Abstract

In this paper, I adopt the view of Rooth (1992,1995) that intuitive association with an operator such as *only* is epiphenomenal, resulting from *only* operating over an expression in its scope and a pragmatically identified set of expressions of the same semantic type. The analysis of the present paper proposes a new pragmatic mechanism which generates these contrast sets from antecedents that license the focus structure of the syntactic associate of the operator. These mechanisms are sensitive to distinctions in focus type (new, old or contrastive), each focus type placing unique restrictions on the antecedent and each playing a different role in creating a contrast set out of an antecedent. The analysis developed accounts for five phenomena not handled by previous analyses such as Krifka (1992,1993,1996a, 1996b), Rooth (1985,1992, 1995), Schwarzschild (1993,1996), von Fintel (1994) and Wold (1994?,1996): the distribution of association with a non-focused expression, the distribution of island effects found with certain long-distance associations, restrictions on the type of focus that a given operator can associate with, accentuation possibilities for operators, and differences in behavior between initially established associations and associations maintained from a preceding context.

1 Introduction

Since at least as early as Jackendoff (1972), it has been observed that words like *even* and *only* appear to associate semantically with focused expressions in their scope. This sensitivity of interpretation to focus can be illustrated with the example in (1).

(1) a. Mary only saw JOHN.
   b. Mary only SAW John.

The surface forms of these sentences differ only in the location of focus, *JOHN* being focused in (1a) and *SAW* in (1b). This simple difference gives rise to a difference in truth conditions intuitively associated with these two sentences. As isolated utterances, (1a) is typically interpreted as meaning that Mary saw John and nobody else, and (1b) as meaning that the only (relevant) relation that Mary stands in to John is the seeing relation. Rooth (1985,1992), von Stechow (1990), Jacobs (1991), and Krifka (1992,1993) account for such association facts by developing a semantics for interpreting focus, and analyzing *even* and *only* as operators sensitive to the semantic contribution that focus makes to a sentence. The appearance of association falls out as a consequence of this interaction without recourse to a syntactically represented association between the operator and the focus. In this paper, I argue that analyses of this type are both too permissive and too restrictive. They are too permissive in that they fail to account for constraints on association that appear to be of a syntactic nature.
and for the interaction of associability with focus type. They are too restrictive in that they fail to allow for observed associations with non-focused expressions. I argue that overcoming these shortcomings requires including a syntactic component to association not present in the above analyses and revising the mechanisms by which contrast sets are generated for operators like only to operate over.

The paper is organized as follows. In section 2 I briefly sketch three theories of association: a semantic theory in which association results from interpretation of focus in the scope of a focus-sensitive operator (Rooth 1985), a hybrid semantic/pragmatic theory in which association is constrained by the focus structure of the expression that constitutes its scope (Rooth 1992), and a pragmatic theory in which association is dependent upon a prior identification of contrast (Schwarzschild 1993). In section 3, I pose five problems that an analysis of associative operators should account for which cannot be accounted for within one or more of these analyses. In section 4, I present an analysis which overcomes all of the problems posed in section 3. This analysis treats intuitive association as derived from a combination of syntactic association and pragmatic establishment of a contrast set, the latter process dependent on the focus structure of the syntactic associate as well as on the discourse roles played by the foci contained therein. Section 5 contains an illustration of the basic mechanisms of section 4. In section 6 I apply the analysis to the data introduced in section 3. Section 7 gives one remaining problem not handled by the analysis. Finally, in section 8 I provide a summary and conclusion.

2 Previous Analyses

2.1 Semantic association with focus (Rooth 1985)

Rooth (1985) develops an analysis of the effects of focus on interpretation in which focus results in the introduction of a type of semantic value distinct from normal semantic values, what Rooth (1992) refers to as a focus semantic value.1 The basic idea behind the proposal is that focused expressions within a constituent are used in constructing a set of alternatives.2 These alternatives consist of the maximal set of normal semantic values that can be generated from the relevant constituent by replacing each focus in that constituent with an expression of identical semantic type. An illustration is given in (2) below. (Following Rooth (1992), I use the symbol $[[ ]]^o$ to indicate the normal semantic value of an expression and the symbol $[[ ]]^f$ to indicate the focus semantic value of an expression.)

\[(2)\]

a. $[[\text{Mary saw [JOHN]}_F]] = \{[[\text{Mary}]]^o\} = \{m\}$
b. $[[\text{Mary}]]^f = \{[[\text{Mary}]]^o\} = \{\lambda x\lambda y.\text{saw}(y,x)\}$
c. $[[\text{saw}]]^f = \{[[\text{saw}]]^o\} = \{\lambda x\lambda y.\text{saw}(y,x)\}$
d. $[[\text{[JOHN]}_F]]^f = \{x| x \in E\}, [[\text{[JOHN]}_F]]^o = j$
e. $[[\text{saw [JOHN]}_F]]^f = \{\lambda y.\text{saw}(y,x)| x \in E\},$
$[[\text{saw [JOHN]}_F]]^o = \lambda y.\text{saw}(y,j)$

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1 For a slightly different approach to association with focus based on Rooth (1985), see Kratzer (1991).

2 For this reason, the semantics is often referred to as alternative semantics.
In (2b,c), the focus semantic value of an expression lacking any focus is the unit set of its normal semantic value. In (2d), the entire expression being interpreted (viz. John) is focused, and the focus semantic value is the set of all expressions of the same semantic type, i.e. the set of all individuals. (2e) is the result of semantically combining the sole member of the focus semantic value of saw in (2c) with every member of the focus semantic value of John in (2d) via function application. Similarly, (2f) is generated by combining each expression in the focus semantic value of the VP in (2e) with the sole member of the focus semantic value of Mary in (2b).

In a sentence containing no focus sensitive operators, focus has no effect on normal semantic values.

Association with focus derives from sensitivity of an operator such as only to both the normal semantic value and the focus semantic value of the expression in its scope. Simplifying by taking these operators to be sentential, in the sentence Mary only saw JOHN, only will operate over the focus semantic value and the normal semantic value of the sentence Mary saw JOHN as given in (2f) above. Its contribution to the semantic interpretation of the sentence is that among the propositions contained in the focus semantic value (={saw(m,x)|x∈E}), only the proposition given by the normal semantic value (=saw(m,j)) is true. Association in this analysis is always and only with focused expressions, and determined by the semantic interpretation of focus within the syntactic structure assumed for the sentence. Hence I will refer to this theory as a semantic theory of association with focus.


2.2 Hybrid semantic/pragmatic association with focus (Rooth 1992)

As already recognized in Rooth (1985), a purely semantic theory of association makes sentences containing only too strong. In a given context, Mary only saw JOHN could easily be intended to exclude Mary’s having seen Bill without also being intended to exclude her having seen a building, tree, bird, Mary or other irrelevant object, and yet a purely semantic theory of association excludes these objects as well. Indeed, for this reason Rooth (1985) includes a restriction to relevant properties within the semantics of only (see footnote [[4]]). Rooth (1992) spells out the relation between focus semantic values and the domain of quantification for an operator like only in more detail. The relation is mediated obligatorily by the two place presuppositional operator ~, whose semantics is given in a somewhat simplified form in Rooth (1995) as follows.

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3 The characterization given here is informal, though sufficient for the purposes of this paper. See Rooth (1985, 41-60) for a formal recursive definition of focus semantic values within the framework of Montague Grammar. The term focus semantic value is from Rooth (1992), and corresponds to the p-sets of Rooth (1985).

4 Formally, the interpretation of only operating over VPs is the following, where C represents the characteristic function of a set of relevant properties. (Rooth (1985,p.43))

\[ \lambda P \forall x. [VQ[[Q\{x\} & C(Q)] \rightarrow Q=\emptyset] \]
Where $\phi$ is a syntactic phrase and $\Gamma$ is a syntactically covert semantic variable, $\phi \sim \Gamma$ introduces the presupposition that $\Gamma$ is a subset of $[[\phi]]^f$ containing $[[\phi]]^o$ and at least one other element. $\Gamma$ is taken to be anaphoric, its value deriving from its antecedent. The semantics of the operator $\sim$ restricts the potential antecedent for $\Gamma$ to an expression that denotes a set of semantic values contained in the focus semantic value of the expression $\phi$ that the operator is adjoined to.

Rooth suggests two ways in which association effects can be derived using the operator introduced in (3). In both cases, associative operators like only lexically introduce a free variable $C$. In the first case, the value of $C$ is fixed entirely pragmatically, while in the second it is lexically constrained to being contained in the focus semantic value of the expression to which the operator is adjoined. Rooth (1992) does not give an explicit semantic analysis of only, though he does give the semantic interpretation that he assumes for a sentence having only adjoined to a VP, which I give in (4) (= Rooth’s (4)).

(4)  
\[ [S \text{ Mary only } \text{VP}] \]
\[ \forall P [P \in C \& P(m) \rightarrow P = \text{VP}'] \]

The two treatments of the lexically introduced variable $C$ lead to different representations. Under the first treatment, Rooth’s strong analysis, there is no restriction on interpreting focus and no requirement that the variable $C$ be identified with any other expression in the sentence, making possible any of the representations in (5a-c). Under the second treatment, Rooth’s weak analysis, the value of $C$ is identified as a lexical property of only with a variable introduced by the operator $\sim$ obligatorily adjoined to the expression in the immediate scope of only, as in (5d).

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5 Rooth (1992) does not explicitly adopt the semantics for only developed in his 1985 dissertation. In his dissertation, he gives a cross-categorial semantics for these operators which takes their primitive function to be operation over a propositional expression. In the later paper, on the other hand, he allows only to operate directly over a predicate type expression, as can be seen in (4). This difference is important for identifying the antecedent expression for the variable $C$ introduced by these operators. Given the semantics from his dissertation, this antecedent should be of propositional type, whereas in (4) it will have to be of predicational type. The two analyses can be unified under the VP-internal subject hypothesis by treating the trace of the subject Mary in the VP in (4) as a semantic argument of the verb. Under such an assumption, the VP in (4) will be of propositional type, with a free variable subject.

6 Rooth follows Horn (1969) in assuming that a sentence containing only has a presupposition as well as an assertion. Only Horn’s assertion is given in (4b). I follow Rooth’s practice of ignoring the presupposition where it is not relevant, though it could readily be added by conjoining $\text{VP}'(m)$ to (4b). For arguments against the presuppositional analysis of Horn, see Atlas (1991). Atlas’s own semantic treatment of statements containing only treats the relation between, e.g., Only John left and John left as a (non-trivial) entailment, not a presupposition. Translating Atlas’s analysis into a compositional semantics, his semantics for only is as follows:

\[ \text{only} = \lambda Q . P [\exists R [R \in C \& R(Q) \& \forall S [(S \in C \& S(Q)) \rightarrow S = P]]] \]

7 As Rooth argues, the relevant representations can be given either as LF representations or as semantic representations. Rooth adopts the former possibility, so I will do so as well.
The two representations in (5c,d) give rise to association between only and any focus contained within the lower VP which is not in the scope of another occurrence of the operator ~ inside that VP. This can be illustrated with the LF representation in (6).

(6) [S Mary only(C) [VP [VP saw JOHN~X]]]

By the semantics for ~ given in (3), the value of X is restricted to being a subset of the focus semantic value of the VP saw JOHN. The focus semantic value of this VP is the set \{\lambda y.\text{saw}(y,x)|x\in E\}. Identifying X with C (either as a lexical property of only (5d) or through optional coindexing (5c)) results in the interpretation given in (7a) with the restriction on C given in (7b).

(7) a. \forall P[(P \in C \& P(m)) \rightarrow P = \lambda y.\text{saw}(y,j)]
    b. (C \subseteq \{\lambda y.\text{saw}(y,x)|x\in E\})

Given appropriate additional pragmatic restrictions on C, (7) gives plausible truth conditions for the sentence represented in (6). This theory employs essentially the same semantic mechanisms of focus interpretation as Rooth’s (1985) analysis. Whenever the variables introduced by only and by the ~ on the VP are identified, association will be possible only with a focused expression contained in the VP, exactly as on the previous analysis. Association is not purely semantic, however, in that even when these two variables are identified their value is not equated with the focus semantic value of the VP to which ~ is adjoined but rather with a pragmatically determined subset of this focus semantic value. If one adopts the weaker version of the theory which requires identification between the two variables, pragmatics plays no further role. If, however, one allows for independent determination of antecedents for the variable contained in only and that introduced by ~ (as in the strong analysis), then pragmatics will presumably play a great role in identifying these antecedents. In either case, the resulting theory is a hybrid semantic/pragmatic analysis of association since association with focus is at least possibly dependent upon the semantics of focus interpretation and the pragmatic resolution of antecedence. Von Fintel (1994), extending Rooth’s strong analysis, is a hybrid semantic/pragmatic analysis as well.

