Some Puzzles about Q-Adjectives, Contrasts and Cumulative Readings*

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0. Overview

Subject of today’s talk: a set of (I believe) related contrasts and puzzles, involving:
- Adjectives of quantity (Q-adjectives) many and few
- Cardinal numerals
- Cumulative interpretations
  (Cf. Solt 2006, 2007a, 2007b, 2009 for treatment of some of these facts)

I sketch out an account within the framework of a degree-based semantics of quantity

1. The puzzles

Parallels between few, many and cardinal numerals

(1) a. Few students presented at the workshop
   b. Many students presented at the workshop
   c. Three students presented at the workshop

(2) There are few/many/three/*every/*most students on the program

(3) The few/many/three students who presented (cf. *the every/most students)

Few vs. many (+ cardinal numerals)

(4) a. A few students presented at the workshop
   b. *A many students presented at the workshop
   c. *A three students presented at the workshop

- Why not treat a few as an idiom?

(5) a. A very few students presented at the workshop
   b. An incredibly few collectors have the good fortune to own one

Few (+ cardinal numerals) vs. many

(6) a. My parents visit every few weeks
   b. *My parents visit every many weeks
   c. My parents visit every three weeks

   • Many/few/three lucky students vs *lucky many/few/three students. But…

(7) a. We spent a busy few weeks preparing for the expedition
   b. *We spent a busy many weeks preparing for the expedition
   c. We spent a busy three weeks preparing for the expedition

(8) a. A lucky few students received fellowships
   b. *A lucky many students received fellowships
   c. A lucky three students received fellowships

Cardinal numerals vs. few/many:

- Cumulative/Distributive readings:

(9) a. Three boys ate seven apples [Krifka ’99] ✓Distrib ✓Cum
   b. Few boys ate seven apples ✓Distrib x Cum
   c. Many boys ate seven apples ✓Distrib x? Cum

(10) a. Three potatoes are (is?) enough to make a soup ✓Distrib ✓Cum
    b. Few potatoes are (is?) enough to make a soup ✓Distrib x Cum
    c. Many potatoes are (is?) enough to make a soup ✓Distrib x Cum

- Specific indefinite readings

(12) a. If three relatives of mine die, I’ll inherit a million dollars (Reinhardt ’97)
   ✓ There are 3 specific relatives s.t. if they (all) die, I get rich
   b. If few relatives of mine die, I’ll inherit a million dollars * There is a specific small group of relatives s.t. if they all die I get rich
   c. If many relatives of mine die, I’ll inherit a million dollars *? There is a specific large group of relatives s.t. if they all die I get rich

- But…

(13) a. If a few relatives of mine die, I’ll inherit a million dollars ✓ There are a few specific relatives s.t. if they (all) die, I get rich

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Few vs. fewer

(14) a. Few people drank 10 bottles of wine
   b. Fewer than 10 people drank 10 bottles of wine
   c. A few people drank 10 bottles of wine

(15) a. Few of our employees do 90% all of the work
   b. Fewer than 10 of our employees do 90% all of the work
   c. A few of our employees do 90% all of the work

(16) b. John finished his degree in few years
   a. John finished his degree in fewer than 6 years
   c. John finished his degree in a few years

2. Observation

Many of these patterns involve the interpretation of a plurality as a single unit:
- Cumulative readings
  - Every $n$ weeks/days/etc.
    - Chunk time into units of $n$ days/weeks/etc. and quantify over chunks
  
(17) For every 10 cups of coffee you buy, you get one free
- A lucky three students, etc.
(18) a. We spent three long days painting the house
   - Individual days ‘long’, but not necessarily consecutive
   b. We spent a long three days painting the house
   - A single unit of three days

(19) a. The essay consisted of five eloquent paragraphs separated by pages of gibberish
   b. The essay consisted of an eloquent five paragraphs separated by pages of gibberish

⇒ Question reduces to the constrains on when a plurality can receive a single unit interpretation

3. Framework

- Degrees as a basic type (type $d$)
  - Number as degree (dimension = cardinality)

- Quantity words denote degrees (cardinal numerals) or quantifiers over degrees (many/few)

(20) $[[\text{three}]] = 3$

(21) a. $[[\text{many}]] = \lambda I_{\text{std}}. R_{\text{std}} \subseteq I$
   b. $[[\text{few}]] = \lambda I_{\text{std}}. R_{\text{std}} \subseteq \text{INV}(I)$

where $R_{\text{std}}$ is a context-dependent range that serves as standard of comparison, and $\text{INV}(I)$ is the join complementary interval (set of degrees) to $I$ (cf. Heim 2006)

(22)

- Degrees linked to individuals via functional head Meas
(23) $[[\text{Meas}]] = \lambda x \lambda d. \mu_{\text{OM}}(x) = d$

- Put together:
(24) Three students attended
   a. SS: $[[DF [\text{Meas} [QP \text{three}] \text{ Meas students}]] \text{ attended}]$
   b. $[[\text{Meas students}]] = \lambda d \lambda x. *\text{student}(x) \land \mu_{\text{OM}}(x) = d$
   c. $[[\text{three Meas students}]] = [[\text{Meas students}]] ([[\text{three}]])$
   d. $[[\text{three Meas students attended}]] = \exists x (*\text{student}(x) \land \mu_{\text{OM}}(x) = 3 \land \text{attended}(x))$

