpreted as the “focus of a sentence” is simply that it needs to contain the “intonation center” (essentially the nuclear stress). Any focus-interpretation that does require shifting the intonation center will contribute to the ambiguity of the default prosody.

The phenomenon that default prominence realization often seems compatible with a wider set of contexts was called “focus projection” in Höhle (1982). An arguably more adequate (and less theoretically loaded) way to describe the phenomenon is to call these cases “focus ambiguities” (Jacobs, 1991): Certain pronunciations seem to be ambiguous with respect to the focus structure of the utterance, since the default prominence principles lead to the same metrical prominence relations as certain focus assignments, or at least to similar ones.

4.3 Further focus ambiguities: arguments and predicates

Schmerling (1976) observed that predicates can often remain accentless when adjacent to an argument, without the need for the predicate to be given. In cases in which the predicate precedes its argument, this may just look like a further instance of the linear order asymmetry we have just discussed. But Schmerling showed that this effect can also be observed in cases in which the predicate *follows* its argument, such as in intransitive sentences in English.

Gussenhoven (1983) proposed explaining Schmerling's insight by positing that predicates and arguments can be integrated into a single prosodic domain (see Selkirk, 1984, for an alternative account). Gussenhoven (1983) tested this hypothesis experimentally by recording dialogues like the following (focus representation added), and playing them back to listeners:

- (102) a. A: Do you live by yourself?
 B: \lceil I [share a FLAT] \rceil_F .
 b. A: I hate sharing things, don't you?
 B: \lceil I share a FLAT \rceil_F .

The perception experiment involved a context-retrieval task, where listeners had to say which dialogue they preferred, one with the same question as in the dialogue in which it was originally recorded, and one with the respective other context. Listeners were at chance when it came to picking the the original context based on the utterance. This is as expected if the two focus structures are not reliably prosodically disambiguated.

Breen et al. (2010) explored this empirical question as well, and found subtle phonetic evidence that the two focus structures are not actually phonetically identical, and that listeners can distinguish object focus from VP at least in very carefully articulated utterances (see also Eady and Cooper, 1986). But there is also evidence that the prosodic relationship between a predicate and an argument

is very different from that of a predicate and an adjunct (Gussenhoven, 1983; Birch and Clifton, 1995; Stevens, 2013), suggesting that there is something to Schmerling’s generalization about predicates and arguments that needs an explanation.

von Stechow and Uhmann (1984) presented evidence that the generalization about arguments and predicates needs to be amended to only apply to *internal* arguments of a predicate (see also Newman 1946 for an early observation in this regard, and also the discussion in Selkirk 1995).

4.4 Syntactic focus projection

Selkirk (1984, 1995) proposes a theory that derives the focus ambiguities by positing a syntactic mechanism called “focus projection,” where a focus feature can literally project to other nodes throughout the tree. The projection rules are devised such that they capture the various empirical findings about focus ambiguities, including the relevance of the internal/external argument distinction, or the argument/adjunct distinction.

In this theory, F-marking has a very different interpretation than in Rooth’s theory. Not every F-marked constituent is interpreted as “focused” and requires alternatives. In Selkirk (1995), for example, only *undominated* F-markers are interpreted as a true focus. This is similar to the assumptions about F-marking in Schwarzschild (1999), which we already discussed.

In Rooth’s theory, the premise is that every F should receive a uniform semantic interpretation; we can characterize the motivation in Selkirk’s and Schwarzschild’s assumptions about F-marking as a giving priority to give every F a consistent *phonological* interpretation (e.g., F=contains a pitch accent). So there is no a priori reason to prefer one theory over the other. However, several empirical and theoretical issues have been raised with the particular theories of F-projection suggested, and alternative explanations have been proposed that do not rely on it. These discussions will not be revisited here (cf. Jacobs, 1991; Wagner, 2005; Büring, 2006; Arregi, 2016; Büring, 2016b).

4.5 Purely phonological contrasts?

Bolinger (1961, 93) reports on a Gardner Rea cartoon, published in the *New Yorker* (April 14, 1956, p. 36), in which a man “stands” upside down suspended in the air, with his feet on the ceiling. The psychologist says:³³

(103) In such a case, our first concern is to persuade the patient that he is a stalagMITE.

This example suggests that focus alternatives can be alternative linguistic expressions, rather than alternative meanings, as is in Alternative Semantics. However, Artstein (2004) argues that (103) and related cases of prominence shifts within words can be accounted for with the same tools that explain semantic focus and givenness marking. The idea is that apparently meaningless sub-word constituents such as *stalag* and *mite* can be assigned a denotation after all: they can denote the phonological string. So *mite* denotes the phonological string [majt].

Using the phonological sequence as a denotation is less contrived than it may seem at first. As Artstein (2004) points out, we can generally refer to the sound of a word or nonword and predicate over them: *-mite begins with an [m]*. An expression like *Dwight*, which does have a regular meaning, can either be used to denote an individual like Dwight Bolinger, but it can be used to denote the phonological [d^wajt] (or an orthographic string): *Dwight begins with a [d]*. Phonological strings can even be substituted by *wh*-words: *Stalag-what?*. There are instances of embedded focus-marking in which word-parts are prosodically focused:

(104) a. John is more concerned with AFfirmation than with CONFirmation. (Chomsky, 1971, 205)

³³The cartoon uses underlining instead of small caps.

- b. Greek divers have found the wreck of the British liner *Brittanic*, sister ship of the *Titanic*... (Ladd, 2008, 234)

Chomsky’s example involves a stress shift in both words, while Ladd’s example only shows a stress shift in the second word, *Titanic*. Intuitively, either option is felicitous. Which one speakers choose may depend on how far they plan ahead, and whether they are able to anticipate the opportunity for encoding a cataphoric relation.

Artstein 2004 2004’s analysis shows that as long as linguistic expressions can be treated as denoting their own phonological form, Alternative Semantics can handle cases of phonological focus marking.

4.6 No semantic contrast without phonological contrast?

Consider the following examples (Williams, 1980, 11–12, (26)–(29)):

- (105) a. John saw Mary, and then MARY saw JOHN.
- b. John saw Mary, and then HE was seen by HER.
- c. #John saw Mary, and then JOHN was seen by MARY.
- d. #He saw her, and then HE was seen by HER.

It seems that the double contrast in the second conjunct is impossible when the resulting pronunciation leads to phonologically identical phrase-final words with nuclear accents. Williams (1980) attributed this to a “rhyming constraint” on adjacent intonational phrases: they cannot end with phonologically identical accented words. This is effectively a constraint ruling out accented epistrophe.

Another interpretation of the “Williams effect” is that the possibility of (phonological) givenness marking blocks or pre-empts the possibility of marking the semantic contrast. In this interpretation, what’s odd about (105c) and (105d) is that one *could* have marked the final argument as given, by choosing a different focus structure:

- (106) John saw Mary, and then JOHN \lceil [was seen BY]_F Mary \rceil .

A production experiment reported in Wagner (2012c) indeed showed evidence that speakers who pronounced the sentence as in (106) or with prominence on the main predicate rated the sentence as much more acceptable than speakers who pronounced it as in (105c). One way to think about this effect is the following: we have seen evidence that focus marking requires a semantic contrast. Maybe focus marking also always requires a *phonological* contrast.

A general constraint on intonational phrases ruling out any homophonous accented endings (such as the “rhyming” constraint proposed by Williams) seems too strong: Note that repeating intonational phrases with identical final accented words is not always infelicitous:

- (107) Yesterday, I forgot my book. And you know what I did today: I forgot my BOOK!³⁴

What’s different about (107) is that no focus marking (phonological or other) is possible within the string *I forgot my book*. The utterance might simply not involve a \sim operator, since no focus presupposition is licensed. Accented epistrophe sounds odd only when there is phonological contrast elsewhere in the utterance, it seems.

³⁴A complication with this data point is that it might actually be necessary to use a particular intonation here. Klassen and Wagner (2017) found evidence in their production study that all-given utterances like this often show heightened pitch on the final pitch accent (reported in the supplementary materials). They call this contour a final “upstep.” Ladd (p.c., 2017) suggests that this might be the surprise-redundancy contour. The purpose of the upstep might be similar to that of an exclamation mark in orthography.

If focus marking requires a phonological contrast, the question arises of why this might be case. It certainly does not follow from anything in Alternative Semantics. One possible interpretation is that marking *Mary* as phonologically given is preferred in (105c) over marking *Mary* as semantically contrastive. It is not obvious, though, why the preference should go this way.

While the rhyming constraint that Williams (1980) proposed to explain the effect may have been too strong, Williams' intuition that there is an important relation to rhyme was correct. Wagner and McCurdy (2010) provide evidence that the Williams effect can explain why identical rhymes (right/write) are unacceptable in English, but acceptable in French: French generally does not show the Williams effect, which is expected given that it cannot mark embedded foci prosodically with a prominence shift, as we have already seen.

5 Association with focus

Apart from conditionals as in (1), there are many other constructions that show a truth-conditional interaction with prosodic focus. Take the case of *why*-questions, which interact with prosodic focus in parallel ways (see Dretske 1972, 419; example adapted from Partee 1991, 171):³⁵

- (108) A: Why did Clyde MARRY Bertha? A': Why did Clyde marry BERTHA?
B: Because otherwise he wouldn't have been eligible for the inheritance.