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8 Schwarzchild (1993) makes the following modification to the semantics of only in order to capture the fact that a sentence like “John only saw Mary and Sue” requires for its truth that John saw Mary. (DomQ is the domain over which only is taken to quantify.)

\[ \forall P(P \in \text{DomQ}) \rightarrow [P(\text{John}) \iff [\text{VP'(John')} \text{entails } P(\text{John'})]] \]

Rooth’s analysis would require that “John saw Mary” be false since the proposition denoted by this sentence is distinct from that denoted by the “John saw Mary and Sue”. Though the modification is needed if one is to adopt a Rooth style analysis, since it is unnecessary in the analysis I give in section 4 I ignore this complication here.
2.3 Pragmatic contrastiveness-based association (Schwarzschild 1993)

Schwarzschild (1993) develops a version of Rooth’s strong analysis which disposes completely with deriving association from the focus semantic value of the expression in the scope of an associative operator. In distinction to Rooth, Krifka, Jacobs, von Fintel and others, Schwarzschild argues that association of an expression with only is a consequence not of focus interpretation but rather of contrastiveness. Schwarzschild assumes along with Rooth (1992) that only comes with a context variable C whose value identifies its contrast set. Schwarzschild differs from Rooth in not assuming that the value of this variable can be fixed syntactically or semantically as the focus semantic value of the expression in the scope of only. Rather, for Schwarzschild, C is in principle free to take on any value at all, presumably from the context in which it occurs. Once the value of C is fixed, the effect of association falls out as in Rooth’s (1992) analysis. To illustrate how this works, consider the following simple dialogue:

(8) Q: Who did John see at the conference?
    A1: He only saw MARC at the conference.
    A2: #He only saw Marc at the CONFERENCE.

The meaning of the question Q in (8) is taken to be the set of all possible answers to the question as in Hamblin (1973). This meaning can thus serve as the antecedent for the variable C introduced by only. Taking only to have propositional scope in A1, this will lead to that sentence being true if and only if John saw Marc at the conference and no other answer to the question is true, i.e. if and only if John saw Marc and nobody else at the conference.

If the analysis were to stop here, then the unacceptability of the answer in A2 above would be inexplicable. Just as with A1, this answer would be expected to be possible with the intuitive associate of only being Marc. This answer is excluded by Schwarzschild, however, by a separate constraint on contrastive interpretation given in (9). [[double check definition with Roger.]]

(9) Contrast constraint:
    If B is uttered in contrast with A, then
    i. \[ \{ A \} \subseteq \text{pset}(B) \]; and
    ii. there is no element K in \text{pfamily}(B) such that \[ \{ A \} \subseteq K \] and K is a proper subset of \text{pset}(B).\footnote{I include clause (ii) for faithfulness, though it will play no role in this paper. The definition of pset is taken from Rooth (1985). Schwarzschild gives the following informal characterization of pset and pfamily.

The pset of an expression \( m \), \( \text{pset}(m) \), is roughly speaking, the union of the meaning of \( m \) and the meanings of alternatives to \( m \), gotten by replacing focused elements with alternatives of like type. \( \text{Pfamily}(m) \) is the set of psets you would get for different focusings of \( m \).}

If an answer A is uttered in contrast with a question Q, then by clause (i) of the contrast constraint, the meaning of Q must be a subset of the pset of A. The meaning of Q in (8) is the set of meanings that can be generated from \( \text{John saw x at the conference} \) by replacing x with an expression that denotes one or more people. The pset of A2, on the other hand, is the set of meanings that can be generated from \( \text{John only saw Marc at} \).
the $x$ by replacing $x$ with an expression of the same type as conference. Even if we ignore the presence of only in the members of the pset of A2, the meaning of the question is not a subset of this pset, and hence clause (i) of (9) is not satisfied.

Given the definitions used so far, A1 will also fail to satisfy the contrast constraint since A1 contains an occurrence of only missing in the question. Schwarzschild fineses this problem by redefining psets in such a way that they are closed under conjunction and disjunction. Assuming a domain containing just the individuals John and Marc, this will make the pset of A1 include the meanings of all of the following sentences:10

(10) a. John only saw Marc at the conference
    b. John only saw John at the conference
    c. John only saw John and Marc at the conference
    d. (c or a) John saw Marc at the conference
    e. (b or a) John saw John at the conference

If the domain of the question is identically restricted to containing just the individuals John and Marc, then the question will indeed be a subset of the pset of A1, since the question will consist entirely of the meanings of (d) and (e) above.

In order for the explanation of the unacceptability of A2 to go through, contrasting A2 with Q must be a requirement of the discourse, and not merely an option. If A2 is not required to contrast with Q, then the fact that A2 fails to satisfy the contrast constraint with respect to Q is inconsequential, and identification of the domain of only as the meaning of the question would be expected to be possible, incorrectly making it possible for only to associate intuitively with Marc. Presumably for this reason, Schwarzschild takes the Question/Answer relation to be an instance of contrast. Since Schwarzschild’s analysis restricts the domain of an operator such as only by purely pragmatic means (any domain is semantically possible, though the domain chosen will have to be compatible with other constraints such as the contrast constraint), I will refer to it as an example of a purely pragmatic analysis of intuitive association.

3 Problems

This section presents a series of four phenomena that an analysis of associative operators needs to address: (i) association with non-focused expressions; (ii) association across foci; (iii) sensitivity of association to focus type; and (iv) the effect of accentuation of an operator on the expressions it can associate with. Each phenomenon will be shown to pose problems for one or more of the analyses outlined above.11

10 See Schwarzschild (1993) for details.

11 In this section, I use the term “focus” informally to denote a sub-expression of a sentence associated with a pitch accent. This usage conforms only partially with the analysis of focus structure given in section 4, diverging in particular in the case of contrastive focus, which according to that analysis can never be narrower than the matrix sentence. The term “deaccenting” as used in this section is replaced in section 4 by the term “non-F-marked” for indicating expressions which must meet a requirement of givenness.
3.1 Association with non-focused expressions

That intuitive association is possible with expressions which are deaccented is problematic for most of the theories outlined above. Two cases should be contrasted here. In (11) we see a case where an association with a focused expression is established in one sentence and that same association is then carried over to a second sentence. I will call such examples cases of maintained association.\footnote{Vallduví (1992) points out cases of association with non-focused expressions as problematic for a semantic theory of association with focus, though the only cases he brings against such a theory are cases of maintained association, which can potentially be treated as a separate phenomenon from establishing an association.}

(11)  
A: Tom saw Sue.  
B: John only saw MARY.  
C: BILL only HEARD Mary.

Taking the intuitive associate of \textit{only} in B’s utterance to be the NP \textit{Mary}, one highly natural interpretation of C’s utterance is that Mary is the only person that Bill heard.

The second case of association with a deaccented expression is illustrated in (12). Here, the discourse context contains the intended associate but not the associative operator. In this case, the association is established for the first time with a deaccented expression, and hence will be referred to as a case of establishing an association.

(12)  
A: John saw Mary.  
B: (Yeah. In fact,) he ONLY saw Mary.

In (12), everything with which \textit{only} could possibly be associated is deaccented, and yet the sentence is perfectly acceptable. In fact, \textit{only} in (12) can be associated with any of the three constituents in its scope, \textit{saw, Mary, or saw Mary}, as shown by the felicity of the following rejoinders:

(13)  
a. He didn’t TALK to her. Of course, he saw SUE TOO.  
b. He didn’t see SUE. Of course, he TALKED to Sue.  
c. He didn’t do anything else.

Examples like (11) and (12) pose prima facie problems for all three theories outlined in section 2. If we analyze the deaccented associate as lacking focus, as common sense would suggest, then a semantic theory of association such as that of Rooth (1985) cannot handle either of these cases. Nor can a hybrid theory like Rooth’s (1992) weak analysis, in which the variable introduced by \textit{only} is required to be identified with the variable introduced by the \textit{~} operator in its immediate scope. In both analyses, focus is a prerequisite for association. Rooth’s strong analysis can account for both maintained and established associations provided that an antecedent for the variable introduced by \textit{only} can be accommodated. \textbf{However, allowing accommodation of an antecedent should make possible an interpretation of (11-B) in which the intuitive associate of \textit{only} is \textit{saw} rather than \textit{Mary, though such an interpretation does not appear to be possible.} Schwarzscild (1993) can readily handle the cases of maintained association in (11) since \textit{only} occurs not only in (C) but also in (B). Identifying the domains of the two occurrences of \textit{only} will be both necessary and sufficient for the second sentence to satisfy the contrast constraint, accounting both for the possibility and for the necessity of maintaining the association.
in these examples. The case of establishing an association in (12) can also be handled with a little more finessing. If we assume that the second sentence in (12) is intended as contrasting with the first sentence, then the focus on only in the second sentence will introduce expressions of the same type as only in the pset for the sentence. The context contains no sentence whose meaning includes such expressions, though an implicit question Did he also see someone else? could be read into the context, and taking this sentence as the contrastive antecedent for (12b) will satisfy the contrast constraint.

3.2 Focus excluding association

I assume that pitch accents are assigned only within foci. Two plausible variants of this assumption can be entertained, one in which each pitch accent determines an independent focus, and one in which a single focus is capable of bearing multiple pitch accents. To simplify discussion, I will concentrate on the former variant. Under the plausible assumption that foci are syntactic constituents, applying the arguments of this section to the other variant is straightforward.

As illustrated in (14), it is possible for an operator such as only to associate with one expression to the exclusion of another focused expression in its scope.13 (Intended associates are underlined.)

(14) a. A: John spoke with and danced with a lot of people at the party.
     B: What about Sue?
     A: He only MET SUE.
 b. John saw Sue, Mary and Alice from a distance. He only MET SUE.
 c. Rice is popular in China. In fact, many FARMERS only EAT rice.14

If we make the questionable assumption that the deaccented rice in (14c) is a disguised focus, these association possibilities can be handled by all analyses under consideration. For Rooth (1985), all that is required is that the non-associated focus be moved at LF out of the scope of the operator, with the associated expression remaining below. For Rooth (1992), this same analysis is possible, though a non-movement account can also be given by interpreting focus twice -- once on the non-associated focus and once on the VP -- as in the representations below.

(15) a. He only(C_i) [[MET_{j} [SUE_{j}~Y_j]~X_i]]
 b. He only(C_i) [[[MET_{j}~Y_j] SUE_{j}~X_i]]
 c. Many [FARMERS_{j}~Z_k] only(C_i) [[[EAT_{j}~Y_j] rice_{j}~X_i]]

The desired interpretations follow from Rooth’s assumption (p.95) that the focus semantic value of an expression A~Y is identical to the normal semantic value of A. Note that this analysis can be extended arbitrarily so as to allow for intuitive association

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13 Here and throughout this section, I will ignore other possible interpretations, including associations with multiple foci, with VPs, etc.

14 Rooth’s original example repeated below gives the false impression that association with the deaccented rice is dependent upon mutual contrast with a preceding expression.

i: People who GROW rice only EAT rice.

The example in (14c) is changed so as to correct this misimpression.
with any expression analyzed as a focus. Under Rooth’s strong analysis, neither of the
above accounts is necessary since there is no requirement that the variable introduced
by only be related to that introduced by the occurrence of ~ on the VP, though each is
possible.

Under Schwarzschild’s (1993) analysis the intuitive associations observed can
be accounted for by stipulating the desired domain for only. Doing so will fail to
satisfy the contrast constraint, though nothing in his analysis forces the second
sentences in (14) to contrast with some antecedent sentence. This way of accounting
for the associations observed is of course entirely unconstrained. However, bringing
in constraints by requiring that the sentences containing only contrast with some
antecedent sentence is problematic. The contrast constraint requires that there be an
antecedent sentence whose meaning is a subset of the pset of the contrasted sentence.
None of the first sentences in (14) satisfy this constraint, however, since the meaning of
the first sentences are simple propositions, not sets of propositions, and hence cannot be
subsets of anything. While reanalyzing the meanings of the first sentence as singleton
sets will allow the second sentences to satisfy the contrast constraint in (14a,b), this
same strategy will not work for (14c): the set containing the meaning of the first
sentence is not a subset of the pset of the second. Accommodating a question into the
context can in principle provide an antecedent for (14c) to contrast with (a trick used in
section 2.3), though in the case of (14c) it is difficult to see what question could
plausibly be so accommodated. Imposing a requirement of contrast on the second
sentences is thus too strong of a constraint, though failing to do so leaves the possibility
of generating the desired association unconstrained.

