

Scalar additives and their interaction with focus

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1 Introduction

- Expressions like *even* have long intrigued researchers because of their unusual interaction with focus:

- (1) a. Joe doesn't even eat [SPInach]_F.
'Joe doesn't eat spinach; that Joe doesn't eat spinach is less likely than his not eating something else.'
- b. Joe doesn't even [EAT]_F spinach.
'Joe doesn't eat spinach; that Joe doesn't eat spinach is less likely than his not doing something else to spinach.'

- Jackendoff (1972) calls the phenomenon ASSOCIATION WITH FOCUS: the meaning of a sentence containing *even* varies with focus.

- In this talk, I examine how *even* is related to *let alone* (Fillmore et al. 1988). On the surface, there is probably no reason to think that it 'associates with focus' in the same sense:

- (2) a. Joe doesn't eat [SPInach]_F let alone eat [CHARD]_F.
'Joe doesn't eat spinach or chard; that Joe doesn't eat spinach is less likely than his not eating chard.'
- b. # Joe doesn't [EAT]_F spinach let alone eat [CHARD]_F.

⇒ Nonetheless, I argue that *let alone* and *even* form a natural class: they exhibit what I call a FORMAL DEPENDENCY ON FOCUS.

⇒ *Even*'s semantic interaction with focus arises independently from its lexical meaning (it is quantificational).

- In the rest of this talk,

- first, I argue that *even* and *let alone* both exhibit a formal dependency on focus;
- then, I show how this restriction on the position of focus can be derived using the alternative semantics for focus (Rooth 1985, 1992);
- next, I show why, given this account, we expect *even*—but not *let alone*—to possess the semantic variability discussed above; and
- finally, I place *even* and *let alone* within a larger typology of focus operators with similar properties.

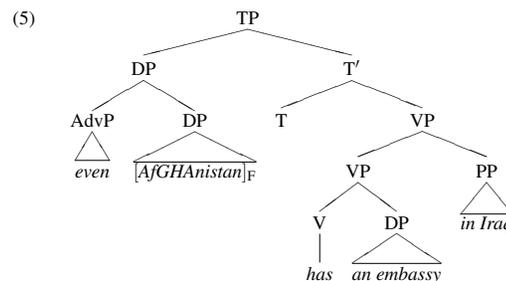
2 Restrictions on the position of focus

- Focus operators in general are cross-categorical operators: they occur almost anywhere in the sentence.

- (3) a. Even [LIZ]_F sings to her canary.
b. Liz even [SINGS]_F to her canary.
c. Liz sings even to [her caNArY]_F.

- When *even* is adjoined to the subject, the focus falls within the subject:

- (4) Q: What countries have embassies in Iraq?
A: Even [AfGHAnistan]_F has an embassy in Iraq.



- It is not possible for this focus to occur elsewhere, even if discourse congruence is satisfied:

- (6) Q: What type of representation does even Afghanistan have in Iraq?
A1: # Even Afghanistan has [an EmbAssy]_F in Iraq.
Intended: 'Afghanistan has an embassy in Iraq; that Afghanistan has an embassy in Iraq is less likely than some other country having an embassy in Iraq.'
- A2: Afghanistan has [an EmbAssy]_F in Iraq.
A3: Even [AfGHAnistan]_F has [an EmbAssy]_F in Iraq.

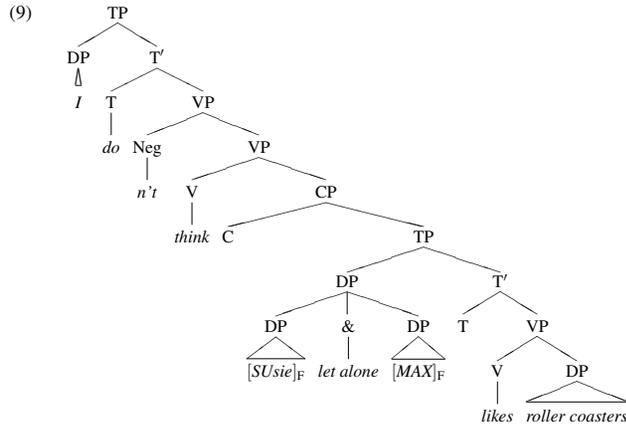
- This FORMAL DEPENDENCY ON FOCUS can be stated informally as:

- (7) *Formal dependency on focus*
An expression α exhibits a FORMAL DEPENDENCY ON FOCUS iff there must be a focus in (each of) α 's sister(s).

