POS and the inverse proportional reading of *many*

Maribel Romero
University of Konstanz

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1. INTRODUCTION

■ Natural language determiners and Conservativity

(1) A determiner denotation $f \in D_{<<e,t>,<<e,t>,t>>}$ is conservative iff, for any $P_{<e,t>}$ and $Q_{<e,t>}$:
$f(P)(Q) = 1$ iff $f(P)(P \cap Q) = 1$ (Keenan & Stavi 1986)

(2) Conservativity Universal: (Keenan & Stavi 1986, cf. Barwise & Cooper 1981:U3)
Determiners in all languages are always interpreted by conservative functions.[1]

(3)

a. Some P is Q.	$P \cap Q \neq \emptyset$	iff	$P \cap (P \cap Q) \neq \emptyset$
b. Every P is Q.	$P \subseteq Q$	iff	$P \subseteq P \cap Q$
c. At least three Ps are Q.	$\lvert P \cap Q \rvert \geq 3$	iff	$\lvert P \cap (P \cap Q) \rvert \geq 3$

■ Cardinal and proportional readings of *many* and *few* (Partee 1989, Cohen 2001)

(4) Many / few faculty children attended the 1980 picnic.

(5) Many Ps are Q.
a. CARDINAL reading: $\lvert P \cap Q \rvert > n$, where n is a large natural number.
b. PROPORTIONAL reading: $\lvert P \cap Q \rvert : \lvert P \rvert > \rho$, where ρ is a large proportion.

(6) Few Ps are Q.
a. CARDINAL reading: $\lvert P \cap Q \rvert < n$, where n is a small natural number.
b. PROPORTIONAL reading: $\lvert P \cap Q \rvert : \lvert P \rvert < \rho$, where ρ is a small proportion.

(7) Scenario: All the faculty children were at the 1980 picnic, but there were few faculty children back then. Almost all faculty children had a good time.

(8) There were few faculty children at the 1980 picnic.
a. Cardinal: true in (7) b. Proportional: false in (7)

(9) Many faculty children had a good time.
a. Cardinal: false in (7) b. Proportional: true in (7)

(10) $Many_{card/prop}$ and $few_{card/prop}$ are conservative:

a. $Many_{card}$ Ps are Q.	$\lvert P \cap Q \rvert > n$	iff	$\lvert P \cap (P \cap Q) \rvert > n$
b. $Many_{prop}$ Ps are Q.	$\lvert P \cap Q \rvert : \lvert P \rvert > \rho$	iff	$\lvert P \cap (P \cap Q) \rvert : \lvert P \rvert > \rho$
c. Few_{card} Ps are Q.	$\lvert P \cap Q \rvert < n$	iff	$\lvert P \cap (P \cap Q) \rvert < n$
d. Few_{prop} Ps are Q.	$\lvert P \cap Q \rvert : \lvert P \rvert < \rho$	iff	$\lvert P \cap (P \cap Q) \rvert : \lvert P \rvert < \rho$

[1] Keenan & Stavi's (1986) Conservativity Universal is actually restricted to extensional determiners, defined in (i). This includes simple and complex determiners like the ones in (2) and excludes certain complex determiners like *an undisclosed number of*. As for *many* and *few*, see Partee (1989:3) for arguments that they are extensional.
(i) A determiner Det is extensional iff , whenever N1 and N2 are co-extensional,
$[\![\text{Det N1 VP}]\!] = 1$ iff $[\![\text{Det N2 VP}]\!] = 1$

- Westerståhl (1985) noted an additional reading of *many*: the "inverse" proportional reading exemplified in (11)-(12). Similarly for *few*.

(11) Many SCANDINAVIANS have won the Nobel Prize in literature.
a. Cardinal: false in (12)
b. Proportional: false in (12)

(12) Scenario: Of a total of 81 Nobel Prize winners in literature, 14 come from Scandinavia.

- Two alternative characterizations of this reading in the literature: (13) vs. (14).

(13) Westerståhl (1985):
a. Pararaphrase: "Many of the Nobel Prize winners are Scandinavians."
b. INVERSE PROPORTIONAL reading of *Many Ps are Q*:
$|P \cap Q| : |Q| > \rho$, where ρ is a large proportion.
c. Inverse proportional: true in (12)

(14) Cohen (2001):
a. Paraphrase: "The proportion of Scandinavians that have won the Nobel Prize in literature is large compared to the proportion of inhabitants of other world regions that have won the Nobel Prize in literature." (Cohen 2001:47-50)
b. INVERSE PROPORTIONAL reading of *Many Ps are Q*:
$|P \cap Q| : |P| > |\cup ALT(P) \cap Q| : |\cup ALT(P)|$
c. Inverse proportional: true in (12)

- As Cohen (2001) shows with (15)-(16), the correct characterization is (14).

