Licensing Strong NPIs

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1. Weak vs. Strong NPIs

The goal of this talk is to give a perspicuous description of the difference in licensing conditions between weak and strong NPIs in English.

(1) Weak NPIs: *any*, *ever*

(2) Strong NPIs: Additive *either*
Punctual *until*
In weeks/months/years

I will not be discussing minimizers, see Heim 1984, Lahiri 1998, among others.

Basic facts: Strong NPIs are licensed in a subset of the environments in which weak NPIs are licensed.

There are two apparent dimensions along which licensers of weak and strong NPIs differ:

I. Negative Strength: (Zwarts 1998, von der Wouden 1997)

(3) a. No one said anything
b. No one has visited in years

(4) a. Not everyone said anything
b. *Not everyone has visited in years
c. Less than 3 students said anything.
d. *Less then three students have visited in years.

(5) [[No one]] $\Rightarrow$ [[Not every one]]

II. Positivity: (Atlas 1996, Horn 1996, a.o.)

(6) a. Only Bill said anything
b. *Only Bill has visited in weeks

(7) a. I'm sorry I said anything
b. *I'm sorry I have visited in weeks

(8) a. *Only Bill left* implies that Bill left
b. *I'm sorry I left* implies that I left

These distinctions are generally treated differently in the theory of NPI-licensing. In this talk, I'll suggest that the two dimensions can be collapsed into one, which will simplify the statement of NPI-licensing principles.

Basic Proposal:

Negative Strength can be reduced to Positivity: negative expressions that are not strongest on their scale introduce implicatures that interfere with licensing

(9) *Not every* implicates *Some*
No introduces no implicature

2. Previous solutions to the two problems:

2.1 Negative Strength: Zwarts 1998

Fauconnier/Ladusaw Hypothesis (FLH):

(10) An NPI α is licensed only if it occurs in the scope of β, where $[[\beta]]$ is DE

(11) Downward Entailing (DE)
A function f of type $<\sigma, \tau>$ is downward entailing (DE) iff
for all x, y of type σ such that $x \Rightarrow y$: $f(y) \Rightarrow f(x)$.

Zwarts added to this a condition that must be satisfied by strong NPIs.

(12) A strong NPI α is licensed only if it occurs in the scope of β, where $[[\beta]]$ is AA

(13) Anti-Additive (AA)
A function f of type $<\sigma, \tau>$ is anti-additive (AA) iff
for all x, y of type σ: $f(x) \wedge f(y) \Leftrightarrow f(x \vee y)$

Notice that if a function is AA then it is DE; consequently the functions that license strong NPIs are a subset of licensers of weak NPIs.

(14) F is Anti-Additive iff F is DE and F(A) ∧ F(B) ⇒ F(A∨B)

(15) [[no]], [[never]] are anti-additive

(16) [[few]], [[not many]], [[less than n]], [[not every]] are not AA

A good split, all things considered, but there are problems:

(17) a. Few Americans have ever been to Spain. Few Canadians have either. (Nathan 1999)
b. He invited few people$_i$ until he knew she liked them$_i$. (de Swart 1996)
c. He was one of the few dogs I'd met in years that I really liked. (Hoeksema 1996)

Other problematic expressions: *seldom*, *hardly ever*/*any*, *little*.

Is there a simple patch to Zwarts's theory for these cases? A logical property intermediate between DE and AA? De Morgan's laws don't define any – but there's no reason to feel beholden to them! (See below)

2.2 Positivity: von Fintel 1999, Horn 2002/2006

The problem here is a bit different, in that first we need to figure out why "positive" expressions license NPIs at all.

(18) Only Bill ate a vegetable
#Therefore, only Bill ate cauliflower.

An answer: the meanings of these licensers divide into two dimensions, one positive and one negative. The licensing condition is made sensitive to only one of the dimensions.

I take von Fintel's <u>Strawson Entailment</u> and Horn's <u>Assertoric Inertia</u> to be two solutions of this kind. (I'll use von Fintel as my representative example)

(19) [[only]] (x) (P) is defined only if P(x) = True.
If defined, [[only]] (x) (P) = True iff ¬∃y≠x: P(y) = True

(20) Strawson Entailment ($\Rightarrow_S$)
a. For p, q of type t: $p \Rightarrow_S q$ iff p = False or q = True.
b. For f, g of type <σ, τ>: $f \Rightarrow_S g$ iff for all x of type σ such that g(x) is defined: $f(x) \Rightarrow_S g(x)$.

(21) Strawson Downward Entailing (SDE)
A function f of type <σ, τ> is Strawson-DE
iff for all x, y of type σ such that $x \Rightarrow y$: $f(y) \Rightarrow_S f(x)$.

