

# Prosodic Focus\*

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## Abstract

This article provides an introduction to the phenomenon of prosodic focus, as well as to the theory of Alternative Semantics (Rooth, 1992b). Alternative Semantics provides an insightful account of what prosodic focus means, and also 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 (Schwarzschild, 1999), the theory of Relative Givenness (Wagner, 2005, 2006b), and Unalternative Semantics (Büring, 2015, 2016), but we will cover a range of other ideas and proposals in the process. The article concludes with a discussion of phonological issues and of association with focus.

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## 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, words that are crucially accented in an utterance will be marked with small caps, and words 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.<sup>1</sup>

The variants in (1) are often 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

Context can influence which prominence pattern is preferred for an utterance. 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 (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’

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<sup>1</sup>See Rooth (1999, 233) for improved versions of these examples.



within a sentence. An example similar to (5) with focus on a modifying adjective is given in (6) (from Klassen and Wagner, 2017, 309):<sup>3</sup>

- (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: The 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 (1992) 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 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. These are those constituents that carry a syntactic F-marker. Any constituent that is marked with the syntactic diacritic F is 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  $D_e$ :

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

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

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

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):

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

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 rele-

<sup>3</sup>See Wagner 2005, 2006b for a discussion of similar examples.

vant 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:

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

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 the effect of contextual domain restriction on focus alternatives.

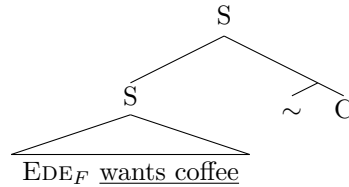
### 1.3 The operator $\sim$

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  $\phi$  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  $\phi$  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<sub>F</sub> 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<sub>F</sub> 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 type.

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

- (14) A: What's up?  
 B: #Ede<sub>F</sub> 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 a member of the focus-semantic value of *Ede<sub>F</sub> 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<sub>F</sub> [  $\sim$ [wants<sub>F</sub> 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, 2010; Wagner, 2012a) and second occurrence (Rooth, 2010; Buring, 2015).

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<sub>F</sub>*. 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.<sup>4</sup> The analyses of contrastive topics in Tomioka (2010) and Wagner (2012a), however, crucially rely on the assumption that alternatives *can* be ‘passed up’ to a higher  $\sim$  operator. See also Bade and Sachs (2019) for a recent discussion.

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

## 1.4 Individual Antecedent or Set of Antecedents?

The semantics of  $\sim$  requires a set of alternatives. This immediately raises the question what to do with cases in which focus only provides an individual antecedent, as in (3). Rooth (1992b) in fact posited another variant of the  $\sim$ -operator, in order to account for cases like (3), where the antecedent is a single alternative, rather than a whole set (the ‘individual case’).

Note, however, that this separate entry for the individual case will not be helpful 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.

Klassen and Wagner (2017) argue that 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 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.

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 question a theory that allows accommodation all-to freely is still predictive. Cases like (5) and (6) suggest that some notion of accommodation is necessary, 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, its the exact contribution of  $\sim$  will vary depending on the attachment site. This is parallel to other syntactic operators (e.g. *even*, *also*, *too*). The flexibility of  $\sim$  enables the theory to account for a much wider set of phenomena. Chomsky (1971, 2005), 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<sub>F</sub> to please]  $\sim$  C<sub>1</sub>, nor [eager<sub>F</sub> to please]  $\sim$  C<sub>2</sub>, ....

In the following, we will call the constituent that  $\sim$  attaches to its ‘scope’.<sup>5</sup> 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 and scope of a focus operator at the same time. We will add a superscript for the index of the hidden pronominal argument where necessary. So (18b) is simply a shorthand for (18a):

- (18) a. [[EDE wants coffee] [ $\sim$  C<sub>7</sub>]].  
b. ‘EDE wants coffee’<sup>7</sup>

## 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 (cf. 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:<sup>6</sup>

<sup>5</sup>It is sometimes also called the ‘domain’ of  $\sim$ .

<sup>6</sup>Note 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.

- (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.

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’

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 operate over the focus-semantic values; and it assumes a constraint 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. 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 one that I believe is motivated by the fact that Rooth’s notation captures some basic primitives that any 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  $\sim$ , or F, 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 broad range of other theoretical claims and perspectives, including the recent theory of Unalternative Semantics (Büring, 2015, 2016).<sup>7</sup>

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—we will briefly discuss some ‘extra-Roothian’ approaches in terms of processing or pragmatics in final part of the paper.

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

## 2 Focus types and other notions

### 2.1 Focused, given, new

The notion of the scope of  $\sim$  (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 that is bound by it

Let’s look at an example:

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

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 antecedents do not necessarily have to contain this word (which would be true of material marked as given), nor do the antecedents have to include an alternative to the 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 ‘marked as given’, for example, 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 alternative set provided by the antecedent.

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) discusses 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) 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, or new ones. This appear to go beyond what can be expressed with Rooth’s formalism as is.

## 2.2 Narrow vs. wide focus

Sometimes the term *contrastive focus* is used to simply to describe utterances in which a single word or constituent within a sentence is singled out prosodically (cf. Gussenhoven, 2007b). 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.  $\lceil \text{The CRATE}_F \text{ contains the missing book.} \rceil$  (prominent condition)

We can define a richer inventory of terms relating to the “breadth” of focus (Ladd, 1980, 75), such as ‘narrow’, ‘broad’ (Eady et al., 1986, cf.), 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’  
 $\llbracket [\text{Ede wants coffee}]_F \rrbracket^F = \{\lambda w. y \text{ holds in } w \mid y \in D_{\langle s, t \rangle}\}$

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 simply reflect *absence* of a  $\sim$  operator in the structure altogether. Note that the focus-semantic value of wide focus as in (24b) and in (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 where this is even empirically answerable, since the effect of  $\sim$  would not be felt. This might be generally true when the constituent that  $\sim$  attaches to is F-marked (see 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 fronted vs. *in situ* focus in Hungarian. Identificational focus, as already observed in Szabolcsi (1981), receives an exhaustive interpretation, similar to clefts in English. Horvath (2007) attributes this to an exhaustifying operator, which 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 which 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 justifies to 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 (have 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. Beaver and Velleman (2011), however, enrich the theory with the ability to mark constituents as ‘new’, which is another way of capturing a separate notion of ‘presentational focus’.

