

# Nonrestrictive adjectives and the theory of scalar implicature\*

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## 1 Blind implicatures

Certain implicatures appear to be computed even when world knowledge should be sufficient to block them (Magri (2009,2011); Singh (2009)).

- (1) a. # Some Italians come from a warm country.  
b.  $\rightsquigarrow$  Not all Italians come from a warm country.
- (2) *Context:* Prof. Smith assigned the same grade to all of his students.  
a. # Smith assigned an A to some of his students.  
b.  $\rightsquigarrow$  Smith did not assign an A to all of his students.

World-knowledge guarantees that (1a) is equivalent to the same sentence with (*all*) *Italians*, so if contextual information is accessed, there should be no implicature (and hence no #) in (1a)—similarly for (2a).

These data support the **Blindness Hypothesis** (Magri 2009): Implicatures are computed without access to contextual information.

**A consequence of this hypothesis:** A sentence  $\phi$  will have as an implicature  $\neg\psi$  whenever  $\psi$  is a **logically** stronger scalar alternative to  $\phi$  (ignoring considerations of relevance and Sauerland's (2004) primary/secondary implicature distinction).

## 2 Asymmetry in DE contexts

Nominal modifiers trigger implicatures in downward-entailing (DE) contexts (Katzir 2007).

- (3) a. Every blond student passed.  
b. Every student with blond hair passed.  
c. Every student who is blond passed.  
d.  $\rightsquigarrow$  Not every student passed.

(4) suggests that this kind of implicature is also computed blindly: world knowledge tells us that all carcinogens are harmful, so (4a) should be equivalent to *Every carcinogen will...*, which would not implicate (4b).<sup>1</sup>

- (4) a. # Every carcinogen that is harmful will be eliminated by this product.  
b.  $\rightsquigarrow$  Not every carcinogen will be eliminated by this product.

In English, certain prenominal adjectives can receive “nonrestrictive” (NR) readings, as in Larson & Marušič's (2004) (5). Crucially, the NR reading is available prenominally only.

- (5) a. Every unsuitable word was deleted. ✓Rest. ✓NR  
b. Every word unsuitable was deleted. ✓Rest. ✗NR

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<sup>1</sup>A similar conclusion was reached by Katz (2008), on the basis of related but somewhat different data.

For concreteness, we can adopt the following definition (where  $c$  is your favorite list of semantic parameters):

- (6) a. An adjective Adj modifying a noun N is *nonrestrictive in  $c$*  iff  $\llbracket \text{Adj N} \rrbracket^c = \llbracket \text{N} \rrbracket^c$ .  
b. Otherwise Adj is *restrictive*.

**The puzzle:** nouns modified by nonrestrictive adjectives (NAs) do not give rise to corresponding implicatures: on the nonrestrictive reading of *harmful*, (7)  $\not\rightarrow$  (4), hence no #.

- (7) Every harmful carcinogen will be eliminated by this product.

**Goal:** to explain the asymmetry between NAs and other kinds of nominal modifiers.

**Main Claim:** the contrast between (4a) and (7) is due to an interaction between the syntax/semantics of NR modification and general principles of implicature calculation.

### 3 Summary of Analysis

The basic form of the argument is as follows:

1. NAs introduce the **presupposition** that the elements in the extension of the noun have the property denoted by the adjective.
2. Structural alternatives (Katzir 2007) + Blindness Hypothesis (Magri 2009) + 1.  $\Rightarrow$ 
  - Sentences like (7) are not asymmetrically entailed by their modifierless alternatives, and so do not trigger implicatures.
  - Sentences like (4a) are asymmetrically entailed by their modifierless alternatives, and therefore trigger implicatures.

Point 1. is argued for in the following section.

### 4 NAs as presuppositional

In non-definites, NAs give rise to something like a generic or universal “inference” (cover-term for implicature/presupposition/etc.). This cannot be due to lexical properties of the determiner, since the inference apparently exists for all kinds of determiners.