Given these definitions, [[*only Bill*]] comes out SDE.

(22) Only Bill ate a vegetable
Bill ate cauliflower
Therefore, only Bill ate cauliflower

If we restate NPI-licensing conditions in terms of SDE we explain, why *only Bill* licenses *any* and *ever*.

(23) An NPI α is licensed only if it occurs in the scope of β, where [[β]] is SDE

2.2.1 Implications for the licensing of strong NPIs:

As noted *only Bill* does not license strong NPIs.

(24) *Only Bill likes WAFFLES, either
*Only Bill has visited in weeks
*Only Bill_1 arrived until his_1 birthday

What is the reason? Is [[*only Bill*]] not Strawson AA? Or is it that Strawson entailment is not relevant to the licensing of strong NPIs.

(25) Strawson Anti-Additive (SAA)
A function f of type <σ, τ> is Strawson-AA
iff f is SDE and for all x, y of type σ: $f(x) \wedge f(y) \Rightarrow_S f(x \vee y)$.

(26) Only Bill drinks and Only Bill smokes
Therefore, only Bill drinks or smokes (see Atlas 1996)

Conclusion: [[*only Bill*]] is Strawson AA (cf. Rullmann 2003). The same is true of other SDE operators investigated by von Fintel, such as *regret* and the antecedents of conditionals.

(27) I have never gone to Amsterdam. *If I go to BRUSSELS either, I will buy you some chocolates. (Rullmann 2003)

(28) I didn't go to Spain. *I regret that I went to Portugal, either. (Rullmann 2003)

(29) None of us has ever been to Amsterdam.
*Every/No one who has been to BRUSSELS either wants to go there.
(Rullmann 2003)

So we must conclude that the licensing conditions of strong NPIs are stated in terms of <u>standard</u> entailment.

[Another view: Atlas 1996, Giannakidou 2006]

2.3 Conclusion

We have seen two separate stories that individually account well for the two contrasts between weak and strong NPIs. But the account is unsatisfying, we account for a two way contrast – weak vs, strong – with two different settings of two independent parameters.

	Entailment	
	Standard	Strawsonian
DE	???	weak NPIs
AA	strong NPIs	???

Is it possible to account for the difference between strong and weak with only one parameter?

Also recall that there is some dissatisfaction with Zwarts's characterization of the licensers of strong NPIs.

3. A New Analysis

My proposal is that both weak and strong NPIs are looking for Downward Entailing licensers, but that they are looking for them at different levels. Weak NPIs only require a licenser that is DE in its truth-conditions. Strong NPIs requires a licenser that is DE when the grammatical, non-truthconditional aspects of its meaning are taken into account.

3.1 Two source of inspiration

3.1.1 Krifka 1995

Krifka 1995 is also dissatisfied with Zwarts 1998 as a characterization of strong NPI licensers. Krifka introduces distinct semantics and pragmatics for weak and strong NPIs:

(30) **Semantics:** weak and strong NPIs introduce different sets of alternatives into the computation. The alternatives to strong NPIs exclude marginal cases.

Pragmatics: the alternatives associated with weak and strong NPIs are exploited by different Assertion operators. (**ScalAssert** vs. **EmphAssert**)

However, as Krifka notes, even with such differences a merely DE operator would be sufficient to license a strong NPI. So, Krifka proposes an additional condition on strong NPIs

(31) Strong NPIs are <u>emphatic</u> in nature.

(32) "Emphatic assertions tend to be emphatic 'across the board'"
(Krifka 1995, p. 231)

In order for a statement containing a strong NPI to be emphatic across the board its licenser must be extreme in value with respect to its alternatives.

Krifka points out that a nice consequence of this view is that what counts as an extreme value may vary from context to context, allowing near extremes like *hardly any* to license strong NPIs:

(33) Hardly anyone had visited in weeks.

I will attempt to say why specifically non-extreme licensers do not license strong NPIs.

3.1.2 Chierchia 2004

Chierchia building on Krifka 1995 suggests that scalar implicatures may interfere with the licensing of (weak) NPIs. In particular, he offers a general account of intervention effects in NPI licensing.

Chierchia generates for every constituent a plain meaning and a strong meaning. The strong meaning is the plain meaning augmented with its scalar implicatures.

Chierchia then argues it is strong meanings that are relevant to NPI licensing

(34) *Bill didn't give everyone anything.
NOT Bill gave EVERYone ANYthing.

