Non-maximality and homogeneity in collective predicates and absolute adjectives

Omri Amiraz, *The Hebrew University of Jerusalem*
omri.amiraz@mail.huji.ac.il

Overview. Sentences with definite plurals such as *The kids laughed* are known to display non-maximality and homogeneity. This is manifested not only in distributive predication but also in collective predication. However, I observe that collective predicates differ with respect to these properties: predicates like *gather* are non-maximal and homogeneous, while predicates like *fit in the trunk* are maximal and non-homogeneous. I argue that this distinction is parallel to a distinction in absolute gradable adjectives with totally-closed scales: *gather* patterns with adjectives like *open*, which have both maximum and minimum standard, while *fit in the trunk* patterns with adjectives like *full*, which only have a maximum standard. I account for the observed parallelism by analyzing collective predication using proportional scales.

Background. Dowty (1987) observes that some collective predicates are very liberal in their non-maximality. For example, (1) is judged as true in a scenario where just a few of the kids actually built the raft, and the others sat idly and watched. This is known as a team credit interpretation.

(1) The kids built a raft.

Križ (2016, 516-519) argues that some collective predicates are also homogeneous. In a scenario where half of the kids gathered in the schoolyard and the others gathered in the hall, neither (2a) nor (2b) is judged as true. Note, again, that (2b) is roughly equivalent to (2b-i) rather than (2b-ii).

(2) a. The kids gathered in the schoolyard.
b. The kids didn't gather in the schoolyard.
(i) $\approx$ No kids gathered in the schoolyard.
(ii) $\not\approx$ Not all of the kids gathered in the schoolyard.

Observation 1. I observe that both non-maximality and homogeneity are correlated with the *gather/numerous* distinction proposed in Dowty (1987). The *gather* type consists of predicates that are compatible with proportional quantifiers like *all* and *most of* (3). On the other hand, *numerous*-type predicates are incompatible with such quantifiers (4). The generalization proposed here is that *numerous*-type predicates are always non-homogeneous, i.e., they have complementary truth conditions with their negations (disregarding the vagueness of predicates like *numerous*, which is related to degree rather than proportion). For instance, the *numerous*-type predicate *elect Mary for president* is non-homogeneous since either (5a) or (5b) has to be true. The notion of non-maximality is not applicable to *numerous*-type predicates because it is related to proportion, and these predicates hold of an argument as an integral whole (Löbner, 2000; Corblin, 2008).

(3) {All / most of} the kids gathered in the schoolyard.

(4) ?{All / most of} the kids were numerous.

(5) a. The students elected Mary for president.
b. The students didn't elect Mary for president.

Observation 2. I further observe that collective predicates of the *gather* type differ in their non-maximality and homogeneity properties. As we have seen, the predicate *gather* is non-maximal and homogeneous (2). On the other hand, *fit in the trunk* (on its collective reading) is maximal and

non-homogeneous. This predicate belongs to the *gather* type since it is compatible with proportional quantifiers (6). However, it is maximal since (7a) does not allow for exceptions—it is true only if all of the suitcases fit in the trunk. If at least one suitcases does not fit, then (7a) is false and its negation (7b) is true. This means that *fit in trunk* is non-homogeneous since the truth conditions of the opposing sentences are complementary. Also note that (7b) is equivalent to (7b-ii) rather than (7b-i), unlike the pattern that we have observed in the case of *gather* (2).

(6) {All / most of} the suitcases fit in the trunk.

(7) a. The suitcases fit in the trunk.
b. The suitcases don't fit in the trunk.
(i) $\not\approx$ No suitcases fit in the trunk.
(ii) $\approx$ Not all of the suitcases fit in the trunk.

Observation 3. Kennedy (2007) distinguishes two types absolute adjectives with totally-closed scales: the *open* type and the *full* type. The *open* type has both maximum and minimum standard (8a), whereas the *full* type only has a maximum standard (8b).

(8) a. The window is {completely / slightly} open.
b. The glass is {completely / ?slightly} full.

I observe that the *open* type and the *full* type interact differently with negation. In the *open* type, negation denies that the argument possesses a minimal degree. As a result, (9b) is similar in meaning to (9b-i). On the other hand, in the *full* type, negation denies that the argument possesses a maximal degree, so (10b) is similar in meaning to (10b-ii). Note that the *open* type patterns with *gather* (2), while the *full* type patterns with *fit in the trunk* (7). This is summarized in Table 1. Table 1 further suggests a similarity between *numerous*-type predicates and non-gradable adjectives. Just like we cannot really talk about non-maximality with respect to *numerous*-type predicates, it makes no sense to say that loosely speaking, 7 is odd. Finally, non-gradable adjectives give rise to complementary truth conditions with their negations, e.g., 7 is either odd or not odd.

(9) a. The window is open.
b. The window isn't open.
(i) $\approx$ The window is closed.
(ii) $\not\approx$ The window isn't completely open.

(10) a. The glass is full.
b. The glass isn't full.
(i) $\not\approx$ The glass is empty.
(ii) $\approx$ The glass isn't completely full.

Analysis. Kennedy (2007) argues that out of context, *open*-type adjectives have a preference for a maximum standard interpretation in affirmative sentences (11a) and a minimum standard interpretation in negative sentences (11b). However, even in affirmative sentences, a minimum standard interpretation can be made salient by the context (11c). Kennedy ascribes these preferences to a Strongest Meaning Hypothesis (SMH) mechanism.

