

Much as a polarity item

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Z A S

- English *much* is a polarity item (Bolinger 1972; among others)
 - (1) Homer *has / doesn't have much money.
- Israel (1996, 2006, 2011): *much* as paradigm case of an **attenuating** NPI, which makes weaker statements than salient alternatives:
 - (2) Homer doesn't have a dime / a red cent / any money ⇒
Homer doesn't have much money
- The facts – both in English and cross-linguistically – are more complicated.
- **Goal:** a semantic analysis of the variable polarity sensitivity of *much* words, as a step towards developing a more general theory of the attenuating class.

- 1 Data: 'much' words in English and beyond
- 2 Alternative comparison framework
- 3 Explaining the data
- 4 Conclusion and open issues

Data: 'much' words in English and beyond



NPI uses

- (3) *Homer drank much coffee.
- (4) Homer didn't drink much coffee.
- (5) Did Homer drink much coffee?
- (6) If Homer drank much coffee he'll sleep badly.

quantificational

- (7) *Homer slept much.
- (8) Homer didn't much much.
- (9) Did Homer sleep much?
- (10) If Homer slept much he'll be cranky.

post-verbal adverb



Non polarity sensitive uses

- (11) Homer drank / didn't drink ...
- ... too much coffee
 - ... that much coffee
 - ... so much coffee that he was jittery
 - ... as much coffee Bart as did

modified



Non polarity sensitive uses

- (12) Homer drank / didn't drink much more coffee **differential**
than Bart.
- (13) Homer is / isn't much taller than Bart.
- (14) Homer is / isn't much different from Bart.
- (15) a much-needed vacation **modifier of deverbal adjective**
- (16) a much-visited attraction



Intermediate cases

- (17) *Homer lost much money in the stock market. **quant. vs.**
- (18) ?Homer lost much of his money in the stock market. **partitive**
- (19) ?Much has been written about Whitman's crimes **pronominal**

Register effects (Zwicky, 2006; Lee, 2015):

- (20) *?We had much fun at the beer blast.
- (21) There was much confusion about absinthe's physiological effects.



Beyond *much*

- (22) Homer ?ate / didn't eat many cookies.
- (23) Homer ate too / so / as many cookies.
- (24) Homer ate many more cookies than he should have.
- (25) Homer *slept / didn't sleep long.
- (26) Homer slept too / so / as long.
- (27) Homer slept a long time.
(also *far*, *often*)

(von Bergen and von Bergen, 1993)



Beyond English

In languages such as the following, we find no evidence that the counterpart of *much* / *many* is polarity sensitive:

- Spanish
- Greek
- Icelandic
- Pre-20th century English (Li, 2013)

But in others, we observe patterns similar to the modern English one.



- (28) John-wa anmari *neta / ne-nakatta.
'John *slept / didn't sleep much'

(Matsui 2011, K. Yatsushiro p.c.)



Frisian

- (29) Hy praat *folle / net folle.
 'He *talks / doesn't talk much'
- (30) Ik freegje my ôf, oft er folle Arabysk ken
 'I wonder if he knows much Arabic'
- (31) Dat is folle dúdliker 'that is much clearer'
- (32) hoe-folle, sa-folle, te-folle 'how/so/too much'

(Hoekstra 2010, 2011, taalportal.org)

- Also Afrikaans (Donaldson, 1993; Berghoff, 2016)



German

(33) Homer hat (nicht) viel Kaffee getrunken.
 'Homer drank / didn't drink much coffee'

quantificational

(34) Homer hat (nicht) viel geschlafen.
 'Homer slept / didn't sleep much'

adverbial

But ...

(35) Homer ??ist / ist nicht viel anders als sein Bruder.
 'Homer is (not) much different from his brother'

- Also Dutch; related pattern in Norwegian.



Summary

English *much* exhibits variable polarity sensitivity:

- The unmodified form - suggesting relationship to vagueness of standard.
- Sensitive to syntactic position.

Cross-linguistically, 'much' words are not consistently NPIs ...

... but there are enough English-like cases to suggest a general pressure in this direction.