- (8) a. Cigarettes contain  $\emptyset$ /several/few/many/most/a lot of/no harmful carcinogens.  
b.  $\therefore$  Carcinogens are (generally) harmful.

Could this inference just be the result of pragmatic reasoning plus world knowledge?

High degree of intuitive plausibility: *harmful* is in some sense “redundant,” so by uttering (8a), the speaker violates Manner in order to draw the addressee’s attention to the fact that carcinogens’ being harmful is somehow relevant to the current conversation (e.g. as an explanation for why one shouldn’t smoke).

#### Against a purely pragmatic approach

1. NR interpretations are licensed only in certain syntactic positions (observation due to Bolinger (1967), example from Larson & Marušič 2004).<sup>2</sup>

<sup>2</sup>At first glance this could be attributed to the fact that default stress is phrase-final in English, so that postnominal modifiers are inherently in focus. However, the finer-grained discussion that follows suggests this can’t be the whole story.

- (9) a. Every unsuitable word was deleted. ✓Rest. ✓NR  
 b. Every word unsuitable was deleted. ✓Rest. ✗NR

- Null hypothesis: *unsuitable word* should have the same denotation as *word unsuitable*. Therefore there's no reason to expect an interpretive asymmetry here.
- (9) instantiates a broader phenomenon: similar pattern in the verbal domain (McConnell-Ginet 1982; Shaer 2000; Morzycki 2008).

- (10) a. If a ship slowly sinks, it's always regrettable.  
 b. If a ship sinks slowly, it's always regrettable. (Morzycki 2008:5)
- (11) a. John illegally took part in insider trading.  
 b. ?? John took part in insider trading illegally.

## 2. Syntactic distribution of NR interpretations is language-dependent.

- (12) (Cinque 2010:8, Italian)
- a. Le lezioni noiose di Ferri se le ricordano tutti  
 the classes boring of Ferri remember all  
 ✓Nonrestrictive: "Everybody remembers Ferri's classes, which were boring."  
 ✓Restrictive: "Everybody remembers just those classes by Ferri that were boring."
- b. Le noiose lezioni di Ferri se le ricordano tutti  
 the boring classes of Ferri remember all  
 ✓Nonrestrictive, ✗Restrictive

## 3. Adjectives are special: In English at least, NR interpretations are generally not possible for other kinds of (non-appositive) nominal modifiers.

- (13) (no NR reading of relative clauses/postnominal PPs)
- a. Every word that was unsuitable was deleted.  
 b. Every word in boldface was unsuitable.
- Could it just be that Maxim of Manner violations have to be "minimal," so that the only the syntactically least complex modifier admits of a NR reading?
  - Probably not—there appears to be no way to put the content of the RC in (14a) into a NR adjective (*hive-inducing* is not relativized to John). So on a minimal-violation theory (14a) should be okay.

- (14) *Context*: All shellfish cause John to break out in hives.
- a. # John should avoid every shellfish that makes him break out in hives.  
 b. \* John should avoid every makes-him-break-out-in-hives shellfish.

**Conclusion:** NR readings (at least in non-definites) aren't exclusively the result of pragmatics.

### Against a semantic account based on "Conventional implicatures"

Some researchers (e.g. Potts 2005; Morzycki 2008; Solt 2009) have claimed that NAs and syntactically similar elements contribute "conventional implicatures."

This approach basically reduces the semantics of NAs to that of appositives.

- (15) a. Cigarettes contain harmful carcinogens.  
 b. ≈ Cigarettes contain carcinogens, which are (generally) harmful.

But NAs should not be semantically conflated with appositives. They pattern very differently w.r.t. information status (for syntactic differences, see del Gobbo 2003 and McCawley 1981).

Appositives typically provide new information. NAs often do not ((??)). (16) is one of Potts's (2005) diagnostics for distinguishing presuppositions from conventional implicatures.