(35) Stronger Alternative to (34):
NOT Bill gave SOMEone ANYthing

(36) Implicature (negation of stronger alternative):
NOT NOT Bill gave SOMEone ANYthing
"Bill gave someone something"

(37) Strong Meaning:
(NOT Bill gave EVERYone ANYthing) AND (Bill gave SOMEONE ANYthing)

Note that the strong meaning no longer supports inferences from sets to subsets. If for example, we replace *thing* in (37) with *book*, we do not obtain a sentence that follows from (37).

(38) Strong Meaning not DE since (37) does not entail, for example:
(NOT Bill gave EVERYone ANYbook) AND (Bill gave SOMEONE ANYbook)

This is the essence of Chierchia's explanation of why non-weak scalar items interfere with NPI licensing.

Chierchia is careful to formulate his analysis in such a way that cancellation of the implicature that interferes with licensing does not ameliorate intervention effects.

3.2 A conservative formalization

The guiding light for the analysis is the idea that non-truthconditional meaning is taken into account in the licensing of strong NPIs but not weak NPIs. I treat presuppositions as domain conditions on functions in the semantics. So, to neutralize their effect on weak NPIs I use Strawson entailment. For strong NPIs, I use standard entailment on meanings enriched with implicatures.

(39) a. [[few]]^{ALT} = { [[no]], [[few]], [[not many]], [[not every]] }
b. [[less than 3]]^{ALT} = { … [[less than 2]], [[less than 3]], … [[less than n]]…}

(40) a. $[[\ \alpha\ ]]^{ALT} = [[\ \beta\ ]]^{ALT}([[\ \gamma\ ]])$
b. $[[$ few students $]]^{ALT} = \{ [[$no student$]], \ldots [[$not every student$]] \}$

(41) Cross-categorial *only* (see Rooth 1985)

(42) $[[\text{ONLY } Q]]^{w}(C) = \lambda P_{<s,et>}.\ [[Q]]^{w}([[P]]^{w})=1\ \ \&\ \forall Q' \in C[\ Q'(w)([[P]]^{w})=1 \rightarrow \forall w'[\ [[Q]]^{w'}([[P]]^{w'})=1 \rightarrow Q'(w)([[P]]^{w'})=1]\ ]$

> **Licensing Principles:**
>
> (43) A weak NPI α is licensed only if it occurs in the scope of β, where $[[\beta]]$ is SDE
>
> (44) A strong NPI α is licensed only if it occurs in the scope of β, where $[[\text{ONLY } \beta]]([[\beta]]^{ALT})$ is DE

(45) $[[\text{ ONLY}$ no students$]]([[$no students$]]^{ALT}) = [[$ no students $]]$

(46) $[[\text{ ONLY}$ not every student$]]([[$not every student$]]^{ALT}) =$
$[[$ many students but not every student $]]$

An analysis that separates truth-conditions and presuppositions into separate dimensions of meaning (Karttunen & Peters 1979, Horn 2002) would allow both licensing conditions to be stated in terms of standard entailment.

Implication for Intervention

Note that the licensing condition on weak NPIs does not make use of strong meanings. Consequently, we lose Chierchia's account of intervention.

Recall that Chierchia 2004 needs to ignore certain implicatures in the licensing of weak NPIs. DE expressions like *not many* introduce their own implicatures.

(47) Not many students left
Strong meaning: Not many students left and some students left.

To prevent these implicatures from interfering with licensing, Chierchia draws a distinction between <u>direct</u> and <u>indirect</u> implicatures.

Indirect implicatures are implicatures introduced by reversal at DE nodes. Chierchia claims only these interfere with NPI licensing.

(48) Entailments, Indirect Implicatures vs. Direct Implicatures, Presupposition

Another option: adopt a different, perhaps syntactic, view of intervention. Some have argued that intervention in NPI licensing should be seen as part of a broader phenomenon (e.g, Beck effects). See Guerzoni (to appear) for a recent view of this kind. It’s not clear how Chierchia’s proposal could extend to other cases of intervention.

3.3 Extension to Other Cases & Potential Problems

3.3.1 Quantifiers that typically induce implicatures and license strong NPIs: Honorary Scalar Endpoints

Recall the observation that negative expressions such as *few, hardly any/ever* and *little* are also capable of licensing strong NPIs. These are not scalar endpoints.

I borrow another idea from Krifka/Chierchia: **scale truncation**. Under certain exceptional contextual conditions, an expression near an endpoint can count as an endpoint.

(49) NO <FEW, NOT MANY, NOT EVERY>

Chierchia: “What enables us to truncate a scale at the low end […] is that small amounts may be functionally equivalent to nothing.”

(50) Typically, few students in my class take an interest in semantics.