3.2.1 Focus types

To show that focus-excluding association is constrained, it is necessary to first
take a closer look at the roles that focus can play in a discourse. As we will see below,
the type of focus involved has a profound effect on what intuitive associations are and
are not possible. I take there to be at least three different types of focus: new, old
and contrastive. For ease of exposition, I refer to the accented expression itself as a
focus, though in the analysis of section 4 this will be seen to be inappropriate.

Contrastive focus is used to contrast an expression with an antecedent
expression in the discourse. Pure cases of contrastive focus are illustrated in (16).

(16) A: John saw Mary today.
    B: No, i: John saw SUE today.
        ii: John HEARD Mary today.
        iii: BILL saw Mary today.
        iv: John saw Mary YESTERDAY.

Each of the B examples contrasts with A exactly in the position of the accented
expression.

Old focus is used to refer back to a previous (often implicit) context occurrence
of what is focused. Pure cases of old focus are illustrated in (17).

(17) A: John saw Mary today.
    B: True, i: John saw MARY today. (But did he also see SUE?)
        ii: John SAW Mary today. (But I bet he didn’t TALK to her.)
iii: JOHN saw Mary today. (But then again JOHN LOOKS.)
iv: John saw Mary TODAY. (But he saw MANY people today.)

Here, contrastive focus would be inappropriate since there is no contrast between any of the B sentences and A. Though it is possible to continue each discourse with a third sentence which contrasts with second exactly in the position of the old focus as in (Bi) and (Bii), this contrast is not obligatory as can be seen in (Biii) and (Biv). Thus analyzing the foci in the second sentences as variant contrastive foci would be misguided.

Both old and contrastive foci are anaphorically dependent upon some antecedent in the discourse context. New focus, in contrast, is potentially non-anaphoric. Pure cases of new focus include context initial utterances as in (18), in which the entire utterance is best taken as new, as well as certain narrowly focused expressions in connected discourse as in (19).

(18) a. What a nice DAY.
   b. A MAN’s coming to fix the SINK today.
   c. Good morning.
(19) A: Rice has many nutrients.
   B: Therefore, you should EAT rice.

In (19), the focused EAT cannot be analyzed as either old or contrastive, though the focus is obligatory. Analyzing the focus as new fits with the intuition that eating is being newly introduced to the discourse.

Claiming that there are three focus types brings with it the responsibility of showing how to distinguish between them. While intonation can help to disambiguate focus type, it cannot be relied on to determine focus type absolutely. Limiting intonation possibilities to final falls (f) and continuation rises (c), contrastive focus (C) will always be associated with f. Old focus (O), if it occurs together with another focus, will always be associated with c. New focus (N), however, can be associated with either f or c, depending on what other foci are present and where the new focus is located with respect to them. Partly for this reason, I take a speaker’s intentions to be primitive in determining which focus type is employed in a given instance, and take intonation to merely give a clue as to what a speaker’s intentions are. In all of the examples below, I will explicitly mark all foci both for intended discourse role and for intonation.

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15 This categorization of focus types partially cross-cuts proposals in Rochemont (1986), Vallduví (1992), Vallduví and Engdahl (1996) and others. Rochemont splits focus types into presentational and contrastive foci, with necessary and sufficient conditions for qualifying as either type derived from the relation that holds between the focus and the preceding discourse. His presentational focus is closest to my new focus, though his contrastive focus covers the central cases of both old and contrastive focus as used here. Vallduví proposes a two way distinction between focus and ground, and further analyzes the ground as consisting of a link and a tail. This analysis is adopted in Vallduví and Engdahl as well. Their notion of link is closest to my notion of old focus, while their notion of focus covers both new and contrastive focus in my terminology. The tail represents given information.
3.2.2 Restricting focus-excluding association

We saw earlier that all three analyses being examined can account for the general phenomenon of non-association with foci in the scope of an operator, and that all but that of Rooth (1985) can be extended arbitrarily. We can now see why the ability to extend the analyses arbitrarily is a problem. As illustrated by the examples in (20), association with a contrastively focused expression can exclude either new or old foci. The same is true of association with a deaccented expression as well, as illustrated in (21). Association excluding a contrastive focus is impossible, regardless of whether the associate is new (20f), old (20b,c), or deaccented (21b,c,f).

(20) a. [John didn’t give Sue flowers.] He only gave Sue\textsubscript{O,c} CANDY\textsubscript{C,f}.
b. [John didn’t give Sue flowers.] #He only gave Sue\textsubscript{O,c} CANDY\textsubscript{C,f}.
c. [John didn’t give Mary candy.] #He only gave Sue\textsubscript{C,f} CANDY\textsubscript{O,c}.
d. [John didn’t give Mary candy.] He only gave Sue\textsubscript{C,f} CANDY\textsubscript{O,c}.
e. [John gave Mary flowers.] He only gave Sue\textsubscript{N,c} CANDY\textsubscript{C,f}.
f. [John gave Mary flowers.] #He only gave Sue\textsubscript{N,c} CANDY\textsubscript{C,f}.

(21) a. [A\textsubscript{1}: John gave Sue flowers. B: What about Mary?] A\textsubscript{2}: He ONLY\textsubscript{N,f} gave MARY\textsubscript{O,c} flowers.\textsuperscript{17}
b. [John gave Mary candy.] #He ONLY\textsubscript{N,c} gave Mary FLOWERS\textsubscript{C,f}.
c. [John gave Mary candy.] #He ONLY\textsubscript{N,c} gave Sue\textsubscript{C,f} CANDY\textsubscript{O,c}.
d. [A\textsubscript{1}: John gave Sue flowers. B: What about candy?] A\textsubscript{2}: He ONLY\textsubscript{N,f} gave Sue\textsubscript{C,f} CANDY\textsubscript{O,c}.
e. [John gave Mary candy.] He ONLY\textsubscript{N,c} gave Sue\textsubscript{N,c} CANDY\textsubscript{C,f}.
f. [John didn’t give Sue flowers.] #He ONLY\textsubscript{N,c} gave Sue\textsubscript{C,f} CANDY\textsubscript{C,f}.

These examples pose a problem for all of the theories under consideration. None of the analyses makes a distinction between types of focus, and hence they have no basis upon which to limit non-associated expressions by focus type.\textsuperscript{18} Thus, the exact same mechanisms that are employed to exclude foci from association in (14) could be

\textsuperscript{16} I assume that there can be at most one contrast per sentence, so that if multiple foci are contrastive, they are always contrasted together. Given that multiple separate contrasts are impossible, the possibility of association with one contrastive focus to the exclusion of another does not arise, excluding a fourth logical possibility.

\textsuperscript{17} I argue in section 6.4 that accent on only is in some cases required in order to establish an association with a deaccented expression, and so place accent on only in all of the examples in (21). Removing the accent can make an acceptable example unacceptable, but can never resurrect an unacceptable example.

\textsuperscript{18} It has been argued in Schwarzschild (1993,1996) and von Fintel (1994) that Rooth’s (1992) analysis suffers from an additional defect in this regard. Each author notes that association with focus does not affect the discourse role that a focus plays, and yet interpretation of focus via the ~ operator makes foci semantically invisible outside the scope of ~. This is problematic on the assumption that discourse role is related only to semantic interpretation. This will be the case if pragmatics interfaces with syntax only through semantic interpretations and not through syntactic LF representations as well. If pragmatics is taken to interface directly with LF, this latter level taken to pair syntactic representations and semantic interpretations, then focus marking would in principle be visible to the pragmatic component, defusing the counterargument to Rooth’s analysis.
employed undifferentially in (20) and (21), allowing for associations to be established in every case.

One could overcome the problem of the differential behavior of distinct types of focus by declaring that focus in the sense relevant for association means either contrastive focus or deaccented focus (not marked), analyzing only these as correlated with a syntactic focus feature. However, such an approach would fail to account for the differential behavior of contrastive foci and of deaccented expressions in islands witnessed in the following examples.\(^{19}\)

(22) Context: Students like people who smoke pears.
   a. They only like people who WEAR\(_{N,c}\) BANANAS\(_{C,f}\).
   b. TEACHERS\(_{N,c}\) only like people who SMOKE\(_{O,c}\) BANANAS\(_{C,f}\).
      (cf. TEACHERS\(_{N,c}\) only like people who smoke BANANAS\(_{C,f}\)).

(23) Context for a,b: Students like people who smoke pears.
   a. #TEACHERS\(_{N,c}\) only/ONLY\(_{N,c}\) like people who WEAR\(_{C,f}\) pears.
   b. #TEACHERS\(_{N,c}\) ONLY\(_{N,f}\) like people who SMOKE\(_{O,c}\) pears.
      (cf. TEACHERS\(_{N,c}\) ONLY\(_{N,f}\) like people who smoke pears.)

Association with a contrastive focus continues to be possible in (22) regardless of the fact that the focus is contained in an island together with an excluded focus. Association with a deaccented expression, however, becomes impossible if the island it is embedded in contains an old focus. This is particularly problematic for Schwarzschild’s analysis since (23b) by hypothesis contains no expression intended as contrastive, and hence should thus presumably be exempt from the contrast constraint. As we have already seen, exemption from this constraint for Schwarzschild results in no constraints on association whatsoever. The contrast between (22) and (23) also finds no source in theories like Rooth (1985,1992).

3.3 Non-associable foci

As mentioned in section 3.2, all of the theories under consideration treat focus uniformly. With the exception of Schwarzschild (1993), they furthermore attach no significance to the discourse role that a focus plays in accounting for the associations that are possible with an operator like \emph{only}. Though Schwarzschild takes contrastiveness to play a central role in restricting possible associations, his analysis places no restrictions on associations in non-contrasted sentences. Thus, the possibility of association with a focused expression is for him as well predicted to be at least partially independent of focus type. However, as the examples in (24) show, focus type affects not only the expressions that can be excluded but also the expressions that can be associated with an operator like \emph{only}.

(24) John saw Mary.
   a. In fact, he ONLY\(_{N,f}\) saw Mary.
   b. #In fact, he only/ONLY\(_{N,f}\) saw MARY\(_{O,c}\).
   c. No, he only/ONLY\(_{C}\) saw SUE\(_{C,f}\).

\(^{19}\) Thanks to an anonymous reviewer of an earlier version of this paper for pointing out this contrast.
In (24) we see three attempts to establish an association with only. In (a), the intended associate is deaccented, in (b) it is an old focus, and in (c) it is a contrastive focus. Only the first and third attempts succeed.

The paradigm in (24) can be extended to show that when only establishes an association with a focused expression rather than maintaining one, the focus must be contrastive, never new or old.20

(25) A: John saw Mary.
   B: i. JOHN_{O,c} saw SUE\_{C,f}.
      ii. JOH\textsubscript{N}\_{O,c} saw only SUE\_{C,f}.
      iii. #Only \textit{JOHN}_{O,c} saw SUE\_{C,f}.

(26) A: John saw Mary.
   B: i. BILL\textsubscript{C,f} saw MARY\_{O,c}.
      ii. Only BILL\textsubscript{C,f} saw MARY\_{O,c}.
      iii. #BILL\textsubscript{C,f} saw only MARY\_{O,c}.

(27) A: John saw Mary.
   B: i. BILL\textsubscript{N,c} saw SUE\_{C,f}.
      ii. BILL\textsubscript{N,c} saw only SUE\_{C,f}.
      iii. #Only BILL\textsubscript{N,c} saw SUE\_{C,f}.

While these facts do not directly refute any of the analyses under consideration, they do point out a need to at least extend the analyses in order to account for the interaction between association and discourse role, an interaction that none of the analyses addresses in full.

3.4 Accentuation of operators

It has been noted in examples throughout the literature that accentuation of an operator such as only can affect the acceptability of a sentence. As the examples in (28) show, this accentuation also affects the range of possible associates of the operator.

(28) A: John saw Mary.
   B: i. BILL\textsubscript{N,c} only saw SUE\_{C,f}.
      ii. BILL\textsubscript{N,c} ONLY\textsubscript{N,c} saw SUE\_{C,f}.