Halliday (1967a, 38) observes interaction between prosodic focus and the modal *must*. A sign on the London Underground could plausibly intend to convey (109a), but not (109b):

- (109) a. DOGS must be CARRIED.
b. DOGS must be carried.

A range of so-called focus-sensitive adverbs show similar truth-conditional effects, the epitome being *only* (Rooth, 1985, 2):

- (110) a. John only introduced BILL to Sue.
b. John only introduced Bill to SUE.

Assertion (110a) could be refuted by showing that John also introduced Anna to Sue; the one in (110b) by showing that John also introduced Bill to Anna.

Truth-conditional effects also arise with the adverbs *always*, *usually*, and *frequently* (Rooth 1985, 164; Schubert and Pelletier 1987, 442):

- (111) a. MARY always takes John to the movies.
b. Mary always takes JOHN to the movies.

Other constructions showing truth-conditional effects of prosodic focus include superlatives, generics, and emotive factives (Partee et al., 1990). There are also adverbs that interact with prosodic focus such that the presupposition they encode is affected, rather than the truth conditions of what is asserted (e.g. *even*, *also*, and negation).

5.1 Is Association with focus obligatory?

How does association with prosodic focus come about? For Rooth (1992b), the relation between operators like *only* and focus is merely indirect. *Only* comes with its own hidden pronoun that denotes an alternative set, and this pronoun may or may not be anaphoric to the same antecedent:

³⁵Interestingly, other *wh*-questions appear not to be focus-sensitive in this way (Partee et al., 1990).

(112) Mary only (C₁) \lceil [READ_F the recognitions]² \sim C₁ \rfloor .

This view of focus association may seem too weak: surely, one spontaneously understands *only* in (112) as ranging over alternative predicates, as indicated by prosodic focus. But this could be just because prosodic focus helps accommodate such a set, and in the absence of a separate antecedent for *only*, the natural assumption is that *only* is anaphoric to the same set as \sim .

Let's consider two examples that seem to support this view of indirect association:³⁶

- (113) a. People who GROW rice generally only EAT rice. (Rooth, 1992b, 109)
 b. I only promised Mary a SMALL SUM, and I only promised PETE a small sum, AS WELL. (Williams, 1997, 607)

For these utterances to be noncontradictory, *only* must associate with *rice* and *a small sum* respectively, even though they do not get the main prominence. Here's another example, this time involving a modifying adjective (adapted from Wagner, 2006a, 317):

- (114) Jo only took Ancient Greek, so he didn't take Latin; and Sue only took MODERN Greek, so she didn't take Latin either.

These examples show that *only* does not necessarily associate with the prosodic focus in its scope. This is expected if association is not obligatory, as in Rooth (1992b), where \sim and *only* can take separate antecedents. If we allow the possibility of nested \sim operators, these examples are also still compatible with a theory that posits obligatory association with F:

- (115) Sue only \lceil took \lceil MODERN_F Greek \rceil \rfloor .

And yet, these examples are just what would be expected if there was no obligatory association with prosodic focus (see also Rooth, 1985, 1992b; Roberts, 1996; Martí, 2003; Dimroth, 2004; Sudhoff, 2010b).

In certain syntactic configurations, however, association with prosodic focus appears to be obligatory after all. Büring (2015a, who credits Roger Schwarzschild for the example) marks the following example as odd (but not everyone appears to agree, given a small poll):

- (116) A: What did you only eat in Paris?
 B: #I only ate CRÊPES in Paris.

A potential confound may be that the example is confusing, since the reading where B reports having eaten nothing but crêpes in Paris may be hard to suppress. But the example is even worse when we choose a different direct object that is unlikely to associate with *only*:

- B: #I only ate EVERYTHING in Paris.

If 116 is odd, and (113b) is not, this raises a puzzle. Both examples involve a repeated focus or "second-occurrence focus," a phenomenon investigated in various recent studies, but see an insightful discussion in Büring (2015a) (see also Partee, 1991; Rooth, 1992b, 1996b; Beaver et al., 2007; Kadmon, 2001; Krifka, 2004; Howell, 2007; Ishihara and Féry, 2008; Rooth, 2010; Büring, 2015a; Baumann, 2016; Schwarzschild, 2019).

The question of how direct the relation between focus-sensitive operators and their foci is remains an open issue. Rooth (1996a) notes, however, that a theory that allows for direct association between operators other than \sim and focus may be too powerful. There are no natural language operators (as far as we know) that work like the made-up operator *tolf*:

³⁶Roberts (1996, 2012) discusses a related example, also showing a broader alternative set than the prosodic focus marking suggests.

- (117) a. I tolfe_d that he_F resembles her: I told him that he resembles her
 b. I tolfe_d that he resembles her_F: I told her that he resembles her
 c. I tolfe_d that he_F resembles her_F: I told him and her that he resembles her

A theory in which operators directly associate focus should give us the power to write lexical entries similar to *tolfe*. Given that the indirect theory of association is more restrictive, von Stechow (1994, 36) considers indirect association the null hypothesis.

5.2 Selective association

As discussed in section 1.2, Alternative Semantics assumes that \sim indiscriminately considers all alternatives introduced in its scope. This appears not to be the case with respect to operators like *only*. When there are multiple accented constituents within a VP, *only* can selectively associate with one of them. Consider (Wagner et al., 2010, contexts are simplified):

- (118) a. Gramma gave a scarf to both Maryanne and John. She only gave a BUNNY to MARYANNE.
 b. Gramma gave a scarf and a bunny to John. She only gave a BUNNY to MARYANNE.

In (118a), *only* associates with *Maryanne*, and *bunny* must be associating with a separate \sim to convey the contrast to *scarf*; in (118b), *only* associates with *bunny*. The production experiment reported in Wagner et al. (2010) shows that selective association of this kind is indeed acceptable.

One possible explanation for selective association is that the constituent whose alternatives appear not to be considered by *only* moves out of its scope. This would lead to an LF of (118b) similar to the following:³⁷

- (119) To MARYANNE, Gramma only \ulcorner gave a BUNNY_{F1} \urcorner .

Rooth (1996a) presents a related example in which there are two overt focus operators, *also* and *only*, and argues that selective association is possible, even into islands:

- (120) We only₁ recovered the diary entries that Marilyn₁ made about John. We also₂ only₁ recovered the diary entries that Marilyn₁ made about Bobby₂.
 ‘Also with respect to diary entries about Bobby, we only recovered the ones that Marilyn made.’

The acceptability of selective association in the presence of multiple foci as in (120) has been questioned based on experimental results reported in Beck and Vasishth (2009). Suppose, however, that it is acceptable, how could we account for selective association without movement? We would need to give \sim the power to “pick” its associate, such that \sim only considers alternatives introduced by certain F-markers (Kratzer, 1991; Wold, 1996). Indexed foci are also argued for in Kratzer (1991) based on the famous Tanglewood example:

- (121) I only went to Tanglewood because you did.

The intended reading is one in which the speaker defends herself against the accusation of being a copycat, and conveys that there is no other town x such that she went to x because the interlocutor did. The questions raised by this example are complex, see Krifka (1991) and Beaver and Clark (2008) for discussion. Erlewine and Kotek (2016) argue for a movement analysis, and argue that this

³⁷ Beaver and Clark (2008) have argued that extraction from within the scope of \sim is impossible, but the empirical situation is complex. A comprehensive discussion of extraction and focus association could easily fill a separate review chapter.

removes the need for indexed foci. But see Longenbaugh and Bassi (ress) for a different interpretation of the facts (see also Krifka 1991).³⁸

5.3 Association without focus

We have seen that prosodic focus is not felicitous without an appropriate salient antecedent, or a context that makes accommodating such an antecedent plausible. Even in cases of association with focus, prosody sometimes fails to signal the locus of alternative substitution. This occurs if the material that is held constant in the alternatives is not contextually given. Consider Williams (1997, 608):

- (122) a. Yesterday, I only saw blue TRUCKS on the road.
 b. #Yesterday, I only saw BLUE trucks on the road.

If I want to convey that all trucks that I saw while driving around for a bit were blue, I can use the prosody in (122b), without necessarily implying that I didn't see any cars (which would be very unlikely, while a situation where all trucks that one saw were blue could easily happen, assuming there were few trucks). Unless we have talked about trucks, the pronunciation in (122a) is preferred for this reading, even though (122b) would make the intended association with *blue* clear. Note that this example is different from the case of selective association in (118) in that (122b) has default prosody and there is no reason here to assume that there are multiple contrastive constituents.

This example shows that prosodic focus prosody is not in fact necessary in order to restrict the alternatives that *only* ranges over. We can call this "association without focus." Sudhoff (2010b,a) presents experimental evidence from a production experiment showing evidence for association without focus in German. The experiments show that association with *only* and prosodic focus can be dissociated: A "contrastive" prosody is only used in the presence of a salient antecedent for prosodic focus marking.