(25) Few students attended
   a. SS: $[[DF [\text{Meas} [QP \text{many}] \text{ Meas students}]] \text{ attended}]$
   b. $[[\text{Meas students}]] = \lambda I_{\text{std}}. R_{\text{std}} \subseteq I$
   c. $[[\text{many}]] = \lambda I_{\text{std}}. R_{\text{std}} \subseteq \text{INV}(I)$

where $R_{\text{std}}$ is a context-dependent range that serves as standard of comparison, and $\text{INV}(I)$ is the join complementary interval (set of degrees) to $I$ (cf. Heim 2006)
4. Applied to Cumulative Readings (many/few vs. cardinal numerals)

Two locations where a numerical expression can be interpreted: ‘low’ (in situ within the DP; (26a)) or ‘high’ (after raising at LF; (26b))

(26) a. [DP three Meas potatoes]
b. many/fewi …… [DP d, Meas potatoes]

⇒ Hypothesis: The DP in (26a), but not that in (26b), can be interpreted cumulatively

- Cumulative interpretation requires that the DP be semantically complete, without variables that are bound from outside of it – hence three potatoes can be interpreted cumulatively, while many/few potatoes cannot

5. Extensions (many vs. cardinal numerals)

A lucky three students, etc.

- The single-unit interpretation (cf. (18), (19)) and the requirement for the indefinite article (in parallel to singular count nouns) suggests that noun phrases of this form are semantically singular

(27) a. a lucky three students
b. *lucky three students

- Can be modeled via group formation operator ↑ of Landman (2004), which maps pluralities into the corresponding group atoms (cf. Solt 2007)

(28) a⊔b⊔c is a plural individual, the “sum” of a, b and c

↑(a⊔b⊔c) is interpreted as “a, b and c as a unit,” an atom in its own right

Derivation:

(29) [[three Meas students]] = λx.*student(x) ∧ μDIM(x) = 3
[[lucky]] = λxATOM.X is lucky
[[lucky three Meas students]] =
= [[lucky]] ∧ ↑( [[three Meas students]])
= λxATOM.[lucky(x) ∧ ∃y[*student(x) ∧ μDIM(x) = 3 ∧ y = ↑x]]

Hypothesis: group atom formation operator ↑ cannot apply to an expression containing a variable bound externally, hence a lucky three students vs. *a lucky many students

(30) * Op, .... ↑(...d,...)

Every three weeks, etc.

- Involve the creation of new atoms (e.g. 3 weeks as an atomic unit) via ↑ operator?
  - Consistent with occurrence of every, otherwise found only with singular nouns (cf. every week vs. *every weeks).

6. Few vs. Fewer

Returning to a contrast between few and fewer:

(14) a. Few people drank 10 bottles of wine
   b. Fewer than 10 people drank 10 bottles of wine

By the above logic, fewer than 10 in (14a) must (at least optionally) be interpreted in situ; that is, on the cumulative interpretation we have the structure in (31a), not that in (31b)

(31) a. [DP fewer than 10 Meas people]
b. fewer than 10i …… [DP di Meas people]

- Perhaps something like this (cf. Krifka 1999):

(32) ∃x3y[people(x) ∧ μDIM(x) = d* ∧ bottle-of-wine(y) ∧ drank(x,y)],
   where 0 < d* < 10

Evidence from NPI licensing: fewer than n (like few) licenses NPIs in both subject and predicate (33), suggesting it has semantic scope over both (cf. (25)). But on the cumulative reading, fewer than n no longer licenses NPIs (34):

(33) a. Fewer than 10 people have ever tasted this wine
   b. Fewer than 10 people who have ever tasted this wine have purchased a bottle

(34) Fewer than 10 people ever drank 10 bottles of wine

How to derive (32) compositionally? And why is an equivalent possibility not available in the case of few (and many)? A possibility based on the decomposition of Q-adjectives:

(35) a. [[many]] = λd.I.d ± gap ⊆ I
   b. [[few]] = λd.I.d ± gap ⊆ INV(I)

(36) [[POS]] = λI.RStd ⊆ I
(37) [[-er than ]] = n
And now another contrast:

(38) a. \([\text{QP} \text{ fewer than } 3]\)
    b. \(\text{POS} \ldots \text{[QP d, few]}\)

⇒ Hypothesis: The QP in (38a) – but not that in (38b) – can undergo a shift from type \(\langle \text{dt, t} \rangle\) to type \(d\), and thus be interpreted \(\text{in situ}\) in a structure of the form in (32)

7. Few vs. Many

• A contrast remains between \(\text{few}\) and \(\text{many}\)

(6) a. We spent a busy few weeks preparing for the expedition
    b. *We spent a busy many weeks preparing for the expedition

(7) a. A lucky few students received fellowships
    b. *A lucky many students received fellowships

• Recall also:

(4) a. A few students presented at the workshop
    b. *A many students presented at the workshop

• And:

(14) a. Few people drank 10 bottles of wine
    b. A few people drank 10 bottles of wine

• Observation: while \(\text{few}\) is typically context-dependent, \((a)\) \(\text{few}\) in the above examples has a context-independent interpretation – a small number in the absolute sense

  o Suggests that there is a separate context-independent \(\text{few}\), which behaves like a cardinal numeral in allowing \(\text{in situ}\) interpretation

(39) A few students attended

\[\exists x [\text{student}(x) \land \nu_{\text{QM}}(x) = \text{d}_{\text{few}} \land \text{attended}(x)]\]

(cf. *A few students ever attended)

8. Summary – and Questions

• A reason for the contrast with \(\text{many}\) is also suggested – while some values (those close to 0) could be considered \(\text{few}\) regardless of context, what qualifies as \(\text{many}\) is necessarily determined by context

(40)

CARDINALITY

• I leave open how a representation of the form in (39) can be derived compositionally from the basic entry for \(\text{few}\) in (35)

References


