

Focus and Topic Sensitive Operators

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Background

Sentences like “Anna only gave BILL chocolate” are commonly analyzed as involving a dependency between the placement of intonational focus¹ and the division of material between the restriction and scope of *focus sensitive particles* (FSP) like *only*. A word is *focus sensitive* if its semantics involves essential reference to the information structure of the sentence containing it.

A number of lexical items and constructions have been identified as *focus sensitive* in English, notably *only, even, too, also, always, usually, never, because*, generics, negations, questions and counterfactual conditionals. It is standardly assumed by most theories of focus that the class of FSPs is homogeneous; i.e. that there is a single mechanism responsible for focus sensitivity, and that all FSPs are sensitive to the same things, e.g. intonational focus in English.

In this paper, we present data that shows that the standard account of FSPs is seriously flawed. We argue that a dynamic model of accommodation along the lines of that developed in Beaver (1994), combined with the proposal for modeling the dynamics of domain restriction in Gawron (1996), can account for the data concerning FSPs in a non-stipulative way. In particular, we argue (1) that whereas some FSPs are directly sensitive to focus, others are in fact sensitive not to sentence focus but to discourse topic, and (2) that the same formal mechanism can be used for representing information associated with both topics and foci.

Theories of Focus Sensitive Particles

Following Rooth (1992), theories of FSPs can be divided into three groups which can be characterized as **semantic**, **hybrid** and **pragmatic**². In semantic accounts, the interpretation of FSPs is structurally linked to intonationally marked focus. In pragmatic accounts, pragmatic factors alone link FSP interpretation to focus. In hybrid accounts of FSPs like Rooth (1992), structural and pragmatic constraints explain FSP interpretation.

(1) Theories of Focus Sensitive Particles

Semantic	Hybrid	Pragmatic
Chomsky (1972) Rooth (1985) von Stechow (1985/1989) Krifka (1992), Krifka (1993) Rooth (1996)	Rooth (1992) Rooth (1995)	Jackendoff (1972) von Fintel (1994) Roberts (1995), Roberts (1996) Schwarzschild (1997) Geurts and van der Sandt (1997)

Let us make a division between Class A FSPs, including adverbs of quantification (e.g. *always, usually*), and some additive particles like *also*, and Class B FSPs, including *only* and *even*. It is rare for one theory of focus sensitive particles to cover both classes in detail, although many authors examining members of one class suggest at least implicitly that their theory will cover both³. Thus von Fintel

¹Capitals denote focal stress, which in most cases discussed would be transcribed as an H* L-L% in the ToBi system.

²In fact Rooth uses the terminology *weak/intermediate/strong*. See (1) for discussion.

³In Rooth (1985) and subsequent work, Rooth utilizes two architectures for the range of FSPs: a Discourse Representation Theory semantics for adverbs of quantification and a Montague grammar semantics for *only/even*. However, he does not motivate this division of labour in terms of different focus-sensitivity, but in terms of quite separate difficulties with binding and anaphora.

(1994), Rooth (1995) and Gawron (1996) are all accounts of Class A but not Class B, while Rooth (1992), Krifka (1993) and Roberts (1996) are accounts of Class B but not Class A. In the next section, we claim that **no** current theory accounts adequately for both classes.

Data

In this section, we discuss original data which shows that a theory which treats FSPs as a homogeneous class is hopelessly flawed. We take *always* as representative of Class A and *only* as functioning parallel to *even*.

Extraction

Consider the following scenario: I have two roommates, Kim and Sandy. I always stock my roommates' fishtanks. I stock Sandy's fishtank with goldfish and nothing else. I stock Kim's fishtank with goldfish and clownfish.

Sandy's fishtank	Kim's fishtank
goldfish	goldfish and clownfish

- (2) KIM's is the tank I said I always stock with clownfish.
- (a) "I said I always stock KIM's tank with clownfish."
 - (b) "I said I always stock Kim's tank with CLOWNFISH."
- (3) # KIM's is the tank I said I only stock with clownfish.
- (a) "I said I only stock KIM's tank with clownfish."
 - (b) "I said I only stock Kim's tank with CLOWNFISH."

In (3) the focus of *only* is extracted. Surprisingly, (3) lacks the reading given in (3a). (2) has the readings in both (2a) and (2b). This data suggests that the extraction of the focus of *only* is impossible, but the extraction of the focus of *always* is possible.

Italian behaves similarly to English as far as extraction is concerned. (4) and (5) are illustrative of the interaction between *solo* ('only') and *sempre* ('always') and extraction. (5) cannot mean 'Giulia knows which boy Maria has only brought HIM to the cinema (and nobody else)'.
 (4) Giulia sa quale ragazzo Maria ha sempre portato al cinema.
 "Giulia knows which boy Maria has always brought to the cinema."
 (5) Giulia sa quale ragazzo Maria ha solo portato al cinema.
 "Giulia knows which boy Maria has only brought to the cinema."

