On Conservativity and other Crosslinguistic Semantic Generalizations

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Outline

1. Introduction
2. Conservativity
   - The Conservativity Universal
   - A challenge
   - Addressing the challenge: Step 1
   - Background on gradable expressions
   - Addressing the challenge: Step 2
3. p-to-Q Distributivity
   - The p-to-Q Distributivity Universal
   - Challenges
4. Conclusions

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Introduction

Semantics studies how languages express meaning:

- how languages “package” concepts into lexical items (= morphemes or words)
- how languages compose these lexical meaning units into larger meaning units (taking into account syntactic structure, prosodic features, pragmatic context, etc.)

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A. Universals on lexical meanings

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A. Universals on lexical meanings

(1) All color terms denote convex regions of color space.
(Gärdenfors, 2014; Jäger, 2010; Steinert-Threlkeld & Szymanik, 2020)

B. Universals on meaning composition:

(2) The only semantic composition rule is Functional Application. ("Frege's Conjecture").
(But see Chung & Ladusaw (2004); Jacobson (2014))

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(3) Conservativity:
All lexical determiners (e.g., *every*, *some*, *no*) are conservative.

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In this talk, we will be concerned with the following two potential semantic universals:

A. Lexical universal: on quantificational determiners

(3) Conservativity:
All lexical determiners (e.g., *every*, *some*, *no*) are conservative.

B. Compositional universal: on attitude verbs

(4) p-to-Q Distributivity:
All responsive attitude verbs (e.g., *know*, *announce*, *say*) are p-to-Q distributive.

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Plot:

- We will revisit a long-standing counterexample to Conservativity: the so-called **reverse proportional reading of** *many*.
- Building on previous analyses of gradable expressions, we will motivate a decompositional analysis of *many* which renders the determiner conservative (Cohen, 2001; Romero, 2021).
- Hence, the Conservativity Universal can be **maintained**.

Introduction

B. Compositional universal: on attitude verbs

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Plot:

- We will test this potential universal on our crosslinguistic MECORE database.
- Though many verbs indeed follow this potential universal, **three crosslinguistic patterns** will be identified that challenge p-to-Q Distributivity (Roelofsen & Uegaki, 2020; Özyıldız et al., 2023).
- Hence, we tentatively conclude that p-to-Q Distributivity can**not** be **maintained** in its present form. Nevertheless, it is still important to establish the limits of crosslinguistic variation (work in progress!)

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The Conservativity Universal

- Back to our lexical universal quantificational determiners:

(Barwise & Cooper, 1981; Keenan & Stavi, 1986)

(5) Conservativity:
All lexical determiners (e.g., *every*, *some*, *no*) are conservative.

The Conservativity Universal

- Back to our lexical universal quantificational determiners:

  (Barwise & Cooper, 1981; Keenan & Stavi, 1986)

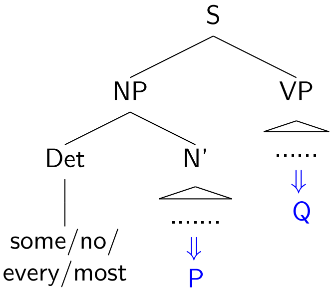
(5)	Conservativity: All lexical determiners (e.g., *every*, *some*, *no*) are conservative.

- But... what does it mean for a quantificational determiner to be conservative?

The Conservativity Universal

- Basic semantic structure for quantificational determiners:

(6) Some/no/every/most [$_{N'}$ elf] [$_{VP}$ is smart].



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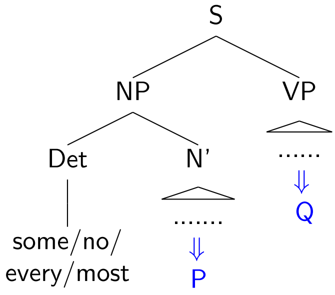

- Example:

(7) Some/no/every/most [$_{N'}$ elf] [$_{VP}$ is smart].
P = the set of elves   Q = the set of smart individuals

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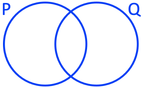

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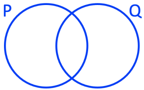

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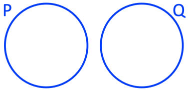

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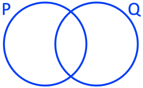

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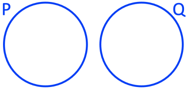

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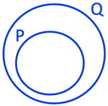

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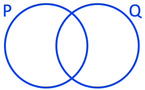

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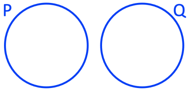

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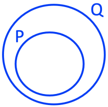
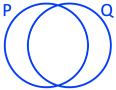


(11) Most Ps are Q. $|P \cap Q| : |P| > \frac{1}{2}$



The Conservativity Universal

- Definition of conservativity:

(12) A determiner Det is CONSERVATIVE if and only if, for any sets P and Q:
$[\![\text{Det}]\!](P)(Q) = \text{TRUE} \quad \Leftrightarrow \quad [\![\text{Det}]\!](P)(P \cap Q) = \text{TRUE}$