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

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

The use of this construction is restricted in other ways. Birner and Ward (1998) argue that using focus-fronting (as well as topicalization) requires the fronted constituent to create a ‘link’ to the context. Being a link requires standing in any of a variety of relations to the prior discourse. According to this theory, the utterance in (26) should only be felicitous if *coffee* can act as a link, which requires there to be a set that includes both *coffee* and some other elements that are already discourse salient. In Rooth’s theory, it is unclear how one would prevent this condition to be fulfilled whenever focus can be marked, and it seems 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 (26) can be explained in terms of processing. Speakers have been shown to choose non-canonical word-orders 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, because it is linking to prior discourse, just as proposed by Birner

and Ward (1998). Otherwise, constituents that encode subjects, agents, and human referents like *Ede* are simply more accessible and planned earlier, which means that the canonical will be preferred. This could in principle explain intuitions about the discourse constraint on using this word order.<sup>8</sup>

## 2.4 The overttness 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 alternative 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 (2017) for a more extensive discussion of ‘overttness’ 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 in English (see Swerts et al., 2002, for experimental evidence). One type of situation in Ladd reports prominence appears to be shifted are corrective utterances, that is, utterances 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 ira 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.’

<sup>8</sup>Fanselow 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.

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 (2007b), 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 must be in a prior utterance that stands in a corrective discourse relation to the present one. And an utterance can be corrective while having wide focus and no opportunity for prosodic focus marking:

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

If prosodic focus marking is indeed restricted to corrective speech acts, it seems that we need to enrich  $\sim$  to restrict the discourse relation in which utterances stand in, in addition to introducing a focus presupposition. Vander Klok et al. (2018) suggest that corrective focus might ‘suggest an amendment to a previous speech act’. But for us 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 this would require that  $\sim$  attaches very high, arguably to the root of an utterance.

This way of looking at corrective focus also opens another possibility: 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.<sup>9</sup>

Gussenhoven (2007b) points out, based on evidence from Frota (1998), that in European Portuguese, corrective foci get a distinct intonational realization. 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 to explain 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) defines a notion of ‘contrast’ as follows: “Contrastive marking on a focus constituent  $\alpha$  expresses the speaker’s assumption that the hearer will not consider the content of  $\alpha$  or the speech act containing  $\alpha$  likely to be(come) common ground.” It seems plausible that this discourse relation could be relevant for

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<sup>9</sup>Yet 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.

focus marking, and Zimmermann (2008) shows evidence from a range of languages that is. This notion is orthogonal in principle to the question of whether an utterance is corrective. Maybe whether and how prosodic focus is marked varies depending on the discourse relation, at least for some languages or some tunes. If so, this requires 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 (2017) 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 whether its truth forms part of the ‘common ground’, i.e. context set comprising the shared 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. Focus is not about knowledge and truth. What is presupposed as true often cannot be marked as given, nor does given material have to be presupposed as true. Consider first the complements of factive predicates (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.

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, 2016). 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 NPI *any* suggests that whether someone dropped a ball is not established. And yet focus-marking in the response 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 does not appear 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 for how to model



what this might mean. Roberts (1996) uses a notion of ‘Question under discussion’; 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’ which 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 (1992) 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 many 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 arguably still 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).

### 3.2 Sentence focus and the question under discussion

We mentioned as an advantage that Alternative Semantics is able to account for both unembedded foci and embedded foci. There are 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 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<sub>F</sub> farmer]<sub>1</sub><sup>72</sup> was talking to  $\lceil$ [a CANADIAN<sub>F</sub> farmer]<sub>2</sub><sup>71</sup> ...

Many focus theories hold on to a special role of a notion of sentence focus, but then then require alternative mechanisms to account for embedded foci. In Alternative Semantics, there is no privileged notion of sentence focus.

According to the discourse model of Roberts (1996), a notion is central to the understanding of prosodic focus is that of the ‘question under discussion’ (QUD). 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.

What is gained 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 we can show that QUDs impose discourse constraints on which antecedents count as salient, then it might make the theory more predictive. See Beaver and Clark (2008) for a theory of focus that operates with QUDs, and evidence in favor of this approach.

### 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 by Michael Rochemont (p.c., 2017), which says that focus marking cannot span multiple sentences. Consider the following contrast:

- (34) Does she like coffee?
- a.  $\lceil$ She DOES<sub>F</sub> like coffee $\rceil$ .
  - b.  $\lceil$ She does<sub>F</sub> $\rceil$ .  $\lceil$ She LIKES<sub>F</sub>. coffee $\rceil$ .
  - c.  $\#$  $\lceil$ She DOES<sub>F</sub>. She likes coffee $\rceil$ .

The utterance in (34c) may simply seem redundant—but it is no more redundant than (34b). Consider also:

- (35) Does she not like coffee?
- a.  $\lceil$ YES<sub>F</sub> she likes coffee $\rceil$ .
  - b.  $\#$  $\lceil$ YES<sub>F</sub> she doesn’t like coffee $\rceil$ .

Goodhue and Wagner (cf. 2018) use (35a) and the contrast to (34c) 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 (35b).

If Rochemont’s conjecture is correct, then we can use prosodic focus as a test for whether two constituents form part of the same sentence:<sup>10</sup>

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

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<sup>10</sup>I haven’t seen this discussed elsewhere, and assume that the observation and the idea of using this as a test is Michael Rochemont’s.