Dutch, German and Swedish show a similar pattern.

Presupposition

In some cases the domain of *always* can apparently be restricted by presupposition, although *only* remains tied to intonational focus (c.f. Cohen (1999)). Consider examples (6) and (7):

- (6) Mary always remembers to go to CHURCH.
- (a) ? "Whenever Mary remembers to do something, it's always to go to church."

- (b) “Whenever it’s time for church, Mary remembers to go.”
- (7) Mary only remembers to go to CHURCH.
 - (a) “The only place Mary remembers to go is to church.”
 - (b) # “The only thing Mary does when it’s time for church, is remember to go.”

Discussion

The extraction and presupposition data show that there are distributional differences between Class A and Class B FSPs. A formal framework which treated FSPs as a homogeneous class would fail to capture these differences.

Regarding the extraction data, consider semantic accounts. These must insist on the focus of a FSP being in the scope of the FSP at some level of representation. There are two options. Either (i) traces (gaps) can carry focus at this level, or (ii) they cannot. If (i), then such accounts incorrectly predict that (3a) is a possible reading. If (ii) they incorrectly predict the absence of reading (2a)⁴.

Consider now pragmatic accounts. Here the absence of reading (3a) is a counterexample. For such approaches the syntactic form of the sentence plays no role in determining the alternative set. So these theories can not distinguish between a variant of (3) with focus on *Kim’s* and sentence (3a) itself, in which the focus is not extracted from the syntactic scope of *only*.

Formal Framework

In this section, we will briefly describe the essential features of the adopted formalism.⁵ The main idea consists in interpreting intonation in terms of presupposition of topics under discussion. Topics under discussions are formalized as domain restrictions in the sense of Gawron (1996). Presupposition and accommodation are analyzed as in Beaver (1995). The quantificational domain of adverbial quantification (Class A FSPs) is crucially restricted by the topics under discussion. The domain of quantification of *only* (a Class B FSP) is restricted to some subset of the domain of objects of the same semantic sort as the focused material in their scope.

Sentences are interpreted as context change potentials, where a context is a pair consisting of an environment e and an information state s . Information states are defined as in Heim (1983) as sets of world-assignment pairs, and an *environment* is defined, as in Gawron (1996), as a partial function from variables to states in which the variable is defined. States encode what is known and what discourse markers are available for future anaphora; environments encode information about what is under discussion. It is crucial that the two kinds of information are stored separately.

Topics under Discussion The topics under discussion are the things the discourse is about. They are formalized as in Gawron (1996) in terms of domain restrictions. Questions are typical examples of expressions introducing topics, this

⁴It is crucial to this argument that in (2), *always* takes scope under *said*. Since the *saying* event is not bound by *always*, it cannot be claimed that *always* takes wide scope at LF. This provides our justification for maintaining that the subject of the main clause, which is the semantic focus of *always*, is neither within the syntactic scope nor the binding domain of *always*.

⁵This framework is further developed in Aloni, Beaver and Clark (in preparation). Please contact the authors for further details.

justifies our choice of denoting by $?x\phi$ the operation of introduction or further specification of the topic ‘what about ϕ ’.⁶ Following Gawron (1996), although adapting notation somewhat, we assume that the update of a context s_e with $?x\phi$ yields a context $s_{e'}$ such that $e'(x)$ is defined and is a state which supports at least the information that x is ϕ . The update of s_e with a quantified sentence $Qx\psi$ will crucially depend on $e(x)$ which encodes all of the restrictions that has been placed on x along the preceding discourse.

Accent The general picture is that intonation signals two features F (ocus) and N (on-) N (ovel). F and NN are represented as presupposed topics under discussion which can be accommodated. Following Krifka (1999), we assume that we have (at least) the two features F and NN realizable in the sentence.⁷ The first role of the Focus feature F is to trigger the presupposition that the background is among the topics under discussion. The sentence in (8) is represented as in (9):

(8) John loves [Mary]_F.

(9) $\partial[?xL(j, x)] \wedge \exists x(x = m)$

The sentence presupposes the previous introduction, as topic, of a set of individuals (those loved by John) and asserts that the item in focus (Mary) belongs to that set. A typical example of a sentence introducing such a topic would be the question: ‘Who does John love?’ The Non-Novel feature NN is interpreted as presupposing an identical antecedent. The sentence in (10) receives the representation in (11):

(10) [A dog]_{NN} is INTELLIGENT.

(11) $\partial[?xD(x)] \wedge \exists xD(x) \wedge I(x)$

Intuitively the sentence presupposes that dogs are among the topics under discussion at the moment of utterance.

Focus and Topic sensitive operators ⁸ *Adverbs of quantification* are analyzed as in the Lewis-Heim-Kamp tradition. They form tripartite structures where if/when clauses, if present, provide the restriction. The topics under discussion which are relevant for the interpretation of the sentence crucially determine what is actually quantified over by the adverb.