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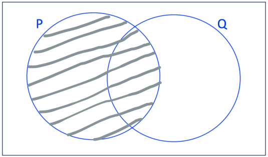

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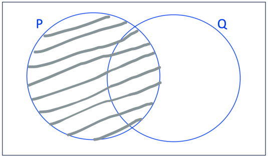

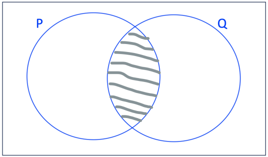

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I.e., $P \cap \mathbf{Q} = P \Leftrightarrow P \cap (\mathbf{P} \cap \mathbf{Q}) = P$

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		I.e., $\mathsf{P} \cap \mathbf{Q} = \mathsf{P}$	$\Leftrightarrow$	$\mathsf{P} \cap (\mathbf{P} \cap \mathbf{Q}) = \mathsf{P}$
(16)	Most Ps are Q.	$\lvert \mathsf{P} \cap \mathbf{Q} \rvert : \lvert \mathsf{P} \rvert > \frac{1}{2}$	$\Leftrightarrow$	$\lvert \mathsf{P} \cap (\mathbf{P} \cap \mathbf{Q}) \rvert : \lvert \mathsf{P} \rvert > \frac{1}{2}$

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- Thus, these determiners are all convervative.

The Conservativity Universal

- What would a non-conservative quantificational determiner look like?

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I.e., $P \cap \mathbf{Q} = P \quad \Leftrightarrow \quad P \cap (\mathbf{P} \cap \mathbf{Q}) = P$

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I.e., $\mathbf{Q} \cap P = \mathbf{Q} \quad \not\Leftrightarrow \quad (\mathbf{Q} \cap \mathbf{P}) \cap P = (\mathbf{Q} \cap \mathbf{P})$

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- The meaning "superset" expressed by *yreve* is a perfectly sensible and useful meaning to have in your language.
  It can, in fact, be expressed with particles like *only*: (17).
  Crucially, crosslinguistically –so says our universal– we do not find this meaning lexicalized as a determiner.

(17) Only elves are smart.

The Conservativity Universal

- What would a non-conservative quantificational determiner look like?

(16) Most Ps are Q. $|P \cap \mathbf{Q}|:|P| > \frac{1}{2} \Leftrightarrow |P \cap (\mathbf{P} \cap \mathbf{Q})|:|P| > \frac{1}{2}$

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- The meaning "proportion-over-Q" expressed by *tsom* is, in principle, a perfectly sensible and useful meaning to have in your language. Crucially, crosslinguistically –so says our universal– we do not find this meaning lexicalized as a determiner.

A challenge

- Cardinal and proportional readings of *many* and *few* (Partee, 1989):

(18) 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.

(19) There were few (/many) faculty children at the 1980 picnic.

(20) Many faculty children had a good time.

A challenge

- Lexical entries for *many* (Partee, 1989):

(21) Many Ps are Q.

a. CARDINAL reading:
$|P \cap Q| > n$, where n is a large natural number.

b. (FORWARD) PROPORTIONAL reading:
$|P \cap Q| : |P| > p$, where p is a large proportion.

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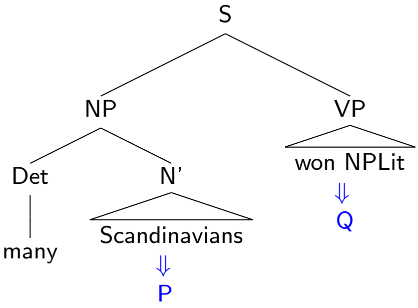
- Once the context-dependent parameters n and p have been fixed for a given context, the relations expressed by $many_{\text{card/f-prop}}$ are conservative.

A challenge

- Yet a third reading of *many*? (Westerståhl, 1985)

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

(23) Many [$_P$ Scandinavians] [$_Q$ have won the Nobel Prize in literature].



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(24) Westerståhl (1985):

a. Paraphrase: 'Many of the Nobel Prize winners are Scandinavians.'

b. REVERSE PROPORTIONAL reading: $|P \cap Q| : |\mathbf{Q}| > p$, where p is a large proportion.

A challenge

- Adding this reading to the lexical entries for *many*:

(25) Many Ps are Q.

a. CARDINAL reading:
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c. REVERSE PROPORTIONAL reading:
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- Crucially, the reserve proportional lexical entry in (25c) is non-conservative.

Addressing the challenge

- We will argue that the relevant reading of Westerståhl's sentence (23) can be derived without recourse to a non-conservative lexical entry.

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- We will proceed in two steps:
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  - Step 2: Decomposition of *many* "Divide an conquer"

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- As a result, we will conclude that Westerståhl's sentence does not constitute an exception to the Conservativity Universal.

- Caveat:
  There are other characterizations of the meaning Westerståhl's and similar sentences (Herburger, 1997; Greer, 2014; Bale & Schwarz, 2020; Romero, 2021): not in this talk but maybe for Q/A.