- (16) Lance Armstrong survived cancer...
- a. # When reporters interview Lance, a cancer survivor, he often talks about the disease.
  - b. And most riders know that Lance Armstrong is a cancer survivor. (Potts 2005:34)
- (17)
- a. Carcinogens are harmful, and you should use this product to rid your body of all harmful carcinogens.
  - b. # Carcinogens are harmful, and you should use this product to rid your body of all carcinogens, which are harmful.

NAs can provide “redundant” information more readily than appositives:

- (18)
- a. Q: Did John's energetic children come to the party?
  - b. A: Yes, John's (energetic) children came to the party.
- (19)
- a. Q: Did John's children, who are energetic, come to the party?
  - b. A: Yes, John's children (#, who are energetic,) came to the party.

Finally, (DP-modifying) appositives can generally only modify referential/definite DPs, a restriction that does not exist for NAs (cf. (8a)).

- (20)
- a. The dog, which is smart, is also loyal. (singular definite)
  - b. Dogs, which are smart, are also loyal. (kind-denoting bare plural)
- (21)
- a. \* Every dog, which is smart, is loyal. (universal quantifier)
  - b. \* I would like to have a dog, which is smart. (non-specific indefinite)

There is more to be said about the mechanics of CI-based approaches, but I won't discuss them further here.

(16-19) suggest NAs are actually more similar to presupposition triggers.

### **Additional evidence for a presuppositional account**

The inferences from appear to project like presuppositions.

- (22)
- a. **Negation:** I doubt that every harmful carcinogen will be eliminated by this product (it's a sham—lots of carcinogens will remain).
  - b. **Question:** Will every harmful carcinogen be eliminated by this product?
  - c. **Modal:** Every harmful carcinogen might be eliminated by this product.
  - d. **Conditional:** If every harmful carcinogen is eliminated by this product, then it's sure to be profitable.

Also, NAs can't receive intonational focus, suggesting that they contribute “backgrounded” information, much like presuppositions (observation due to Umbach (2006) for German).

- (23)
- a. In Anna's garden there are colorful flowers.
  - b. # In Anna's garden there are [COLORFUL]<sub>F</sub> flowers.

**Conclusion:** NAs trigger the presupposition that the elements in the extension of the noun generally/universally have the property denoted by the adjective.

But **how** is this presupposition generated?

**NAs in the “two-domain” theory of nominal modification: Bolinger contrasts**

The restrictive/nonrestrictive opposition is one of several “Bolinger contrasts:” interpretive properties of adjectives that correlate with syntactic position (see Cinque 2010:Ch1-2 for a nearly comprehensive survey).

A second contrast is between i(ndividual)-level and s(tage)-level interpretation.

- (24) a. The visible stars include Capella and Sirius.  
✓i-level: “The intrinsically visible stars...” ✓s-level: “The currently visible stars...”
- b. The stars visible include Capella and Sirius.  
✗i-level: “The intrinsically visible stars...” ✓s-level: “The currently visible stars...”

Larson (1998,2000) shows that several contrasts are more fine-grained than just pre/postnominal.

- (25) a. The invisible visible stars include Capella.
- b. # The visible invisible stars include Capella.
- (26) a. Olga is a blond beautiful dancer. ✓adverbial *beautiful*
- b. Olga is a beautiful blond dancer. ✗adverbial *beautiful*

Corresponding ordering restrictions for prenominal relative clauses in Turkish, Japanese, Chinese, and Korean (Larson & Takahashi (2007)). (i/s level shown here)

- (27) (Larson & Takahashi 2007, ex. (5), Japanese)
- a. [Watashi-ga kinoo atta] [tabako-o suu] hito-wa Tanaka-san desu.  
1SG-NOM yesterday met tobacco-ACC inhale person-TOP T. COP  
“The person who smokes who I met yesterday is Miss Tanaka.”
- b. ?\* [Tabako-o suu] [watashi-ga kinoo atta] hito-wa Tanaka-san desu.

Cinque (2010) suggests the same is true of NAs (though superlative probably complicates matters).

- (28) a. His most unsuitable unsuitable acts were condemned.
- b. \* His unsuitable most unsuitable acts were condemned.