(12) Quantifier_(Topics)(Restriction)(Nuclear Scope)

The sentence in (13) is represented as in (14).

(13) [A dog]_{NN} is always INTELLIGENT.

(14) always (\emptyset) ($\partial[?xD(x)] \wedge \exists xD(x) \wedge I(x)$)

⁶An analysis of questions in terms of domain restrictions is a promising one. From domain restrictions we can define partitions and all of the relevant notions for a theory of questions and answers (cf. Groenendijk and Stokhof (1984)). Furthermore, we would have a natural characterization of the notion of a congruent answer (cf. von Stechow (1991)).

⁷The prosodic effect of the F feature is that the item receives a H* L-L% in the ToBi labeling system. The prosodic effect of NN is that it prevents the item from receive a pitch accent and this means that the accent has to be realized elsewhere. According to Krifka, the NN item is deaccented or it has a secondary accent realized as low-rise. In our analysis, it is not essential that the NN feature be identifiable, except in cases where a topic must be accommodated. If a topic is already present in the discourse context, then domain restriction effects for class A FSPs can be achieved simply by co-indexation.

⁸Aloni, Beaver and Clark (in preparation) will provide a fully detailed analysis of *only* and adverbial quantification in this framework.

The adverb is analyzed in such a way that it actually quantifies over all the variables introduced in its scope which are defined in the environment at the moment of interpretation. In this case, since the sentence is defined only in contexts in which the topic $?xD(x)$ has already been introduced, the variable quantified over is x and the domain of quantification of the adverb is automatically restricted to dogs. The sentence means: “All dogs are intelligent.”

A first role of the focus feature was mentioned above, that of introducing a certain presupposition. The second function of the focus feature is to identify the focussed variable to class B FSPs such as *only*. The interpretation of *only* involves a universal quantification automatically restricted by the presupposition expressed by the F feature. The sentence in (15) receives the representation in (16). Note that although an existential binds x , the FSP *only* has the effect of changing the quantificational force, in much the same way as in the standard dynamic analysis of unselective binding.

(15) John only loves [MARY]_F.

(16) $\text{only}_x(\partial[?xL(j, x)] \wedge \exists x(x = m))$

(16) is interpreted as asserting that all x are equal to Mary. Since the sentence is defined only in contexts in which the topic $?xL(j, x)$ has already been introduced, the domain of quantification will contain only individuals who John loves. The sentence means “John loves nobody but Mary.”

Results The formal system has enough structure to capture the difference between the (a)-(b) cases in the following two examples:

(17) a. A DRUMMER always lives in [a half empty building]_{NN}.

b. [A drummer]_{NN} always lives in a HALF EMPTY BUILDING.

(18) a. Mary only_i introduced [JOHN]_{F_i} to Bill.

b. Mary only_i introduced John to [BILL]_{F_i}.

By incorporating accommodation in the notion of entailment (cf. Beaver (1995)), we can prove the following facts:

(19) (a) $\text{always}(\emptyset) (\partial[?xB(x)] \wedge \exists yD(y) \wedge \exists xB(x) \wedge L(x, y)) \models \forall x(B(x) \rightarrow \exists yD(y) \wedge L(x, y))$

(b) $\text{always}(\emptyset) (\partial[?yD(y)] \wedge \exists yD(y) \wedge \exists xB(x) \wedge L(x, y)) \models \forall y(D(y) \rightarrow \exists xB(x) \wedge L(x, y))$

Thus (17a) means “All half empty buildings house drummers.” and (17b) means “All drummers live in half empty buildings.”⁹

(20) (a) $\text{only}_x(\partial[?xI(m, x, b)] \wedge \exists x(x = j)) \models \forall x(I(m, x, b) \rightarrow x = j)$

(b) $\text{only}_x(\partial[?xI(m, j, x)] \wedge \exists x(x = b)) \models \forall x(I(m, j, x) \rightarrow x = b)$

⁹The accents in these sentences could also be analyzed as marking focus rather than non-novelty. In this case the first sentence would mean: “All half empty buildings which house somebody, house drummers.” and the second sentence would mean “All drummers who live somewhere, live in an half empty building.”

(18a) means “Mary did not introduce anybody but John to Bill.” and (18b) means “Mary did not introduce John to anybody but Bill.”

Among the advantages of representing intonation as presupposed domain restrictions is that the so called requantification problem¹⁰ is avoided. A further advantage is that we have a straightforward account of the fact that the quantificational domains of *only* or *always* can be further restricted by the context. Domains of quantification are constructed by combining constraints that arise from different sources and given the dynamics of the system, we can account for the anaphoric nature of these restrictions (cf. Jäger (1995)).

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¹⁰First observed Rooth (1995), the requantification problem is discussed by von Fintel (1994) who invented the name and more recently by Krifka (1999).