In (Bi), only can associate either with SUE or with the VP saw SUE. It cannot associate with saw in the context of (A). In (Bii), in contrast, association can be with saw as well as with SUE, or with saw SUE. Rooth (1985,1992) has no account to give for these facts. If saw can be the associate of only in (Bii), it is predicted to also be a potential associate in (Bi). There is simply nothing in his analyses which could be exploited to generate this distinction. Schwarzschild (1993) fares no better here. If (Bi) is taken to contrast with (A) and the accent on SUE is taken to indicate VP focus, then (Bi) will satisfy the Contrast Constraint with the domain of only restricted to

---

20 A fourth paradigm containing a contrastive focus followed by a new focus appears to be impossible to construct. A focus marked with continuation intonation seems to always be interpreted as old when that focus follows a final fall, and no sentence can have more than one final fall. Turning these and previous observations regarding the correlations between focus types and intonation types into a formal analysis I have to save for a later date, resting the claims purely on intuitions.
expressions of the form [R Sue]. This is so since the pset of (Bi) will contain all of the following meanings (in addition to many others -- see Schwarzschild (1993) for details):\textsuperscript{21}

\begin{align*}
\text{(29)} & \quad \begin{array}{l}
\text{a. of all properties } P \text{ of the form } \text{“} R \text{ Sue} \text{”, } P(\text{John}) \text{ is true iff } \text{John saw Sue entails } P(\text{John}) \quad (= \text{John saw and only saw Sue}) \\
\text{b. of all properties } P \text{ of the form } \text{“} R \text{ Sue} \text{”, } P(\text{John}) \text{ is true iff } \text{John heard Sue entails } P(\text{John}) \quad (= \text{John heard and only heard Sue}) \\
\text{c. of all properties } P \text{ of the form } \text{“} R \text{ Sue} \text{”, } P(\text{John}) \text{ is true iff } \text{John heard and saw Sue entails } P(\text{John}) \quad (= \text{John heard and saw, and only heard and saw Sue}) \\
\text{d. (a or c) John saw Sue} \\
\text{e. (b or c) John heard Sue}
\end{array}
\end{align*}

With the domain of only consisting entirely of expressions of the form [R Sue], intuitive association will be with saw. We have already seen, however, that such an intuitive association is not in fact possible.

Typically, expressions which lack accent do so either because they are taken as given or because they are part of a larger focus in which accent is located somewhere else. Operators like only readily surface without accent the first time they occur in a discourse. Schwarzschild (1996) takes this to indicate that even first occurrences of only in a discourse can potentially count as given. Only, he argues, is a scalar operator. Given a scale, only \(x\) excludes anything ranked higher than \(x\) on that scale. If we imagine a scale consisting entirely of two expressions \(x\) and \(y\) with \(x\) ranked lower than \(y\), only \(x\) will thus exclude \(y\) though only \(y\) will not similarly exclude \(x\). Indeed, only \(y\) when judged with respect to this scale is semantically (though not pragmatically) equivalent to \(y\). It is this latter equivalence which for Schwarzschild (1996) licenses treating only as given -- only \(x\) is possible in the context of \(y\) since with respect to this scale \(y\) is semantically equivalent to only \(y\), and only \(y\) licenses the occurrence of only in only \(x\) as given.\textsuperscript{22}

Schwarzschild’s analysis can explain the impossibility of association of a deaccented only with deaccented saw in (28-Bi) above. Such an association would only be possible if the scale with respect to which only is interpreted ranks expressions of the form R Sue, with saw Sue ranked somewhere below the top. While the context does not provide such a scale, we can assume for the sake of argument that such a scale is available nonetheless. However, if such a scale is used for interpreting the occurrence of only in (28-Bi), then that occurrence will fail to be given. The only potential antecedent which could license only as given is the sentence John saw Mary in

\textsuperscript{21} To keep things relatively simple I assume a domain with only two relations. Expanding to a domain with an infinite number of relations does not eliminate (d) from the pset of (Bi), though it will require an infinite disjunction to include it. Making use of infinite disjunctions in this manner is independently necessary under Schwarzschild’s analysis to account for the acceptability of examples like the following:

\begin{align*}
\text{A:} & \quad \text{What did John do to Mary?} \\
\text{B:} & \quad \text{He only TALKED to her.}
\end{align*}

\textsuperscript{22} Presumably, use of \(y\) in this context licenses accommodation of only \(y\), the accommodated expression responsible for licensing only in only \(x\) as given.
However, the scale which ranks expressions of the form \( R \) Sue does not include the VP saw Mary. With respect to this scale, then, the VP saw Mary is not equivalent to the VP only saw Mary. Given this non-equivalence, the context cannot be construed as containing a semantically vacuous only in this VP, and deaccenting of only in (28-Bi) will violate the requirement that it be given.

While this explanation works for the specific case it was constructed for, when we look at operators other than only we see its shortcomings. The adverb usually in the examples shows the same sensitivity of association to its accentuation as does only.

(30)  A: For lunch, John always has noodles.
      B: \( \text{BILL}_{N,c} \) usually/only has \( \text{CURRY}_{C,f} \) for lunch.

(31)  A: John always has noodles for lunch.
      B: i. \( \text{BILL}_{N,c} \) usually/only has noodles for \( \text{DINNER}_{C,f} \).
          ii. \( \text{BILL}_{N,c} \) \( \text{USUALLY/OONLY}_{N,c} \) has noodles for \( \text{DINNER}_{C,f} \).

In both (30) and (31), all occurrences of only and usually in the (B) examples are new to the discourse. In (31-Bii) where the operator is focused, association can be either with the deaccented (and presumably given) noodles or with the focused DINNER. In (31-Bi) and (30-B) where the operators are deaccented, association can only be with the focused expressions DINNER and CURRY respectively, and not with the deaccented expressions noodles and lunch. However, usually x is not equivalent to x (or to always x) with respect to any scale, as would be required in order to extend Schwarzschild’s (1996) analysis to these examples.23

4 The General Solution

4.1 Outline of approach

I adopt Rooth’s (1992,1995) analysis of association effects as deriving from the comparison of an expression \( e \) in the scope of an operator with alternatives in a contrast set. The appearance of association with an expression \( x \) in \( e \) on this analysis is the result of the contrast set consisting entirely of expressions which differ from \( e \) exactly in the position of \( x \). The key to accounting for the data in section 3 thus lies in the identification of this contrast set. For Rooth, the contrast set is ultimately generated directly from the scope of the operator, i.e. from the predicate phrase to which the operator is adjoined in typical cases of long distance association. In contrast, I derive

23 It should be noted in passing that sensitivity of association to accentuation of the operator surfaces in Dretske’s (1972) examples as well. (The intended associate in the context sentence is underlined.)

(i)  A: In St. Petersburg, cavalrmen often escorted musicians.
      B: i. \( \text{OFFICERS}_{N,c} \) always escorted \( \text{BALLERINAS}_{C,f} \).
          ii. \( \text{OFFICERS}_{N,c} \) \( \text{ALWAYS}_{N,c} \) escorted \( \text{BALLERINAS}_{C/N,f} \).

(ii) A: Cavalrmen can escort musicians if they want.
      B: i. \( \text{OFFICERS}_{N,c} \) must escort \( \text{BALLERINAS}_{C,f} \).
          ii. \( \text{OFFICERS}_{N,c} \) \( \text{MUST}_{N,c} \) escort \( \text{BALLERINAS}_{C/N,f} \).

In the (Bi) examples, intuitive association is obligatorily with the focused \( \text{BALLERINAS} \), while in the (Bii) examples it is also possible for the intuitive associate to be the deaccented escorted.
the contrast set from an expression syntactically associated with the operator at LF. When the surface position of the operator is immediately before a predicate phrase, the syntactic associate of the operator will have to raise to the operator covertly at LF. The general schema for association with an operator is illustrated in (32).

(32) ... [[ operator [syntactic associate ... ]] [scope ... ]] ... 

To generate a contrast set from the syntactic associate SA of an operator, I propose to make use of the focus properties of SA. If SA is an anaphoric Focus, I propose to generate the contrast set from the antecedent which licenses it as a focus of the type it is. If SA is not an anaphoric Focus, I take the contrast set to be generated independently of any antecedent.

Before turning to the formal details of the analysis, I illustrate it with a case of intuitive association between only and an accented expression embedded in a syntactic island given in (33-B).

(33) A: John knows people who wear bananas.
    B: BILL \[VP only \[VP knows people who SMOKE_{C,f} bananas \]]

An anonymous reviewer suggested that the arguments of Wold (1996) are knockdown arguments against an analysis which derives intuitive association by movement of a constituent containing the intuitive associate. Three arguments are given by Wold. The first is that a movement analysis of the type envisioned will be unable to explain the possibility of dual association in (ib), with only associated with BOUGHT and also simultaneously associated with BILL.

(i) a. John only saw the car that was BOUGHT by Mary.
    b. John also only saw [the car that was BOUGHT by BILL].

While such a possibility would indeed be problematic if real, the judgments claimed are far from clear (see section 6.5 for discussion). Wold’s second argument is that such movement would require raising a pronoun out of the scope of an operator which binds it, as would occur if the bracketed expression in (iiib) were raised to also.

(ii) a. John only asked BILL which lady will invite the sociologist.
    b. John also only asked BILL which lady \[1 will invite [her philosophical Rival]\]

This argument, however, completely misses its mark, since it overlooks the possibility of raising the entire embedded CP to also, in which case the pronoun will remain in the scope of its binder. Wold’s third argument is that the movement based analysis being entertained would force a reverse scope reading of the quantifiers in (iiib), with a philosopher obligatorily taking scope over every.

(iii) a. We only susPECT that every department that invites Prof. Jones will offend Bill.
    b. We only also susPECT that every department that invites [a phiLOsopher] will offend Bill.

Here we have a pure confusion, however. Raising of the bracketed expression in (iiib) to also would result straightforwardly in an island violation, and thus is predicted to be impossible. For just this reason, the smallest constituent which could be raised is the entire embedded subject. This expression, however, contains the quantifier every, and thus the raising would not alter the scope ordering between the two quantifiers. Perhaps the reviewer had other arguments in mind, but these are certainly not knockdown.

Drubig (1994) refers to the syntactic associate as a Focus Phrase, a terminology adopted in Krifka (1996b) as well. I have opted against using this terminology since it implies the presence of a Focus. As I will argue in section 5.5, it is necessary to allow the syntactic associate of only to contain no Foci at all.
By assumption, *only* needs to have a syntactic associate, requiring that some expression raise to it at LF. I further assume that this movement is subject to standard syntactic island constraints, making it impossible to raise to *only* any expression properly contained in the object NP headed by *people*. For illustrative purposes, I take the syntactic associate to be the entire object NP, yielding the LF representation for (33-B) given in (34).

\[(34)\] 
\[\text{BILL} \left[ \text{VP} \left[ \text{only} \left[ \text{NP} \text{people who SMOKE}_{C,f} \text{bananas}_{I} \right] \right] \right] \left[ \text{VP knows } t_{j} \right] \]

The syntactic associate of *only* contains contrastive focus marking at least on the expression *SMOKE*. In order for this focus marking to be licensed, I assume that the NP containing it must have an antecedent differing from it only in positions having contrastive focus marking. In (33), this requirement is satisfied by the NP object *people who wear bananas* in (33-A). Taking this antecedent to constitute the contrast set of *only* gives us the intuitively correct interpretation of the sentence in (33-B) if we take *only* to semantically presuppose that its syntactic associate combines truthfully with the remainder of the sentence and to assert that the expression(s) in its contrast set do not so combine truthfully.26 This will result in (33-B) presupposing that Bill knows people who smoke bananas and asserting that Bill does not know people who wear bananas. Since the only difference between what is asserted and what is presupposed is in the verbs (*smoke* vs. *wear*), the appearance of association with the verb follows just as it does in Rooth (1992).

4.2 Formalization

Formalizing the analysis sketched in section 4.1 requires making explicit three things: (i) the relation between focus and accent, (ii) discourse constraints on different types of focus, and (iii) rules for generating contrast sets from the syntactic associate of an operator. In this section, I give the formalization in a bare form, noting departures from previous analyses and highlighting certain features of the analysis. The motivation for the analysis will come in section 5 where the analysis is applied to the problematic data from section 3.

4.2.1 F-marking and Focus projection

Following Selkirk (1984, 1995), I take the relation between focus and accent to be mediated by syntactic F-marking, with F-marking licensed in three ways: by a pitch accent, by inheritance from an F-marked argument, and by projection. I depart from Selkirk in allowing three different types of F-marking (C-, O- and N-marking) corresponding to the three different types of focus (contrastive, old and new respectively), and in allowing F-marking to project to a constituent from any of its F-marked daughters. I also assume contra Selkirk that projection and inheritance of F-

---

26 This approach to the semantics of *only* differs from that of Rooth (1985, 1992), who always includes the intuitive associate of an operator in its contrast set. Adopting an exclusive semantics for *only* helps explain the impossibility of intuitive association of *only* with new and old Foci. Since Rooth’s only reasons for positing such an inclusion relation are theory internal, dropping this assumption is unproblematic.
marking are obligatory. The rules of F-marking, projection and inheritance adopted here are given in (35).