- Let alone* is always accompanied by a pair of foci:

- (8) Q: Who likes roller coasters? Does Max like roller coasters?
A: I don't think [SUsie]_F let alone [MAX]_F likes roller coasters.

- Since *let alone* is syntactically a coordinator, each focus is contained within one of its sisters:



- The presence of these foci is obligatory:

- (10) Q: What does Susie or Max like? Do they like roller coasters?
 A1: # I don't think Susie let alone Max likes [ROLLER coasters]_F.
 Intended: 'I do not think Susie likes roller coasters; that I do not think Susie likes roller-coasters is less likely than my not thinking that Max likes roller coasters.'
 A2: I don't think Susie or Max likes [ROLLER coasters]_F.
 A3: I don't think [SUsie]_F let alone [MAX]_F likes [ROLLER coasters]_F.

⇒ *Even* exhibits a formal dependency on one focus, and *let alone* shows a similar dependency on two foci.

3 Deriving the formal dependency on focus

3.1 Discourse congruence

- Focus is an abstract property of expressions that restricts how those expressions can be used in discourse (Halliday 1967, Akmajian 1970, Chomsky 1971, Jackendoff 1972:229–278):

- (11) Q: Who makes sushi?
 A1: [MAX]_F makes sushi.
 A2: # Max makes [SUsi]_F.

- Discourse congruence can be derived with Rooth's (1985, 1992) alternative semantics for focus.

- All expressions have an ordinary meaning, given by $\llbracket \]^o$, as well as a focus meaning, given by $\llbracket \]^f$:

(12)

	Max	[MAX] _F
Ordinary meaning	max	max
Focus meaning	{ max }	{ <i>x</i> <i>x</i> ∈ <i>D_e</i> }

- When *Max* is not F-marked, the focus meaning is equal to the set containing just *Max*.
- When *Max* is F-marked, the focus meaning is equal to the set of alternatives to *Max*, i.e. the set of individuals (*Max*, *Liz*, *Oswald*, etc.)

- To get the focus meaning of an entire sentence, focus meanings are composed pointwise: each member of one set is applied to each member of the other set.

- An assertion is congruent to a question just in case its focus value is equal to the meaning of the question.

- (13) *Question-answer congruence*
 An assertion α is CONGRUENT to a question β iff $\llbracket \alpha \rrbracket^f = \llbracket \beta \rrbracket^o$.

- (14) Q: $\llbracket \text{Who makes sushi?} \rrbracket^o = \{\mathbf{make(sushi)}(x) \mid x \in D_e\}$
 A1: $\llbracket \text{[MAX]}_F \text{ makes sushi} \rrbracket^f = \{\mathbf{make(sushi)}(x) \mid x \in D_e\}$
 A2: $\# \llbracket \text{Max makes [SUsi]}_F \rrbracket^f = \{\mathbf{make}(x)(\mathbf{max}) \mid x \in D_e\}$

- The focus associated with *even*, though it must be present, still plays a role in enforcing discourse congruence (von Stechow 1994:61, Schwarzschild 1997:5):

- (15) Q: Who did John invite for dinner?
 A1: He didn't even invite [ANDre]_F for dinner.
 A2: # He didn't even invite [ANDre]_F [for DInner]_F.
 Intended: 'He didn't invite Andre for dinner; that he didn't invite Andre for dinner is less likely than his not inviting Andre for something else.'

- The foci associated with *let alone* play a similar role:

- (16) Q: What color tux is Max wearing to prom? Is he wearing a purple tux to prom?
 A1: Max isn't wearing a [BLACK]_F tux let alone a [PURple]_F tux to prom.
 A2: # Max isn't wearing a [BLACK]_F [TUX]_F but a [PURple]_F [TUX]_F to prom.

⇒ We have to account for the fact that the foci associated with *even* and *let alone* count for the purposes of discourse congruence.