Addressing the challenge: Step 1

- Our sentence, again:

(23) Many $[_P$ Scandinavians$]$ $[_Q$ have won the Nobel Prize in literature$]$.

- Back to the truth conditions suggested by Westerståhl (1985):

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a. Paraphrase: 'Many of the Nobel Prize winners are Scandinavians.'

b. Reverse Proportional reading:
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Addressing the challenge: Step 1

- Problem pointed out by Cohen (2001):
  The truth conditions in (24b) make no reference to the proportion $|P \cap Q| : |P|$, but this proportion matters.

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

(27) Many Andorrans have won the Nobel Prize in literature.

(28) Many Scandinavians have won the Nobel Prize in literature.

Addressing the challenge: Step 1

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  The truth conditions in (24b) make no reference to the proportion $|P \cap Q|:|P|$, but this proportion matters.
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- Problem pointed out by Cohen (2001):
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  - While 3 Andorrans having won the prize suffices to make sentence (27) true in scenario (26), it is questionable whether the same number renders sentence (28) true.
  - Yet, the formalization in (24b) only asks us to consider $|P \cap Q|:|Q|$, which is 3/112 for either sentence.

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Addressing the challenge: Step 1

- Some auxiliary notions:

(29) $\text{ALT}(\llbracket\text{Scandinavians}\rrbracket) = \{\llbracket\text{Scandinavians}\rrbracket, \llbracket\text{Mediterraneans}\rrbracket, \llbracket\text{Middle Eastern}\rrbracket, \llbracket\text{North Americans}\rrbracket, \ldots\}$

(30) Function θ combines with the set containing alternative proportions and yields a threshold value for that set.

Addressing the challenge: Step 1

- Some auxiliary notions:

(29) ALT($[\![$Scandinavians$]\!]$) = {$[\![$Scandinavians$]\!]$, $[\![$Mediterraneans$]\!]$, $[\![$Middle Eastern$]\!]$, $[\![$North Americans$]\!]$, ...}

(30) Function θ combines with the set containing alternative proportions and yields a threshold value for that set.

- Revised truth conditions (Cohen, 2001; Romero, 2021):

(31) a. Paraphrase: 'The proportion of Scandinavians that have won the Nobel Prize in literature is large compared to a threshold based on the proportions of inhabitants of other worlds regions that have won the Nobel Prize in literature.'

b. REVERSE PROPORTIONAL reading of *Many Ps are Q*:
$|P \cap Q| : |P| \quad > \quad \theta\,(\{|P' \cap Q| : |P'| \,:\, P' \in ALT(P)\})$

Addressing the challenge: Step 1

- Adding the revised reading to the lexical entries for *many*:

(32) Many Ps are Q.

a. CARDINAL reading:
$|P \cap Q| > n$, where n is a large natural number.

b. FORWARD PROPORTIONAL reading:
$|P \cap Q| : |P| > p$, where p is a large proportion.

c. REVERSE PROPORTIONAL reading:
$|P \cap Q| : |P| \quad > \quad \theta\,(\{|P' \cap Q| : |P'| \,:\, P' \in ALT(P)\})$

Addressing the challenge: Step 1

- Adding the revised reading to the lexical entries for *many*:

(32) Many Ps are Q.

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- Note that the revised truth conditions in (32c) are still non-conservative.

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- Note that the revised truth conditions in (32c) are still non-conservative.

- This take us to our Step 2: Decomposition of *many*.
But first we will motive decomposition of gradable expressions in general.

Background on gradable expressions

- Gradable expressions decompose into a STEM plus a degree operator:

(33) a. tall = TALL + POS
b. taller = TALL + -er
c. tallest = TALL + -est

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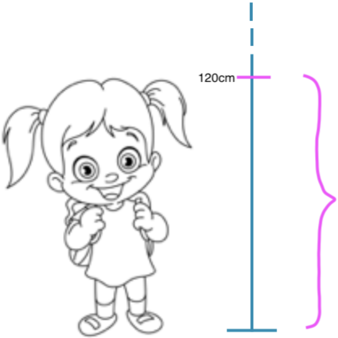
- The gradable STEM:

(34) $[\![\text{TALL}]\!] = \lambda$d.$\lambda$x.tall(x,d)

(35) Lucía is 120cm tall.

(36) λd.tall(lucia,d)



Background on gradable expressions

- Degree operators are scopally separated from their stem and interpreted in a higher syntactic position:

(37) [[-er/-est/POS C] 1 [Lucia is t_1-tall]]

- Degree operators compare the degrees to which the prejacent is true with the degrees made salient by an –explicit or implicit– comparison class C:

Background on gradable expressions

- Degree operators are scopally separated from their stem and interpreted in a higher syntactic position:

(37) [[-er/-est/POS C] 1 [Lucia is t_1-tall]]

- Degree operators compare the degrees to which the prejacent is true with the degrees made salient by an –explicit or implicit– comparison class C:

(38) a. Lucía is tall (for an 8-year old).
b. (Greta is 116cm). Lucía is taller (than that).
c. Lucía is tallest (among the girls in her class).