This is a bit vague, let me propose a precise restriction on when a negative operator can act like a strong scalar endpoint:

Condition on Truncation: to be able to act as strong scalar endpoint a scalar item must be close enough to the endpoint.

To be considered “close enough” a scalar item must be Intolerant (see Löbner 1985, Horn 1989)

(51) A function f of type <<e,t>,t> is Intolerant iff

if f is not trivial[1], then for all x of type <e,t>, f(x)=0 or f(¬x)=0

On its proportional reading, *few* is plausibly Intolerant.

(52) a. #Few of my friends are linguists and few of them aren't. (Horn 1989)
b. #He rarely goes to church and he rarely doesn't go. (Horn 1989)

(53) a. Fewer than 4 of my friends are linguists and fewer than 4 aren't.

Someone unconvinced by my story might still be interested in DE+Intolerant as an intermediate category of negation between DE and AA.

(54) AA ⊂ DE+Intolerant ⊂ DE

NPI-licensing by cardinal *few*?

(55) There were few potatoes in the pantry.
??There were few in the refrigerator, either.

Rullmann (2003) collected data from the CBC website and found that 98% of NPI *either*'s were licensed by *not, never* and *no*.

[PROBLEM: **less than 1/3 of the students have visited in weeks*]

3.3.2 Quantifiers that do not (?) induce implicatures but do not license strong NPIs: DE comparative quantifiers

Krifka 1999 and Fox & Hackl 2006 argue that *more than n* quantifiers do not give rise to scalar implicatures.

(56) More than 3 students left early
Does not implicate: It's not the case that 5 students left early

Krifka also makes this claim for negative comparative quantifiers, such as *less than/at most n*. If this is true, this is a problem since these quantifiers are DE. I would predict they license strong NPIs contrary to fact.

(57) Less than 3 students left early.
Claim: No implicature

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[1] A function f is trivial iff for all x, f(x)=1 or for all x, f(x)=0. I include this clause to bring out the inclusion relations in (54). See Appendix for proof that AA⊆DE+Intolerant

(58) Less than 3 students wrote on phonology.
*Less than 3 wrote on SEMANTICS, either.

Fortunately, the claim that DE comparative quantifiers introduce no implicature is less plausible than it is in the UE case. Krifka 1999 acknowledges that sentences like (57) typically give rise to an existential inference, which he analyzes as a presupposition.

(59) ?Less than 3 students left early. And <u>they</u> only left because they felt ill.

(60) a. ?Hey wait a minute! I had no idea some students left early.
b. Mary wants less than 3 students to walk out on her talk.

(61) [[ONLY less than 3 students]](P) = $\perp$

I suggest that if strengthening operator ONLY produces inconsistency a weaker one steps in to generate an existential implicature.

(62) $[[\text{W-ONLY } Q]]^w(C) = \lambda P_{<s,et>}.\ [[Q]]^w([[P]]^w)=1\ \ \&\ \exists Q' \in ALT(Q)[\ [[Q']]^w([[P]]^w)=0]$

Another possible strike against *less than n:*

DE comparative quantifiers are not Intolerant so may never qualify as strong to serve as a strong scalar endpoint, except possibly in one case…

3.3.3 Less than one/ Zero

A problem that haunts semantic accounts of strong NPI licensing:

(63) a. [[no]] = [[fewer than one]] = [[zero]]
b. *Fewer than one student has visited in weeks/either.

My theory does no better than an AA theory here, since *fewer than one student* does not intuitively give rise to such an existential implicature.

Possible response: follow Fox & Hackl in assuming all measurement domains are dense. The system will produce an implicature like ".3 students left" but the implicature doesn't see the light of day once it confronts our world knowledge about counting students.

The grammar (and implicature-generating mechanism as a part of it) can't distinguish one numeral from another. The grammar knows degree domains are ordered and possibly dense but doesn't know the names of degrees.

Functions like [[zero students]] are DE (even AA), do not give rise to positive implicatures, but do not license strong NPIs.

(64) Zero students left early
No/*Zero students like SEMANTICS, either.

(65) a. On no/*zero occasion(s) did he mention my help. (cf. Deprez 1999)
b. No/*Zero students but Bill came. (cf. Moltmann 1995)
c. She drank no/*zero martinis, not even weak ones. (cf. Postal 2004)

(66) ?Zero students said anything.

I argued for Intolerance as a line dividing DE quantifiers that could act as endpoints from those that could not. Explicit proportionals like (64) are a problem.

(67) *Less than 1/3 of the students have visited in weeks

Perhaps, grammar not good at working out explicit proportions:

(68) a. Rob doesn't speak more than half of the 9 languages spoken in Sydney (Fox 2000)
b. Rob doesn't speak five of the nine languages spoken in Sydney.