Alternative comparison framework



Overview

- Polarity items obligatorily introduce alternatives (Krifka, 1995; Chierchia, 2013; Spector, 2014)
- Polarity-based distributional restrictions arise when something goes wrong in the process of reasoning about alternatives..
- Two innovations:
 - Explicit preference for simplicity
 - Vagueness factors into calculation of relative informativity
- Specific implementation: Neo-Gricean framework based on Katzir (2007)



Conversational principle

Do not use ϕ if there is another sentence $\phi' \in ALT(\phi)$ such that both:

- i. ϕ' is 'better than' ϕ ($\phi' \succ \phi$);
- ii. ϕ' is weakly assertable.

- 1 In asserting ϕ , the speaker implicates that all better alternatives ϕ' cannot be asserted.
- 2 A sentence ϕ is blocked when an implicature derived in this way contradicts the original assertion, or equivalently, when ϕ always has a better alternative.



Structurally defined alternatives

Let ϕ be a parse tree. $ALT(\phi)$ – the set of alternatives to ϕ – is the set of parse trees ϕ' that can be derived from ϕ via:

- **deletion** of constituents in ϕ ;
- **substitution** of constituents in ϕ with constituents of the same category taken from the substitution source $L(\phi)$.



Assertability

A sentence is **weakly assertable** iff the speaker believes it to be:

- i. true;
- ii. relevant;
- iii. and supported by the facts.



'Better than' relation

Proposal: In (at least) the cases under consideration, the 'better than' relation is defined in terms of both **informativity** and **simplicity** (cf. the Q and R principles of Horn 1984; also discussion in Katzir 2007).

$\phi \succ \psi$ iff

- i. $\phi \succ_{INF} \psi$
- ii. $\phi \succ_{SIMP} \psi$
- iii. $\phi \succ_{INF} \psi \vee \phi \succ_{SIMP} \psi$

- ϕ is better than ψ iff it is no less informative and no less simple and has an advantage on either informativity or simplicity.



Simplicity

The **simplicity** relation \succ_{SIMP} is defined in structural term:

- i. $\phi \preceq_{SIMP} \psi$ iff ϕ can be derived from ψ via substitution/deletion
 - ii. $\phi \succ_{SIMP} \psi$ iff $\phi \preceq_{SIMP} \psi$ and not $\psi \preceq_{SIMP} \phi$
- ϕ is simpler than ψ iff ϕ can be derived from ψ via a series of substitutions or deletions, but not vice versa.



Informativity

The **informativity** relation \succ_{INF} turns out to be more complicated:

- Straightforward when alternatives have determinate truth conditions (e.g. *some* vs. *all*; *or* vs. *and*)
- But what if one or both are vague?

Proposal: In the case of vague alternatives, ‘more informative than’ must be understood as ‘significantly’ or ‘definitively’ stronger than.

- Cf. effect of vagueness on manner implicatures (Leffel et al., to appear)



Indices of interpretation

To model the interpretation of vague language, I follow Krifka (2012) in assuming expressions of language to be interpreted relative to a pair of indices $\langle w, i \rangle$:

- w is a world index
- i an interpretation index.

The common ground can be modeled as a pair $\langle W, I \rangle$, where W is a set of worlds and I a set of interpretations.



Four informativity relations

- (36) ϕ is **at least as strong as** ψ ($\phi \succeq_S \psi$) iff
 $\forall i, \{w : \phi_{i,w} = 1\} \subseteq \{w : \psi_{i,w} = 1\}$
- (37) ϕ is **weakly stronger than** ψ ($\phi \succ_{WS} \psi$) iff:
 i. $\phi \succeq_S \psi$
 ii. $\exists w, i [\psi_{w,i} = 1 \wedge \phi_{w,i} = 0]$ (i.e. $\neg \psi \succeq_S \phi$)
- (38) ϕ is **strictly stronger than** ψ ($\phi \succ_{SS} \psi$) iff:
 i. $\phi \succeq_S \psi$
 ii. $\forall i \exists w [\psi_{w,i} = 1 \wedge \phi_{w,i} = 0]$
- (39) ϕ is **definitively stronger than** ψ ($\phi \succ_{DS} \psi$) iff:
 i. $\phi \succeq_S \psi$
 ii. $\exists w \forall i, i' [\psi_{w,i} = 1 \wedge \phi_{w,i'} = 0]$



Four informativity relations

ϕ is ...