(15) Many ANDORRANS have won the Nobel Prize in literature.

(16) Scenario: 112 Nobel Prize winners in literature. 4 out of a total of 60,000 Andorrans have won it. 4 out of a total of 20,000,000 Scandinavians have won it.

- $Many_{inv\text{-}prop}$ is <u>not</u> conservative: (17).

(17) $Many_{inv\text{-}prop}$ is <u>not</u> conservative:
$|P \cap Q| : |P| > |\cup ALT(P) \cap Q| : |\cup ALT(P)|$ ~~iff~~ $|P \cap (P \cap Q)| : |P| > |\cup ALT(P) \cap (P \cap Q)| : |\cup ALT(P)|$

- Efforts have been made in the literature to derive the inverse proportional reading of *many* in a principled way (de Hoop & Solà 1996, Herburger 1997, Cohen 2001), the key issue being whether, in such a principled derivation, the determiner remains conservative or challenges the conservativity universal.

- Goal of this paper: to derive the correct truth conditions and distribution of the inverse proportional reading while maintaining conservativity.

  - **Point of departure**: observation in the literature that the inverse proportional reading is available only if the N' complement of the Determiner is focused (F) (Herburger 1997) or functions as contrastive topic (CT) (Cohen 2001).

  - **Innovation**: decomposition of *many* as *MANY+POS*. Instead of building F-/CT-sensitivity into the determiner (part) itself, we will build it into *POS*, as independently motivated in the grammar.
    Rule of three: A:B :: C:?
    - Terms A and B**:** Behavior of the superlative morpheme *–est* in adjectives like *highest* (Heim 2001) and in determiners like *most* (=*MANY+est*) (cf. Hackl 2000).
    - Term C: Behavior of the (phonologically null) positive morpheme *POS* in adjectives like *high(-POS)* (Schwarz 2010).
    - Variable ?: Behavior of *POS* in determiners like *many*.

- Roadmap:
  §2 Background on *-est*
  §3 Background on *POS*
  §4 Proposal
  §5 Previous analyses
  §6 Conclusions

2. BACKGROUND ON *-EST*

- The superlative morpheme *-est* with adjectives (Szabolcsi 1986, Heim 1999)
  Sentence (18) allows for an absolute and a relative reading: (18a,b).
  The exact relative reading depends (at least partly) on the placement of focal accent: (19).

(18) John climbed the highest mountain.
  a. Absolute: "John climbed a mountain higher than any other (relevant) mountain".
  b. Relative: "John climbed a higher mountain than anybody else (relevant) climbed".

(19) a. John wrote the longest letter to MARY. ⇨ compares *recipients* of John's letters
  b. JOHN wrote the longest letter to Mary. ⇨ compares *senders* of letters to Mary

- Scope analysis of *-est* in Adj+*est* (Heim 1999)
  - The lexical entry for *–est*, in (20), takes as first argument a comparison class *C*.
  - The Deg(ree)P *[-est C]* can take scope within the host NP, as in (21a), or it can take sentential scope, as in (22a).
  - The comparison class *C* is retrieved (partly) from the focal structure of the LF sister of *[-est C]*, as in (21b,c) and (22b,c).

(20) $[\![\textit{-est}]\!] = \lambda\mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d)\ \&\ \forall Q \in \mathbf{Q}\ [Q \neq P \rightarrow \neg Q(d)]\ ]$ (Heim 1999)

(21) ABSOLUTE reading:
a. LF: John climbed the 2 [**[-est C]** [1[$t_{2,\mathbf{F}}$ t_1-high mountain]] ~ **C**]
b. $[\![\textit{1[}t_2\ t_1\textit{-high mountain]}]\!]$ = λd'. g(2) is a d'-high mountain
c. $[\![C]\!]$ $\subseteq$ { λd'. Everest is a d'-high mountain, λd'. Kilimanjaro is a d'-high mountain, λd'. Montblanc is a d'-high mountain, ... }
d. $[\![(18)]\!]=1$ iff $\exists x\ [\text{climb}(j,x) \wedge \exists d\ [\ \text{mount}(x) \wedge \text{height}(x) \geq d \wedge \forall Q \in [\![C]\!]\ [Q \neq \lambda d'.\text{mount}(x) \wedge \text{height}(x) \geq d' \rightarrow \neg Q(d)]\ ]\ ]$