If association without focus is possible (this section), and association with focus is not necessary (section 5.1), this suggests a more indirect relationship between *only* and prosodic focus than is often assumed.

At first sight, these observations seem compatible with the indirect theory in Rooth (1992b). There is a potential problem, however: if *only* has access to an alternative set of the form *x trucks* in (122a), then why couldn't a \sim operator use that same antecedent, leading to the pronunciation in (122b)? Prosodic focus marking should be possible. But if it is possible, then it should presumably also be obligatory.

It seems that the alternative set that \sim ranges over requires a salient linguistic antecedent (similar to VP ellipsis), while the alternative set that *only* ranges over can be restricted in the same way as the domains of quantifiers often are, without any need for a salient antecedent. This difference does not seem expected based on the representation in (112) (but see Rooth 1992b for a related, insightful discussion).

5.4 No association without (some) prominence?

One observation that is suggestive of a more direct relationship between *only* and prosodic focus is that it appears that *only* cannot associate with a constituent that has no prosodic prominence whatsoever (Beaver and Clark, 2008, 150):

- (123) A: You had many discussions with Sandy, but what I want to know is the extent to which you talked about Fred. Of all the times you talked with Sandy, how often was Fred the person you talked about?

³⁸ A reviewer points out complications with Kratzer's claim discussed in Schmitz and Schröder (2002).

B': I [only]F discussed'im with Sandy. Cannot mean: 'I only discussed Fred (and no one else) with Sandy.'

Related observations are reported in von Stechow (1994, 45) and Rooth (1996b) for English, in Bayer (1996, 59) for German, in Hoeksema and Zwarts (1991, 67) for Dutch, and in Beaver and Clark (2008) for Spanish. If the relationship between *only* and prosodic focus is indirect, this seems surprising. Using Büring's terminology, one could argue that using a clitic introduces an unalternative: The sentence is incompatible with narrow focus on the referent of the clitic.

Beaver and Clark (2003) note another twist to this observation. In the same set of circumstances, association with *always* is actually possible (example from Beaver and Clark, 2008, 150):

- (124) A: You had many discussions with Sandy, but what I want to know is the extent to which you talked about Fred. Of all the times you talked with Sandy, how often was Fred the person you talked about?
 B: I [always]F discussed'im with Sandy. 'Whenever I discussed someone with Sandy, I discussed Fred.'

Therefore, it is not the case then that association with a cliticized argument is impossible in general. This restriction seems to be specific to focus operators like *only* and *even*. This, and a number of other differences between operators like *only* and operators like *always*, are used in Beaver (2004) to argue that *only* associates with focus directly, while *always* does not.

In the preceding sections we have seen evidence that *only* can fail to associate with prosodic focus in its presence, that it can selectively associate in the presence of multiple foci, and that it can associate with constituents in the absence of focus prosody. All of these observations pointed to an indirect relation between *only* and prosodic focus. The observations reported in this section provide arguably the strongest evidence that there is a more direct relation after all. See Beaver and Clark (2008) for additional arguments.

5.5 Structured meanings

Many analyses of focus operators like *only* or *even* assume that they necessarily range over a set of propositional alternatives. Alternative Semantics as proposed in Rooth (1985) provides the tools to make this possible. The fact that *only* apparently can range over smaller alternatives such as DP-meanings might be illusory. Maybe these are just cases in which the rest of the constituents in the proposition are marked as given. In the following example, we could say that the alternatives that *only* ranges over are propositions of the form {Ede wants coffee, Jan wants coffee, ...}, rather than over individuals:

- (125) Only EDE wants coffee.

There are syntactic questions that arise in such a theory, since *only* at least appears to be able to form a constituent with a DP. But there is also a semantic problem with this approach. The issue was first observed in Rooth (1985, 85, fn. 14), and then shown in its full generality in Zimmermann (2017). Consider first a case in which *only* attaches to a subject (Zimmermann, 2017, 12):

- (126) Only three is an odd number.

This sentence is intuitively clearly false, and yet, if we assume with Rooth (1985) that *only* ranges over propositional alternatives of the form $\lambda w.x$ is an odd number in w , it should come out as true. The reason is that numbers are rigid designators, and a proposition of the form x is an odd number is either true in all worlds or false in all worlds (that is, its truth does not vary by world). Therefore, any sentence of the form x is an odd number that involves an actual odd number denotes the *same*

proposition, because propositions are assumed to be characterized by the set of worlds in which they are true.

The particular example here might by itself not be entirely convincing. After all, a theory that takes *three is an odd number* to denote the same proposition as *five is an odd number* is not fine-grained enough to capture our intuition that they mean different things. However, Zimmermann (2017) argues that the problem also surfaces with less “pathological” examples.

It seems, then, that *only* needs “access” to the meaning of the DP it associates with, and range over individuals in this case, rather than propositions. There is a theory of focus that is suitable to provide this access, the “structured meaning account” to focus. The structured-meaning account to focus assumes that focus divides up the meaning of an expression into two separate semantic pieces, the focused part and the non-focused part, and operators (like *only*) take this tuple of meanings as their argument (von Stechow and Wunderlich, 1991; Krifka, 1991, 2001). Zimmermann (2017) argues that this theory provides a rich enough representation of focus to resolve the Rooth/Zimmermann puzzle.

5.6 Syntactic association?

Following Rooth (1992b), most current analyses of *only* assume that the mechanism through which *only* associates with prosodic focus is that the alternatives of the constituent that *only* attaches to are restricted according to the placement of prosodic focus. For example, if *only* attaches to a VP, the idea is that the alternatives it operates over are always VP meanings, even if the only parts that vary within the VP are substitutions of the DP embedded within it. This view is often called the “in situ theory of association with focus.”

An alternative view is that in such cases, the LF that is interpreted is actually different from the apparent surface syntax. In our example (110a), for example, the DP *Bill* would move to associate with *only*. Rooth (1985) entertains such an analysis of *only*, according to which it takes two arguments, namely a focus constituent and a second one, and in cases of VP-only, the focus moves to associate with *only*. Drubig (1994); Bayer (1996); Krifka (2004) and Wagner (2006a) present a range of arguments in favor of such a movement account. The LF of a sentence involving *only* might always look as follows under such an account, with a focus constituent in the complement position of *only*, and a second background argument:

(127) [[only focus constituent] background]

In the case of (110a), the associate DP moves to the complement position of *only* at LF, leading to the following representation:

(128) [[only Bill] [λx . John introduced x to Sue]].

The empirical argument in Wagner (2006a) in favor of association by movement is based on the distribution of negative polarity items.

Association by movement is compatible with Rooth’s theory of focus, but no such movement is necessary given the possibility of restricting alternative sets by simply leaving certain words and constituents in the scope of \sim without an F-marker. In fact, association through movement does not do away with the need for a mechanism to further restrict the alternatives, since the semantic focus can be a subpart of the constituent that *only* attaches to. One can question, then, what the motivation for associating by movement is, if the same semantic effect could be achieved in situ by restricting the alternatives. More evidence for a two-place operator analysis of *only* can be found in Smeets and Wagner (2018).

Wagner (2006a) argues that the analysis of *only* as taking two syntactic arguments might also explain some of the differences from *always*. After all, *only* can (on the surface) attach to a range of constituents, while the syntax of *always* is substantially more restricted. In this view, *always* differs

from *only* simply in that it is a true propositional adverb that takes a single syntactic argument, and not two. Whether such a syntactic analysis can explain all the differences between *only* and *always*, such as the one observed in (124), remains to be seen.

The syntactic approach to association can be seen as a syntactified version of the structured meaning account. It only posits the equivalent of structured meanings for certain operators, however, and crucially not for \sim , where we have seen that there is little evidence for the obligatory movement of foci.

Challenges for association by movement are discussed in Hirsch (2017), who argues against the claim that *only* can attach to constituents of a range of semantic types. The surface syntax, which indeed shows syntactic flexibility, is taken to show that the word *only* we observe on the surface might sometimes not reflect the syntactic attachment of the operator, but rather be a form of concord (see also Hole, 2015, 2017; Erlewine, 2017; Bayer, 2018; Hirsch and Wagner, 2019). We cannot explore these syntactic issues in more detail here.

6 Do we need a semantic theory of prosodic focus?

Throughout this chapter, we have used the Roothian formalism to discuss different ideas about focus and givenness marking, and association with focus. The crucial ingredients of this formalism are the operator \sim ; the syntactic F-marker that marks constituents that introduce alternatives; syntactic constraints on \sim and its relation to F; assumptions about how speakers make choices of different focus structures (e.g., AvoidF or Maximize Presupposition); and a phonological principle that captures the effect of \sim on the pronunciation of an expression.

The Roothian notation has helped us define terminology related to focus phenomena, characterize different “focus types,” and make precise the ways in which languages might differ typologically. It has also helped to compare theories that were originally formalized in different ways. The strategy of translating theories into Roothian notation has limits though: we have already saw some “Super-Roothian” ideas that require additional tools, for example, a three-way distinction of focus, given, and new *within the scope of* \sim would go beyond what Rooth’s notation can accommodate. We now turn to theories of focus phenomena that are “extra-Roothian,” that is, they simply cannot be expressed with this notation, since they do not assume that a grammatical mechanism is involved.