... **at least as strong as** ψ iff there is no interpretation on which it is weaker.

... **weakly stronger than** ψ iff there is also an interpretation on which it is stronger.

... **strictly stronger than** ψ iff it is stronger on every (individual) interpretation.

... **definitively stronger than** ψ if there is some state of affairs such that that ψ is true regardless of interpretation but ϕ is false regardless of interpretation.



Vagueness and informativity

Proposal: for the purpose of selecting between alternatives,

the 'more informative' relation $(\phi \succ_{INF} \psi)$

must be understood as

the 'definitively stronger' relation $(\phi \succ_{DS} \psi)$

Explaining the data



In a nutshell

The variable polarity sensitivity of *much* words can be attributed to the interaction of:

- the nature of the threshold invoked by *much*
- the interpretation of the corresponding unmodified form
- the principles of the AC framework



Lexical semantics of *much* (simplified)

$$\llbracket much \rrbracket = \lambda d \lambda x. \mu_{DIM}(x) \geq d$$

$$\llbracket POS-much \rrbracket^i = \lambda x. \mu_{DIM}(x) \geq \theta_i$$

- Various compositional implementations possible (e.g. Solt, 2009, 2014; Wellwood, 2014)



Quantificational *much* words

ϕ = Homer drank much coffee.
Homer hat viel Kaffee getrunken.

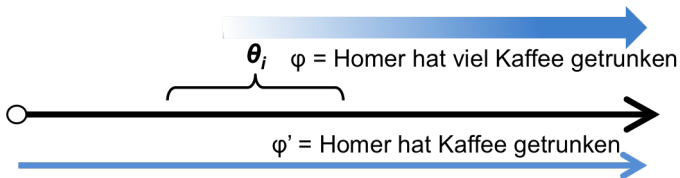
ϕ' = Homer drank coffee.
Homer hat Kaffee getrunken.

$$\llbracket \phi \rrbracket^{w,i} = \exists x [\text{coffee}(x) \wedge \text{drank}_w(H, x) \wedge \mu(x) > \theta_i]$$

$$\llbracket \phi' \rrbracket^{w,i} = \exists x [\text{coffee}(x) \wedge \text{drank}_w(H, x)]$$

- *much* context sensitive and vague.
- standard θ_i dependent on comparison class; potentially very weak.

Quantificational *viel*



$$\phi \succ_{DS} \phi'$$

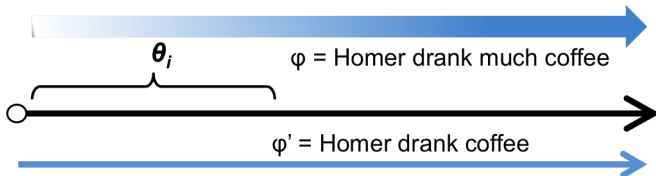
$$\phi \succ_{INF} \phi'$$

$$\phi' \succ_{SIMP} \phi$$

$$\text{therefore } \phi' \sim \phi$$

no implicature

Quantificational *much*



$\phi \succ_{WS} \phi'$ but not $\phi \succ_{DS} \phi'$

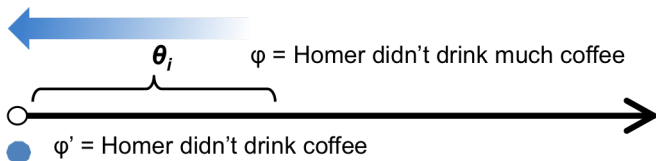
$\phi \sim_{INF} \phi'$ $\phi' \succ_{SIMP} \phi$ therefore $\phi' \succ \phi$

$\rightsquigarrow \phi'$ not assertable

'it's not the case that Homer drank coffee'

contradiction!