This generalization, if true, 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.

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’). And as already mentioned, Vander Klok et al. (2018) argue that the scope of  $\sim$  may be a point of cross-linguistic variation.

### 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:

- (37) A: Viola wants coffee. A': Who wants coffee?  
B: #EDE wants COFFEE.

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 that encodes focus and givenness 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 ‘Maximize Presupposition’. This is the analysis of 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).<sup>11</sup>

Under this account, utterances that only differ in the strength of the presupposition they encode compete with each other. For the purposes of focus marking, maybe all possible focus structures for an utterance are considered.<sup>12</sup> An account in terms of Maximize Presupposition can explain why the meaning of the default pronunciation apparently becomes 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 (37). 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):

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

<sup>12</sup>Although maybe the candidate set has to vary in more than just the focus structure, see the discussion in Mayr (2010).

- (38) A: Does an American farmer like Mary?  
 B: #No,  $\lceil$ a CANADIAN<sub>F</sub> farmer $\rceil$  likes MARY.  
 B': No,  $\lceil$ a CANADIAN<sub>F</sub> farmer likes Mary $\rceil$ .

Only the utterance in which  $\sim$  takes wider scope and encodes a stronger presupposition is felicitous, which 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 (38) 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:

- (39) A: An American farmer asked me who likes Mary.  
 B:  $\lceil$  $\lceil$ A CANADIAN<sub>F</sub> farmer $\rceil$ <sub>F</sub> 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 the right prediction. Consider the following examples from a production experiment reported in Klassen and Wagner (2017):

- (40) 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. 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*, which each provide a contrast. Once the adverbs are added, most speakers will choose the pronunciations as indicated in (40), since the choice of adverb will reveal the choice of antecedent.

The puzzle for Maximize Presupposition that (40) resides in the optionality in the absence of the adverbs: 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 (41), the presupposition would be very weak, and B's response should be preferred:

- (41) B:  $\lceil$ JOLENE<sub>F</sub> pitched a tent $\rceil$   
 B':  $\lceil$ [JOLENE pitched A TENT]<sub>F</sub> $\rceil$

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 then raises the question why in (39), one can't just choose to only mark one focus relation. Many open questions like this remain.

### 3.5 Antecedence through Entailment?

Clark and Haviland (1977, 6) observed that constituents can sometimes be prosodically reduced that are not actually part of the antecedent, but are only contextually entailed (see also Rooth 1992a):

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

The speaker in Clark & Haviland’s example expects the listener to accommodate 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*). This can be related to a more general pattern of ‘bridging’ inferences (Haviland and Clark, 1974) that can sometimes derive an antecedent through entailment.

Antecedence through entailment was also implicated in examples in which hyponyms can be treated as if they were contextually salient and marked as given, for example the noun phrase *animals* in the example below (example from: Rochemont 1986, 50; see also: Allerton 1978, 142; Baumann 2006):

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

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. As far as I know, Rochemont (1986) was the first to offer 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 provides a way to understand how antecedence through entailment from a salient linguistic antecedent works. We will not discuss the details here, but the strategy involves replacing F-marked constituents with variables, and existentially closing them, and lifting the meaning of all expressions to that of a proposition, so that entailment relations can be checked (cf. Rochemont, 2016, for a recent discussion).

This entailment model of antecedence predicts 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, 2016, 119):

- (44) (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 (44a)—while maybe not outright infelicitous, using default prominence in (44b) at least seems more likely.

One reason why (44a) 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 (44b) is actually (45), 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 (44a):

(45)  $\lceil \text{SAM}_F \text{ won't practice PIANO}_F \rceil$ .

What could be the source of a preference of (45) over (44a)? Maybe the observed preference has something to do with the fact that (44a) competes with (44c). If the choice of instrument matters, then (45) might be preferable (which draws attention to the fact that it's a piano as opposed to some other instrument); if it does not, then (44c) might be (why bring up the piano at all if the choice of instrument does not matter?).<sup>13</sup>

So maybe even if antecedence through entailment is possible in principle, it might also always create new focus marking opportunities since other structures are preferred. However, Keshet (2013), discussing related examples, and argues against (direct) antecedence through entailment. Instead, inferring antecedents 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 (42). 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 might not share. The speaker's choice of prosody in (42) crucially relies on this background assumption, and therefore *conveys* that the speaker makes this loaded assumption. So maybe *democrat* 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 and informative background assumption, and signals that the listeners is intended to draw this inference.

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

(46) A: Why do you think he hasn't played soccer before?  
B: He  $\lceil \text{THREW}_F \text{ the ball into the goal.} \rceil$

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, 2016, for a discussion of 'rather than' and its relation to focus effects). The prosody in (46) makes the inference from 'throw' to 'didn't kick' salient.<sup>14</sup>

This example seems compatible with Keshet (2013)'s conclusion that entailment relations merely play an indirect role in bridging inferences, in that they affect what questions can or cannot be accommodated given the discourse. This seems like a potential argument for the QUD version of Alternative Semantics discussed in section . Or alternatively, maybe it shows that accommodation of a salient focus set is only

<sup>13</sup>Thanks to Dan Goodhue for discussion of this example.

<sup>14</sup>This example also illustrates that in cases of 'evoked alternatives' both the given material as well as the focus substitutions can be accommodated, while in (5,6) the material marked as given was previously mentioned. Büring (2016) discusses cases of accommodated contrast, but claims that material marked as given must be mentioned, while contrastive alternatives can be accommodated.

possible if the alternatives can then be used to make an inference that is relevant to the discourse.

Whatever the correct explanation, it is clear that antecedence through entailment is often possible. Various factors seem to influence, however, the ease of a bridging inference. Haviland and Clark (1974) and other studies since have shown evidence that bridging inferences take time and are costly. It might be that we want a theory of givenness that doesn't make antecedence through entailment free.