(35)  

**F-marking**
A head bearing a pitch accent is F-marked  
**Projection**
F-marking on X licenses the F-marking of the phrase immediately dominating X.  
**Inheritance**
F-marking on an internal argument of a head licenses the F-marking of the head.

Projection and inheritance preserve the type of F-marking, so that if X is C-marked, for example, and Y inherits its F-marking from X, then Y is C-marked as well. When a constituent contains two F-marked expressions of different type, I assume that the F-marking that projects is that highest on the focus hierarchy given in (36).

(36)  

**Focus projection hierarchy**
Contrastive > Old > New

Identification of the basic focus types associated with words bearing a pitch accent under this analysis is determined by the intentions of the speaker, though once these

---

27 This last assumption will make it impossible to identify a particular constituent as a Focus whenever the F-marking of that expression can project. This goes directly against one of the central claims of Selkirk that Focus determination is only partially determined by accent location. Selkirk's primary justification for this assumption lies in the observation that there appears to be a correlation between what is being asked in a question and focus marking in an answer. Several authors have called this correlation into question, including Williams (1995) and Schwarzschild (1996). The correlation breaks down in cases in which the information which answers the question can be licensed as given, as in the following discourse.

A: John saw Mary.  
B: Who did Bill see?  
A': BILL (TOO) saw Mary.

There can be no question that A' answers the question in B, and yet there is no hint of focus on the part of A' which answers the question who, i.e. Mary. If an answer to a wh-question need not identify any particular phrase as Focus, motivation for limiting focus projection disappears.

28 Selkirk additionally allows F-marking to be inherited by a trace from its antecedent. None of the examples considered in this paper make crucial use of this additional source of F-marking inheritance, and so I leave it out here.

29 The need for Focus projection and inheritance to keep constant the type of F-marking is shown by the following contrast.

i:  
A: John saw Mary.  
B: i. He only HEARD\textsubscript{N} Sue\textsubscript{C,f}.  
ii. #He only heard Sue\textsubscript{C,f}.

If inheritance of F-marking allowed a change in type of F-marking, then it would be possible for heard in (Bii) to be analyzed as N-marked, and this sentence would be predicted to be as acceptable as (Bi) in the context of (A). If we assume that inheritance of F-marking entails inheritance of F-marking type as well, on the other hand, then the unacceptability of (Bii) follows. If the syntactic associate of only is Sue, then heard will not be able to inherit F-marking and will violate the Givenness Constraint. If the syntactic associate of only is heard Sue, then heard will inherit C-marking from Sue and hence not fun afoul of the Givenness Constraint. However, then (Bii) will contradict (A).
have been identified, the F-marking of the remainder of the sentence is fixed deterministically. The result of applying the mechanisms in (35) to a sentence containing 3 pitch accents, one intended as new, one old and one contrastive, is illustrated in (37).

\[
(37) \quad [\text{IP} [\text{NP}\text{JOHN}_{N,c}]_{N} [\text{VP}\text{sent}_{C} [\text{NP}\text{PAINTINGS}_{C,f} \text{of Sue}]_{C}
\quad [\text{PP}\text{toO} [\text{NP}\text{MARY}_{O,c,O}]_{O} ]_{C} ]_{C}
\]
\]

In (37), JOHNN, MARY and PAINTINGS are F-marked in accordance with their bearing pitch accents. In each case, the F-marking of the words is projected to the phrases they head. The C-marking on [NP PAINTINGS of Sue] is inherited by the verb sent, and the O-marking on [NP MARY] is inherited by the preposition to. Taking the VP to be ternary branching, the VP contains three F-marked daughters, two of which are C-marked and one of which is O-marked. According to the Focus projection hierarchy in (36), C-marking projects to the VP. It is then inherited by the head of IP, projects to I', and finally projects to IP, winning out in the last step over projection of the N-marking of the subject in SpecIP. As with Selkirk’s original analysis, the mechanisms of F-marking assignment assumed here leave open the possibility that certain expressions (e.g. of Sue above) will not have any F-marking. Such expressions are assumed with Selkirk to have to qualify as Given.

4.2.2 Focus Constraints and Givenness

The structures generated by the F-marking mechanisms in (35) are subject to pragmatic constraints on usage. Each focus type has a unique role to play in connecting discourse, and so each is associated with its own unique constraint. I define the notion of a Focus relative to a constituent X as a (not necessarily proper) sub-constituent Y of X F-marked as type T (T ∈ {New, Old, Contrastive}) where Y is not immediately dominated in X by a category F-marked as type T. According to this definition, an F-marked constituent X is a Focus relative to itself, but is only a Focus relative to a higher category if its F-marking fails to project. In (38) I give the minimum characterization of the Focus Constraints needed for the purposes of this paper. How new and/or old Foci should be related with topic-related functions and how these functions should be formulated I leave as questions for future research.

\[
(38) \quad \text{Consider a structure } [X \ldots Y_{1} \ldots Y_{n} \ldots ], \text{ where } X \text{ is F-marked and } Y_{1} \ldots Y_{n} \text{ are the Foci properly contained in } X \text{ which are not embedded in other Foci within } X. \text{ Define } Z \text{ as the result of replacing all } Y_{i}, 1 \leq i \leq n, \text{ in } X \text{ with (non-F-marked) syntactic variables of the same semantic type as the Foci they replace. Focus Constraints: }
\]

**Old Constraint**

- If X is O-marked, X has an antecedent X’ such that:
  - X’ is of the same semantic type as X;

---

30 Adopting a more realistic but complicated syntax for the VP not affect the overall result that the F-marking which projects to the VP is C-marking and not O-marking.
ii: Z is non-distinct from X';

iii: Z satisfies the Givenness Constraint with respect to X'.

**Contrast Constraint**

If X is C-marked, X has an antecedent X' such that:

i: X' is of the same semantic type as X;

ii: X' is distinct from Z; and

iii: Z satisfies the Givenness Constraint with respect to X'.

**New Constraint**

If X is N-marked, then either (a) X does not have an antecedent and X satisfies the Givenness Constraint, or (b) X has an antecedent X' such that:

i: X' is of the same semantic type as X;

ii: X' is distinct from Z (=X); and

iii: Z (=X) satisfies the Givenness Constraint with respect to X'.

For some U, every expression z₁ ... zₘ in Z which is not F-marked has an antecedent z' in U with respect to which it is non-distinct, and for any i/j such that 1 ≤ i/j ≤ m and i ≠ j, if zᵢ stands in a thematic relation θ to zⱼ in Z, then the antecedent of zᵢ stands in θ to the antecedent of zⱼ in U.

[[N.B. This does not account for the anomaly of: A: John saw Mary. B: [BILLₙ,c \[heardₙ MARYₙ,c\]ₙ,c]. The Contrast Constraint is satisfied, though focus]]

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31 If topicalization can be analyzed as an instance of old focus, then this restriction initially appears to be too strong. Ward & Prince (1986), cited in Vallduví (1992), propose the following constraint on preposing in topicalization:

The entity represented by the preposed constituent must be related, via a salient partially ordered set relation [poset], to one or more entities already evoked in the discourse model.

Rather than revise the conditions on old focus in the manner above, however, the effects of Ward & Prince's condition can be captured by requiring an identical antecedent to be accommodated into the context when it does not already appear. Taking accommodation to involve creating an antecedent out of an expression contained in the context by a process of inference, the poset relation between an old focus and an antecedent expression can be derived. For details of the type of accommodation process involved, cf. Tancredi (1992), where a similar process is applied to supply a suitable antecedent for deaccented expressions. Here and throughout this paper I will limit examples to cases in which the identity relation clearly obtains between an old focus and its intended antecedent.

32 Note that for a new Focus having an antecedent, the New Constraint places the exact same conditions on the Focus as the Contrast Constraint does on a contrastive Focus. The different work done by the two constraints derives in part from the optionality of a new focus having an antecedent and in part from the asymmetric relation between the two types of F-marked expressions: a C-marked expression is never contained in a non-C-marked expression, though an N-marked expression can be contained in a non-N-marked expression.

33 See Tancredi (1992) and Schwarzschild (1996) for two related ways of formalizing constraints on givenness. The analysis presented here differs from both of these preceding analyses in taking the Givenness Constraint to be subordinate to each of the Focus Constraints. (See footnote [this+2] for consequences of this difference.)

34 Following Higginbotham (1985), I take thematic relations to include θ-marking, θ-binding and θ-identification. I assume that θ-relations in this sense are head-head relations.
is not as narrow as it could be. Check Schwarzschild for a solution. (Gricean Quantity-based scalar implicature?)

Non-distinctness is defined as follows.

(39) X and Y are **non-distinct** iff X is of the same semantic type as Y, and
   i: X is a syntactic variable; or
   ii: X contains a syntactic variable and Y contains expressions syntactically and semantically identical, except for F-marking, to the non-variable part of X; or
   iii: X contains no syntactic variables and X and Y are syntactically and semantically identical except for F-marking.

The Focus Constraints are intended as constraints on felicitous discourse. As formulated, they can apply to any constituent of a syntactic representation. Discourse felicity of a sentence S, however, requires only that each expression identified as a Focus relative to S satisfy the Focus Constraints. I encapsulate this requirement in the Focus Principle below.

(40) **Focus Principle**

A sentence Y1 containing independent Foci Y2 ...Yn is felicitous only if for every i : 1 ≤ i ≤ n, Yi satisfies the Focus Constraints.

Following the guiding principles of Chomsky’s (1995) Minimilast Program, I take the level at which the Focus Principle applies to be the syntactic level of LF. As such, the antecedents with respect to which the Focus Constraints are satisfied have to be LF representations as well.

It should be noted that Given-marked expressions in the present analysis are analyzed exclusively as non-F-marked expressions contained in a Focus. Furthermore, the Givenness Constraint is embedded in each of the individual Focus Constraints. This approach to givenness generalizes the analysis of Selkirk (1995), though unlike Selkirk I take lack of F-marking within an F-marked constituent to be both a necessary and sufficient condition for identifying an expression as Given-marked. It should furthermore be noted that while all Given-marked expressions of a focus F that are thematically related have to be licensed by a single antecedent, Given-marked expressions of distinct foci are in principle allowed to take distinct, non-related antecedents.

### 4.2.3 Contrast set generation rules

As mentioned in section 4.1, I assume that a contrast set for an operator Op can be generated in one of two distinct ways depending on the focus properties of the syntactic associate SA of Op. If SA has a focus antecedent A (i.e. an antecedent with respect to which it satisfies the New, Old or Contrastive Constraint), the contrast set is generated from A by substituting all new and old foci Y in SA for the expressions in A which match the variable introduced for Y in satisfying the relevant Focus Constraint. If SA is O-marked or N-marked, then substitution of new and old Foci for their corresponding expressions in the antecedent will result in the contrast set consisting of SA itself. If SA is C-marked and satisfies the Contrast Constraint, then the contrast set will consist of an expression distinct from SA. In the simplest case in which SA properly contains no other foci, this expression will be A. If SA lacks a focus antecedent (an option if it
is a new Focus and obligatory if it is not F-marked), then I assume a separate mechanism for creating a contrast set from SA. This mechanism I take to form members of the contrast set by making type-preserving substitutions for non-F-marked expressions in SA. If SA is exhaustively N-marked, then the only expression that can be contained in the contrast set of Op is SA itself.

5 Basic Illustrations

Before turning to applications of the analysis to the data from section 3, I first illustrate how the Focus Constraints apply to simple discourses, and then apply the analysis to simple cases containing the operator.

5.1 Focus Constraints in discourse

The Focus Constraints are intended as general constraints on discourse. I apply them here to the discourse in (41).

(41) A: JOHN's N MOTHER brought a CAKE to a PARTY.

B: BILL N brought ICE-CREAM.

C: i. Then, BILL's C mother brought a cake.

ii. No, BILL O brought SHERBET.

iii. #BILL's N/O/C mother brought ice-cream.

The first sentence opens the discourse. As such the only type of Focus that can be licensed is new Focus, and this only if there are no non-F-marked expressions in the LF representation of the sentence. Accent placement on the four expressions written in capitals is the minimum accentuation required to meet this requirement, N-marking being obligatorily projected to or inherited by every expression in the sentence from there. The second sentence contains accents on Bill and ice-cream. Analyzing these as indicating N-marking and C-marking respectively, the LF representation for this sentence will be that given in (42).