(39) $[\![$Lucía is tall (for an 8-year old)$]\!] = \text{TRUE}$ iff
θ ({λd.tall(ann,d), λd.tall(jonah,d), λd.tall(lucia,d), ...}) $\subseteq$
λd.tall(lucia,d)

Background on gradable expressions

- Gradable expressions are ambiguous between:
  - absolute reading: (40a)
  - relative reading: (40b)

(40) 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 (e.g., a 3-year old) to have.'

[Szabolcsi (1986); Heim (1999); Hackl (2009); Schwarz (2010); Solt (2011)]

Background on gradable expressions

- The exact relative reading depends on what element X_{ALT} acts as the source of alternatives leading to the comparison class C:
  - X_{ALT} may be **external** to the Noun Phrase hosting the gradable adjective: (41a,b), (42)

(41) Paul gave Mia [$_{NPhost}$ an expensive hat].

a. Relative to *Mia*$_{ALT}$:
'Paul gave Mia a hat that is expensive for somebody like Mia to get.'
E.g.: {x: x is a 3-yr old}

b. Relative to *Paul*$_{ALT}$:
'Paul gave Mia a hat that is expensive for somebody like Paul to give.'
E.g.: {x: x is unemployed}

(42) (For a 3-yr old / an unemployed person,) Paul gave Mia an expensive hat.

[Szabolcsi (1986); Heim (1999); Schwarz (2010)]

Background on gradable expressions

- The exact relative reading depends on what element X_{ALT} acts as the source of alternatives leading to the comparison class C:
  - X_{ALT} may be **external** to the Noun Phrase hosting the gradable adjective: (41a,b)
  - X_{ALT} may be **internal** to the Noun Phrase hosting the gradable adjective: (43)-(44)

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

(44) Relative with *car*$_{ALT}$:
(For the presents he has given her, this time) {x: x is present from R to K}
Rockefeller gave Kate [$_{NPhost}$ an inexpensive car$_{ALT}$].

[Romero (2021)]

Background on gradable expressions

Summary on gradable expressions:

- Gradable expressions decompose into STEM + POS/*-er*/*-est*
- In the relevant readings, POS scopes out of its host NP to gain sentential scope and it retrieves from the context comparison class C that matches the meaning of the sister of [POS C] by cycling in different alternatives to X_{ALT}.
- The source of alternatives X_{ALT} may be external or internal to the original host NP.

Addressing the challenge: Step 2

- We are now reading to go back to Westerståhl's sentence:

(45) Many Scandinavians have won the Nobel Prize in literature.

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- The goal is to derive the intended reading of this sentence while maintaining Conservativity.

- To do this, we will parsimoniously extend the analysis of gradable expressions above to the determiner *many*.

Addressing the challenge: Step 2

Ingredients of the proposal:

i. Like other gradable expressions, *many* can appear in positive, comparative or superlative form: (46).
In particular, the positive form *many* decomposes into the determiner stem MANY and the degree operator POS, defined in (47).

(46) a. many = MANY + POS
b. more = MANY + -er
c. most = MANY + -est

(47) $[\![\text{POS}]\!] = \lambda C_{<dt,t>}.\ \lambda P_{<d,t>}.\ \theta(C) \subseteq P$

(Hackl, 2000, 2009; Solt, 2011; Penka, 2011)

Addressing the challenge: Step 2

Ingredients of the proposal:

ii. There is only one proportional determiner MANY_{prop} and it is conservative.

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

(à la Partee (1989))

Addressing the challenge: Step 2

Ingredients of the proposal:

iii. Just as we saw with the relative reading of adjectives, POS in the determiners *many* scopes sententially and retrieves a comparison class C from its syntactic scope based on its X_{ALT}-associate. The exact reading obtained depends on the associate:

- When X_{ALT} is **external** to the original NP host, the FORWARD PROPORTIONAL reading arises.
- When X_{ALT} is **internal** to the original NP host, the REVERSE PROPORTIONAL reading obtains.

(Romero, 2021)

Deriving the forward proportional reading

(49) Many (of the faculty) children had a good$_{\textbf{ALT}}$ time.