One type of approach views focus prosody as a processing effect, and attributes contextual effects on prosodic prominence to the level of activation of cognitive representations. Certain words might be reduced simply because their meaning, an aspect of their structure, or maybe even just the phonological form had some prior activation. This prior activation might make them more “accessible,” and this could lead to reduction effects during production. Alternatively, speakers could make certain choices (like giving more prominence to one word over another word) because they take into account what parts of the message will be easy or difficult for the listener to decode. Such accounts based on “accessibility” or “predictability” are pursued in the psycholinguistic literature on prosodic reduction. For a recent review see Arnold and Watson (2015) and Turnbull (2017). Wagner and Klassen (2015) and Klassen and Wagner (2017) present experimental evidence in favor of the need for Alternative Semantics. Even if accessibility effects are also attested (such as repetition effects), accessibility factor cannot explain prominence shifts due to focus, and reference to alternatives is crucial in accounting for them.

Another set of Extra-Roothian approaches is that of purely pragmatic theories to focus (see Kadmon 2001, and Gutzmann 2020 for general questions regarding the distinction between semantics and pragmatics). A recent example is an account proposed in Bergen (2016), based on the rational speech act model. The basic idea in Bergen (2016) is that the focus prosody is not a result of hidden grammatical structure, but rather just a rational use of signal strength. The reason a speaker may give added prominence to *Ede* might be to reduce the noise in the channel for that part of the message, at the expense of increasing the noise rate for the reduced part. This speaker anticipates

that the listener will guess their intention behind the boost in prominence, and the effect of prosodic focus comes about through a cascade of pragmatic reasoning. Schmitz (2008), Stevens (2013) and Westera (2016) propose other accounts that are similar in that they try to give pragmatic reasons for the interpretive effects of focus prosody.

The pragmatic approach in Bergen (2016) has trouble explaining why other strategies of boosting prominence, for example reduplication or phonetic lengthening (e.g., *Eeeeeede wants coffee*) do not have equivalent pragmatic effects to shifting prominence. They may trigger pragmatic inferences, but these seem different from the effect of prosodic focus. However, the model in Bergen (2016) does not preclude that there could be a conventionalized meaning for focus. And it seems hard to deny that prosodic focus must be conventionalized to some extent—why else would languages differ in whether, how, and under what circumstances they use prosodic focus (see Ladd, 1990)? Maybe pragmatic accounts can at least offer an explanation of the historical origin of focus prosody. How far a pragmatic account can be pushed to account for the variety of phenomena outlined in this chapter remains to be seen.

Crossreferences

Context and conversation; Information Structure; Questions and interrogatives, exhaustivity vs quantificational variability; The syntax and semantics of appositives; Semantics of English intonation: A leopard? A leopard!; Semantics vs Pragmatics; Topic; Verum Focus

References

- Allerton, D. (1978). The notion of "givenness" and its relations to presupposition and to theme. *Lingua*, 44(2-3):133–168.
- AnderBois, S. (2014). The semantics of sluicing: Beyond truth conditions. *Language*, 90(4):887–926, DOI: 10.1353/lan.2014.0110.
- Anscombre, J.-C. and Ducrot, O. (1976). L'argumentation dans la langue. *Langages*, 10(42):5–27, DOI: 10.3406/lgge.1976.2306.
- Arnold, J. E. and Watson, D. G. (2015). Synthesising meaning and processing approaches to prosody: performance matters. *Language and Cognitive Processes*, 30:88–102, DOI: 10.1080/01690965.2013.840733.
- Arregi, K. (2002). *Focus on Basque Movement*. PhD thesis, MIT, Cambridge, Ma.
- Arregi, K. (2016). Focus projection theories. In Féry, C. and Ishihara, S., editors, *The Oxford Handbook of Information Structure*, pages 185–202. Oxford University Press, DOI: 10.1093/oxfordhb/9780199642670.013.005.
- Artstein, R. (2004). Focus Below the Word Level. *Natural Language Semantics*, 12(1):1–22, DOI: 10.1023/B:NALS.0000011145.76954.0b.
- Bade, N. (2016). *Obligatory presupposition triggers in discourse*. PhD thesis, Universität Tübingen.
- Bade, N. and Sachs, K. (2019). Exh passes on alternatives: a comment on fox and spector (2018). *Natural Language Semantics*, 27(1):19–45, DOI: 10.1007/s11050-019-9149-7.
- Baumann, S. (2006). *The intonation of givenness*. Niemeyer, Tübingen, DOI: 10.1515/9783110921205.

- Baumann, S. (2016). Second occurrence focus. In Féry and Ishihara (2016), pages 483–502, DOI: 10.1093/oxfordhb/9780199642670.013.38.
- Baumann, S. and Riester, A. (2013). Coreference, lexical givenness and prosody in German. *Lingua*, 136:16–37, DOI: 10.1016/j.lingua.2013.07.012.
- Bayer, J. (1996). *Directionality and Logical Form: On the scope of focusing particles and wh-in-situ*. Kluwer, Dordrecht, DOI: 10.1007/978-94-017-1272-9.
- Bayer, J. (2018). Critical freezing in the syntax of particles. In Hartmann, J., Jäger, M., Kehl, A., Konietzko, A., and Winkler, S., editors, *Freezing. Theoretical Approaches and Empirical Domains*, pages 225–263. De Gruyter, Berlin, Boston, DOI: 10.1515/9781501504266.
- Beaver, D. and Velleman, D. (2011). The communicative significance of primary and secondary accents. *Lingua*, 121(11):1671–1692, DOI: 10.1016/j.lingua.2011.04.004.
- Beaver, D. I. (2004). Five only pieces. *Theoretical Linguistics*, 30(1):45–64, DOI: 10.1515/thli.2004.006.
- Beaver, D. I., Clark, B., Flemming, E., Jaeger, T. F., and Wolters, M. (2007). When semantics meets phonetics: Acoustical studies of second-occurrence focus. *Language*, 83(2):245–276, DOI: 10.1353/lan.2007.0053.
- Beaver, D. I. and Clark, B. Z. (2003). "Always" and "Only": Why not all focus sensitive operators are alike. *Natural Language Semantics*, 11(4):323–362, DOI: 10.1023/A:1025542629721.
- Beaver, D. I. and Clark, B. Z. (2008). *Sense and sensitivity: How focus determines meaning*. Wiley-Blackwell, Oxford, DOI: 10.1002/9781444304176.
- Beck, S. and Vasisht, S. (2009). Multiple focus. *Journal of Semantics*, 26:159–184, DOI: 10.1093/jos/ffp001.
- Bergen, L. (2016). *Joint Inference in Pragmatic Reasoning*. PhD thesis, Massachusetts Institute of Technology.
- Birch, S. and Clifton, C. (1995). Focus, accent, and argument structure: effects on language comprehension. *Language and Speech*, 38(Pt 4):365–91, DOI: 10.1177/002383099503800403.
- Birner, B. J. and Ward, G. L. (1998). *Information Status and Noncanonical Word Order in English*. John Benjamins, DOI: 10.1075/slcs.40.
- Bocci, G. (2010). *The syntax-prosody interface from a cartographic perspective: evidence from Italian*. PhD thesis, University of Siena.
- Bolinger, D. (1961). Contrastive accent and contrastive stress. *Language*, 37:83–96, DOI: 10.2307/411252.
- Braun, B. and Tagliapietra, L. (2010). The role of contrastive intonation contours in the retrieval of contextual alternatives. *Language and Cognitive Processes*, 25(7):1024–1043, DOI: 10.1080/01690960903036836.
- Breen, M., Fedorenko, E., Wagner, M., and Gibson, E. (2010). Acoustic correlates of information structure. *Language and Cognitive Processes*, 25(7):1044–1098, DOI: 10.1080/01690965.2010.504378.