3.2 *Let alone*

- Usually, to get the focus meaning of an entire sentence, focus meanings are composed pointwise.
- I propose, however, that *let alone* returns the intersection of the focus meanings of its two arguments:

- (17) $\llbracket \alpha \text{ let alone } \beta \rrbracket^f = \{x \mid x \in \llbracket \alpha \rrbracket^f \cap \llbracket \beta \rrbracket^f\}$ defined iff $\llbracket \alpha \rrbracket^o \in \llbracket \beta \rrbracket^f \wedge \llbracket \beta \rrbracket^o \in \llbracket \alpha \rrbracket^f \wedge \llbracket \alpha \rrbracket^o \neq \llbracket \beta \rrbracket^o$

- But this function is only defined when *let alone*'s two sisters are:

1. alternatives to one another, i.e. $\llbracket \alpha \rrbracket^o \in \llbracket \beta \rrbracket^f$ and $\llbracket \beta \rrbracket^o \in \llbracket \alpha \rrbracket^f$
2. distinct from each other, i.e. $\llbracket \alpha \rrbracket^o \neq \llbracket \beta \rrbracket^o$

- Both conditions are met only when each of *let alone*'s two sisters contains a focus:

(18) I don't think [SUsie]_F let alone [MAX]_F likes roller coasters.

	[SUsie] _F	[MAX] _F	
Ordinary meaning	susie	max	susie \neq max
Focus meaning	$\{x \mid x \in D_e\}$	$\{x \mid x \in D_e\}$	susie $\in \{x \mid x \in D_e\}$ and max $\in \{x \mid x \in D_e\}$

- When neither of *let alone*'s two sisters contains a focus, the second condition is not satisfied:

(19) # I don't think Susie let alone Max likes [ROLLER COASTERS]_F.

	Susie	Max	
Ordinary meaning	susie	max	susie \neq max
Focus meaning	$\{\mathbf{susie}\}$	$\{\mathbf{max}\}$	susie $\notin \{\mathbf{max}\}$ and max $\notin \{\mathbf{susie}\}$

- Once we have the focus meaning for the *let alone* phrase, we can derive the focus meaning of the entire sentence in (18):

(20) $\llbracket \text{I don't think [SUsie]_F let alone [MAX]_F likes roller coasters} \rrbracket^f = \{-\mathbf{think}(\mathbf{like}(\mathbf{roller-coaster})(x))(\mathbf{I}) \mid x \in D_e\}$

- It will only be congruent to a subject question like *Who don't you think likes roller coasters?*
- Note that each of the conditions in (26) is motivated independently:

- (21) $\llbracket \alpha \rrbracket^o \in \llbracket \beta \rrbracket^f$ and $\llbracket \beta \rrbracket^o \in \llbracket \alpha \rrbracket^f$:
Max isn't wearing a black [TUX]_F let alone a purple [TUX]_F to prom.
- (22) $\llbracket \alpha \rrbracket^o \neq \llbracket \beta \rrbracket^o$:
Max isn't wearing a [BLACK]_F tux let alone a [BLACK]_F tux to prom.

3.3 Even

- *Even* also returns the focus meaning of its sister. It must contain an alternative distinct from the ordinary meaning of *even*'s sister (cf. the \sim operator of Rooth 1992):

(23) $\llbracket \text{even } \beta \rrbracket^f = \{x \mid x \in \llbracket \beta \rrbracket^f\}$ defined iff $\exists x(x \in \llbracket \beta \rrbracket^f \wedge x \neq \llbracket \beta \rrbracket^o)$

- *Even*'s sister only contains an alternative other than itself when there is a focus present:

(24) Even [AfGHANistan]_F has an embassy in Iraq

	[AfGHANistan] _F	
Ordinary meaning	afghanistan	
Focus meaning	$\{x \mid x \in D_e\}$	there is a y in $\{x \mid x \in D_e\}$, such that $y \neq \mathbf{afghanistan}$

(25) # Even Afghanistan has [an Embassy]_F in Iraq.

	Afghanistan	
Ordinary meaning	afghanistan	
Focus meaning	$\{\mathbf{afghanistan}\}$	there is no y in $\{\mathbf{afghanistan}\}$, such that $y \neq \mathbf{afghanistan}$

\Rightarrow Both *even* and *let alone* require the presence of a focus in (each of) their argument(s), a requirement that can be derived formally using Rooth's alternative semantics.

4 Semantic effects of focus

- I have proposed that the formal dependency on focus is an independent property of *even* and *let alone*.
- Why, then, does the meaning of *even* sentence vary with the position of focus?