(50) [[**POS C**] [1[**[**t_1-MANY$_{\text{prop}}$ children**]** had a good$_{\textbf{ALT}}$ time]] $\sim$ C]

(51) a. $[\![$1[t$_1$-MANY children had a good time]$]\!]$ $=$
λd.($|\{$x:child(x)$\} \cap \{$x:good-time(x)$\}|$: $|\{$x:child(x)$\}|$) $\geq$ d
$=$ the proportion of children that had a good time

b. $[\![$C$]\!] \subseteq \{\lambda$d'.($|\{$x:child(x)$\} \cap \{$x:good-time(x)$\}|$: $|\{$x:child(x)$\}|$) $\geq$ d',
$=$ the proportion of children that had a **good** time
λd'.($|\{$x:child(x)$\} \cap \{$x:bad-time(x)$\}|$: $|\{$x:child(x)$\}|$) $\geq$ d',
$=$ the proportion of children that had a **bad** time
λd'.($|\{$x:child(x)$\} \cap \{$x:regular-time(x)$\}|$: $|\{$x:child(x)$\}|$) $\geq$ d',
$=$ the proportion of children that had a **regular** time
$\ldots\}$

c. $\theta([\![$C$]\!]) \subseteq$
λd.($|\{$x:child(x)$\} \cap \{$x:good-time(x)$\}|$: $|\{$x:child(x)$\}|$) $\geq$ d

Deriving the reverse proportional reading

(52) Many Scandinavians$_{\textbf{ALT}}$ have won the Nobel Prize in literature.

(53) [[**POS C**] [1[**[**t_1-MANY$_{\text{prop}}$ Scandinavians$_{\textbf{ALT}}$**]** won NP]] $\sim$ C]

(54) a. $[\![$ 1[t$_1$-MANY Scandinavians won NP]$]\!]$ =
λd.(|{x:Scandin(x)} $\cap$ {x:won(x)}| : |{x:Scandin(x)}|) $\geq$ d
= the proportion of Scandinavians that won NP

b. $[\![$C$]\!]$ $\subseteq$ {λd'.(|{x:Scandin(x)} $\cap$ {x:won(x)}| : |{x:Scandin(x)}|) $\geq$ d',
= the proportion of **Scandinavians** that won NP
λd'.(|{x:Mediterr(x)} $\cap$ {x:won(x)}| : |{x:Mediterr(x)}|) $\geq$ d',
= the proportion of **Mediterraneans** that won NP
λd'.(|{x:MEastern(x)} $\cap$ {x:won(x)}| : |{x:MEastern(x)}|) $\geq$ d',
= the proportion of **MEastern** that won NP ...}

c. $\theta([\![$C$]\!])$ $\subseteq$
λd.(|{x:Scandin(x)} $\cap$ {x:won(x)}| : |{x:Scandin(x)}|) $\geq$ d

Assessing the obtained truth conditions

- Our original sentence again:

(55) Many $\textbf{[}_{\textbf{N'}}$ Scandinavians$_{\textbf{ALT}}$ $\textbf{]}$ $\textbf{[}_{\textbf{VP}}$ have won the NPlit $\textbf{]}$.

$$\text{Scandinavians} \Downarrow P \qquad \text{have won the NPlit} \Downarrow Q$$

$$ALT(P) = \{\ P, P_1, P_2, P_3, \ldots \}$$

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- Schema of truth conditions that we just derived:

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- Schema of truth conditions that, after revision, we targeted:

(57) $|P \cap Q| : |P| \quad > \quad \theta\ (\{|P' \cap Q| : |P'| : P' \in ALT(P)\})$

In sum

- The proposed analysis...
  - ... derives the desired, revised truth conditions for the reverse proportional reading of our original sentence...
  - ... by using interpretive mechanisms independently needed for gradable expressions in general and...
  - crucially while keeping the quantificational determiner stem MANY conservative.

(58) $[\![\text{POS}]\!] = \lambda C_{<dt,t>}.\ \lambda P_{<d,t>}.\ \theta(C) \subseteq P$

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- Hence, the Conservativity Universal can be maintained.

(60) Conservativity:
All lexical determiners (e.g., *every*, *some*, *no*) are conservative.

Outline

1 Introduction

2 Conservativity
- The Conservativity Universal
- A challenge
- Addressing the challenge: Step 1
- Background on gradable expressions
- Addressing the challenge: Step 2

3 p-to-Q Distributivity
- The p-to-Q Distributivity Universal
- Challenges

4 Conclusions

The p-to-Q Distributivity Universal

- Let us turn now to our potential compositional universal about attitude verbs:

(61) p-to-Q Distributivity:
All responsive attitude verbs are p-to-Q distributive.

The p-to-Q Distributivity Universal

- Let us turn now to our potential compositional universal about attitude verbs:

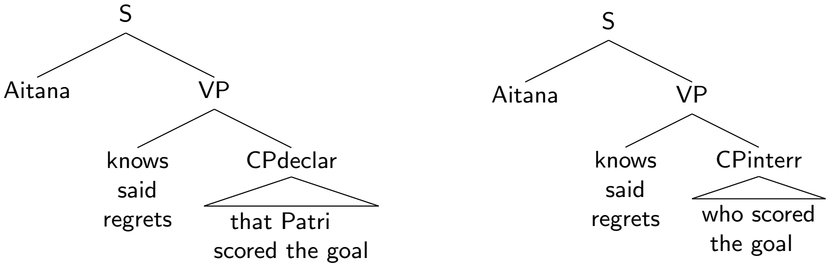
(61) p-to-Q Distributivity:
All responsive attitude verbs are p-to-Q distributive.