- Burdin, R. S., Phillips-Bourass, S., Turnbull, R., Yasavul, M., Clopper, C. G., and Tonhauser, J. (2015). Variation in the prosody of focus in head-and head/edge-prominence languages. *Lingua*, 165:254–276, DOI: 10.1016/j.lingua.2014.10.001.
- Büring, D. (2003). On D-trees, beans, and B-accents. *Linguistics and Philosophy*, 26(5):511–545, DOI: 10.1023/A:1025887707652.
- Büring, D. (2006). Focus projection and default prominence. In Molnár, V. and Winkler, S., editors, *The Architecture of Focus*, pages 321–346. Mouton De Gruyter, Berlin, DOI: 10.1515/9783110922011.321.
- Büring, D. (2008). What’s new (and what’s given) in the theory of focus? In Berson, S., Bratkievich, A., Bruhn, D. and Campbell, A., Escamilla, R., Giovine, A., Newbold, L., Perez, M., Piqueras-Brunet, M., and Rhomieux, R., editors, *Proceedings of the 34th Annual Meeting of the Berkeley Linguistics Society*, pages 403–424, Berkeley, CA. Berkeley Linguistics Society, DOI: 10.3765/bls.v34i1.3586.
- Büring, D. (2015a). A theory of second occurrence focus. *Language, Cognition and Neuroscience*, 30(1-2):73–87.
- Büring, D. (2015b). Unalternative semantics. In D’Antonio, S., Moroney, M., and Little, C. R., editors, *Proceedings of SALT*, volume 25, pages 550–575. Linguistic Society of America, DOI: 10.3765/salt.v25i0.3634, <http://journals.linguisticsociety.org/proceedings/index.php/SALT/issue/view/132>.
- Büring, D. (2016a). Discontinuous foci and unalternative semantics. *Linguistica*, 56(1):67–82, DOI: 10.4312/linguistica.56.1.67-82.
- Büring, D. (2016b). *Intonation and meaning*. Oxford University Press, DOI: 10.1093/acprof:oso/9780199226269.001.0001.
- Calhoun, S. (2010). The centrality of metrical structure in signaling information structure: A probabilistic perspective. *Language*, 86(1):1–42, DOI: 10.1353/lan.0.0197.
- Chafe, W. L. (1974). Language and consciousness. *Language*, pages 111–133, DOI: 10.2307/412014.
- Chafe, W. L. (1976). Givenness, contrastiveness, definiteness, subjects and topics. In Li, C. N., editor, *Subject and Topic*, pages 25–56. Academic Press, New York, NY.
- Chomsky, N. (1971). Deep structure, surface structure, and semantic interpretation. In Steinberg, D. D. and Jakobovits, L. A., editors, *Semantics: An Interdisciplinary Reader in Philosophy, Linguistics, and Psychology*, pages 183–216. Cambridge University Press, Cambridge.
- Chomsky, N. (1976). Conditions on rules of grammar. *Linguistic Analysis*, 2(4):303–351.
- Chomsky, N. and Halle, M. (1968). *The sound pattern of English*. Harper & Row, New York, NY.
- Ciardelli, I., Groenendijk, J., and Roelofsen, F. (2018). *Inquisitive semantics*. Oxford University Press, Oxford, DOI: 10.1093/oso/9780198814788.001.0001.
- Cinque, G. (1999). *Adverbs and functional heads: A cross-linguistic perspective*. Oxford Studies in Comparative Syntax. Oxford University Press, Oxford.
- Clark, H. H. and Haviland, S. (1977). Comprehension and the given-new contract. In Freedle, R. O., editor, *Discourse production and comprehension*, pages 1–40. Erlbaum, Hillsdale.

- Constant, N. (2014). *Contrastive topic: Meanings and realizations*. PhD thesis, University of Massachusetts at Amherst, https://scholarworks.umass.edu/dissertations_2/171/.
- Diesing, M. (1992). *Indefinites*. MIT Press, Cambridge, Ma.
- Dimroth, C. (2004). *Fokuspartikeln und Informationsgliederung im Deutschen*, volume 69. Stauffenburg.
- Dretske, F. I. (1972). Contrastive statements. *The Philosophical Review*, 81(4):411–437, DOI: 10.2307/2183886.
- Drubig, H. B. (1994). Island constraints and the syntactic nature of focus and association with focus. In *Arbeitspapiere des Sonderforschungsbereichs 340: Sprachtheoretische Grundlagen der Computerlinguistik*, volume 51. Sonderforschungsbereich 430, Tübingen/Stuttgart.
- É. Kiss, K. (1998). Identificational focus and information focus. *Language*, 74(2):245–273, DOI: 10.2307/417867.
- Eady, S., Cooper, W., Klouda, G., Mueller, P., and Lotts, D. (1986). Acoustical characteristics of sentential focus: narrow vs. broad and single vs. dual focus environments. *Language and Speech*, 29(3):233–251, DOI: 10.1177/002383098602900304.
- Eady, S. J. and Cooper, W. E. (1986). Speech intonation and focus location in matched statements. *Journal of the Acoustical Society of America*, 80(2):402–415, DOI: 10.1121/1.394091.
- Eckardt, R. and Fränkel, M. (2012). Particles, *maximize presupposition* and discourse management. *Lingua*, 122(15):1801–1818, DOI: 10.1016/j.lingua.2012.08.014.
- Erlewine, M. Y. (2017). Vietnamese focus particles and derivation by phase. *Journal of East Asian Linguistics*, 26(4):325–349, DOI: 10.1007/s10831-017-9156-y.
- Erlewine, M. Y. and Kotek, H. (2016). Tanglewood untangled. In *Semantics and Linguistic Theory*, volume 26, pages 224–243. DOI: 10.3765/salt.v26i0.3785.
- Erteschik-Shir, N. (2007). *Information Structure: The Syntax-Discourse Interface*. Oxford University Press.
- Fanselow, G. and Lenertová, D. (2010). Left peripheral focus: mismatches between syntax and information structure. *Natural Language & Linguistic Theory*, 29:169–209, DOI: 10.1007/s11049-010-9109-.
- Farkas, D. (2010). The grammar of polarity particles in Romanian. In Di Sciullo, A. M. and Hill, V., editors, *Edges, heads, and projections: Interface properties*, volume 156, pages 87–124. John Benjamins, Amsterdam, DOI: 10.1075/la.156.08far.
- Ferreira, F. (1993). Creation of prosody during sentence production. *Psychological Review*, 100:233–253, DOI: 10.1037/0033-295x.100.2.233.
- Féry, C. (2017). *Intonation and prosodic structure*. Cambridge University Press, DOI: 10.1017/9781139022064.
- Féry, C. and Ishihara, S. (2009). How focus and givenness shape prosody. In Zimmermann, M. and Féry, C., editors, *Information Structure: Theoretical, Typological, and Experimental Perspectives*, pages 36–63. Oxford University Press, DOI: 10.1093/acprof:oso/9780199570959.003.0003. Ms. Goethe Universität Frankfurt.

- Féry, C. and Ishihara, S., editors (2016). *The Oxford Handbook of Information Structure*. Oxford University Press.
- Féry, C. and Samek-Lodovici, V. (2006). Focus projection and prosodic prominence in nested foci. *Language*, 82:131–150, DOI: 10.1353/lan.2006.0031.
- Frota, S. (1998). *Prosody and focus in European Portuguese: Phonological phrasing and intonation*. PhD thesis, University of Lisbon.
- Garrod, S. C. and Sanford, A. J. (1982). The mental representation of discourse in a focussed memory system: Implications for the interpretation of anaphoric noun phrases. *Journal of semantics*, 1(1):21–41, DOI: 10.1093/jos/1.1.21.
- Geis, M. L. and Zwicky, A. M. (1971). On invited inferences. *Linguistic inquiry*, 2(4):561–566.
- German, J. S. (2009). *Prosodic Strategies for Negotiating Reference in Discourse*. PhD thesis, Northwestern University.
- Goodhue, D. (2017). *On Asking and Answering Biased Polar Questions*. PhD thesis, McGill University. Defense Draft December 2017.
- Goodhue, D. (2018). A minimal theory of verum focus and context dependent bias in questions. In Hucklebridge, S. and Nelson, M., editors, *The Proceedings of the North East Linguistics Society (NELS)*, volume 48, pages 1–10. <http://lingbuzz.auf.net/lingbuzz/004166>.
- Goodhue, D., Harrison, L., Su, Y. T. C., and Wagner, M. (2016). Toward a bestiary of English intonational tunes. In Hammerly, C. and Prickett, B., editors, *Proceedings of the 46th Conference of the North Eastern Linguistic Society (NELS), Concordia University*, pages 311–320. http://prosodylab.org/~chael/papers/Goodhue-et-al_NELS_2016.pdf.
- Goodhue, D. and Wagner, M. (2018). Intonation, *yes* and *no*. *Glossa: a journal of general linguistics*, 3(1):45pp, DOI: 10.5334/gjgl.210.
- Grosz, B., Joshi, A., and Weinstein, S. (1983). Providing a unified account of definite noun phrases in discourse. In *Proceedings of the 21st Annual Meeting of the Association for Computational Linguistics*, pages 44–50. Association for Computational Linguistics, DOI: 10.3115/981311.981320.
- Güldemann, T., Zerbian, S., and Zimmermann, M. (2015). Variation in information structure with special reference to Africa. *Annu. Rev. Linguist.*, 1(1):155–178, DOI: 10.1146/annurev-linguist-030514-125134.
- Gussenhoven, C. (1983). Testing the reality of focus domains. *Language and Speech*, 26:61–80, DOI: 10.1177/002383098302600104.
- Gussenhoven, C. (2004). *The phonology of tone and intonation*. Cambridge University Press, Cambridge, DOI: 10.1017/cbo9780511616983.
- Gussenhoven, C. (2007). Types of focus in English. In Lee, C., Gordon, M., and Büring, D., editors, *Perspectives on Meaning and Intonation*, pages 83–100. Kluwer, Dordrecht, DOI: 10.1007/978-1-4020-4796-1_5.
- Gutzmann, D. (2020). Semantics vs. pragmatics. In Gutzmann et al. (2020).
- Gutzmann, D., Matthewson, L., Meier, C., Rullmann, H., and Zimmermann, T. E., editors (2020). *The Wiley Blackwell Companion to Semantics*. Wiley–Blackwell.