Perhaps more telling: the outer modifiers in (29) can be NR only if the inner ones are:

If only some of John’s acts were unsuitable, then *very heinous* cannot be NR w.r.t. *acts* in (29a);  
If only some of John’s acts were very heinous, then *unsuitable* cannot be NR w.r.t. *acts* in (29b).

- (29) a. John’s very heinous unsuitable acts were condemned.
- b. John’s unsuitable very heinous acts were condemned.

Data like (24-29) support some version of a “two domain” theory of nominal modification (Larson 1998):

- (30) [DP... XP<sub>1</sub> [NP XP<sub>2</sub> N ] XP<sub>3</sub> ...]  
indirect-mod. direct-mod. indirect-mod.

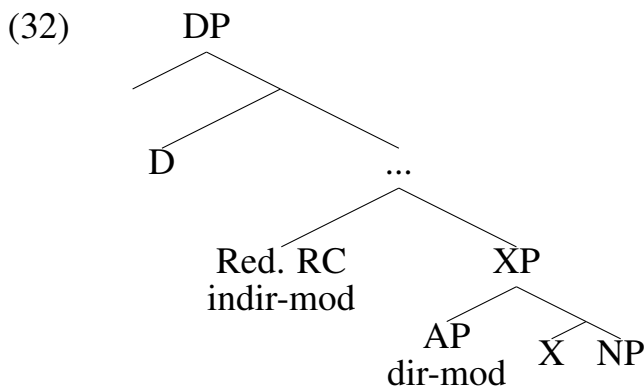
The direct modification domain is associated with various “generic interpretations” (see Larson 2000), motivating a generic quantifier somewhere inside DP.

- (31) a. [DP AP<sub>1</sub> [NP Γe [ AP<sub>2</sub> N ]] AP<sub>3</sub> ]  
 b. Olga is a beautiful dancer. (Though she was clumsy tonight)  
 “*Generally*, when Olga dances, it is beautiful.”  
 c. Our Thursday meeting (has been moved to Tuesday this week)  
 “Our meeting, which *generally* takes place on Thursday”  
 d. Sirius is a visible star. (But it currently can’t be seen)  
 “Sirius is a star which is *generally* visible.”

Cinque argues that direct modifiers are introduced as the specifiers of DP-internal functional heads, which are responsible for each of the characteristic interpretive properties.

I adopt Larson’s insights re: genericity, but follow Cinque’s version of the two-domain theory:

The interpretation of a direct modifier depends on the semantics of the functional head that introduces it. Indirect modifiers are reduced relative clauses with an intersective semantics (tree adapted from Cinque 2010:55).



On this view, the interpretation of NAs is different from that of restrictive modifiers (e.g. *that*-headed relative clauses, postnominal PPs) because NAs are direct modifiers and do not combine with nouns via Predicate Modification (set intersection).

**Hypothesis:** if NAs are direct modifiers, then they too should be bound by Γ.

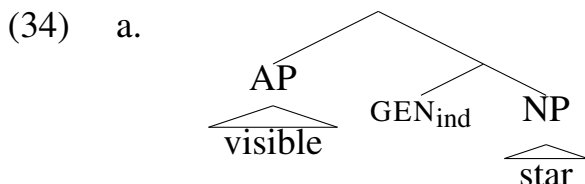
**Semantics for DP-internal GEN**

Γ is a quantifier with quasi-universal force (possibly allowing exceptions). Some implementations require Γ’s restrictor to specify a set of relevant situations via a contextually resolved variable *C*, parameterized to an individual. (Chierchia 1995, a.o.)