### 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 V (and shift in prominence to the subject) actually just requires the salience of the 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 Schwarzschild's sense) the following:

(47)  $\exists x.x$  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:

- (48) 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.<sup>15</sup>
  - 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 is obligatory is because the number of F-markers must be minimized

Let's look at these proposals one by one. We already discussed the pros and cons of (48a). The assumption in (48b) 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 this 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 (48c).

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 to 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

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<sup>15</sup>Assumption (48a) 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.

alternatives, but for others there may not be. In this theory, F-markers de facto used as diacritics that prevent unintended givenness presuppositions. Assumption (48d) assures that F-marked constituents do not require alternatives (see also the discussion in Wagner, 2005, 251).

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):

$$(49) \quad \ulcorner \ulcorner \text{EDE}_F \urcorner \urcorner \ulcorner \text{wants} \urcorner \urcorner \ulcorner \text{coffee} \urcorner \urcorner \urcorner$$

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 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 (47). 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 (49) are fulfilled.

It is crucial to understand that (49) 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 alternatives. In Rooth’s theory, the representation that would have the same meaning as (49) is (50a) (with a  $\sim$  attached to VP, and without F in its scope). This representation does not require alternatives to *Ede*. The representation in (50b), on the other hand, *would* require alternatives to *Ede*, and is hence not equivalent to (49) in Schwarzschild’s theory:

$$(50) \quad \begin{array}{ll} \text{a.} & \text{EDE} \ulcorner \text{wants coffee} \urcorner \\ \text{b.} & \ulcorner \text{EDE}_F \text{ wants coffee} \urcorner \end{array}$$

We can call the effect of the F-marking in (49) ‘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 is given. The representation in (49), for example, only requires the VP meaning to be given.



Wagner (2005, 2006a) presents arguments that using subject-prominence without evoking alternatives to the subject is actually impossible. Here’s a new data point that serves to make the same point:

- (51) Solving this problem won’t be easy. I know one thing:
- a. If VIOLA solves the problem, there will be a party.
  - b. If Viola 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 should be obligatory, since an F-mark on *Viola* results in the minimal number of F-markers in the utterance, and leads to the strongest presupposition possible.

Here’s the problem: The response in (51a) implies that there will likely be no party if certain other people (or possibly anyone other than Viola) solve the problem. When the prosody in (51b) is used (or, alternatively, default prominence within the conditional), no such implication is made. This is unexpected in Schwarzschild’s theory: There is no reason why alternatives to *Viola* should necessarily come into play in the interpretation of (51a). The givenness of the VP should make a prominence shift possible and obligatory even when no such contrast is intended.

Under Rooth’s (1992) theory, this is as expected: At least one alternative to *Viola* is necessarily involved when prominence is shifted as in (51a), and we take these alternatives into account when interpreting the conditional. No alternatives to *Viola* are required in (51b), and hence no implications about what happens when other people solve it are necessarily made.

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

- (52) My roommates Steve and Paul and I took a quiz in our self-paced calculus class, which was graded right away by the TA. Afterwards, George asked me {how it went}/{whether I passed}. My answer was:
- a. I passed.
  - b. I PASSED.

A prominence shift to the subject as in (52a) necessarily triggers an implicature about the roommates: One or more of the others didn’t pass (unless the speaker continues by saying something like *...but I don’t know about the others*). At least when the context includes *whether I passed* (which was crucially added here), there should be no such inference necessary in Schwarzschild’s theory: The VP *passed* is given.

It seems that a prominence shift to the subject necessarily involves alternatives. Stevens (2013, 50), however, presents evidence against the claim that alternatives are necessarily involved when the subject is focused, and more generally against the claim that pure givenness marking is not possible. Consider:

- (53) Mary went swimming. In fact, <sup>7</sup>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). However, this argument has force only if we assumed that *Mary went swimming* cannot be enriched to *Mary and no one else went swimming* or *Mary but not everyone else went swimming*. But this would clearly be an implicature of the first sentence when uttered by itself. The use of *in fact* might indeed signal that the second

sentence backtracks on such an enrichment. Wagner (2012b) discussed related examples involving entailment relations in which strengthening is not possible, and focus marking is consequently impossible as well, as predicted. A full discussion of Stevens (2013)’s other arguments is not possible here.

Further arguments for alternatives from variations of so-called ‘all-given’ utterances are discussed in Wagner (2005) and (Goodhue, 2017). Note, for example, that the effect of the adverbs in (40) can only be explained if subject prominence requires alternatives. Arguments from double contrast-sentences are discussed in Kehler (2005) and Büring (2008).<sup>16</sup>

The interpretation of subject-focus shows that Schwarzschild’s assumption about alternative-free F-substitution in (48d) has undesirable consequences. We now turn to a different argument against this assumption.

### 3.8 The Contrastiveness Requirement on Alternatives

Wagner (2005, 2006b) proposes 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 (1999)’s account (cf. Wagner, 2005, 302), without any necessity for alternatives for the adjective:

(54) [A new<sub>F</sub> bicycle]<sub>F</sub>

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

- (55) 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 (55a) and (55b) seem unsurprising: The word *bicycle* is reduced when it is contextually given. But (55c) suggests that in order to reduce *bicycle*, givenness is not enough: The alternative to *new* in the context has to be a ‘real’ 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, nor is it 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). It is important to set up the examples such that accommodating an alternative would lead to pragmatically odd inferences. For example, if the target answer had *used* in it, prominence would very likely be shifted in (55c), it seems plausible that the speaker might be evoking the alternative *new* to make a complaint about the cheapness of aunt.

<sup>16</sup>Additional insightful discussion of Schwarzschild (1999) can be found in German (2009).