(22) RELATIVE reading:
a. LF: [**[-est C]** [1[JOHN$_{\mathbf{F}}$ climbed A t_1-high mountain]] ~ **C**]
b. $[\![\textit{1[John climbed a }t_1\textit{-high mountain]}]\!]$ = λd'. John climbed a d'-high mountain
c. $[\![C]\!]$ $\subseteq$ { λd'. John climbed a d'-high mountain, λd'. Bill climbed a d'-high mountain, λd'. Paul climbed a d'-high mountain, ... }
d. $[\![(18)]\!]=1$ iff $\exists d\ [\ \exists x[\text{climb}(j,x) \wedge \text{mount}(x) \wedge \text{height}(x) \geq d] \wedge \forall Q \in [\![C]\!]\ [Q \neq \lambda d'.\ \exists x[\text{climb}(j,x) \wedge \text{mount}(x) \wedge \text{height}(x) \geq d'] \rightarrow \neg Q(d)]]$

■ The superlative morpheme *-est* with determiners

(23) a. John sent the most letters to MARY. ⇨ compares *recipients* of John's letters
b. JOHN sent the most letters to Mary. ⇨ compares *senders* of letters to Mary

■ Scope analysis of *-est* in Determiner+*est* (cf. Hackl 2000, Hackl 2009)
- *Most* is decomposed into the parametrized Determiner *MANY* in (24) + *-est*.
- Since the parametrized Determiner is at the edge of the NP, *-est* can not scope inside the NP and must scope sententially.
- Other than that, same as above: (25).

(24) $[\![\textit{MANY}_{card}]\!]$ = $\lambda d_d.\ \lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ \exists x\ [\ |x| \geq d\ \&\ P(x)=1\ \&\ Q(x)=1]$ (≈Hackl 2000:83)

(25) RELATIVE reading:
a. LF: [**[-est C]** [1[JOHN$_{\mathbf{F}}$ sent t_1-MANY letters to Mary]] ~ **C**]
b. $[\![\textit{1[John sent }t_1\textit{-MANY letters to Mary]}]\!]$ = λd'. John sent d'-many letters to Mary
c. $[\![C]\!]$ $\subseteq$ { λd'. John sent d'-many letters to Mary, λd'. Bill sent d'-many letters to Mary, λd'. Paul sent d'-many letters to Mary, ... }
d. $[\![(23b)]\!]=1$ iff $\exists d\ [\ \exists x[\text{send}(j,x,m) \wedge \text{letters}(x) \wedge |x| \geq d] \wedge \forall Q \in [\![C]\!]\ [Q \neq \lambda d'.\ \exists x[\text{send}(j,x,m) \wedge \text{letters}(x) \wedge |x| \geq d'] \rightarrow \neg Q(d)]]$

Summary of Section 2:
A. *-est* in adjectives can scope within the NP or sententially. In the latter case, the reading obtained depends on the information structure (Focus) of the sentence.
B. *-est* in determiners can only scope sententially. The reading obtained depends on the information structure (Focus) of the sentence.

3. BACKGROUND ON *POS*

- The (phonologically null) positive morpheme POS with adjectives (Schwarz 2010)
  An ambiguity parallel to the absolute/relative ambiguity that we saw in superlatives is detectable when the adjective is in positive form as well: (26).
  The exact relative reading depends on what element *POS* is associated with: (27).

(26) Mia has an expensive hat.
  a. Absolute: "Mia has a hat that is expensive for a hat"
  b. Relative: "Mia has a hat that is expensive for somebody like Mia to have (e.g., for a 3-year old)".

(27) Paul gave Mia an expensive hat.
  ⇨ a hat that is expensive for somebody like Paul (e.g. unemployed people) to give
  ⇨ a hat that is expensive for somebody like Mia (e.g. a 3-year old) to get

- Scope analysis of *POS* in Adj+*POS* (adapted from Schwarz 2010)
  - The lexical entry for *POS*, in (28), states that the degree to which P holds is above the standard or threshold θ established by the comparison class *C*.
  - The Deg(ree)P *[POS C]* can take scope within the host NP, as in (29a), or it can take sentential scope, as in (30a).
  - The comparison class *C* is retrieved (partly) from the information structure of the LF sister of *[POS C]*, as in (29b,c) and (30b,c).[2]

(28) $[\![POS]\!] = \lambda \mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d) \wedge d > \theta(\mathbf{Q})\ ]$