Tentative conjecture: the grammar cannot ascribe different grammatical properties to expressions because they contain different numerals.

3.3.4 More Problems: Superlatives

(69) a. This is the liveliest party I have been to <u>in years</u> (Hoeksema 1996)
b. This is the hardest problem any student$_i$ finished <u>until</u> she$_i$ graduated (cf. Mittwoch 1988, but see de Swart 1996)
c. Fred is the tallest student I've ever met.
?He's the tallest student SUE's ever met, <u>either</u>.

A hunch: the semantics of superlatives is similar to exclusives. Some exclusives license strong NPIs some don't:

(70) No one other than Bill likes pancakes.
a. *Only Bill likes WAFFLES, either.
b. Nobody but Bill like WAFFLES, either. (Atlas 1996, Nathan 1999)

(71) a. [but Bill]$_1$ [[no one t_1] likes waffles]] (Gajewski 2005)

(72) Bill is the tallest student
a. There is a degree d s.t. only Bill is a d-tall student
b. There is a degree d s.t. nobody but Bill is a d-tall student

Conclusion

- Perspicuous account of difference between weak & strong NPIs in terms of whether non-truthconditional meaning considered in assessing DE-ness
- An explicit proposal for a condition on when non-scalar endpoints can license strong NPIs
- Plausible story about licensing properties of DE comparative quantifiers
- Suggestions for dealing with problematic cases of superlatives and determiners truthconditionally equivalent to [[*no*]]

Appendix: Proof that AA ⊆ DE+Intolerant

Assume f is AA.

Suppose f is not trivial, i.e., $\exists x\ f(x)=1$ & $\exists x\ f(x)=0$

Now suppose for reductio that $f(a)=1$ & $f(\neg a)=1$ for arbitrary a

Notice that $a \vee \neg a = U$, that is, the top element in the domain.

Since f is AA it follows that $f(a \vee \neg a) = f(U) = 1$

But, being AA, f is DE so for all y, such that $y \Rightarrow U$, $f(y)=1$

But all y are such that $y \Rightarrow U$, so for all y, $f(y)=1$

(This contradicts our assumption that f is not trivial)

So, for all z, $f(z)=0$ or $f(\neg z)=0$.

Therefore, f is Intolerant.

Selected References

Atlas 1996 "'Only' Noun Phrases, Pseudo-Negative Generalized Quantifiers, Negative Polarity Items, and Monotonicity." *Journal of Semantics.*

Chierchia 2004 "Scalar implicatures, polarity phenomena, and the syntax/pragmatics interface" In *Structures and Beyond.*

Deprez 1999 'The Roots of Negative Concord in French and French Based Creoles' in *Language Creation and Language Change: Creole, Diachrony and Development*

von Fintel 1999 "NPI-Licensing, Strawson-Entailment, and Context-Dependency"

Journal of Semantics.
Fox 2000 *Economy and Semantic Interpretation*. MIT Press
Fox & Hackl 2006 "The universal density of measurement" *Linguistics and Philosophy*
Gajewski 2005
Guerzoni To appear. "Intervention effects on NPIs and feature movement: Toward a unified account of intervention" *Natural Language Semantics*
Hoeksema 1996 "In days, weeks, months, years, ages: a class of negative polarity items" Ms.
Horn 1989 *A Natural History of Negation*
Horn 1996 "Exclusive Company: *Only* and the Dynamics of Vertical Inference" *Journal of Semantics.*
Horn 2002 "Assertoric Inertia and NPI Licensing", CLS 38 Paper.
Horn 2006 "Only connect: how to unpack an exclusive proposition" in a festschrift for Jay Atlas.
Krifka 1995 "The Semantics and Pragmatics of Polarity Items." *Linguistic Analysis.*
Krifka 1999 "At Least Some Determiners Aren't" SALT
Löbner 1985 "Quantification as a Major Module of Grammar"
Moltmann 1995 "Exception Sentences and Polyadic Quantification" *Linguistics and Philosophy*
Nathan 1999 "Either: Negative Polarity meets Focus Sensitivity" Ms. Brown
Postal 2004 "The Structure of One Type of American English Vulgar Minimizer" Skeptical Linguistic Essays
Rullmann 2003 "Additive particles and polarity" *Journal of Semantics*
de Swart 1996 "Meaning and Use of *not…until*" *Journal of Semantics*
Van der Wouden 1997 *Negative Contexts*
Zwarts 1998 "Three Types of Polarity." In *Plurality and Quantification.*