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

- (56) I want a bicycle. A  $\lceil$ NEW bicycle. $\rceil$

This example makes it look like all that is needed is that *bicycle* is given. Again, this example would have to be analyzed as requiring accommodation. The example (55c) shows, however, that there this accommodation step does not work is the accommodated alternative set appears to be irrelevant and drawing attention to it would lead to odd inferences.

The fact that there is a constraint on the alternatives implies that alternative-free F-substitution cannot be possible here. See Büring (2008), Katzir (2013), and Büring (2016) for further discussion of this observation.

### 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 (48b).

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*:

- (57) 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 (57b) is not felicitous. If it was possible to simply omit the  $\sim$  at the root node in Schwarzschild’s theory, then the prosody should be acceptable. If  $\sim$  attaches to the root node, the infelicity is as expected: It follows from the lack of an antecedent of the form *x slapped John*.

In Scharzschild’s own formalization, this effect of (48b) 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 (57b) would be to place a  $\sim$  on the entire sentence, so the problem does not arise.

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:

- (58) 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 they are given. The prosody in (58) should hence be infelicitous. And yet the whole expression *threw in the towel* is happily marked as given and prosodically reduced.

This is as expected based under 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 (cf. 2012b, 111).

### 3.10 F-less uses of $\sim$ , or ‘Relative Givenness’?

Once we abandon Schwarzschild’s (1999) assumption of ubiquitous  $\sim$  placement in (48b), we can no longer maintain the notion of F-less uses of  $\sim$  in (48c). The reason is that otherwise, pure givenness marking should be freely available after all.

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:

- (59)    a.    *Ede*  $\lceil$ wants coffee $\rceil$   
           b.    A new  $\lceil$ bicycle $\rceil$

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 (59) (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 makes a comparison possible. We’ve now seen evidence that the proposals (48b)–(48d) of our Roothian reconstruction of Schwarzschild’s theory are problematic. 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:

- (60)    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 is obligatory is because Maximize Presupposition

Conditions (60b) and (60c) together predict that all prominence shifts must be contrastive, and evoke alternatives. In other words, what we 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 (60d) 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 saw 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) claim that ‘...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:

- (61) 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 (2007b) interprets these cases as encoding ‘counter-presuppositional focus’, where prominence on the verb denies the presupposition of a previous utterance, for example, the presupposition *John reads books* in the case of (61b). However, if this presupposition was 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:

- (62) A: Has John read Slaughterhouse-Five?  
       B: # John *doesn’t* read books.

The prosody in the assertions in (61) 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 counterpresuppositional focus:

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

Even if the responses in (61) can be used to deny a presupposition in these particular instances, they cannot be reliant on using that presupposition as a focus antecedent.

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; Büring, 2016). In Roothian terms, this involves using  $\sim$  without any F in its scope, as Rooth (1992b, ex. 4, notation adapted):

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

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 (51), or a nominal predicate, as in (55)? There are several conceivable answers.

First, it could be that the examples in (61) all have narrow focus on the verb. We can test this out by looking at a case where accommodating such 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):

- (65) 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 (63) is arguably the predicate *painting*, not any individual paintings.

A third possibility would be 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).

A fourth possibility is that to assume with Spathas (2010) that the scope of  $\sim$  is restricted such that it cannot directly attach to head nouns as in (66a), but it can attach to DPs, as in (66b). 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 66a), while  $\sim$  can directly attach to direct objects, and does in the examples in (61):

- (66) a. \*A NEW  $\lceil$ convertible $\rceil$ .  
 b.  $\lceil$ A NEW<sub>F</sub> 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 (51), 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:

- (67) a. VIOLA  $\lceil$ wants coffee $\rceil$ . (no alternative required  $\rightarrow$  too weak!)  
 b.  $\lceil$ VIOLA<sub>F</sub> wants coffee $\rceil$ . (alternative required)

A fifth possibility is proposed in Wagner (2005, 2006b). The claim is that the actual presentation (65) is one in which the object moves, and the remnant is what is F-marked:

- (68)  $\lceil$  $[\lambda x$ . I already ATE  $x]$ <sub>F</sub> some food $\rceil$

The focus structure in (68) 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 (65), or simply by the following context, which directly introduces a set of propositions involving *some food* (cf. Wagner, 2006b, 303):

- (69) 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 outlined a set of facts that poses a syntactic puzzle: Which con-

stituents 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. Büring (2016), however, points out that this analysis faces an important problem as well, which we turn to in the next section. See Stevens (2013) for further objections.

Büring (2016) proposes instead that two separate mechanisms are needed, focus marking and givenness marking, following many prior approaches that made this assumption (Tancredi, 1992; Selkirk, 1995; Reinhart, 2006; Féry and Samek-Lodovici, 2006; Katz and Selkirk, 2011; Stevens, 2013). More specifically, Büring (2016, 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 (2016) points out, the alternatives created by substituting the adjective have to be mutually exclusive in cases like (55), while the purported set of alternatives to *I ate x* in (68) 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 (69) might still impose constraints. Consider the following example:

- (70) A: My quirky aunt Jocelyn, who owns a Vespa factory, but sometimes she 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*, and seems preferable. Shifting prominence away from *Vespa* seems to imply that A’s story is *about Vespas*. Correspondingly, the preference shifts toward focus marking 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 “psycho-

logical 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*:

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

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

(72) What about Vespas?

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

(73) 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 operator requires a single contextually salient proposition involving  $\phi$ , while  $\sim$  plus movement requires a set of propositions involving  $\phi$ , while the combination of movement plus  $\sim$  (when it is subject to the contrastiveness requirement) requires a set of propositions.

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

(74) 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:<sup>17</sup>

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

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

(76) “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.”

<sup>17</sup>In fact, the  $\sim$  attaching to the root could just as well be omitted in (74) and (75), since the presupposition it introduces may be imperceptibly weak. Note that this representation either requires 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.