(29) ABSOLUTE reading:
  a. LF: Mia has a 2 [**[POS C]** [1[$t_{2,\mathbf{F/CT}}$ t_1-expensive hat]] ~ **C**]
  b. $[\![C]\!] \subseteq$ { λd'. h_1 is a d'-expensive hat, λd'. h_2 is a d'-expensive hat, ... }
  c. $[\![(25)]\!]=1$ iff $\exists x\ [\text{have}(m,x) \wedge \exists d\ [\ \text{hat}(x) \wedge \text{expensiveness}(x) \geq d \wedge d > \theta([\![C]\!])]]$

(30) RELATIVE reading:
  a. LF: [**[POS C]** [1[$\text{MIA}_{\mathbf{F/CT}}$ has a t_1-expensive hat]] ~ **C**]
  b. $[\![C]\!] \subseteq$ { λd'. Mia has a d'-expensive hat, λd'. Katie has a d'-expensive hat, ... }
  c. $[\![(25)]\!]=1$ iff $\exists d\ [\ \exists x[\text{have}(m,x) \wedge \text{hat}(x) \wedge \text{expensiveness}(x) \geq d] \wedge d > \theta([\![C]\!])]$

Summary of Section 3:
C. *POS* in adjectives can scope within the NP or sententially. In the latter case, the reading obtained depends on the information structure (F or CT) of the sentence.

[2] This part of the analysis is not from Schwarz (2010). Schwarz uses a 3-place lexical entry for *POS* and thus doesn't need to generate alternatives from the information structure of the sentence. We assume the 2-place entry and need to generate alternatives somehow. To this end, we will assume that the associate of *POS* (e.g. *Paul* or *Mia* in (27)) bears focal stress or functions as contrastive topic. The choice between the 3-place line and the 2-place line is not essential for the analysis to be proposed.

4. PROPOSAL

- Ingredients of the proposal:
  - *Many* is decomposed into the parametrized determiner *MANY* and *POS*.
  - There are two Determiner morphemes *MANY*: the cardinal one in (32) and the proportional one in (33).[3]
  - *POS* in determiner *many*, like *–est* in *most*, can only scope sententially. The reading obtained depends on the information structure (F or CT) of the sentence.
  - Novel observation: *POS* with sentential scope can associate not only with an element external to the host NP, as we saw in (30), but also with an element internal to the host NP, witness (34)-(36).

(31) $[\![POS]\!] = \lambda\mathbf{Q}_{<dt,t>}.\lambda P_{<d,t>}.\ \exists d\ [\ P(d) \wedge d > \theta(\mathbf{Q})\ ]$ (=(28))

(32) $[\![MANY_{card}]\!] = \lambda d_d.\ \lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ \exists x\ [\ |x| \geq d\ \&\ P(x)=1 \wedge Q(x)=1]$ (=(24))

(33) $[\![MANY_{prop}]\!] = \lambda d_d.\ \lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ (|P \cap Q| : |P|) \geq d$

(34) (For what he has been giving her so far, this time) Rockefeller gave Kate an inexpensive car.

(35) Scenario: Rockefeller gave Kate a very expensive car. Still, this present compares poorly to his previous astronomically expensive presents (e.g. apartment in Manhattan, island in Pacific, etc.)

(36) $[\![C]\!] \subseteq$ { λd'. R gave K a d'-inexpensive car, λd'. R gave K a d'-inexpensive apartment in Manhattan, λd'. R gave K a d'-inexpensive island in the Pacific, ... }

The appearance of non-conservativity results when two factors co-occur: proportional $MANY_{prop}$ is used and the F/CT-associate of *POS* is internal to the host NP.

4.1. Cardinal reading and I(nformation) S(tructure) sensitivity

- $MANY_{card}$ + *POS* associated with an element in the sentence external to the host NP.

(37) (For a 7-year old,) Lucía$_{F/CT}$ has read many books.

(38) a. LF: [**[POS C]** [1[Lucía$_{F/CT}$ has read **[**t_1-MANY books**]**]] ~ **C**]
b. $[\![C]\!] \subseteq$ { λd'. Ann has read d'-many books, λd'. Kira has read d'-many books, ... }
c. $[\![(37)]\!]=1$ iff $\exists d\ [\ \exists x[read(l,x) \wedge books(x) \wedge |x| \geq d] \wedge d > \theta([\![C]\!])]$

[3] Similarly, *few* is decomposed into *FEW* and *POS*. For a unified version of *POS* that works with both members of antonym pair, see e.g. von Stechow (2009).
(i) $[\![FEW_{card}]\!] = \lambda d_d.\ \lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ \neg\exists x\ [\ |x| \geq d\ \&\ P(x)=1 \wedge Q(x)=1]$
(ii) $[\![FEW_{prop}]\!] = \lambda d_d.\ \lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ (|P \cap Q| : |P|) < d$

■ $MANY_{card}$ + *POS* associated with an element in the sentence internal to the host NP.