Intersective i-level interpretations can be derived with the following semantics (**in** is the relation between individuals, properties and eventualities that holds when an individual has a property in an eventuality).

$$(33) \quad \text{GEN}_{\text{ind}} : \lambda P \lambda Q \lambda y \Gamma s [C(s, y)] [\text{in}(Q, y, s)] \wedge P(y)$$

Then *visible star* is interpreted as in (34b):



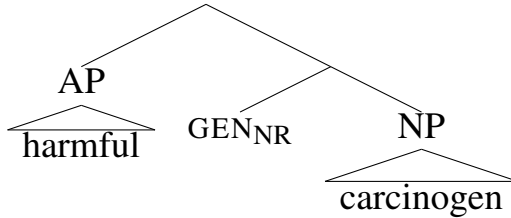
- b.  $\lambda y \Gamma s [C(s, y)] [\mathbf{in}(visible', y, s)] \wedge star'(y)$   
 “The set of  $y$  that are both stars and are generally visible (in  $C$ -type situations)”

If variants of GEN are responsible for different kinds of interpretations, then nonrestrictive GEN can be defined as in (35). [Adj [GEN<sub>NR</sub> NP]] is defined iff the generic presupposition is satisfied.

$$(35) \quad GEN_{NR} : \lambda P \lambda Q \lambda y : \Gamma x [P(x)] [Q(x)]. P(y)$$

Then *harmful carcinogen* is interpreted as in (36b).

(36) a.



- b.  $\lambda y : \Gamma x [carcinogen'(x)] [harmful'(x)]. carcinogen'(y)$   
 “The set of  $y$  such that  $y$  is a carcinogen (defined iff carcinogens are generically harmful)”

On this analysis,  $\llbracket [harmful [GEN_{NR} carcinogen]] \rrbracket^c = \llbracket carcinogen \rrbracket^c$  for any  $c$  satisfying the presupposition, and hence *harmful* in (36) will satisfy the definition of “nonrestrictive” above.<sup>3</sup>

On this theory, (7) has a presupposition that (4a) lacks. Therefore (37) is logically stronger than (4a) but not (7). **This explains the contrast between (4a) and (7)**

- (37) Every carcinogen will be eliminated by this product.

Formalization requires two principles of implicature calculation...

## 5 Implicature calculation

The computation of a sentence’s implicatures depends on (i) what the alternatives to that sentence are, and (ii) how entailment is defined.

An utterance (38a) often implicates that (38b) is false because (i) (38b) could have been uttered instead of (38a) (it is an alternative), and (ii) (38b) is a logically stronger statement (it entails (38a)).

- (38) a. John ate some of the beans.      b. John ate all of the beans.

There are a number of ways “alternative” and “entailment” can be defined for the purposes of implicature calculation.

**Structural alternatives** (Katzir 2007) are required to guarantee that, e.g. (37) is an alternative to (4a) but not vice versa. Also immediately captures the pattern in (3) and provides a solution to “the symmetry problem,” which are both arguably not possible for Horn-scale based approaches (see Katzir 2007 for additional discussion/motivation)

- (39)  $\psi$  is an alternative to  $\varphi$  ( $\psi \in Alt(\varphi)$ ) iff  $\psi$  can be obtained from  $\varphi$  by a series of deletions, contractions, and substitutions of terminal elements of the same grammatical category.

<sup>3</sup>(35) does not encode situation/world dependency—this is motivated by examples like (1), in which an s-level adjective appears to be nonrestrictive.

(1) After the marathon, every exhausted runner took a nap.

- (40)  $\varphi$  is strictly better than  $\psi$  ( $\varphi \prec \psi$ ) iff
- $\varphi \in Alt(\psi)$  and  $\varphi$  entails  $\psi$ ; and either
  - $\psi \notin Alt(\varphi)$  or  $\psi$  does not entail  $\varphi$
- (41) An utterance of  $\varphi$  implicates that for all  $\psi \in Alt(\varphi)$  s.t.  $\psi \prec \varphi$ ,  $\psi$  is unassertable, false, or irrelevant (depending on context).

This approach makes crucial reference to “entailment,” which could be defined in a number of ways.

**Blindness Hypothesis** (Magri 2009): The definition of “entailment” for computing implicatures is **logical entailment** (= (42a)), not **contextual entailment** (= (42b)). Contextual entailment would fail to capture the patterns observed in §1 (see Magri 2009, 2011 for additional motivation/discussion).