This presumes a notion of ‘stored under  $x$  in the CG content’, which takes us beyond Rooth’s theory into the realm of theories of discourse. Furthermore, constraints on discourse coherence may influence which focus antecedents are salient in particular contexts (Kehler, 2005). It is not clear though, if 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 antecedents.

In this section we saw that once we take movement into account, we can account for certain a certain type of topicality, just by using  $\sim$ . This seems like a desirable outcome. A further notion of ‘topic’ are *contrastive topics* (Büring, 2003). We will not discuss these here either, 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.

### 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 discussed in the prior two 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:

$$(77) \quad \text{Givenness movement: } \lceil \text{XP } \underbrace{[_{VP} \dots t \dots]}_F \rceil$$

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

$$(78) \quad \text{a. } \text{König Ubu hat } \lceil [\text{die Krone}] [_{VP} \text{ wahrscheinlich } t \text{ VERLOREN}]_F \rceil.$$

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 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 (78), or above. Moving a constituent and marking the remnant as focused can create anaphoric possibilities to mark a focus presupposition where otherwise no focus presupposition could have been marked.<sup>18</sup>

Related accounts of givenness movement are presented in Kučerová (2012) and Stevens (2013). They crucially differ 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.

<sup>18</sup>Neeleman and Reinhart (1998) propose instead that this kind of scrambling has a prosodic motivation. See Wagner (2005) for some discussion.

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 stayed in situ if they were marked as given prosodically for focus reasons.

Neeleman and Kučerová (2012) 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 for whether a prominence shift is possible or not. Wagner (2005) and Wagner (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 (60d), see also Williams (1997) for a related analysis. This hypothesis makes focus/givenness-based decisions 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 already provided in Wagner (2005, 2006b): Every F must be attached to a constituent in the immediate scope of the  $\sim$  that binds it. The assumption is that exactly one of the two daughters of the node that  $\sim$  attaches to must be F-marked.<sup>19</sup>

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.<sup>20</sup>

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):

- (79) 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 (79b) 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 (55). Intuitively, it is clear what is going on here: While being *red* does not exclude being *expensive*, being required to

<sup>19</sup>This 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.

<sup>20</sup>Note 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 so, then it must be.

bring a *red* convertibles 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 whether a prominence shift will be possible and felicitous in a particular context cannot always be very locally.<sup>21</sup>

### 3.15 Do foci have to move?

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

- (80) 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 moves 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 (80) 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 from Williams’s own interpretation of the contrast).

Moulton and Han (2018) attributes the contrast in (80) (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 (80) 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 whether free foci necessarily move (Chomsky’s 1976 claim), from the question whether focus association involves movement. Here, we 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: He posits 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’:

- (81) [  $XP_{Focus}$  [ Foc  $YP_{Background}$  ]

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<sup>21</sup>Katzir (2013) actually makes a different theoretical point based on these examples, which we will not discuss here.

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 (cf. Wagner, 2005, 311). Here is an example of focus fronting in English:

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

We could analyze focus movement more generally as follows:

(83) Focus movement:  $\lceil \text{XP}_F [\text{Y}_P \dots t \dots] \rceil$

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.<sup>22</sup>

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 (82) predicts the same focus presupposition as the following structure in which *a coffee* stays in situ:

(84)  $\lceil \text{Ede wants COFFEE}_F \rceil$

So what could motivate choosing (82) over (84)? And more generally, what is the motivation of 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 are sometimes very different:<sup>23</sup>

- (85) a. König Ubu hat wahrscheinlich  $\lceil \text{[die KRONE]}_F \text{ verloren} \rceil$ .  
King Ubu has probably the crown lost  
b. König Ubu hat  $\lceil \text{[die KRONE]}_F \text{ wahrscheinlich } t \text{ verloren} \rceil$ .  
King Ubu has the crown probably lost  
‘King Ubu probably lost the crown.’

The moved variant in (85b) 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 (85b) is stronger since *probably* is part of the material marked as given.

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

This interpretive motivation for focus movement unfortunately only works based on the syntactic constraint on the relation between  $\sim$  and F, since otherwise the same

<sup>22</sup>See Wagner (2012a) for a discussion on how certain properties of focus movement vs. topic movement that Rizzi observed can be derived under this theory.

<sup>23</sup>There are interactions with definiteness that are relevant here, but which we cannot get into in this paper (cf. Diesing, 1992).

focus meanings can be introduced in situ. We 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 pretty much 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 globally provides more insight on focus in some global sense seems daunting, whereas the project of evaluating which types of relations 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;<sup>24</sup> Rizzi’s claim about the distribution of focus heads 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 a different 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 which relation focus, background and topic can have with respect to each other within a syntactic tree (see Wagner 2009 and Wagner 2012a for discussion of some problematic predictions).

Some types of focus movement may not be motivated 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 (1998)’s proposal of p-movement, Neeleman and Reinhart (1998)’s approach to scrambling, or Szendrői (2003)’s account of focus movement in Hungarian. It is controversial though whether in all of these cases the relationship between the movement in questions and prosodic prominence is really the driving factor. We saw that in the case of scrambling, prominence can be placed either on the scrambled constituent or the remnant, depending on which is marked as given relative to which. As for Hungarian, Horvath (2005), argues that focus movement is not actually directly to prosody either. See Szendroi (2016) for more discussion, and a comparison of the prosodic account and the cartographic approach.

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<sup>24</sup>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*.

### 3.17 Alternatives or Unalternatives?

Unalternatives Semantics (Büring, 2015, 2016) 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).<sup>25</sup>

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: the accounts involving AvoidF, Maximize Presupposition, and Williams’s ‘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 (Büring, 2015):

(86) 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  $\sim$  as the effect that the pronunciation in (86) 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 (86) 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 (86). Consider the following example, which shows default prominence on the direct object within the VP:

(87) 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 rules out, according to Unalternative Semantics, is *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 to switch to a marked prominence relation in a constituent imposes the constraint that the focus-semantic value of that constituent cannot vary only by substitutions of the non-prominent constituent.