(39) (For how unappealing Scottish authors are to John,) John has read many books by Douglas$_{\mathbf{F/CT}}$.
a. Cardinal: true in (40) b. Proportional: false in (40)

(40) Scenario: John is an avid reader but dislikes Scottish authors. There are five (relevant) Scottish authors, say, Douglas, McFire, McDawn, Hings and Keath. John has read the following amounts of books from them, respectively: 5 out of 50, 1 out of 2, 1 out of 3, 1 out of 5, and 3 out of 6.

(41) a. LF: [**[POS C]** [1[John has read [t_1-MANY books by Douglas$_{\mathbf{F/CT}}$]]] ~ **C**]
b. ⟦*C*⟧ ⊆ { λd'. John has read d'-many books by Douglas, λd'. John has read d'-many books by McFire, λd'. John has read d'-many books by McDawn, ... }
c. ⟦(39)⟧=1 iff ∃d [∃x[read(j,x) ∧ books(x) ∧ by(x,douglas) ∧ |x|≥d] ∧ d > θ(⟦*C*⟧)]

4.2. Proportional reading, IF-sensitivity and the inverse proportional reading

■ $MANY_{prop}$ + *POS* associated with an element in the sentence external to the host NP.

(42) Many (of the few) faculty children had a good$_{\mathbf{F/CT}}$ time. (=(9))

(43) (Regular) proportional reading:
a. LF: [**[POS C]** [1[[t_1-MANY$_{proportional}$ faculty children] has a good$_{\mathbf{F/CT}}$ time]] ~ **C**]
b. ⟦*C*⟧ ⊆ { λd'.(|{x: fac-child(x)}∩{x: have-good-time(x)}| : |{x: fac-child(x)}|) ≥ d',
λd'. (|{x: fac-child(x)}∩{x: have-bad-time(x)}| : |{x: fac-child(x)}|) ≥ d',
λd'. (|{x: fac-child(x)}∩{x: have-regular-time(x)}| : |{x: fac-child(x)}|) ≥ d', ...}
c. ∃d [(|{x: fac-child(x)}∩{x: have-good-time(x)}| : |{x: fac-child(x)}|) ≥ d
∧ d > θ(⟦*C*⟧)]

■ $MANY_{prop}$ + *POS* associated with an element in the sentence internal to the host NP.

(44) Many Scandinavians$_{\mathbf{F/CT}}$ have won the Nobel Prize in literature.

(45) Inverse proportional reading:
a. LF: [**[POS C]** [1[[t_1-MANY$_{proportional}$ Scandinavians$_{\mathbf{F/CT}}$] have won NP]] ~ **C**]
b. ⟦*C*⟧ ⊆ { λd'.(|{x: Scandinavian(x)}∩{x: NP-winner(x)}| : |{x: Scandinavian(x)}|) ≥ d',
λd'. (|{x: Mediterranean(x)}∩{x: NP-winner(x)}| : |{x: Mediterranean(x)}|) ≥ d',
λd'. (|{x: MiddleEastern(x)}∩{x: NP-winner(x)}| : |{x: MEastern(x)}|) ≥ d', ... }
c. ∃d [(|{x: Scandinavian(x)}∩{x: NP-winner(x)}| : |{x: Scandinavian(x)}|) ≥ d
∧ d > θ(⟦*C*⟧)]

■ In sum:

Correct truth conditions have been derived for the so-called inverse proportional reading of *many(/few)*, and this has been achieved using only conservative determiners –namely, $MANY_{PROP}$ (/FEW_{PROP})– and exploiting independently motivated properties of *POS*.

4.3. Back to *MANY* + *-est*

- We saw that *-est* and *POS* behave in a parallel way in terms of scope possibilities and association with F/CT.