- Halliday, M. A. K. (1967a). *Intonation and grammar in British English*. De Gruyter, The Hague, DOI: 10.1515/9783111357447.
- Halliday, M. A. K. (1967b). Notes on transitivity and theme in English: Part 2. *Journal of Linguistics*, 3(2):199–244, DOI: 10.5040/9781474211970.ch-002.
- Hamblin, C. L. (1973). Questions in Montague English. *Foundations of language*, 10:41–53, DOI: 10.1016/b978-0-12-545850-4.50014-5.
- Hamlaoui, F. and Szendroi, K. (2017). The syntax-phonology mapping of intonational phrases in complex sentences: A flexible approach. *Glossa*, 2(1)(55), DOI: 10.5334/gjgl.215.
- Hankamer, J. and Sag, I. (1976). Deep and surface anaphora. *Linguistic Inquiry*, 7(3):291–428.
- Haviland, S. E. and Clark, H. H. (1974). What’s new? Acquiring new information as a process in comprehension. *Journal of Verbal Learning & Verbal Behavior*. Vol, 13(5):512–521, DOI: 10.1016/s0022-5371(74)80003-4.
- Heim, I. (1990). Presupposition projection. In van der Sandt, R., editor, *Reader for the Nijmegen Workshop on Presupposition, Lexical Meaning, and Discourse Processes*, Univ. of Nijmegen. University of Nijmegen Press.
- Heim, I. (1991). Artikel und Definitheit. In von Stechow and Wunderlich (1991), pages 487–535.
- Hirsch, A. (2017). *An inflexible semantics for cross-categorial operators*. PhD thesis, Massachusetts Institute of Technology.
- Hirsch, A. and Wagner, M. (2019). Only reconstruction and backwards association. In *Proceedings of the Amsterdam Colloquium*. http://events.illc.uva.nl/AC/AC2019/uploaded_files/inlineitem/Hirsch_and_Wagner_Only_reconstruction_and_backwards.pdf.
- Hoeksema, J. and Zwarts, F. (1991). Some remarks on focus adverbs. *Journal of semantics*, 8(1-2):51–70.
- Höhle, T. (1982). Explikation für ‘Normale Betonung’ und ‘Normale Wortstellung’. In Abaraham, W., editor, *Satzglieder des Deutschen*, pages 75–153. Narr, Tübingen.
- Hole, D. (2015). A distributed syntax for evaluative ‘only’ sentences. *Zeitschrift für Sprachwissenschaft*, 34(1):43–77, DOI: 10.1515/zfs-2015-0002.
- Hole, D. (2017). A crosslinguistic syntax of scalar and non-scalar focus particle sentences: the view from vietnamese and chinese. *Journal of East Asian Linguistics*, 26(4):389–409, DOI: 10.1007/s10831-017-9160-2.
- Horvath, J. (2005). Is ‘focus movement’ driven by stress. *Approaches to Hungarian*, 9:131–158.
- Horvath, J. (2007). Separating focus movement from focus. In Karimi, S., Samiian, V., and Wilkins, W. K., editors, *Phrasal and Clausal Architecture: Syntactic derivation and interpretation. In honor of Joseph E. Emonds*, volume 101, pages 108–145. John Benhamins, Amsterdam, DOI: 10.1075/1a.101.07hor.
- Howell, J. (2007). Second occurrence focus and the acoustics of prominence. In *Proceedings of the 27th West Coast Conference on Formal Linguistics*, pages 114–125. Cascadilla Press, DOI: 10.1121/1.4787465.

- Hualde, J. I., Elordieta, G., and Elordieta, A. (1994). *The basque dialect of lekeitio*, volume 34 of *Supplements of Anuario del Seminario de Filología Vasca "Julio de Urquijo"*. University of the Basque Country Press, Bilbao.
- Ishihara, S. and Féry, C. (2008). The phonology of second occurrence focus. *Journal of Linguistics*, 45(2):285–231, DOI: 10.1017/s0022226709005702.
- Jackendoff, R. S. (1972). *Semantic Interpretation in Generative Grammar*. MIT Press, Cambridge, Ma.
- Jacobs, J. (1991). Negation. In von Stechow and Wunderlich (1991), pages 560–596.
- Kadmon, N. (2001). *Formal Pragmatics: A book on semantics, pragmatics, presupposition, and focus*. Blackwell.
- Katz, J. and Selkirk, E. (2011). Contrastive focus vs. discourse-new: Evidence from phonetic prominence in english. *Language*, 87(4):771–816, DOI: 10.1353/lan.2011.0076.
- Katzir, R. (2013). A note on contrast. *Natural language semantics*, 21(4):333–343, DOI: 10.1007/s11050-013-9095-8.
- Kehler, A. (2005). Coherence-driven constraints on the placement of accent. In *Proceedings of the 15th Conference on Semantics and Linguistic Theory*, pages 98–115, Ithaca, NY. CLC Publications, DOI: 10.3765/salt.v0i0.2922.
- Keshet, E. (2015). Entailment and givenness. Ms., University of Michigan.
- Kim, C. S., Gunlogson, C., Tanenhaus, M. K., and Runner, J. T. (2015). Context-driven expectations about focus alternatives. *Cognition*, 139:28–49, DOI: 10.1016/j.cognition.2015.02.009.
- Klassen, J. and Wagner, M. (2017). Prosodic prominence shifts are anaphoric. *Journal of Memory and Language*, 92:305–326, DOI: 10.1016/j.jml.2016.06.012.
- Klassen, J., Wagner, M., Tremblay, A., and Goad, H. (2016). Prominence shifts in English and Spanish parallel constructions. In Hunter, J., Simons, M., and Stone, M., editors, *JerSem: The 20th Workshop on the Semantics and Pragmatics of Dialogue (SemDial)*, pages 76–85, New Brunswick, NJ. http://semantics.rutgers.edu/jersem/proceedings/Semdial_2016_JerSem_proceedings.pdf.
- Krahmer, E. and Swerts, M. (2001). On the alleged existence of contrastive accents. *Speech Communication*, 34:391–405, DOI: 10.1016/s0167-6393(00)00058-3.
- Kratzer, A. (1991). The representation of focus. In von Stechow and Wunderlich (1991), pages 825–834.
- Kratzer, A. and Selkirk, E. (2018). Deconstructing information structure. Ms, *University of Massachusetts Amherst and University College London*. [downloadable as *lingbuzz/004201*]. Submitted.
- Krifka, M. (1991). A compositional semantics for multiple focus constructions. In *Semantics and Linguistic Theory*, volume 1, pages 127–158. DOI: 10.3765/salt.v1i0.2492.
- Krifka, M. (2001). For a structured meaning account of questions and answers. In Féry, C. and Sternefeld, W., editors, *Audiatur Vox Sapientiae. A Festschrift for Arnim von Stechow*, pages 287–319. Akademie Verlag, Berlin, DOI: 10.1515/9783050080116.287.

- Krifka, M. (2004). Focus and/or context: A second look at second occurrence expressions. In Kamp, H. and Partee, B. H., editors, *Context-dependence in the analysis of linguistic meaning*, pages 187–207. Elsevier, Amsterdam.
- Krifka, M. (2008). Basic notions of information structure. *Acta Linguistica Hungarica*, 55(3):243–276, DOI: 10.1556/aling.55.2008.3-4.2.
- Krifka, M. (2019). Questions. In von Heusinger, K., Maienborn, C., and Portner, P., editors, *Semantics. Sentence and Information Structure*, pages 1742–1785. De Gruyter, Berlin, DOI: 10.1515/9783110589863-005.
- Kripke, S. A. (2009). Presupposition and anaphora: Remarks on the formulation of the projection problem. *Linguistics Inquiry*, 40(3):367–386, DOI: 10.1162/ling.2009.40.3.367.
- Kučerová, I. (2012). Grammatical marking of givenness. *Natural language semantics*, 20(1):1–30, DOI: 10.1017/cbo9780511740084.005.
- Kügler, F. and Féry, C. (2017). Postfocal downstep in German. *Language and Speech*, 60:260–288, DOI: 10.1177/0023830916647204.
- Ladd, D. R. (1980). *The Structure of Intonational Meaning*. Indiana University Press, Bloomington, IN.
- Ladd, D. R. (1990). Metrical representation of pitch register. In Kingston, J. and Beckman, M., editors, *Papers in laboratory Phonology, vol. I: Between the grammar and physics of speech*, pages 35–57. Cambridge University Press, Cambridge, DOI: 10.1017/cbo9780511627736.003.
- Ladd, D. R. (2008). *Intonational Phonology*. Cambridge University Press, Cambridge, 2nd edition, DOI: 10.1017/cbo9780511808814.
- Lakoff, G. (1971). The role of deduction in grammar. In Fillmore, C. J. and Langendoen, D. T., editors, *Studies in linguistic semantics*, pages 63–72. Holt, Rinehart, & Winston, New York.
- Liberman, M. Y. (1975). *The Intonational System of English*. PhD thesis, MIT.
- Longenbaugh, N. and Bassi, I. (in press). Against ‘Tanglewood’ by focus movement: a reply to Erlewine and Kotek 2018. *Linguistic Inquiry*, DOI: 10.1162/ling.a.00348.
- Martí, L. (2003). *Contextual variables*. PhD thesis, University of Connecticut.
- Mayr, C. (2010). *The Role of Alternatives and Strength in Grammar*. PhD thesis, Harvard University.
- Merchant, J. (2001). *The Syntax of Silence. Sluicing Islands, and the Theory of Ellipsis*. Oxford University Press, Oxford.
- Merchant, J. (2004). Fragments and ellipsis. *Linguistics and Philosophy*, 27:661–738, DOI: 10.1007/s10988-005-7378-3.
- Moulton, K., Chan, Q., Cheng, T., Han, C.-h., Kim, K.-m., and Nickel-Thompson, S. (2018). Focus on cataphora: Experiments in context. *Linguistic Inquiry*, 49(1):151–168, DOI: 10.1162/ling.a.00269.
- Neeleman, A. and Reinhart, T. (1998). Scrambling and the PF-interface. In Butt, M. and Geuder, W., editors, *The projection of arguments*, pages 309–353. CSLI Publications, Stanford, CA.
- Neeleman, A. and van de Koot, H. (2007). The nature of discourse templates. Ms. UCL.