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<sup>25</sup>Thanks for comments to the attendees of a McGill Semantics Group meeting in June 2016, where this material was first presented.

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:

- (88) 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 (88) requires placing a pitch accent on the verb stem instead—but this is the default stress location for the verb.<sup>26</sup> 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 seem infelicitous as a way to focus tense:

- (89) 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 predict 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  $\hat{\phantom{x}}$  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):

- (90) 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 (90a) 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 (90b) requires an appropriate antecedent of the form *x book*. Interestingly, one cannot shift prominence in Lekeitio Basque to a word that is lexically

<sup>26</sup> Accentined *-ed* seems possible, but feels metalinguistic and arguably involves focusing the phonological content rather than the meaning. See section 4.5.

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):

- (91) 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 (91a). 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 to highlight constituents marked as focused and background constituents marked as given. In writing, the effect of focus prosody is often mimicked by capitalization in writing. It appears then that focus prosody is about ‘prominence’. But not just any prominence. There are alternative strategies to render 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 as focus prosody:

- (92) 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 therein). But Accents are possible even in the post-focal domain, but 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 postfocal 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 is 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 then 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 (2007a), Ladd (2008), and Féry (2016).

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 (2016) for a recent proposal of 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 already described in (20).

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

There may be other ways in which the phonological realization 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 many studies that provided evidence for contrastive accents 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 (cf. 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:

- (93) a. A: What does Ede want?  
           B:  $\lceil \text{EDE wants COFFEE}_F \rceil$   
       b. A: Who wants coffee?  
           B:  $\# \lceil \text{EDE}_F \text{ wants COFFEE} \rceil$

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 (93a) will fulfill the constraint in (20) in that the object is more prominent than the subject, but (93b) will not (cf. 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:

- (94) 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:

- (95) 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 or at least similar metrical prominence relations as certain focus assignments.

### 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 to 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 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 to explain 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 looking recording dialogues like the following (focus representation added), and playing them back to listeners:

- (96) a. A: Do you live by yourself?

- B:  $\lceil$ I [share a FLAT] $_F$  $\rceil$ .  
 b. A: I hate sharing things, don't you?  
 B:  $\lceil$ I share a FLAT $_F$  $\rceil$ .

The perception experiment involved a context-retrieval task, where listeners had to say which dialogue they prefer, 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, as expected based on the idea that the two focus structures are not 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 suggesting that the generalization 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 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 features can literally project 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 different meaning 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 discussion will not be revisited here (cf. Jacobs, 1991; Wagner, 2005; Büring, 2006; Arregi, 2016; Büring, 2016).

#### 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:<sup>27</sup>

<sup>27</sup>The cartoon uses underlining instead of small caps.

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

This example suggests that alternatives must be alternative linguistic expressions, rather than alternative meanings, as is in Alternative Semantics. However, Artstein (2004) argues that (97) 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 non-word 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<sup>w</sup>ajt] (or an orthographic string): *Dwight begins with a [d]*. Phonological strings can even be substituted by wh-words: *Stalag-what?*. There are even instances of embedded focus-marking in which word-parts are prosodically focused:

- (98) a. John is more concerned with AFfirmation than with CONFirmation (Chomsky, 1971, 205)  
 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 options 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)'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, examples 26–29):

- (99) 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', which imposes a constraint on adjacent intonational phrases: They cannot end with phonologically identical accented words.

Another interpretation of the 'Williams effect' is that the possibility of (phonological) givenness marking blocks or pre-empts the possibility of marking the contrast. In this interpretation, what's odd about (99c) and (99d) is that one *could* have marked the final argument as given, by choosing a different focus structure:

- (100) John saw Mary, and then JOHN  $\uparrow$ [was seen BY]<sub>F</sub> Mary $\downarrow$ .

A production experiment reported in Wagner (2012c) indeed showed evidence that speakers who pronounced the sentence as in (100) or with prominence on the main predicate rate the sentence as much more acceptable than speakers who pronounced it as in (99c). 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 more general constraint on intonational phrases ruling out any homophonous accented endings (the ‘rhyming’ constraint proposed by Williams) seems too strong: Note that repeating intonational phrases with identical nuclei (in Williams’s sense) is not always infelicitous:

- (101) Yesterday, I forgot my book. And you know what I did today: I forgot my BOOK!<sup>28</sup>

What’s different about (101) 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.

If focus marking requires a phonological contrast, the question arises 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 (99c) 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’s 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 use mark embedded foci, as we already saw.

## 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):<sup>29</sup>

- (102) 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 (103a), but not (103b):

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

<sup>28</sup>A 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.

<sup>29</sup>Interestingly, other wh-questions appear not to be focus-sensitive in this way (Partee et al., 1990).

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

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

Assertion (104a) could be refuted by showing that John also introduced Anna to Sue; the one in (104b) 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):

- (105) 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 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 focus come about? For Rooth (1992b), the relation between operators like *only* and prosodic 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:

- (106) Mary only ( $C_1$ )  $\uparrow$ [READ<sub>F</sub> the recognitions.]<sup>2</sup>  $\sim C_1$  ]

This view of focus association may seem too weak: Surely, one spontaneously understands *only* in (106) 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 a separate antecedent for *only*, the natural assumption is that *only* is anaphoric to the same set.

Let's consider an example from Williams (1997, 607) that supports this view of indirect association:<sup>30</sup>

- (107) 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 non-contradictory, *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):

- (108) 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  $\sim$

<sup>30</sup>Roberts (1996, 2012) discusses a related example, also showing a broader alternative set than the prosodic focus marking suggests.

operators, these examples are also still compatible with a theory that posits obligatory association with F:

- (109) Sue only  $\ulcorner$ took  $\lceil$ MODERN<sub>F</sub> Greek $\rceil$  $\urcorner$ .