- (42) a.  $\varphi$  *logically* entails  $\psi$  iff  $\llbracket \varphi \rrbracket \subseteq \llbracket \psi \rrbracket$   
 b.  $\varphi$  *contextually* entails  $\psi$  iff  $(\llbracket \varphi \rrbracket \cap C) \subseteq \llbracket \psi \rrbracket$ , where  $C$  is the Context Set.

## 6 Explaining the Restr./NR contrast

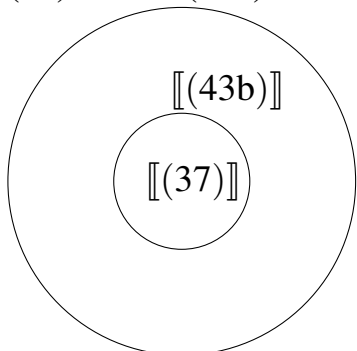
On the analysis of NAs in §4, sentence (7) (= (43a)) has a presupposition that sentence (4a) (= (43b)) lacks, due to the presence of  $GEN_{NR}$  in the syntax.

- (43) a. Every [harmful [ $GEN_{NR}$  carcinogen]] will be eliminated by this product.  
 Presupposes: Carcinogens generically have the property of being harmful.  
 b. # Every carcinogen that is harmful will be eliminated by this product.

There are **logically** possible worlds (inconsistent with common knowledge) where carcinogens are not generally harmful, so there will be worlds such as  $w_1$  below where the presupposition of (43a) (= “ps”) is not satisfied; and hence where (43a) is neither true nor false.

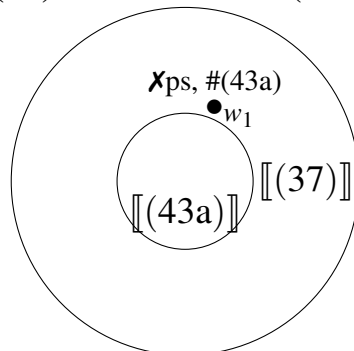
- (37) Every carcinogen will be eliminated by this product.

(37) entails (43b)



$(37) \in Alt((43b))$  and  $(43b) \notin Alt((37))$   
 $\therefore (37) \prec (43b)$   
 $\therefore$  expected implicature from (43b)

(37) does not entail (43a)



$\therefore (37) \not\prec (43a)$   
 $\therefore$  no expected implicature from (43a)

If contextual entailment (= (42b)) were used, (43a), (43b), and (37) would all be equivalent (i.e. would all entail each other), since we know that carcinogens are in fact harmful! This would incorrectly predict (43a) to have the implicature that (37) is unassertable or false.



## Two final points:

1. Identical reasoning can be used to explain why (44a) does not implicate that (44b) is unassertable or false, even though (44b) is a contextually equivalent structural alternative to (44a)—the sole contribution of *too* is to introduce the presupposition that someone else came to the party.

- (44) *Context*: It is mutually known that several people other than Mary came to the party.  
a. Mary came to the party too.                      b. Mary came to the party.

2. Entailment must be computed relative to *local contexts* (see Schlenker 2009). If entailment were computed globally, then (45a) should be dispreferred to (45b), since (45a) has no global presupposition. (45) shows that alternatives must be compared at least on a clause-by-clause basis.

- (45) a. John came to the party, and Mary came to the party too.  
b. John came to the party, and Mary came to the party.

## 7 Conclusions

- The idea that NAs trigger grammatically-generated presuppositions has syntactic and semantic motivation, from Bolinger contrasts and patterning with other presuppositional items, respectively.
- This analysis does not predict unattested implicatures in downward entailing contexts.
- A theoretical implication: additional evidence for the Blindness Hypothesis in implicature calculation.
- Possible application: A difference in observed implicatures has been attributed to a difference in presuppositions. Possible implications for Singh's (2009) attempted reduction of *Maximize Presupposition!* to the theory of SI.

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