Quantificational *much* – under negation



$$\phi \succ'_{WS} \phi$$

$$\phi \sim_{INF} \phi'$$

$$\phi' \succ_{SIMP} \phi$$

therefore $\phi' \succ \phi$

$\rightsquigarrow \phi'$ not assertable

'it's not the case that Homer didn't drink coffee'
(=Homer drank some amount of coffee)

acceptable



Differential *much*

ϕ = Homer drank much more than 1 liter of coffee.

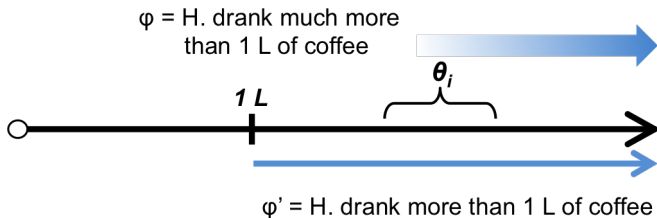
ϕ' = Homer drank more than 1 liter of coffee.

$$\llbracket \phi \rrbracket^{w,i} = \exists x [\text{coffee}(x) \wedge \text{drank}_w(H, x) \wedge \mu(x) > 1L + \theta_i]$$

$$\llbracket \phi' \rrbracket^{w,i} = \exists x [\text{coffee}(x) \wedge \text{drank}_w(H, x) \wedge \mu(x) > 1L]$$

- interpretation of *much* vague but constrained.
- standard θ_i set relative to 1 L.
 - cf. *much more than 1 liter* vs. *much more than 100 liters*

Differential *much*



$$\phi \succ_{DS} \phi'$$

$$\phi \succ_{INF} \phi'$$

$$\phi' \succ_{SIMP} \phi$$

$$\text{therefore } \phi' \sim \phi$$

no implicature



Partitive *much*

ϕ = Homer drank much of his coffee.

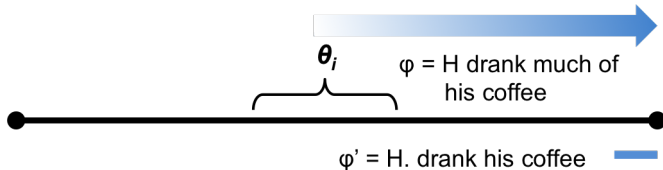
ϕ' = Homer drank his coffee.

$$\llbracket \phi \rrbracket^{w,i} = \exists x [x \sqsubseteq H\text{-coffee} \wedge \text{drank}_w(H, x) \wedge \mu(x) > \theta_i]$$

$$\llbracket \phi' \rrbracket^{w,i} = \text{drank}(H, H\text{-coffee})$$

- *much*: Proportional interpretation.
- bare: universal (perhaps non-maximal) interpretation; homogeneity effects.

Partitive *much*


 $\phi' \succ_{INF} \phi$
 $\phi' \succ_{SIMP} \phi$

 therefore $\phi' \succ \phi$
 $\rightsquigarrow \phi'$ not assertable

'it's not the case that Homer drank (all of) his coffee'

acceptable



Summary

much coffee	contradictory implicature
not much coffee	acceptable implicature
viel Kaffee	no implicature
much more than 1 L of coffee	no implicature
much of his coffee	acceptable implicature



Broader context

- Weakening and renewal of intensifiers (Partington, 1993; Ito and Tagliamonte, 2003)
- Cross-linguistic differences in semantics of quantity words
 - E.g. *much/many* distinction; *much/very* border

Conclusion and open issues

Conclusions



- Polarity sensitivity of *much* derives from its vagueness.
- Blocking occurs when standard is weak – insufficient added informativity to offset greater complexity relative to unmodified form.
 - Sensitive to syntactic context / nature of standard
 - Language specific



Open issues

- Independent evidence for weakening / strength difference
- Other non-polarity-sensitive cases
- Register effects
- PPI *much* (e.g. Danish)
- Extension to other members of attenuating class

Thank you!

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