(42) [IP [NP Bill]N [VP brought [NP ice-cream]C]]

The IP being C-marked, the sentence as a whole has to satisfy the Contrast Constraint. This it does since the sentence is of the same semantic type as its antecedent in (41-A), and the result of replacing the NP Bill by a variable (i) is distinct from the LF of (41-A), and the Old Constraint satisfied by (42). The second sentence contains accents on Bill and ice-cream, indicating C-marking and N-marking respectively, the LF representation for this sentence will be that given in (42).

The unacceptability of (Ciii) follows from the failure of this example to satisfy the Contrast Constraint with respect to (B) and the old Focus on Bill in (B). The first two sentences in (C) are felicitous in this context. The acceptability of (Cii) is expected since (Cii) satisfies the Contrast Constraint with respect to (B), and contains no other Focus. The acceptability of (C) is also expected since it has an antecedent of the same semantic type (John's mother) with which it is distinct and with respect to which it (trivially) satisfies the Old Constraint. The acceptability of (Cii) is also expected since it has an antecedent of the same semantic type (Bill's mother) with which it is distinct and with respect to which it (trivially) satisfies the Old Constraint.
Givenness Constraint. While *mother, brought, ice-cream* and [*brought ice-cream*] all occur somewhere in the context, the Givenness Constraint requires that they all be in the same antecedent expression, and this condition is not met -- *mother* only occurs in (A), and *ice-cream* only occurs in (B). (The Focus Constraints further require that this antecedent be the one with respect to which the relevant Focus Constraint is satisfied, provided there is such an antecedent.) Thus, the Focus Constraints accurately predict the unacceptability of (Ciii) and correctly allow (Ci) and (Cii).35

5.2 Syntactic associate is C-marked

The most common cases of association with *only* arise when the syntactic associate of the operator is C-marked. This case was illustrated in example (33) of section 4. I repeat that example here and give the LF representation of (33-B) in (43) with F-marking made explicit. (I ignore irrelevant F-marking on functional heads and their intermediate projections.)

(33) A: John knows people who wear bananas.
   B: BILL [VP only [VP knows people who SMOKEC,f bananas]]


Here the syntactic associate of *only* is taken to be the NP object of *knows*. This object contains the accented verb *smoke* which by hypothesis is intended contrastively. The accent thus licenses the verb’s being C-marked. This C-marking is projected to VP.

35 The requirement of identical thematic relations introduced in the givenness constraint is necessary in order to block examples such as the following:

i: Students like people who smoke pears.
   #TEACHERS only like students who SMOKEO BANANASC.

The context sentence contains *students*, and so the requirement of an antecedent for this expression is met. Without additionally requiring the thematic relations among *students, like, who, etc.* to be paralleled by their antecedents, (i) would wrongly be predicted to be acceptable. In Tancredi (1992), a similar requirement is imposed on deaccented expressions independent of focus type, giving what could be labeled a givenness constraint. Schwarzschild (1996) also formulates a similar constraint, again independent of focus types. The present formulation differs from these previous analyses in allowing distinct antecedents for non-F-marked expressions contained in distinct (sets of) Foci, but not for non-F-marked expressions contained in identical Foci. This makes it possible to distinguish between the acceptable (Di) in the discourse in (ii) and the unacceptable (Dii).

ii: A: There was a party yesterday.
   B: John’s mother brought a cake.
   C: BILL brought ICE-CREAM and he ATE ice-cream.
   D: i: BILL’sN,c mother ate CAKEC,f
      ii. #BILL’sC/N/O,f mother ate ice-cream.

In (Di), *mother* will have to satisfy the Givenness Constraint only inside the new focus [Bill’sN mother]. *Ate*, in contrast, will have to satisfy the Givenness Constraint with respect to the expression [x ate CAKEF..]. Both of these requirements are satisfied, the former with respect to sentence (B) and the latter with respect to the second conjunct of sentence (C). In (Dii), in contrast, there is only one focus, and so the entire sentence will have to satisfy the Givenness Constraint as a whole. Since there is no antecedent in the discourse which contains *mother, ate and ice-cream*, this constraint cannot be satisfied here. Unlike with (Di), using different antecedent sentences to license the distinct parts is not an option.
and on to IP, CP and NP. I take the NP to be the internal argument of only (cf. section 6.4 for motivation), and hence C-marking will be inherited by only. It will then project to the higher VP, to \( \Gamma' \), and on to IP, winning out over projection of N-marking from the subject since C-marking is higher on the focus projection hierarchy. N-marking on Bill will thus only project up to the NP.

The syntactic associate SA of only being C-marked, a contrast set for only will be generated from the antecedent with respect to which SA satisfies the Contrast Constraint, here the NP people who wear bananas. Since SA contains no other Foci, its antecedent is admitted unchanged into the contrast set. As a result, the sentence will presuppose that Bill knows people who wear bananas and assert that Bill does not know people who wear bananas, giving rise to the appearance of association with smoke. Finally, by the Focus principle, the sentence as a whole must satisfy the Focus Constraints as must the new focus \([NP \text{Bill}_{N,c}]\) contained therein. The latter has no antecedent and contains no non-F-marked expressions, and hence satisfies the New Constraint via clause (a). (Alternatively, it’s antecedent is the NP John from which it is distinct, in satisfaction of clause (b) of the New Constraint.) The sentence as a whole satisfies the Contrast Constraint since it has an antecedent of the same semantic type, namely (33-A), which is distinct from the result of replacing the new Focus \([NP \text{Bill}_{N,c}]\) with a variable, and with respect to which it satisfies the Givenness Constraint. This latter constraint is satisfied since (33-A) contains expressions non-distinct from the non-F-marked people, who, bananas, knows, \(t_i\) and \(\{VP \text{knows } t_i\}\); people and who are \(\theta\)-identified in (33-A) just as they are in (43); and knows \(\theta\)-marks \(t_i\) in (43) and the non-distinct antecedent to \(t_i\), i.e. bananas, in (33-A).

It should be noted that intuitive association in this case is obligatorily with a C-marked expression since such expressions are the only expressions in the syntactic associate that can fail to appear in the contrast set. Thus whenever the syntactic associate of only is a C-marked expression, association with a new Focus, an old Focus or a non-F-marked expression is impossible.

### 5.3 Syntactic associate is O-marked

Syntactic association of only with an O-marked expression is unacceptable, as seen earlier in (24b). I expand that example in (44), and give the possible LF representations of (44-B) in (45) on the assumption that the syntactic associate of only is the NP Mary.

\[(44)\]
\begin{align*}
A: \text{John saw Mary’s mother.} \\
B: \# \text{In fact, he only}_O/\text{ONLY}_C/\text{ONLY}_I \text{ saw } \text{MARY’S}_O/\text{S}_O/\text{S}_c \text{ mother}
\end{align*}

\[(45)\]
\begin{align*}
a. & \quad [IP \text{he } [VP [\text{only}_N/O [NP; [NP \text{Mary}_O/’s mother}\}_O ]_O \text{ saw } \text{t}_i ] ]_O \\
b. & \quad [IP \text{he } [VP [\text{only}_C [NP; [NP \text{Mary}_O/’s mother}\}_O ]_C \text{ saw } \text{t}_i ] ]_C
\end{align*}

If only is accented, it is independently F-marked. If it is not accented, it inherits O-marking from its syntactic associate \([NP \text{Mary’s mother}]\). Both options are represented in (45). Since the syntactic associate of only, i.e. \([NP \text{Mary’s mother}]\), is an old Focus, its antecedent must be identical to it, a requirement met by the occurrence of Mary’s mother in (44-A). The contrast set is constructed by substituting the old Focus for its antecedent (i.e. substituting Mary’s mother for Mary’s mother). The
semantics of only will then result in the sentence presupposing that John saw Mary’s mother and asserting that John did not see Mary’s mother. The presupposition and assertion of the sentence cannot simultaneously be satisfied, making the sentence self-contradictory. More importantly, since what is asserted is identical to what is denied, none of the LF representations in (45) provides a basis for identifying Mary (or any other expression) as the intuitive associate of only. This is so since intuitive association is analyzed as an epiphenomenon dependent on the proposition presupposed differing from that denied, and this is exactly what does not obtain in the examples at hand.

I note as an aside that none of the representations in (45a) satisfies the Focus Constraints. If only is O-marked, then the entire sentence fails to satisfy the Old Constraint since there is no antecedent sentence containing only. If it is N-marked, the sentence will fail to satisfy the Givenness Constraint (applied at the level of the sentence as part of the Old Constraint), since the (non-F-marked) variable substituted for the new focus only fails to match an expression of the same type in (44-A). (45b) in contrast does satisfy the Focus Constraints. I note also that since an old Focus requires an antecedent and since the contrast set constructed from an O-marked syntactic associate will consist (by substitution) of that syntactic associate itself, syntactic association with an O-marked expression cannot give rise to intuitive association with anything at all, be it an N-marked expression, a non-F-marked expression, or an O-marked expression.

5.4 Syntactic associate is N-marked

Acceptability of syntactic association of only with an N-marked expression depends first on whether the syntactic associate has an antecedent. If it takes an antecedent, then generating an intuitive association will be impossible for the exact same reasons that association with an O-marked expression was impossible above. An example of syntactic association with a new focus is given in (46) (= (20f)?), with the intended intuitive associate underlined. The relevant LF representation is given in (47).

(46)  A: John gave Mary flowers.
     B: (Later,) #he only gave SUE_{N,c} CANDY_{C,f}.

(47)  \[ IP he [VP onlyN [NP:SueN]N [VP gaveC ti candyC]C ]C \]

If the new focus Sue has Mary as an antecedent, the contrast set for only will be constructed by substituting Sue (a new focus) for Mary. Given the semantics of only assumed, the sentence will both presuppose and deny that John gave Sue candy, providing no basis for identifying an intuitive associate for only. If the syntactic

36 The fact that (44-B) is self-contradictory cannot be taken as an explanation of the unacceptability of the sentence without further argument. A similar clash arises between presupposition and assertion in negative existential statements such as The king of France does not exist, and yet these statements are not thereby anomalous. Adopting Atlas’s (1991) semantics of only according to which John’s having seen Mary is an entailment of (44-B) rather than a presupposition does not help to obviate the problem. This analysis would put (44-B) on a par with self-contradictory sentences such as John saw each of us but he didn’t see me, where the first conjunct entails the negation of the second, though intuitively such contradictory sentences are not infelicitous in the same way that (44-B) is. I speculate that the added anomaly of (44-B) (in particular when only is C-marked) derives from the function that old focus plays in implying a contrast with a statement which is to follow.
associate does not take an antecedent, again the same conclusion follows, though in a different way. In the absence of an antecedent, a contrast set for only is constructed by substituting expressions in place of non-F-marked expressions in SueN. Since there are no such expressions, no substitutions can be made and thus once again the contrast set will consist solely of the NP Sue.

If the syntactic associate of only is both N-marked and contains a non-F-marked expression, then intuitive association with a non-F-marked expression is possible, in contrast with what was found with O-marked and C-marked syntactic associates. On the present analysis, this comes from the mechanism of contrast set construction employed for expressions lacking a focus antecedent. A relevant example is given in (48), with the LF representation in (49).

(48) A: Pears are a popular fruit at this university.
    B: In fact, STUDENTSN,c only LIKEN,c people who WEARN,f pears.37
    (That is, they don't like people who wear only things other than pears.)


Taking the syntactic associate SA of only not to have a focus antecedent, a contrast set can be constructed directly from SA by making substitutions for one or more of the non-F-marked expressions. Choosing pears as the expression substituted for will generate a set of expressions of the form people who wear x, with x presumably restricted to pragmatically relevant expressions (perhaps fruits). By the semantics of only, then, the sentence will presuppose that students like people who wear pears and deny that students like people who wear x for all values of x substituted for pears in creating the contrast set. This will produce the intuitive association with pears observed to be possible in (48-B).