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

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

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

If this is odd, and (107b) is not, this raises a puzzle. Both examples involve a repeated focus or ‘second-occurrence focus’, a phenomenon which investigates in various recent studies, but which we will not review here (Partee, 1991; Rooth, 1992b, 1996b; Beaver et al., 2007; Kadmon, 2001; Krifka, 2004; Howell, 2007; Ishihara and Féry, 2008; Rooth, 2010; Büring, 2015).

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 (to the extent that we know) that work like the made-up operator *toIf*:

- (111) a. I *toIf*ed that he<sub>F</sub> resembles her: I told him that he resembles her  
b. I *toIf*ed that he resembles her<sub>F</sub>: I told her that he resembles her  
c. I *toIf*ed that he<sub>F</sub> resembles *her*<sub>F</sub>: 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 *toIf*. 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):

- (112) 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 (112a), *only* associates with *Maryanne*, and *bunny* must be associating with a separate  $\sim$  to convey the contrast to *scarf*; In (112b), *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 (112b) similar to the following:<sup>31</sup>

- (113) To MARYANNE, Gramma only  $\lceil$ gave a BUNNY<sub>F1</sub> $\rceil$

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:

- (114) We only<sub>1</sub> recovered the diary entries that Marilyn<sub>1</sub> made about John. We also<sub>2</sub> only<sub>1</sub> recovered the diary entries that Marilyn<sub>1</sub> made about Bobby<sub>2</sub>.  
‘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 (114) has been questioned based on experimental results reported in Beck and Vasisht (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:

- (115) 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 copy-cat, 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. One view, defended for example in Erlewine and Kotek (2016) (but see also Krifka 1991), is that once a movement analysis is adopted, the need for indexed foci vanishes. But see Longenbaugh and Bassi (2017) for a different interpretation of the facts.<sup>32</sup>

### 5.3 Association without Focus

We saw prosodic focus is not felicitous without an appropriate salient antecedent, or a context that makes accommodating of 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):

- (116) 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 (116b), without necessarily implying that I didn’t see any cars (which would be very unlikely, while having seen only blue trucks could easily happen). Unless we have talked about trucks, the pronunciation in (116a) is preferred for this reading, even though (116b) associates with *blue*. Note that this example is different from the case of selective association in (112) in that (116b) has default

<sup>31</sup>Extraction from within the scope of  $\sim$  has been argued to be impossible in Beaver and Clark (2008), but the empirical situation is complex. A comprehensive discussion of extraction and focus association could easily fill a separate review article.

<sup>32</sup>A reviewer points out complications with Kratzer’s claim discussed in Schmitz and Schröder (2002).



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), 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 (116a), then why couldn’t a  $\sim$ -operator use that same antecedent, leading to the pronunciation in (116b)? 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* can be restricted in the same way that the domain of quantifiers can be restricted. This difference does not seem expected based on the representation in (106) (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):

- (117) 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 [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 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):

- (118) 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 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 past sections we saw 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. This 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 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:

(119) 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):

(120) 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  $\lambda w.x \text{ is an odd number in } w$ , then it should come out as true. The reason is that numbers are rigid designators, and a proposition of the form  $x \text{ is an odd number}$  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  $x \text{ is an odd number}$  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 that could resolve the Rooth/Zimmermann puzzle.

## 5.6 Syntactic Association?

Following Rooth (1985, 1992b), most current analyses of *only* assume that the mechanism through which *only* associates with prosodic focus is that the alternatives of the constituent *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 part that varies 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 (104a), for example, the DP *Bill* moves to associate with *only* according to this view. Drubig (1994); Bayer (1996); Krifka (2004) and Wagner (2006a) present a range of arguments in favor of such a movement account. Wagner (2006a) presents arguments for a particular analysis according to which the LF of *only* always looks as follows, with a focus constituent in the complement position of *only*, and a second background argument:

- (121)    [[ *only* focus constituent] background ]

In the case of (104a), the associate DP moves to the complement position of *only* at LF, leading to the following representation:

- (122)    [[ *only* Bill ] [ $\lambda x$ . 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 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 *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. See some discussion of this question in Wagner (2006a). More evidence for a two-place operator analysis of *only* can be found in Smeets and Wagner (2018).

Wagner (2006a), proposes that the analysis of *only* as taking two syntactic arguments might also explain some of the differences to *always*. After all, *only* can (on the surface) attach to a range of constituents, while the syntax of *always* is substantially more restricted. Under 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 (118), 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 saw 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 Bayer, 2016; Hole, 2015, 2017; Erlewine, 2017). We cannot explore these syntactic issues in more detail here.

## 6 Do we need a semantic theory of prosodic focus?

Throughout this article, 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.

This notation helped us define terminology related to focus phenomena, characterize different ‘focus types’, and make precise the ways in which languages might differ typologically. It also helped to compare theories that were originally formalized in different ways. The strategy of translating theories into Roothian notation has limits though: We already saw some ‘Super-Roothian’ ideas that require additional tools, for example, a three-way distinction of the 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.

One type of approach of this sort are accounts of focus phenomena that view them as a processing effect, and attribute them 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. Such 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 to decode by the listener. 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 of Alternative Semantics. Even if accessibility effects are also attested, they cannot explain the distribution of focus prosody.

Another set of Extra-Roothian approaches are purely pragmatic theories to focus (cf. Kadmon, 2001). 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 different pragmatic accounts for why focus prosody (and other intonational means) have the semantic and pragmatic effects that they do.

The pragmatic approach in Bergen (2016) has trouble explaining why other strate-

gies of boosting prominence, for example reduplication or phonetic lengthening (e.g., *Eeeeeede wants coffee*) does not have equivalent pragmatic effects to shifting prominence. They may trigger pragmatic inferences, but these seem different from the effect of focus. However, the model in Bergen (2016) does not preclude that here 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 (cf. 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 article remains to be seen.

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