- However, though the inverse proportional reading is available for *many*, Westerståhl (1985) pointed out that no such reading is possible for *most* in (46):

(46) # Most Scandinavians / SCANDINAVIANS have won the Nobel Prize in literature.
a. Intended reading: "The proportion of Scandinavians that have won the Nobel Prize in literature is the largest compared to the proportion of inhabitants of other world regions that have won the Nobel Prize in literature"

- According to our analysis, two factors need to co-occur for the inverse proportional reading to arise:
  (i) proportional $MANY_{prop}$
  (ii) the F/CT-associate of *POS* is internal to the host NP

- English: factor (ii) fails for *-est*
  The F-associate of *-est* cannot be internal to the host NP, witness *-est* in adjectives:

(47) John has the cheapest CAR.
"John has a car that is cheaper than any other (relevant) thing he has."

- Bulgarian: factor (ii) is in principle satisfiable for *-est*, witness (48)-(49). Since the Bulgarian version of (46) does not have an inverse proportional reading either, we tentatively conclude (50).

(48) Ivan ima naj-dobri albumi na/ot U2 [Bulgarian]
Ivan has est-good albums of/by U2
'Ivan has better albums by U2 that by any other band.'

(49) Ivan ima naj-mnogo albumi na/ot U2 [Bulgarian]
Ivan has est-many albums of/by U2
'Ivan has more albums by U2 than by any other band.'

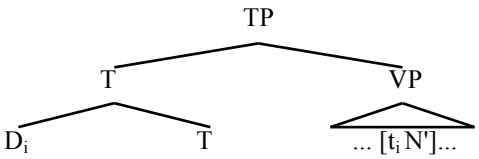
(50) a. *most* ≠ $MANY_{prop}$ + *-est*
b. *most* = $MANY_{card}$ + *-est*

5. PREVIOUS ANALYSES

5.1. Herburger (1997)

- Her analysis
  - Weak determiners, which include *many*$_{prop}$, can QR by themselves and leave behind their N' restrictor: (51)
  - When they have QRed by themselves, their restriction and nuclear scope are not determined syntactically, but by information structure, like with adverbs of quantification: background material goes to the restrictor and focused material goes to the nuclear scope. This gives us (52).
  - The inverse proportional reading necessarily involves focus internal to the host NP.

(51)



(52) Many SCANDINAVIANS$_F$ have won the Nobel Prize in literature.
| SCAN ∩ NP-WINNER| : |NP-WINNER| > ρ

- Evaluation:
  - Unified lexical entry for proportional *many*$_{prop}$. ☺
  - This lexical entry *many*$_{prop}$ is conservative. ☺
  - Since weak determiners are incompatible with i(ndividual)-level predicates (Milsark 1974) and since her derivation of the inverse proportional reading crucially depends on the determiner being weak, her analysis predicts that inverse proportional readings are impossible with i-level predicates. But this prediction is incorrect (Cohen 2001:49): (53). ☹
  - Incorrect truth conditions ☹

(53) Many SCANDINAVIANS$_F$ have a Nobel Prize in literature.

5.2. Cohen (2001)

- His analysis
  - In proportional readings, alternatives of P and Q are factored into semantics via (54)
  - A lexical entry for *many*$_{prop}$ for both proportional readings: (55)

(54) A = { P' ∩ Q'| P' ∈ ALT(P) ∧ Q' ∈ ALT(Q)}

(55) [[*Many*$_{prop}$ *Ps are Q*]] = 1 iff |P ∩ Q| :| P ∩ ∪A| > ρ, where:
1. ρ is large (regular proportional reading)
2. ρ = |∪A ∩ Q| : |∪A| (inverse proportional reading)

- Evaluation
  - The lexical entry for proportional *many*$_{prop}$ is disjunctive. ☹
  - Part 2 of this lexical entry *many*$_{prop}$ is not conservative. ☹
  - It allows inverse proportional readings both with i-level and s-level predicates ☺
  - Correct truth conditions ☺

6. CONCLUSION

- An analysis has been proposed for the inverse proportional reading of *many* (and *few*) that derives the correct truth conditions while maintaining the Conservativity Universal:
  - *Many* in the inverse proportional reading is decomposed into the parametrized determiner $MANY_{\text{prop}}$ and POS.
  - The parametrized determiner $MANY_{\text{prop}}$ is conservative. Its task in this construction is to secure that the reading is proportional.
  - *POS* behaves just like *-est* in determiners: sentential scope and sensitivity to information structure. Its task in this construction is to make the reading inverse.

- Open issue: Adjectival $many_{\text{card}}$?
  - *the many N*

(56) The many demonstrators walked in silence.

  - Hackl's (2009) analysis of the absolute reading of *most*
  - BUT van Benthem's problem (see Hackl 2000:§3.2.3)

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