

Homogeneity and (under)specification with non-distributive predicates

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Overview. We propose an account of Homogeneity phenomena which utilizes a trivalent semantics for the pluralization operator $*$ and relativization to covers (building on but departing from Schwarzschild 1994). The main advantage of the proposal is its ability to account for ‘non-homogeneous’ plural predication as the result of a specific cover-type.

Homogeneity properties of predicates. Homogeneity is manifested in the fact that (1a) and (1b) are both not true if some but not all of the kids laughed (abstracting away from Non-maximality, see e.g. Križ 2015). Križ (2015) observed the existence of Homogeneity with non-distributive predication: Both (1c) and (1d) are not true if half of the kids lifted the piano together (and no one else did). However, for all existing accounts of Homogeneity with non-distributive predication (Križ 2015; Križ and Spector 2017) a stipulation is needed for explaining why ‘non-homogeneous’ plural predication is possible: On collective construals, (2a) is true if the plurality consisting of all bottles is light, and otherwise (2b) is true, regardless of whether any individual bottles are light.

- (1) ‘Homogeneous’ predication:
 - a. The kids laughed.
 - b. The kids didn’t laugh.
 - c. The kids lifted the piano.
 - d. The kids didn’t lift the piano.
- (2) ‘Non-homogeneous’ predication:
 - a. The bottles are light.
 - b. The bottles aren’t light.
 - c. The bottles are heavy.
 - d. The bottles aren’t heavy.

Correlation with Specification properties. Furthermore, we point out a correlation which isn’t captured by previous accounts between Homogeneity properties of predicates and their Specification properties, i.e., whether they give rise to readings which are underspecified with respect to distributivity and collectivity (henceforth: US-predicates) or to specified (distributive or collective) ones (henceforth: S-predicates). We claim that US-predicates are ‘homogeneous’ and S-predicates are ‘non-homogeneous’. To establish this correlation, we point out that tests for specification vs. underspecification lead to different results when applied to ‘homogeneous’ and ‘non-homogeneous’ (non-distributive) predicates compatible with distributive and collective situations: (a) *Negation*: while (2d) has a distributive meaning compatible with all the bottles together being light, (1d) does not have a reading compatible with all the kids together lifting the piano; (b) *Universal quantification*: While it’s possible to quantify universally over *the kids lifted the piano* for describing both distributive and collective scenarios, (3a), it is impossible to do the same with *the bottles cost 6 dollars*, (3b); (c) *Objections*: only ‘non-homogeneous’ plural predication can be objected to based on a collective understanding knowing that it holds distributively (compare (4) to (5)).

- (3) a. [Context: Last week each of the kids at my kid’s school lifted the piano alone, yesterday they did it together.]
On both occasions the kids lifted the piano.
 - b. [Context: Last week at the store there were 3 toys which cost 6 dollars each. Yesterday they were sold together for 6 dollars.]
?? On both occasions the toys cost 6 dollars.
- (4) [Context: B thinks that each of the bottles is light but taken together they are heavy.]
A: The bottles are light enough to carry.
B: What? That’s not true! (Oh, you mean individually.)

- (5) [Context: B thinks that the kids lifted the piano individually, but not together.]
 A: The kids lifted the piano.
 B: #What? That’s not true! (Oh, you mean individually.)

The correlation between Specification and Homogeneity calls for a principled explanation. We first present a view of Pluralization which allows specified and underspecified meanings, and then propose a way to tie Homogeneity to Pluralization to account for the correlation.

*** and covers.** We follow Schwarzschild (1991); Heim (1994) who propose to account for the availability of both specified and underspecified meanings by assuming that the pluralization operator is Link’s (1983) * operator which is relativized to contextually-supplied covers:

- (6) a. $\llbracket *_{Cov} \rrbracket^c(P)(x) = 1$ iff $\exists P' \subseteq P \cap Cov_x^c[\sqcup P' = x]$
 b. P covers x iff $\exists P' \subseteq P[\sqcup P' = x]$ (Cov_x^c is a contextually supplied cover of x)

* yields an underspecified meaning when Cov_x^c is a TOTAL cover of x (i.e., it contains all parts of x). It yields specified meanings when the cover is MINIMAL (i.e., has no proper subset which covers x): a distributive one when it’s MINIMAL-ATOMIC (i.e., contains all atomic parts of x) and a collective one when it’s MINIMAL-SINGLETON (i.e., it contains x). To capture the differences between US-predicates and S-predicates pointed out above we put forward the novel hypothesis that different predicates associate with different cover-types:

- (7) **Association between predicates and cover-types:**
 a. TOTAL cover (US-predicates): *lift the piano, perform Hamlet, gather.*
 b. MINIMAL cover (S-predicates): *cost 6 dollars, be heavy, be light, be numerous.*

We further assume (following Schwarzschild 1994; Kratzer 2007) that there are no *-less LFs when predicating over pluralities (otherwise purely collective readings would freely sneak in).

Homogenizing *. We further follow Schwarzschild (1994) in assuming that a trivalent semantics for * is responsible for Homogeneity. Schwarzschild’s own proposal however does not account for Homogeneity with non-distributive predicates. We hence propose an alternative way to homogenize *, by defining the following falsity conditions of * (note the replacement of ‘=’ in (6a) with ‘ \sqsupseteq ’):

- (8) $\llbracket *_{Cov} \rrbracket^c(P)(x) = 0$ iff $\neg \exists P' \subseteq P \cap Cov_x^c[\sqcup P' \sqsupseteq x]$

Importantly, given this trivalent semantics for * (1d) entails that no plurality of kids lifted the piano (assuming that adding negation doesn’t change the cover associated with the predicate, i.e., it is TOTAL). The truth conditions of (2b)/(2d) are however different. Since the cover associated with *light* and with *heavy* is MINIMAL, they have two meanings: if the cover is ATOMIC we get distributive meanings according to which no atomic bottle is light/heavy (regardless of whether non-atomic pluralities of bottles are); and if instead the cover is a SINGLETON cover we get collective meanings according to which the plurality containing all bottles isn’t light/heavy (regardless of whether other pluralities are). The Homogeneity properties of predicates hence follow from the analysis of their specification properties (association with cover-types) together with our trivalent semantics for *.

References. Heim, I.: 1994, ‘Plurals’, Lecture notes. Kratzer, A.: 2007, ‘On the plurality of verbs’, *Event structures in linguistic form and interpretation*, 269–300. Križ, M. and B. Spector: 2017, ‘Interpreting Plural Predication: Homogeneity and Non-Maximality’, Ms., Institut Jean Nicod. Križ, M.: 2015, *Aspects of Homogeneity in the Semantics of Natural Language*, Ph.D. thesis, University of Vienna. Link, G.: 1983, ‘The logical analysis of plurals and mass terms: A lattice theoretical approach’, in R. Bäuerle, C. Schwarze and A. von Stechow (eds.), *Meaning, use, and interpretation of language*, Walter de Gruyter, pp. 127–144. Schwarzschild, R.: 1994, ‘Plurals, presuppositions and the sources of distributivity’, *Natural Language Semantics* 2(3), 201–248. Schwarzschild, R. S.: 1991, *On the Meaning of Definite Plural Noun Phrases*, Ph.D. thesis, University of Massachusetts at Amherst.