5.5 Syntactic associate lacks F-marking

When the expression raised to an operator is a focus, intuitive association of only with a non-F-marked expression was seen to be possible only when the focus was a new focus. The only other way of generating an intuitive association with a non-F-marked expression is from an LF representation in which the entire syntactic associate of only is

37 Krifka (1996b) offers an argument that syntactic association must be with a constituent which properly contains the intuitive associate when the latter is embedded in an island. That argument can be applied equally to (48-B), in which intuitive association is with pears. If pears were taken to be the formal associate of only (i.e. the syntactic associate in the present analysis), then the sentence would be predicted to mean that only pears are an x such that teachers like people who wear x. This would predict truth conditions for the sentence requiring that teachers dislike anybody who wears anything other than or in addition to pears. A clothed person wearing pears around his neck would thus have to be disliked by teachers in order for the sentence to be true. The lack of such an implication under any interpretation follows under an analysis like that developed here in which the smallest constituent which could be analyzed as the formal associate of only is the NP people who wear pears. Since a person who wears pears and clothes is also a person who wears pears, the truth conditions for the sentence having this larger NP as the associate of only will allow the sentence to be true even if teachers are found to like normally clothed individuals with pear accessories. Krifka's argument forms the basis for the somewhat awkward paraphrase given in parentheses.
non-F-marked. The simplest such case is that illustrated in (12), repeated here as (50) with a potential LF representation of (50-B) given in (51).

(50) A: John saw Mary.
    B: (Yeah. In fact,) he ONLY$_N,f$ saw Mary.

(51) [IP he [VP [ only$_N$ [NP$_i$ [Mary]]] [VP saw $t_i$]$_N$]$_N$

Here I have chosen the object NP Mary as syntactic associate of only. Not being F-marked, this expression cannot have a focus antecedent. The only way of generating a contrast set for only is thus the method employed for new Foci lacking an antecedent -- making substitutions for one or more of the non-F-marked expression in the syntactic associate. Since the only such expression is Mary, substitution will have to replace Mary. The contrast set will thus consist exclusively of alternatives to Mary that are of the same semantic type. Taking this set to contain Sue and Nancy, (50-B) will presuppose that John saw Mary and assert that he did not see Sue or Nancy. This will give rise to the intuitive association with Mary observed to be possible.

6 Further Applications

In addition to illustrating the analysis of section 4, section 5 additionally provides solutions to some of the problems introduced in section 3. In particular, it shows how to establish an association with a non-F-marked (and hence Given) expression, and shows how establishment of an association with an F-marked expression is only possible if the F-marking is contrastive. In this section, I show how the analysis of section 4 accounts for the remainder of the data introduced in section 3, and provide some additional justification for portions of the analysis.

6.1 Motivating two mechanisms for generating intuitive associations

Under the analysis presented, there are two distinct ways of producing what would at first glance appear to be a single phenomenon of intuitive association. The first accounts for association with F-marked expressions, and the second for association with non-F-marked expressions, the mechanisms for generating contrast sets in the two cases being distinct. That this difference is needed is supported by a subtle but clear distinction between the intuitive associations generated in the two cases. When association is established with a contrastively focused expression, there is a strong tendency to restrict the contrast set to exactly the expression derived in the manner of section 4.2, making a discourse such as (52) awkward.

(52) A: John, Alice and Tom think Bill saw Mary.
    B: Nancy$_N,c$ thinks he only saw SUE$_C,f$.

That is, she thinks that he didn’t see Tom, Mary, John or Alice.

Taking (52) to be context initial, B’s first sentence is preferentially taken to mean that Nancy thinks Bill saw Sue and didn’t see Mary. Depending on the choice of syntactic associate, the mechanisms for generating contrast sets given above will result in a contrast set for only that contains either Mary or the VP saw Mary, and nothing else. The clarification offered in B’s second sentence, however, requires the contrast set for only in B’s first sentence to have included (saw) Tom, (saw) John and (saw) Alice as well. This clash in requirements imposed on the contrast set will require the hearer to revise the rule generated contrast set constructed upon hearing the first sentence of B.
(or to accommodate an appropriate antecedent so that the rule generated contrast set comes out right). This can be analyzed as giving rise to in a mild garden path effect, resulting in degraded acceptability.

If we minimally alter the example so that the associate of only is entirely deaccented, the garden path effect observed in (52) disappears completely.

(53)  A: John, Alice and Tom think Bill saw Mary.
      B: NANCY\textsubscript{N,c} thinks he saw SUE\textsubscript{C,f}.
      C: JANE\textsubscript{N,c} thinks he ONLY\textsubscript{N,c} saw Sue.

      That is, she thinks he didn’t see John, Alice, Tom, Mary, Nancy or herself.

Here, there is no sense of clash between the first and second of C’s sentences. Since the independent means of determining contrast sets for deaccented expressions can by hypothesis only be employed when focus constraints fail to pick out an antecedent expression from which the contrast set must be derived, the distinction between (52) and (53) follows.

6.2 Focus-excluding association

We saw in section 3.2 that it is possible for only to associate with one expression to the exclusion of another, but that this possibility is restricted. In particular, while it is possible in principle for association with either a non-F-marked (i.e. deaccented) expression or a C-marked (contrastively focused) expression to exclude an O-marked (old focused) expression, only the former case is sensitive to whether the intuitive associate and the O-marked expression are contained in an island. This was illustrated in (22b) and (23b), repeated below as (54).

(54) Context: Students like people who smoke pears.

      a. TEACHERS\textsubscript{N,c} only like people who SMOKE\textsubscript{O,c} BANANAS\textsubscript{C,f}. (= (22b))
      b. #TEACHERS\textsubscript{N,c} ONLY\textsubscript{N,f} like people who SMOKE\textsubscript{O,c} pears. (= (23b))

The analysis handles this distinction straightforwardly. LF representations for the two sentences are given in (55), where I’ve somewhat arbitrarily chosen to analyze the object of like as the syntactic associate of only. (The reader can verify that the choice is inconsequential.)

(55) Context: Students like people who smoke pears.

      a. [teachers\textsubscript{N} [VP [only\textsubscript{C} [NP:i people [who [smoke\textsubscript{O} bananas\textsubscript{C} ]\textsubscript{C} ]\textsubscript{C} ]\textsubscript{C} ]\textsubscript{C} [VP like t\textsubscript{i} ] \textsubscript{C} ]\textsubscript{C} ]\textsubscript{C}
      b. [teachers\textsubscript{N} [VP [only\textsubscript{N} [NP:i people [who [smoke\textsubscript{O} pears ]\textsubscript{O} ]\textsubscript{O} ]\textsubscript{O} ]\textsubscript{O} [VP like t\textsubscript{i} ] \textsubscript{O} ]\textsubscript{O} ]\textsubscript{O}

Since the syntactic associate SA of only contains a C-marked expression in (55a), and since C-marking ranks higher than O-marking in the Focus Projection Hierarchy, SA itself is C-marked. This means that the contrast set for only in this example will be constructed from the antecedent with respect to which SA satisfies the Contrast Constraint. This antecedent is the NP people who smoke pears in the Context sentence. Since SA contains an old Focus, namely the verb smoke, in generating the contrast set
from this antecedent smoke in SA will have to be substituted (vacuously) for smoke in the antecedent. The result is a contrast set consisting of the NP people who smoke pears. (55a) will thus presuppose that teachers like people who smoke bananas and deny that teachers like people who smoke pears, giving rise to intuitive association with bananas.

In (55b), the syntactic associate SA of only is O-marked. Since SA contains no other Foci, in order to satisfy the Old Constraint, it must have an antecedent with which it is non-distinct. This is satisfied by the NP people who smoke pears in the Context sentence. A contrast set is generated from this antecedent by substituting (vacuously) the SA as a whole (being an old Focus) for the antecedent. The result is a contrast set consisting of SA. (55b) thus presupposes that teachers like people who smoke pears and denies that teachers like people who smoke pears, which in addition to being contradictory fails to give rise to an intuitive association with pears or any other expression.

Intuitive association with pears in (54b) would of course fall out if the NP pears could by itself form the syntactic associate of only, as in (56).

(56)  [teachersN [VP onlyN [NP;i pears] ]]O
In this case, the alternative means of generating a contrast set for expressions lacking an antecedent would potentially give rise to a contrast set for only distinct from its syntactic associate. However, movement of pears to only violates standard island constraints, and so the LF representation in (56) is syntactically ill-formed.38,39

6.3 Maintaining an association

Until now, I have been looking exclusively at the question of when an association can be established for the first time. As seen in section 3.1, such cases represent only one part of the phenomenon misleadingly referred to in the literature as association with focus. In addition to these cases, cases of maintained association as illustrated in (11) (repeated here as (57) with focus properties made explicit) also need to be explained.

(57)  A: Tom saw Sue.
      B: JOHNN,e only saw MARYC,f.

38 This consequence depends on the still controversial assumption that LF movement is constrained by island constraints. To the extent that the present analysis is otherwise well motivated, the fact that adopting such an assumption about LF movement makes it possible to account for the distinction in (54), while not doing so does not, lends support to this assumption.

39 The possibility of association with a non-F-marked expression across an N-marked expression when both expressions are contained in an island was already illustrated in section 5.4 as a case of association into an F-marked expression which lacks an antecedent. The explanation for the possibility of association with a C-marked expression across a new Focus as in (i) parallels the explanation given in the text for association across an old Focus.

i: Students like people who smoke pears.
    They only like people who WEARN,c BANANASC,f.
The only difference is that the substitution of the new Focus wear for smoke in creating the contrast set for only is non-vacuous.
Maintaining an association is restricted in very different ways than is establishing an association. This can be seen in the fact that it is possible for only to maintain an association with an old focus as seen in (58), though establishing such an association is not possible as seen in (59).

(58) A: Tom gave Sue chocolate.
    B: John only gave Mary chocolate.
    C: BILL N,c only gave MARYO,c FLOWERSc,f.

(59) A: John gave Mary chocolate.
    B: #BILLN,c only/ONLY gave MARYO,c FLOWERSc,f.

Additionally, association can be maintained with a deaccented expression across an old focus even when both foci are contained in a syntactic island as in (60-B), though we have already seen that establishing an association in such circumstances is impossible.

(60) A: Students only like people who smoke Pears.
    B: No, TEACHERS C,f only like people who SMOKEO,c pears.

All of these examples can be given the same explanation. In each case, the association can be accounted for by assuming that the contrast set for only remains unchanged from the first sentence in which only occurs to the second. To illustrate, consider the case of (58). Intuitive association with Mary in (5b-B) can be generated from the LF representation in (61).


Using this LF representation, the contrast set for only will consist of Sue, resulting in (58-B) presupposing that John gave Mary chocolate and denying that John gave Sue chocolate. This generates the intuitive association with Mary observed. The possible LF representations for (58-C) are given in (62).


If we applied the analysis of contrast set generation given in section 4 to these representations, the first would produce no intuitive association and the second would produce intuitive association with flowers. If, on the other hand, we adopt the representation in (62a) and reuse the contrast set for only generated from (61), we derive the observed interpretation in which only is intuitively associated with Mary. The only thing remaining in order to make the analysis complete is a statement of the conditions under which a contrast set can be reused. I take there to be only one such condition: only must be either O-marked or non-F-marked.

6.4 Accentuation of operators

According to the present analysis, F-marking on only can arise in one of two ways: from only bearing a pitch accent, or from only inheriting F-marking from its syntactic associate. This analysis gives us the means to account for the contrast observed in (31), repeated in part as (63).
As was noted in section 3.5, the only possible intuitive associate for *only* in (63-Bi) is *DINNER*, while (63-Bii) additionally allows association with *noodles*. Intuitive association with the non-F-marked *noodles* in these example can only potentially be generated by raising the NP *noodles* to *only*. Intuitive association with *DINNER*, in contrast, can be generated by raising any expression containing it to *only*. Candidate LF representations for generating these readings are given in (64) and (65) respectively, with the (a) examples corresponding to (63-Bi) and the (b) examples to (63-Bii).

(64)  

(65)  
a. [IP Bill_N [VP [onlyC [PP:i forC [dinner_C ]C ]C ] [VP has [noodles]  
\[ t_i \]C ]C ]C  
b. [IP Bill_N [VP [onlyN [PP:i forC [dinner_C ]C ]C ] [VP has [noodles]  
\[ t_i \]C ]C ]C  

Looking first at (64b), *only* surfaces with N-marking (which percolates up one node). This means that *only noodles* must be licensed as a new focus. Analyzing this expression as taking *always noodles* as its antecedent will satisfy the New Constraint, *only* differing from *always* and *noodles* satisfying the Givenness Constraint with respect to the occurrence of *noodles* in the antecedent. Furthermore, the sentence as a whole will satisfy the Contrast Constraint, since replacing the new Foci *only noodles* and *Bill* with variables results in a representation which is distinct from (63-A), of the same semantic type as (63-A), and which satisfies the Givenness Constraint with respect to (63-A).