- (26) a. Joe doesn't even eat [SPINACH]_F.
'Joe doesn't eat spinach; that Joe doesn't eat spinach is less likely than his not eating something else.'
- b. Joe doesn't even [EAT]_F spinach.
'Joe doesn't eat spinach; that Joe doesn't eat spinach is less likely than his not doing something else to spinach.'

- Both sentences in (26) can be translated as:

(27) At-issue:
 $\lambda w(\neg \mathbf{eat}_w(\mathbf{spinach})(\mathbf{joe}))$
Presupposition:
 $\lambda w \exists \mathbf{p} \in C(\mathbf{p} \neq \lambda w'(\neg \mathbf{eat}_{w'}(\mathbf{spinach})(\mathbf{joe})) \wedge \mathbf{p}(w) \wedge \lambda w'(\neg \mathbf{eat}_{w'}(\mathbf{spinach})(\mathbf{joe})) < \mathbf{p})$

- I adopt Karttunen and Peters's (1979) semantics for *even* with two changes: 1) the scale is not always one of likelihood; and 2) the at-issue proposition does not have to be at the absolute bottom of a scale (Kay 1990).
- Like other quantificational structures, the domain of *even* is restricted. This restriction is represented with the free variable *C*, which is anaphoric to the question under discussion (Rooth 1992, von Stechow 1994).
- Since the position of focus is different in each of the sentences in (26), the question under discussion will be different for each, and hence each sentence will quantify over a different set of propositions.
- For instance, (26a) answers the question:

(28) $\llbracket \text{What doesn't Joe eat?} \rrbracket^o = \{\lambda w(\neg \mathbf{eat}_w(x)(\mathbf{joe})) \mid x \in D_e\}$

- With (28) as the question under discussion, the domain of *even* is restricted to the set of propositions of the form 'Joe doesn't eat *x*'. Its presupposition is thus equivalent to:

(29) $\lambda w \exists \mathbf{p} \in \{\lambda w'(\neg \mathbf{eat}_{w'}(x)(\mathbf{joe})) \mid x \in D_e\}(\mathbf{p} \neq \lambda w'(\neg \mathbf{eat}_{w'}(\mathbf{spinach})(\mathbf{joe})) \wedge \mathbf{p}(w) \wedge \lambda w'(\neg \mathbf{eat}_{w'}(\mathbf{spinach})(\mathbf{joe})) < \mathbf{p})$

- In other words, that Joe doesn't eat spinach is less likely than his not eating something else (compare with (26b)).

- Turning now to *let alone*, it does not exhibit a similar semantic interaction with focus since it does not express quantification.

(30) Joe doesn't eat [SPInach]_F let alone eat [CHARD]_F.
'Joe doesn't eat spinach or chard; that Joe doesn't eat spinach is less likely than his not eating chard.'

- *Let alone* orders two propositions on a scale (Fillmore et al. 1988, Toosarvandani, to appear):

(31) At-issue: $\lambda w(-\text{eat}_w(\text{spinach})(\text{joe}) \wedge -\text{eat}_w(\text{chard})(\text{joe}))$
Presupposition: $\lambda w(-\text{eat}_w(\text{spinach})(\text{joe})) < \lambda w(-\text{eat}_w(\text{chard})(\text{joe}))$

- (30) presupposes that Joe's not eating spinach is lower on some scale—perhaps likelihood—than his not eating chard.

- There is no room in the meaning of *let alone* for domain restriction by the question under discussion.
- And moving one of the foci just causes infelicity since *let alone*'s two arguments are no longer focus alternatives to one another:

(32) # Joe doesn't [EAT]_F spinach let alone eat [CHARD]_F.

	[EAT] _F spinach	eat [CHARD] _F	
Ordinary meaning	eat(spinach)	eat(chard)	eat(spinach) ≠ eat(chard)
Focus meaning	{R(spinach) R ∈ D_{e,e,(s,x)}}	{eat(x) x ∈ D_e}	eat(spinach) ∈ {eat(x) x ∈ D_e} but eat(chard) ∉ {R(spinach) R ∈ D_{e,e,(s,x)}}