- But, first,... what exactly is a responsive attitude verb?
A verb that expresses an attitude (e.g., belief, desire) and combines both with declarative and with interrogative complement clauses:

(62) a. Aitana knows / said / regrets / thinks / *asked [$_{\text{CPdeclar}}$ that Patri scored].
b. Aitana knows / said / regrets / *thinks /asked [$_{\text{CPinterr}}$ who scored].

p-to-Q Distributivity

- We have, thus, two syntactic structures for responsive verbs:



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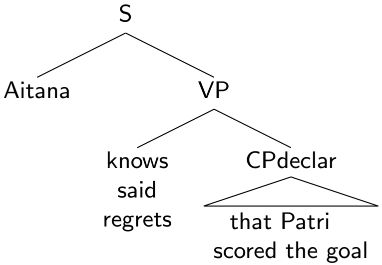

- The universal at hand concerns how these two structures interpretively relate to each other.

p-to-Q Distributivity

- A first, stronger version: C-Distributivity: (Spector & Egré, 2015)

(63) A verb V is c-distributive iff, for any question Q:
there is a possible answer p to Q such that $[\![\text{x Vs p}]\!] = \text{TRUE}$ $\Leftrightarrow$ $[\![\text{x Vs Q}]\!] = \text{TRUE}$

- A weaker version: p-to-Q Distributivity: (Roelofsen & Uegaki, 2020)

(64) A verb V is p-to-Q distributive iff, for any question Q:
there is a possible answer p to Q such that $[\![\text{x Vs p}]\!] = \text{TRUE}$ $\Rightarrow$ $[\![\text{x Vs Q}]\!] = \text{TRUE}$

The p-to-Q Distributivity Universal

- Testing p-to-Q distributivity on some sample responsive verbs:

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(65) English *to know* (factive): (a) $\Rightarrow$ (b)

a. Aitana knows [$_{\text{CPdeclar}}$ that Patri scored the goal].

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- Thus, all these verbs are p-to-Q distributive.

The p-to-Q Distributivity Universal

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(68) *shknow*: (a) $\not\Rightarrow$ (b)
⟦x shknows p⟧ = 'x knows p' and
⟦x shknows Q⟧ = 'x wonders p'. (Spector & Egré, 2015)

a. Aitana shknows (= 'knows') [$_{\text{CPdeclar}}$ that Patri scored the goal].

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a. Aitana shknows (= 'knows') [$_{\text{CPdeclar}}$ that Patri scored the goal].

b. Aitana shknows (= 'wonders') [$_{\text{CPdeclar}}$ who scored the goal].

(69) *knopinion*: (a) $\not\Rightarrow$ (b)
$[\![$x knopinions p$]\!]$ = 'x is opinionated about p' and
$[\![$x knopinions Q$]\!]$ = 'x knows Q'. (Steinert-Threlkeld, 2020)

a. Aitana knopinions (= 'is opinionated about') [$_{\text{CPdeclar}}$ that Patri scored the goal].

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a. Aitana knopinions (= 'is opinionated about') $[_{\text{CPdeclar}}$ that Patri scored the goal].

b. Aitana knopinions (= 'knows') $[_{\text{CPdeclar}}$ who scored the goal].

- Crucially, crosslinguistically –so says our universal– we do not find this kind of meaning composition in natural language.

Challenges

- After proposing p-to-Q Distributivity, Roelofsen & Uegaki (2020) note several exceptions or challenges to p-to-Q distributivity, leaving a more in-depth study for future research.

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- After proposing p-to-Q Distributivity, Roelofsen & Uegaki (2020) note several exceptions or challenges to p-to-Q distributivity, leaving a more in-depth study for future research.

- In our crosslinguistic MECORE study (Özyıldız et al., 2023), we find that, although p-to-Q Distributivity is a strong trend, exception patterns to p-to-Q Distributivity are not uncommon.

- Following Roelofsen & Uegaki (2020), the crosslinguistic exceptions found can be clustered into three main classes:
  - **i.** [x Vs p] and [x Vs Q] differ in the **veridicality** of the complement.
  - **ii.** [x Vs p] and [x Vs Q] differ in the **attitude** expressed by V.
  - **iii.** [x Vs p] and [x Vs Q] differ in the **content** towards which V expresses an attitude.

Challenge class (i)

- Challenge class **i**:
  The structures [x Vs p] and [x Vs Q] differ in the **veridicality** of the complement.
  This difference in veridicality disrupts p-to-Q distributivity.

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- Sample: (data from T. Klochowicz)

(70) Polish *wyjaśniła* 'explain': (a) $\not\Rightarrow$ (b)

a. Piotr wyjaśnił, że Maria wygrała wyścig. Non-veridical wrt p
   Piotr explained that Maria won the race
   'Piotr explained that Maria won the race' (... but in fact she didn't.)

b. Piotr wyjaśnił, która zawodniczka wygrała wyścig. Veridical wrt Q
   Piotr explained which player won the race
   'Piotr explained which player won the race (giving the correct answer).'