Consider now (64a). In this representation, both *only* and *noodles* lack F-marking. Consequently, the expression *only noodles* will not have to satisfy any of the Focus Constraints since at no point does it constitute a Focus. However, the sentence as a whole still has to satisfy the Contrast Constraint, and the lack of F-marking on *only* makes this impossible. (64a) satisfies the first two clauses of the Contrast Constraint with respect to the antecedent (63-A). However, it fails to satisfy the third clause, that requiring that the result of replacing Foci by variables satisfy the Givenness Constraint with respect to that antecedent. This last clause is not satisfied since *only* is not F-marked in (64a) and (63-A) does not contain an occurrence of *only*.

The two examples in (65) both satisfy the Focus Constraints, as the reader can verify, accounting for the possibility of intuitive association with *DINNER* in both examples in (63-B).40
6.5 Multiple focus marking

In this section, I look at an example which, while not strictly problematic for previous analyses of association with operators, receives a more natural account under the present analysis. Krifka (1992) has suggested that examples similar to the following be handled by multiple focus marking on *WATER* to account for the fact that this expression acts as the intuitive associate both of *only* and of *also*.

(66)  A: When I go out with my friends, we usually drink beer.
     B: However, I once only drank wine.
     C: I also once only drank WATER.

A similar mechanism of multiple focus marking for association with multiple operators is posited by Jacobs (1991). Under the analysis developed in section 4, in contrast, multiple focus marking is unnecessary, the representation in (67) giving rise to both intuitive associations.

(67) \[ I \[ VP \[ alsoC \[ VP \[ once \[ VP \[ onlyC \[ NP:i \[ waterC \]C \]C \]C \[ VP:j \[ drank ti \]C \]C \]C \]C \]

Given the representation in (67), *only* in (66-C) is both syntactically and intuitively associated with *water*. *Also* is syntactically associated with the VP \[once only wateri \[ drank ti\]. Given a plausible semantics for *also* which presupposes that members of its contrast set combine truthfully with the remainder of the sentence minus *also* and asserts that its syntactic associate does as well, the syntactic association will give rise to an intuitive association with *water*, the contrast set for *also* consisting of the VP \[once only winei \[ drank ti\] which differs from its syntactic associate exactly in containing *wine* in place of *water*.

The one question that the analysis does not answer definitively is the question of what *water* is intuitively contrasted with as the associate of *only*. If we allow for the syntactic associate of *only* to take an antecedent independently of the antecedent that the sentence as a whole takes, then we can naturally allow for the C-marked NP *water* to take as its antecedent either *beer* from (66-A) or *wine* from (66-B). This is a natural thing to allow under the present analysis since the syntactic associate of *only* is already being treated as an independent expression (and hence as a Focus here). This gives us an account for the (previously unnoticed) fact that though both operators appear to associate with *water*, what is being contrasted with *water* for the two operators can easily differ: *only water*, not *beer*; and *also water*, in addition to *wine*.

The acceptability of (i) in a manner completely parallel to the explanation given for (63-Bi) on the reading in which the intuitive associate is *dinner*.

(i)  (Context: John collects things that cats eat.)
     BILLN,c only collects things that BIRDSc,f eat.

In order for *only* to be acceptable without having to bear a pitch accent, it must inherit F-marking. The only F-marked expression in its scope is *birds*, though this expression is embedded in an island and cannot raise directly to *only*. The only way for *only* to inherit C-marking from *birds* is thus if that C-marking projects at least as high as the NP headed by *things* and potentially to the VP. However, on Selkirk’s analysis such projection is impossible. *Birds* is not the head of the IP of the relative clause, and nor is it an internal argument of any expression, so its F-marking can be neither projected nor inherited.
6.6 Multiple operators, multiple associates and islands

Analyzing intuitive association as dependent on syntactic association of a phrase containing the intuitive associate brings with it the prediction that if the movement needed to generate the association violates syntactic constraints on movement, then the intuitive association should be impossible. Krifka (1996b) argues that this is precisely what happens in certain cases of sentences containing multiple overt operators, each intended as associating with a distinct expression. In particular, Krifka claims that two distinct focus-sensitive operators cannot be associated with two distinct foci when each focus is separated from its associated operator by the same syntactic island. The examples he gives are repeated below, together with his judgments. (Co-subscripting is used to indicate intended intuitive associations. The context is provided by me.)

(68) Context: Tom talked to the man who introduced Jackie to John F. Kennedy.

a. Sam onlyI talked to the man who introduced MARILYNI to John F. Kennedy.

b. *Sam alsoO onlyI talked to the man who introduced MARILYNI to BOBBYI Kennedy.

Wold (1994) and Rooth (1995), in contrast, judge examples entirely parallel to (68b) to be acceptable, and use this judgment as an argument against making intuitive association dependent upon syntactic association.41

The present analysis predicts that sentences like (68a) should be acceptable. The only way of generating the intuitive association between only and Marilyn in (68a) is by raising to only an expression containing the NP headed by the man, with Marilyn being C-marked. I give one such representation in (69).

(69) ... [[onlyC [the man [who [introducedC MarilynC to John F. Kennedy]C]C]C talked to tk]C ...

Generating the same association in (68b) requires that Marilyn be C-marked. This means that the association has to be established again rather than maintained. This gives us the LF representation in (70a).

(70) a. ... [[onlyC [the man [who [introducedC MarilynC [to [BobbyN/O/C Kennedy]N/O/C]N/O/C]N/O/C]N/O/C talked to tk]C ...

b. ... [[onlyO [the man [who [introducedO MarilynO [to [BobbyN/O Kennedy]N/O/O]N/O/O]N/O/O talked to tk]O ...

In order for this LF representation to generate an intuitive association with Marilyn, the antecedent licensing the F-marking will have to be the context sentence preceding (68a). Maintaining the association with Marilyn from (68a) to (68b) is on the present

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41 My own judgments on these types of examples are not clear, and hence I have avoided basing the theory on such examples. The sentences appear to be more acceptable than examples in which association is with a deaccented expression contained in an island together with an O-marked or C-marked expression (cf. (23) for an example of the former), though they also appear to be worse than their counterparts in which neither associated expression is separated from its operator by an island. I give the predictions of the theory here and leave it to the reader to decide whether the predictions do justice to the data.
analysis impossible. This would require the F-marking of Marilyn to be O-marking and would further require this O-marking to be inherited by only, as in (70b), with O-marked only then re-using the contrast set of its antecedent in (68a) rather than generating its own. However, this would make the contrast set for only consist of the NP the man who introduced Marilyn to John F. Kennedy, giving rise to an intuitive multiple association with Marilyn and Bobby rather than to the desired single association with Marilyn.

If association of only with Marilyn in (68b) requires the LF representation in (70a) (or one differing from (70a) only in having a higher constituent raise to only), then association of also with Bobby will have to make use of the same partial LF representation. Raising some expression out of (70a) to also would either result in an island violation or would remove Marilyn from the syntactic associate of only, the latter case eliminating the possibility of only being associated with Marilyn. This means that the entire VP represented in (70a) must itself be the syntactic associate of also in (68b), as represented in (71).

(71) ... [[alsoC C [VP;i [onlyC C the man [who C MarilynC to 

If Bobby is C-marked, then the syntactic associate of also in (71) will satisfy the Contrast Constraint with respect to the expression in (68a) represented in (69). Given the semantics of also proposed in section 6.5, this representation will then generate an intuitive association between also and Bobby. Furthermore, C-marking on Bobby will plausibly allow for the pitch accent on Marilyn to be associated with continuation intonation rather than with a final fall, the final fall going with Bobby.\(^\text{42}\) Intuitive association of only with Marilyn is thus predicted to be possible simultaneously with intuitive association of also with Bobby. Importantly, generating the two associations does not require violating any island constraints.

7 Remaining Problems: Association and pronouns

One problem not handled by the analysis developed above is the difficulty of association with a non-focused pronoun. Von Fintel (1994) cites an example from Susan Tunstall illustrating this point, extended somewhat below.

(72) A: John gave xerox copies to every student in the department.
B: Eva only gave xerox copies to the GRADUATE students.
C: i: No, PETER only gave xerox copies to the graduate students.
ii: ??No, PETER only gave xerox copies to them.
iii: #No, PETER only gave xerox copies to 'em.
iv: No, PETER\(_C,\text{f}\) only gave xerox copies to THEM\(_O,\text{c}\).

All four examples in (72-C) are examples of maintained associations, with the intended associate underlined throughout. In each case, only is not F-marked, making it

\(^{42}\) Clearly more research is needed to determine the exact relation between intonation, pitch accents and focus types as well as to determine what F-marking patterns are permitted. Intuitively, it appears to be difficult if not impossible for an N-marked expression to follow a C-marked expression, though nothing in the analysis predicts this.
possible on the analysis developed for it to inherit its contrast set from the antecedent occurrence of *only* in (B). Taking this contrast set to consist of the NP *every student in the department* should give rise to intuitive association with *graduate* in (Ci) and with *them* in (Cii-iv). The first of these appears to be fully felicitous. Intuitive association with *them* in (Cii), however, is marginal at best, and becomes absolutely impossible if the pronoun is further reduced to *’em* as in (Ciii). If the pronoun is an old focus as in (Civ), the association is once again possible. Only the examples in (Ci) and (Civ) are explained by the analysis of section 4. Clearly a more thorough investigation of the interactions between pronominal anaphora, focus and deaccenting is needed to make sense of this paradigm.43

8 Summary and Conclusion

In this paper, I have argued for the following points:

i: Associative operators like *only* take a syntactic argument -- their syntactic associate -- which is potentially distinct from the expression in their scope.

ii: When an operator occurs in pre-VP position, it is related to its syntactic associate by movement.

iii: Intuitive association with *only* derives from the semantics of *only* generating a presupposition from its syntactic associate and an assertion from its contrast set.

iv: The contrast set C for an operator having a syntactic associate A is generated from the antecedent that licenses A as a Focus when such an antecedent exists. In the absence of such an antecedent, C is generated directly from A by making substitutions for non-F-marked expressions in A.

Central to the analysis developed is the assumption that focus comes in three different types -- new, old and contrastive. These types of focus are taken to be differentiated by the intentions of the speaker, reflected in the different constraints that each must satisfy and partially distinguishable by intonation. Justification for this proliferation of focus types comes form a correlation between the pragmatic uses to which focus can

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43 FN A potential problem for the Focus Constraints in (38) comes from the discourse in (i). (38) provides no reason why the discourse in (i) should be unacceptable, given an LF representation for (i-C) as in (ii). (This prediction was brought to my attention by an anonymous reviewer of an earlier version of this paper.)

i: A: Last Friday there was a stock car race at the fairgrounds.
B: John watched hats worn by guys driving red cars.
C: In contrast, BILL\(_N\), COUNTED\(_C\), cars.

ii: [BILL\(_N\) [COUNTED\(_C\) cars] \(_I\)][C]

(i-C) satisfies the Contrast Constraint since it has an antecedent, namely (i-B), which is of the same semantic type as (i-C), distinct from (i-C), and which contains the sole non-F-marked expression of (i-C), namely cars. The problem this example raises is that the intended contrast is fairly unnatural. While this unnaturalness calls for explanation, however, I do not take it to refute the formulation of the Focus Constraints proposed for two reasons. First, though unnatural, the contrast is not impossible to obtain, as it would be if for example cars in (i-C) were replaced by (non-accented) flags. Second, while the Contrast Constraint gives necessary conditions for felicitous use of a sentence containing contrastive focus marking, it does not give sufficient conditions for such felicity, leaving open the possibility that the awkwardness of the contrast in (i) has an entirely unrelated basis.
be put and the effects that these different uses of focus have on the possibility of associating with only. The analysis accounts for the following facts not handled by previous analyses:

I: that only can establish an association with deaccented expressions or contrastive foci but not with new or old foci;

II: that establishing an association with a deaccented expression is potentially restricted by syntactic island constraints, but establishing an association with a contrastive focus is not;

III: that maintained associations are possible only with old Foci and non-F-marked expressions; and

IV: that accentuation of an operator can affect what expressions that operator can intuitively associate with.

The analysis draws heavily on insights from several other authors, including most prominently Drubig (1994), Rooth (1992), Schwarzschild (1993,1996) and Selkirk (1995), though none of these analyses is adopted in full.

The most significant innovations of the present analysis is the tight connection it makes between pragmatic Focus Constraints and association with only. In distinction to most previous approaches to the problem of explaining intuitive association (Schwarzschild (1993, 1996) being notable exceptions), the present analysis does not take focus to be directly semantically significant. It rather takes the focus to connect discourse, entering into the semantics solely by being used to identify the domain of quantification for a focus sensitive operator. To the extent to which this core property of the analysis can be maintained, it opens the door to a unified, non-semantic analysis of focus.
References


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