5 Conclusion

- While MONADIC FOCUS OPERATORS like *even* have a formal dependency on one focus, DYADIC FOCUS OPERATORS like *let alone* have a formal dependency on two foci (since they take two arguments).
- Both *even* and *let alone* are SCALAR ADDITIVES since they order two propositions along a scale:
 - Sentences with *even* explicitly describe one proposition and assert the existence of another.
 - Sentences with *let alone* describe both propositions.
- Only the monadic scalar additive exhibits a semantic interaction with focus since only it is quantificational.
- This parallelism between monadic and dyadic focus operators is found with other expressions studied under the rubric of association with focus:

(33)

	MONADIC	DYADIC
Additives	Nonscalar <i>also, as well, too,</i> <i>additionally, in addition</i> Scalar <i>even</i>	Nonscalar <i>along with, as well as,</i> <i>in addition to</i> Scalar <i>let alone, much less,</i> <i>in fact, if not</i>
Adversatives	<i>instead</i>	adversative <i>but, instead of,</i> <i>rather than, so much as</i>
Exclusives	<i>only, just, merely,</i> <i>exclusively, solely,</i> <i>but (archaic)</i>	

⇒ What it means, then, to associate with focus is to restrict the position of focus in the sentence (the formal dependency on focus).

⇒ The interpretive effects of focus—if any—arise independently, through contextual domain restriction.

Appendix: Second occurrence focus

There are some environments, first identified by Partee (1991:21), where a constituent that we would expect to be focussed does not bear a pitch accent:

(34) A: Eva even gave xerox copies to [the UNdergrads]_F.
B: (No,) PEtr even gave xerox copies to [the undergrads]_F.

Since the nuclear pitch accent is located on the subject, everything following it is deaccented, including *the undergrads* in B's response. But as Beaver et al. (2007) show, this SECOND OCCURRENCE FOCUS does receive a more prominent realization than the surrounding nonfocal material: it has both increased energy (it is louder) and increased duration.

This is too subtle for there to be reliable judgments, but the presence of a focus can be probed using weak pronouns. Weak pronouns cannot be in focus, even when they do not bear a pitch accent (Krifka 2004:204f., Beaver and Clark 2008). We see this in second occurrence focus contexts:

(35) A: Mary said that she would even kiss [HER]_F.
B1: No, only JOHN said that he would even kiss [her]_F.
B2: #No, only JOHN said that he would even kiss'er.

Even must contain a focus somewhere within its argument, even if it does not bear a pitch accent. This is the formal dependency on focus. *Let alone* shows a similar restriction on its two foci:

(36) Context: Mike and Sean are twins. Mike is shy, while Sean is quite outgoing. Two onlookers, A and B, observe Mike refuse to play with another pair of siblings, Andrew and Andrea, while Sean happily offers both of them his toys. Later, the twins' mother asks: *How did the twins get along with the other kids?*
A: Sean wouldn't play with [ANdrew]_F let alone with [ANdrea]_F at the party.
B1: No, MIKE wouldn't play with [him]_F let alone with [her]_F at the party.
B2: #No, MIKE wouldn't play with'im let alone with'er at the party.

The distribution of weak pronouns follows from the more general account for the formal dependency on focus:

(37) #Even her BOSS only likes'er.

Assuming that pronouns are interpreted as variables that get their interpretation from the assignment function, then for (37), the ordinary meaning of *only*'s sister will be the property of liking $g(x)$:

(38) a. $\llbracket \text{likes'er} \rrbracket^o = \text{like}(g(x))$
b. $\llbracket \text{likes'er} \rrbracket^f = \{\text{like}(g(x))\}$

But since the verb phrase does not contain any foci, its focus meaning is the unit set containing just the ordinary meaning (38b). The unavailability of weak pronouns with the dyadic focus operators receives a similar explanation:

(39) #No, MIKE wouldn't play with'im let alone with'er at the party.

When the object of *with* is realized as weak pronoun, and there are no foci elsewhere in these PPs, their focus meanings are going to be unit sets:

- (40) a. $\llbracket \text{with}'im \rrbracket^o = \mathbf{with}(g(x)) \notin$
 $\llbracket \text{with}'er \rrbracket^f = \{\mathbf{with}(g(y))\}$
 b. $\llbracket \text{with}'im \rrbracket^o = \mathbf{with}(g(y)) \notin$
 $\llbracket \text{with}'er \rrbracket^f = \{\mathbf{with}(g(x))\}$

As a consequence, the first PP *with'im* is not in the focus meaning of the second PP *with'er*, and vice versa.

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