Challenge class (i)

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- Other verbs in this challenge class:
  - English *tell* (Karttunen (1977), but see Spector & Egré (2015) a.o.)
  - Buryat *hanaxa* ‘think/recall’ (Bondarenko, 2019)
  - Turkish *bil-* 'know (non-factive)’ (Özyıldız, 2017), *bildir-* ‘inform’.

Challenge class (ii)

- Challenge class **ii**:
  [x Vs p] and [x Vs Q] differ in the **attitude** expressed by V.
  The different nature of the attitude disrupts p-to-Q distributivity.

Challenge class (ii)

- Challenge class **ii**:
  [x Vs p] and [x Vs Q] differ in the **attitude** expressed by V.
  The different nature of the attitude disrupts p-to-Q distributivity.

- Sample: surprise/wonder alternation in Spanish *intrigar* 'intrigue'

(71) Spanish *intrigar* 'intrigue' (a) $\not\Rightarrow$ (b)
$[\![$x intrigues p$]\!]$ = 'x is surprised by p' and
$[\![$x intrigues Q$]\!]$= 'x wonders Q'.

a. A Pedro le intriga que Taylor Swift sea la mejor
To Pedro CL intrigues that Taylor Swift is.Subj the best
cantante del mundo.
singer of.the world
'It intrigues Pedro that T Swift is the best singer in the world.'

b. A Pedro le intriga quién es la mejor cantante del mundo.
To Pedro CL intrigues who is the best singer of.the world
'Pedro is intrigued by who is the best singer in the world.'

Challenge class (ii)

- Challenge class **ii**:
  [x Vs p] and [x Vs Q] differ in the **attitude** expressed by V.
  The different nature of the attitude disrupts p-to-Q distributivity.

- Other verbs in this challenge class:
  - The surprise/wonder alternation illustrated in (71) is also found in Tagalog *magtada* (Roelofsen & Uegaki, 2020), in Kiitharaka *rigara*, in Swedish *undra* as well as in several Japanese and Catalan verbs.
  - A belief/ignorance alternative is found with 'think' verbs including Swedish *tänka*, Turkish *düsün-* and Spanish *pensar*.

Challenge class (iii)

- Challenge class **iii**:
  The structures [x Vs p] and [x Vs Q] differ in the **content** towards which V expresses an attitude.
  The different nature of the content disrupts p-to-Q distributivity.

Challenge class (iii)

- Challenge class **iii**:
  The structures [x Vs p] and [x Vs Q] differ in the **content** towards which V expresses an attitude.
  The different nature of the content disrupts p-to-Q distributivity.

- Sample:

(72) Turkish *de-* 'say' (a) $\not\Rightarrow$ (b)
$[\![$x says p$]\!]$ = 'x produced a declarative clause with meaning p' and
$[\![$x says Q$]\!]$= 'x produced a interrogative clause with meaning Q'.

a. Tunç annesi Ankara'da dedi.
   Tunç his mom in Ankara said
   Tunç said that his (= Tunç's) mom was in Ankara.

b. Tunç annesi Ankara'da mı dedi.
   Tunç his mom in Ankara Q said
   Tunç said "Is his (=Tunç's) mom in Ankara?"

Challenge class (iii)

- Challenge class **iii**:
  The structures [x Vs p] and [x Vs Q] differ in the **content** towards which V expresses an attitude.
  The different nature of the content disrupts p-to-Q distributivity.

- Other verbs in this challenge class:
  - The linguistic production alternation illustrated in (72) is also found in other Turkish communication verbs: *yaz-* 'write' and *fısılda* 'whisper'
  - A explanans/explanandum alternation in found in English *explain* (Elliott, 2016; Pietroski, 2000)

In sum

- We have considered the composition universal of p-to-Q Distributivity:

(73) p-to-Q-Distributivity:
All responsive attitude verbs (e.g., *know*, *announce*, *say*) are p-to-Q distributive.

In sum

- We have considered the composition universal of p-to-Q Distributivity:

(73) p-to-Q-Distributivity:
All responsive attitude verbs (e.g., *know*, *announce*, *say*) are p-to-Q distributive.

- Several crosslinguistic patterns challenging this potential universal have by now been identified, pivoting around three interpretive differences between the structures [x Vs p] and [x Vs Q]:
  - i. difference in the **veridicality** of the complement.
  - ii. difference in the **attitude** expressed by V.
  - iii. difference in the **content** towards which V expresses an attitude.

In sum

- We have considered the composition universal of p-to-Q Distributivity:

(73) p-to-Q-Distributivity:
All responsive attitude verbs (e.g., *know*, *announce*, *say*) are p-to-Q distributive.

- Several crosslinguistic patterns challenging this potential universal have by now been identified, pivoting around three interpretive differences between the structures [x Vs p] and [x Vs Q]:
  - **i.** difference in the **veridicality** of the complement.
  - **ii.** difference in the **attitude** expressed by V.
  - **iii.** difference in the **content** towards which V expresses an attitude.

- Hence, unless these exceptional patterns can be explained away, this universal will have to be (further) revised.