- Neeleman, A. and van de Koot, H. (2008). Dutch scrambling and the nature of discourse templates. *The Journal of Comparative Germanic Linguistics*, 11(2):137–189, ISSN: 1383-4924, DOI: 10.1007/s10828-008-9018-0.
- Newman, S. S. (1946). On the stress system of English. *Word*, 2:171–187, DOI: 10.1080/00437956.1946.11659290.
- Norcliffe, E. and Jaeger, T. (2005). Accent-free prosodic phrases? Accents and phrasing in the post-nuclear domain. In *Proceedings of Interspeech 2005*.
- Partee, B., Meulen, A. t., and Wall, R. (1990). *Mathematical methods in linguistics*. Kluwer, Dordrecht, DOI: 10.1007/978-94-009-2213-6.
- Partee, Barbara, H. (1991). Topic, focus and quantification. In *Proceedings of SALT*, volume 1, pages 159–188, Cornell, Ithaca, NY. CLC Publications, DOI: 10.3765/salt.v1i0.2981.
- Percus, O. (2006). Antipresuppositions. In Ueyama, A., editor, *Theoretical and Empirical Studies of Reference and Anaphora: Toward the establishment of generative grammar as an empirical science. Report of the Grant-in-Aid for Scientific research (B), Project No. 15320052*, pages 52–73. Japan Society for the Promotion of Science, Tokyo.
- Pierrehumbert, J. (1980). *The phonology and phonetics of English Intonation*. PhD thesis, MIT.
- Prince, E. (1981). Toward a taxonomy of given-new information. In Cole, P., editor, *Radical Pragmatics*, pages 223–255. Academic Press, New York, NY.
- Reinhart, T. (2006). *Interface Strategies*. MIT Press, Cambridge, Ma., DOI: 10.7551/mitpress/3846.001.0001.
- Repp, S. (2016). Contrast. In Féry and Ishihara (2016), pages 260–288, DOI: 10.1093/oxfordhb/9780199642670.013.006.
- Richter, F. (1993). Settling the truth: Verum focus in german. Ms. University of Massachusetts Amherst.
- Riester, A. . J. P. (2015). Anarchy in the np. when new nouns get deaccented and given nouns don’t. *Lingua*, 165:230–253, DOI: 10.1016/j.lingua.2015.03.006.
- Rizzi, L. (1997). The fine structure of the left periphery. In Haegeman, L., editor, *Elements of Grammar*, pages 281–337. Kluwer, DOI: 10.1007/978-94-011-5420-8.7.
- Roberts, C. (1996). Information structure in discourse: Towards an integrated formal theory of pragmatics. *OSU Working Papers in Linguistics*, 49:91–136.
- Roberts, C. (2012). Information structure in discourse: Towards an integrated formal theory of pragmatics. *Semantics and Pragmatics*, 5(6):1–69, DOI: 10.3765/sp.5.6.
- Rochemont, M. (1986). *Focus in Generative Grammar*. John Benjamins, Amsterdam/Philadelphia.
- Rochemont, M. (2016). Givenness. In Féry and Ishihara (2016), DOI: 10.1093/oxfordhb/9780199642670.013.18.
- Rooth, M. (1985). *Association with Focus*. PhD thesis, University of Massachusetts, Amherst.
- Rooth, M. (1992a). Ellipsis redundancy and reduction redundancy. In Berman, S. and Hestvik, A., editors, *Proceedings of the Stuttgart Ellipsis Workshop*, number 29 in Arbeitspapiere des Sonderforschungsbereiches 340: Grundlagen für de Computerlinguistik. Universität Stuttgart/Tübingen.

- Rooth, M. (1992b). A theory of focus interpretation. *Natural Language Semantics*, 1(1):75–116, DOI: 10.1007/BF02342617.
- Rooth, M. (1996a). Focus. In Lappin, S., editor, *The Handbook of Contemporary Semantic Theory*, chapter 10, pages 271–297. Blackwell, Oxford.
- Rooth, M. (1996b). On the interface principles for intonational focus. In Galloway, T. and Spence, J., editors, *Proceedings of SALT*, volume 6, pages 202–226, Ithaca, NY. DOI: 10.3765/salt.v0i0.2767.
- Rooth, M. (1999). Association with focus or association with presupposition? In Bosch, P. and van der Sandt, R., editors, *Focus*, chapter 12, pages 232–244. Cambridge University Press, Cambridge.
- Rooth, M. (2010). Second occurrence focus and relativized stress F. In Féry, C. and Zimmermann, M., editors, *Information Structure: Theoretical, Typological, and Experimental Approaches*, pages 15–35. Oxford University Press, Oxford, DOI: 10.1093/acprof:oso/9780199570959.003.0002. Ms. Cornell University.
- Rooth, M. (2014). Representing focus scoping over new. Proceedings of NELS.
- Rooth, M. (2016). Alternative semantics. In Féry and Ishihara (2016), pages 260–288.
- Samko, B. (2016). *Syntax & Information Structure: The Grammar Of English Inversions*. PhD thesis, UC Santa Cruz.
- Sauerland, U. (2005). Don’t interpret focus! Why a presuppositional account of focus fails, and how a presuppositional account of givenness works. In Maier, E., Bary, C., and Huitink, J., editors, *Proceedings of Sinn und Bedeutung 9, University of Nijmegen*, pages 370–384. NCS, Nijmegen, DOI: 10.1023/A:1008370902407.
- Schlenker, P. (2020). The semantics and pragmatics of appositive. In Gutzmann et al. (2020).
- Schlöder, J. J. (2018). *Assertion and rejection*. PhD thesis, University of Amsterdam.
- Schmerling, S. F. (1976). *Aspects of English sentence stress*. University of Texas, Austin.
- Schmitz, H.-C. (2008). *Accentuation and interpretation*. Palgrave Macmillan, New York, NY, DOI: 10.1057/9780230592568.
- Schmitz, H.-C. and Schröder, B. (2002). On focus and vp-deletion. *Snippets*, 5:16–17.
- Schubert, L. K. and Pelletier, F. J. (1987). Problems in the representation of the logical form of generics, plurals, and mass nouns. In LePore, E., editor, *New directions in semantics*, pages 385–451. Academic Press, London.
- Schwarzschild, R. (1999). Givenness, AVOIDF and other constraints on the placement of accent. *Natural Language Semantics*, 7:141–177, DOI: 10.1023/A:1008370902407.
- Schwarzschild, R. (2019). The representation of focus, givenness and exhaustivity. In Bhatt, R., Frana, I., and Menéndez-Benito, P., editors, *Making Worlds Accessible. A Festschrift for Angelika Kratzer*.
- Selkirk, E. O. (1984). *Phonology and Syntax. The relation between sound and structure*. MIT Press, Cambridge, MA.