(11) a. The window is open. (maximum standard preferred)

b. The window isn't open. (minimum standard preferred)
c. The window is almost closed, but not quite. It's still open.

Interestingly, this is exactly the analysis that Krifka (1996) proposes for plural predication. Krifka (1996, 146) proposes that "[i]f a predicate P applies to a sum individual x, grammar does not fix whether the predication is universal ($\forall y[y \sqsubseteq x \rightarrow P(y)]$) or rather existential ($\exists y[y \sqsubseteq x \rightarrow P(y)]$), except if there is explicit information that enforces one or the other interpretation." Given SMH, in affirmative sentences there is a preference for universal (=maximum standard) interpretation, while in negative sentences there is a preference for existential (=minimum standard) interpretation.
In Krifka (1996), plural distributive predication is stipulated to be underspecified between universal and existential quantification. I argue that we can ground this stipulation in scale structure. *Gather*-type predicates and plural distributive predicates are associated with a proportional scale. Such scales are totally closed by definition. By default, predicates with totally-closed scales can have both maximum and minimum standard (Kennedy, 2007). I believe that unifying these two seemingly unrelated phenomena lends support to both of these analyses.
Proportional scales. Solt (2018) proposes that proportional readings of comparatives involve a proportional measure function, which maps parts of an entity to the proportion they represent of the totality (12). This measure function is introduced by a null functional head *Meas* (13).

(12) A PROPORTIONAL MEASURE FUNCTION is a function of the following form:
For $y \sqsubseteq x : \mu^c_{DIM;x}(y) = \mu^c_{DIM-prop;x}(y) = \frac{\mu^c_{DIM}(y)}{\mu^c_{DIM}(x)}$

(13) $[\![\textit{Meas}_A]\!]^c = \lambda P_{\langle et\rangle}\lambda d\lambda x.\exists y[y \sqsubseteq x \wedge \mu^c_{DIM-prop;\bigoplus x}(y) = d \wedge P(y)]$

The notion of proportional scales invites a comparison between degree modifiers (14a) and proportional modifiers (15a)—the former involve degree scales, and the latter involve proportional scales. Furthermore, just like we can ask how tall John has to be to qualify as tall (14b), we can also ask how much of the door has to be wooden for the door itself to be considered wooden (15b).

(14) a. John is 6 feet tall. (measure phrase)
b. John is tall. (positive form)

(15) a. This door is 80% wooden. (proportion phrase)
b. This door is wooden. (positive form)

I assume that *Meas* is present in the positive form, and a null *pos* morpheme saturates the degree argument introduced by *Meas* (16). This allows us to derive non-maximality and homogeneity.

(16) This door is [$_{MeasP}$ *pos* *Meas*$_A$ [$_{AP}$ wooden]].

Non-maximality is due to the possibility of choosing between maximum and minimum standard. Consider the following example: in a Paris university, students protest by blocking the entrance to the elevator. There are 200 students involved in these protests, and they take turns in blocking the elevator. Marie, a professor at the university, walks into the building and sees five students in front of the elevator. Then, Marie says (17) to her colleague. In this scenario, *gather* allows for extreme non-maximality due to a team credit interpretation. Finally, homogeneity (2) is due to a preference for maximum standard in affirmative sentences and minimum standard in negative sentences.

(17) The students are gathering in front of the elevator again. We'll have to take the stairs.

Table 1: Partial taxonomy of predicates

	gather-type predicates / absolute gradable adjective		*numerous*-type predicates / non-gradable adjectives
Standard of comparison	Max + Min	Max	Non-scalar
Scale introduced by Adjective	*open*	*full*	*odd*
Scale introduced by *Meas*	*gather*	*fit in the trunk*	*be numerous*
Degree/proportional modification	✓	✓	✗
Non-maximality	non-maximal	maximal	NA
Homogeneity	homogeneous	non-homogeneous	non-homogeneous

References

Corblin, F. (2008). Des prédicats non-quantifiables: Les prédicats holistes. *Langages 169*, 34–56.

Dowty, D. (1987). Collective predicates, distributive predicates and *all*. In A. Miller and Z. sheng Zhang (Eds.), *Eastern States Conference on Linguistics (ESCOL) 3*, pp. 97–115.

Kennedy, C. (2007). Vagueness and grammar: The semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy 30*(1), 1–45.

Krifka, M. (1996). Pragmatic strengthening in plural predications and donkey sentences. In T. Galloway and J. Spence (Eds.), *Semantics and Linguistic Theory (SALT) 6*, pp. 136–153.

Križ, M. (2016). Homogeneity, non-maximality, and *all*. *Journal of Semantics 33*(3), 493–539.

Križ, M. and B. Spector (2017). Interpreting plural predication: Homogeneity and non-maximality. *Ms., Institut Jean-Nicod*.

Löbner, S. (2000). Polarity in natural language: Predication, quantification and negation in particular and characterizing sentences. *Linguistics and Philosophy 23*(3), 213–308.

Malamud, S. A. (2012). The meaning of plural definites: A decision-theoretic approach. *Semantics and Pragmatics 5*, 3:1–58.

Solt, S. (2018). Proportional comparatives and relative scales. In R. Truswel, C. Cummins, C. Heycock, B. Rabern, and H. Rohde (Eds.), *Sinn und Bedeutung 21*, pp. 1123–1140.