Outline

1. Introduction
2. Conservativity
   - The Conservativity Universal
   - A challenge
   - Addressing the challenge: Step 1
   - Background on gradable expressions
   - Addressing the challenge: Step 2
3. p-to-Q Distributivity
   - The p-to-Q Distributivity Universal
   - Challenges
4. Conclusions

Conclusions

This talk has investigated two potential universals about the semantics of natural language:

- At the lexical level: Conservativity Universal
- At the composition level: p-to-Q Distributive Universal

Conclusions

(74)	Conservativity: All lexical determiners (e.g., *every*, *some*, *no*) are conservative.

We took the following steps:

- Challenge: reverse proportional reading of Westerståhl's (1985) example
- Step 1 to address the challenge: revised truth conditions
- Step 2 to address the challenge: decomposition of *many* into the determiner stem MANY and the positive degree operator POS, as independently needed for gradable expressions in general
- Hence, the Conservativity Universal can be maintained.

Conclusions

(75) p-to-Q Distributivity:
All responsive attitude verbs (e.g., *know*, *announce*, *say*) are p-to-Q distributive.

We took the following steps:

- We saw numerous challenges from crosslinguistic data, clustered in three classes:
    i. difference in the veridicality of the complement.
    ii. difference in the attitude expressed by V.
    iii. difference in the content towards which V expresses an attitude.
- Hence, the p-to-Q Distributivity Universal seems too strong in its present shape and may need to be (further) revised.

Collaborators on second universal: MECORE team

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Thank you for your attention!

Appendix

- Two descriptive characterizations of the reverse proportional reading in the literature:
  - Cohen (2001): The proportion $|P \cap Q|:|P|$ matters.
  - Herburger (1997): The proportion $|P \cap Q|:|P|$ does not matter.

Appendix

- Two descriptive characterizations of the reverse proportional reading in the literature:
  - Cohen (2001): The proportion $|P \cap Q|:|P|$ matters.
  - Herburger (1997): The proportion $|P \cap Q|:|P|$ does not matter.

- Herburger's characterization:

(76) Few cooks applied.

(77) The fellowship committee is sorting through the applications for travel funding to Paris. Without knowing how many applications there are, at an early point during the review process they observe that on average only every twentieth application was sent by a cook, which is a much lower percentage than they had anticipated. (Herburger, 1997, pp.61-2)

(78) Additional remark in text: the committee does not know "what percentage of all cooks the applying cooks constitute" (Herburger, 1997, p. 62).

Appendix

- Proposed analysis of Herburger's characterization in Romero (2021):

(79) $[\![\text{FEW}_{\mathsf{card}}]\!] = \lambda d_d.\lambda P_{<e,t>}.\lambda Q_{<e,t>}.|P \cap Q| < d$

(80) Few cooks applied at $pro_{0\mathbf{ALT}}$.

(81) a. LF: [0 [[POS $\mathrm{C}_{\mathrm{pro}_0}$] [1 [$t_1$-FEW cooks applied at $pro_{0\mathbf{ALT}}$]] $\sim$ $\mathrm{C}_{\mathrm{pro}_0}$]]

b. $[\![\mathit{1}\ [t_1\text{-FEW}\ \mathit{cooks\ applied\ at\ pro_0}]]\!] =$
$\lambda d.|\{x : \mathrm{cook}(x, g(0))\} \cap \{x : \mathrm{apply}(x, g(0))\}| < d$

c. $[\![C_{\mathrm{pro}_0}]\!] = [\![C]\!](g(0) \subseteq$
$\{\lambda d'.|\{x : \mathrm{cook}(x, w)\} \cap \{x : \mathrm{apply}(x, w)\}| < d' \ : \ w = g(0) \ \vee$
$w \in max_{Ste(g(0))}(Dox_x^+(g(0)) \cap$
$\underline{\lambda w''.|\{x : \mathrm{apply}(x, w'')\}| = |\{x : \mathrm{apply}(x, g(0))\}|})\}$

d. $\lambda w_0.\ L([\![C]\!](w_0)) \subseteq \lambda d.|\{x : \mathrm{cook}(x, w_0)\} \cap \{x : \mathrm{apply}(x, w_0)\}| < d$

Appendix

- Proposed analysis of Herburger's characterization in Bale & Schwarz (2020):

(82) $[\![\text{few}]\!] = \lambda d_d.\lambda P_{<e,t>}.\lambda Q_{<e,t>}.\ \mu(\sqcup(P \cap Q)) < d$

(83) a. $\mu = \lambda x.|x|$

b. $\mu = \lambda x.|x| : |\sqcup [\![\text{cooks}]\!]|$

c. $\mu = \lambda x.|x| : |\sqcup [\![\text{applied}]\!]|$

(84) There are more cars on Route 101 than on Route 104.

(85) a. $\mu_1 = \lambda x.|x| : \textsc{length}(\text{Route101})$

b. $\mu_2 = \lambda x.|x| : \textsc{length}(\text{Route104})$

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