- Selkirk, E. O. (1995). Sentence prosody: Intonation, stress, and phrasing. In Goldsmith, J. A., editor, *Handbook of Phonological Theory*, chapter 16, pages 550–569. Blackwell, London.
- Šimík, R. and Wierzbica, M. (2015). The role of givenness, presupposition, and prosody in Czech word order: An experimental study. *Semantics and Pragmatics*, 8(3):1–103, DOI: 10.3765/sp.8.3.
- Smeets, L. and Wagner, M. (2018). Reconstructing the syntax of focus operators. *Semantics & Pragmatics*, 11(6):1–27, DOI: 10.3765/sp.11.6.
- Spalek, K., Gotzner, N., and Wartenburger, I. (2014). Not only the apples: Focus sensitive particles improve memory for information-structural alternatives. *Journal of Memory and Language*, pages 68–84, DOI: 10.1016/j.jml.2013.09.001.
- Spathas, G. (2010). *Focus and Anaphora*. PhD thesis, Universiteit Utrecht. Published by LOT.
- Stalnaker, R. (1978). Assertion. *Syntax and Semantics: Pragmatics*, 9:315–332, DOI: 10.1023/A:1008370902407.
- Steedman, M. (2014). The surface-compositional semantics of english intonation. *Language*, 90(1):2–57, DOI: 10.1353/lan.2014.0010.
- Stevens, J. (2013). *Information Structure, Grammar & Strategy In Discourse*. PhD thesis, University of Pennsylvania.
- Sudhoff, S. (2010a). Focus particles and contrast in German. *Lingua*, 120(6):1458–1475, DOI: 10.1016/j.lingua.2009.02.011.
- Sudhoff, S. (2010b). *Focus particles in German: syntax, prosody, and information structure*, volume 151. John Benjamins, Amsterdam, DOI: 10.1075/la.151.
- Swerts, M., Krahmer, E., and Avesani, C. (2002). Prosodic marking of information status in Dutch and Italian: A comparative analysis. *Journal of Phonetics*, 30(4):629–654, DOI: 10.1006/jpho.2002.0178.
- Szabolcsi, A. (1981). The semantics of topic-focus articulation. In Groenendijk, J., Janssen, T., and Stokhof, M., editors, *Formal methods in the study of language*, volume 2, pages 513–541. Mathematisch Centrum, Amsterdam.
- Szendrői, K. (2003). A stress-based approach to the syntax of Hungarian focus. *Linguistic Review*, 20:37–78, DOI: 10.1515/tlir.2003.002.
- Szendrői, K. (2016). The syntax of information structure and the pf interface. *Glossa*, 2(1), DOI: 10.5334/gjgl.140.
- Tancredi, C. (1992). *Deletion, deaccenting and presupposition*. PhD thesis, Massachusetts Institute of Technology.
- Tomioka, S. (2009). Contrastive topics operate on speech acts. In Zimmermann, M. and Féry, C., editors, *Information Structure: Theoretical, Typological and Experimental Perspectives*, pages 115–138. Oxford University Press, Oxford, UK.
- Tomioka, S. (2010). A scope theory of contrastive topics. *Iberia*, 2(1):113–130.
- Tomioka, S. (2020). Topic. In Gutzmann et al. (2020).

- Tonhauser, J. (2016). Prosodic cues to presupposition projection. In *Proceedings of SALT*, volume 26, pages 934–960. DOI: 10.3765/salt.v26i0.3788.
- Truckenbrodt, H. (1995). *Phonological phrases: Their relation to syntax, focus, and prominence*. PhD thesis, MIT, Cambridge, Mass.
- Truckenbrodt, H. (2012). On the prosody of German wh-questions. In Elordieta, G. and Prieto, P., editors, *Prosody and meaning*, pages 73–118. de Gruyter, Berlin, DOI: 10.1515/9783110261790.73.
- Truckenbrodt, H. (2013). An analysis of prosodic F-effects in interrogatives: Prosody, syntax and semantics. *Lingua*, 124:131–175, DOI: 10.1016/j.lingua.2012.06.003.
- Turnbull, R. (2017). The role of predictability in intonational variability. *Language and Speech*, 60(1), DOI: 10.1177/0023830916647079.
- Turnbull, R., Royer, A. J., Ito, K., and Speer, S. R. (2017). Prominence perception is dependent on phonology, semantics, and awareness of discourse. *Language, Cognition and Neuroscience*, 32(8):1017–1033.
- Vander Klok, J., Goad, H., and Wagner, M. (2018). Prosodic focus in English vs. French: A scope account. *Glossa: a journal of general linguistics*, 3(1)(71):1–47, DOI: 10.5334/gjgl.172.s1.
- von der Gabelentz, G. (1869). Ideen zu einer vergleichenden Syntax. *Zeitschrift für Völkerpsychologie und Sprachwissenschaft*, 6:376–384.
- von Fintel, K. (1994). *Restrictions on Quantifier Domains*. PhD thesis, University of Massachusetts, Amherst.
- Von Fintel, K. (2008). What is presupposition accommodation, again? *Philosophical perspectives*, 22:137–170, DOI: 10.1111/j.1520-8583.2008.00144.x.
- von Stechow, A. and Uhmann, S. (1984). On the focus-pitch accent relation. In Abraham, W. and de Mey, S., editors, *Papers from the 6th Groningen Grammar Talks on Topic, focus, and configurationality*, volume 25 of *Groninger Arbeiten zur Germanistischen Linguistik*, pages 228–263. University of Groningen.
- von Stechow, A. and Wunderlich, D., editors (1991). *Semantik. Ein internationales Handbuch der zeitgenössischen Forschung. (HSK 6)*. De Gruyter, Berlin.
- Wagner, M. (2005). *Prosody and Recursion*. PhD thesis, MIT, <http://dspace.mit.edu/handle/1721.1/7582>.
- Wagner, M. (2006a). Association by movement. Evidence from NPI-licensing. *Natural Language Semantics*, 14(4):297–324, DOI: 10.1007/s11050-007-9005-z.
- Wagner, M. (2006b). Givenness and locality. In Gibson, M. and Howell, J., editors, *Proceedings of SALT*, volume 16, pages 295–312, Ithaca, NY. CLC Publications, DOI: 10.3765/salt.v16i0.2938.
- Wagner, M. (2008). A compositional analysis of contrastive topics. In Abdurrahman, M., Schardl, A., and Walkow, M., editors, *Proceedings of NELS 38 2007 in Ottawa*, volume 2, pages 415–428. <http://semanticsarchive.net/Archive/zYyZTBh0/>.
- Wagner, M. (2009). Focus, topic, and word order: A compositional view. In van Craenenbroeck, J., editor, *Alternatives to Cartography*, pages 53–86. Mouton De Gruyter, Berlin/New York, DOI: 10.1515/9783110217124.53.

- Wagner, M. (2012a). Contrastive topics decomposed. *Semantics & Pragmatics*, 5(8):1–54, DOI: 10.3765/sp.5.8.
- Wagner, M. (2012b). Focus and givenness: A unified approach. In Neeleman, A. and Kučerová, I., editors, *Contrasts and Positions in Information Structure*, pages 102–147. Cambridge University Press, Cambridge, DOI: 10.1017/cbo9780511740084.007, <http://semanticsarchive.net/Archive/GNmMjJlN/index.html>.
- Wagner, M. (2012c). A givenness illusion. *Language and Cognitive Processes*, 27(10):1433–1458, DOI: 10.1080/01690965.2011.607713.
- Wagner, M. (2016). Information structure and production planning. In Féry and Ishihara (2016), pages 541–561, DOI: 10.1093/oxfordhb/9780199642670.013.39.
- Wagner, M. (2018). Focus, givenness, topic: Prosodic effects and interactions with syntax, DOI: 10.17605/OSF.IO/KQ8TU. Lectures of the Graz Summer school on intonation and word order. Published on the *Open Science Framework*.
- Wagner, M., Breen, M., Flemming, E., Shattuck-Hufnagel, S., and Gibson, E. (2010). Prosodic effects of discourse salience and association with focus. In *Proceedings of Speech Prosody*. <http://speechprosody2010.illinois.edu/papers/100239.pdf>.
- Wagner, M. and Klassen, J. (2015). Accessibility is no alternative to alternatives. *Language, Cognition, and Neuroscience*, 30:212–233, DOI: 10.1080/23273798.2014.959532.
- Wagner, M. and McAuliffe, M. (2019). The effect of focus prominence on phrasing. *Journal of Phonetics*, 77, DOI: 10.1016/j.wocn.2019.100930.
- Wagner, M. and McCurdy, K. (2010). Poetic rhyme reflects cross-linguistic differences in the grammar of information structure. *Cognition*, 117:166–175, DOI: 10.1016/j.cognition.2010.08.007.
- Wasow, T. (1972). *Anaphoric relations in English*. PhD thesis, Massachusetts Institute of Technology Cambridge.
- Westera, M. (2016). *Exhaustivity and Intonation. A unified theory*. PhD thesis, Draft. Institute for Logic, Language and Computation. Universiteit van Amsterdam.
- Williams, E. (1980). Remarks on stress and anaphora. *Journal of Linguistic Research*, 1(3):1–16.
- Williams, E. (1997). Blocking and anaphora. *Linguistic Inquiry*, 28(4):577–628.
- Wold, D. E. (1996). Long-distance selective binding: The case of focus. In Galloway, T. and Spence, J., editors, *Proceedings of SALT*, volume 6, pages 311–328, Ithaca, NY. CLC Publications.
- Zimmermann, M. (2008). Contrastive focus. *Acta Linguistica Hungarica (Since 2017 Acta Linguistica Academica)*, 55(3-4):347–360, DOI: 10.1556/aling.55.2008.3-4.9.
- Zimmermann, M. (2016). Information structure. In Aronoff, M., editor, *Oxford Bibliographies*. OUP.
- Zimmermann, M. and Onea, E. (2011). Focus marking and focus interpretation. *Lingua*, 121(11):1651–1670, DOI: 10.1016/j.lingua.2011.06.002.
- Zimmermann, T. E. (2017). Quantification over alternative intensions. *Semantics & Pragmatics*, 10:1–24, DOI: 10.3765/sp.10.8.
- Zubizarreta, M. L. (1998). *Prosody, Focus, and Word Order*. MIT Press, Cambridge, Ma.