Pluralities vs. clusters: A view from Ukrainian singulatives

Introduction. Singulatives are derived unit nouns, i.e., expressions designating a singular object individuated from a plurality perceived as a homogeneous collection of entities. Singulative morphology is attested cross-linguistically, e.g., in Brittonic Celtic, Semitic, Cushitic, Nilo-Saharan, Algonquian and East Slavic, and is puzzling since it reverses the markedness of the singular/plural distinction (Wierzbicka 1988, Corbett 2000, Dimmendaal 2000, Mathieu 2014, Acquaviva 2015, Dali & Mathieu 2021, Kagan & Nurmio t.a., Kagan et al. t.a.). Though recent research revealed the theoretical relevance of various types of singulative formations, the meaning of singualtives is still not well understood. In this paper we will examine Ukrainian word formations such as (11)–(12) and propose a meretopological analysis on which the singulative morpheme *-yna* is an atomizer of sorts (Scontras 2014). It selects for an aggregate predicate, i.e., a property of entities prototypically conceptualized as clusters, and turns it into a predicate of discrete singular integrated wholes.

Data. Based on a sample of 44 frequent Ukrainian singulatives derived with the suffix *-yna*, we formulate the following generalizations. The suffix *-yna* always attaches to an uncountable concrete noun to form a countable concrete unit noun, which can pluralize and combine with cardinal numerals (13)–(14). The base is typically an aggregate noun, i.e., an expression designating entities naturally perceived as forming cohesive collections, see Table 1. These include granulars such as names of seeds, clustered plants, 'sand', 'hail', 'snow', 'sugar' etc., object mass nouns designating artifacts like clothing, jewelry, dishes, garbage etc. and animate collectives of the 'cattle' type. Singulatives are not formed from solid homogeneous substance mass nouns; neither from prototypical liquid mass nouns, though they are occasionally derived from terms like 'rain' and 'dew', which typically designate collections of drops rather than a homogeneous body of substance. In several food terms like 'carrot' and 'cabbage', the base is ambiguous between the count and the mass sense. We argue that in such cases the singulative is always derived from the mass sense, which gives rise to seemingly redundant triplets like *kartopl'a* '(a) potato(es)' ~ *kartopl'i* 'potatoes' ~ *kartoplyna* 'a potato'. In addition, the singulative can be also formed from a derived spatial collective noun (Wągiel 2021), which results in a few complex series such as *pero* 'a feather' ~ *pera* 'feathers' ~ *pirja* 'feathers as a mass' ~ *pirjina* 'a feather' ~ *pirjiny* 'feathers'.

Puzzles. Unlike Arabic and Celtic which form singulatives from virtually any kind of concrete nouns (Mathieu 2014), singulative formation in Ukrainian is significantly more restrained. The suffix *-yna* combines only with a restricted set of nominal expressions. Furthermore, at first blush pluralization of singulatives seems redundant given that the base can already refer to a plurality. We argue that previous approaches to singulatives do not provide a satisfactory account for the Ukrainian data, and thus we propose a semantic explanation to these puzzles.

Analysis. In order to account for structured parthood, we follow Grimm (2012) and adopt mereotopology, a theory of wholes extending standard mereology with topological notions (Casati & Varzi 1999). In mereotopology, CONNECTEDNESS (C) allows for capturing a configuration in which two entities share a boundary. Given C, it is possible to define more complex mereotopological notions to capture subtle distinctions between different spatial configurations. For instance, an entity is SELF-CONNECTED (SC) iff any two parts that form the whole of that entity are connected to each other (1) (O stands for overlap). A stronger notion of STRONGLY SELF-CONNECTED (SSC) captures entities whose interiors are also self-connected (2). Finally, an entity is MAXIMALLY STRONGLY SELF-CONNECTED (MSSC) if (i) every part of that entity is connected to (overlaps) the whole (strongly self-connected) and (ii) anything else which overlaps it and is strongly self-connected is

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once again part of it (maximality). The notion of MSSC allows for distinguishing between integrated wholes from other mereological objects such as scattered entities and arbitrary sums.

(1) $\text{SC}(x) \overset{\text{def}}{=} \forall y \forall z [\forall w [\text{O}(w,x) \leftrightarrow (\text{O}(w,y) \lor \text{O}(w,z))] \rightarrow \text{C}(y,z)]$

(2) $\text{SSC}(x) \overset{\text{def}}{=} \text{SC}(x) \land \text{SC}(\text{INT}(x))$

(3) $\text{MSSC}(P)(x) \overset{\text{def}}{=} P(x) \land \text{SSC}(x) \land \forall y [P(y) \land \text{SSC}(y) \land \text{O}(y,x) \rightarrow y \sqsubseteq x]$

Furthermore, inspired by Grimm (2012) we propose a revised formulation of the property TRANSITIVELY CONNECTED (TC) (4), which determines whether two objects are connected through a series of mediating entities. In addition, TC allows for defining the concept of CLUSTER (CLSTR) (5) (again, a revised definition). An entity x is a cluster relative to a connection relation C and a property P iff x is a sum of entities falling under the same property which are all transitively connected relative to some subset of a sequence Z under the same property and connection relation.

(4) For a finite sequence $Z = \langle z_1, \ldots, z_n \rangle$, $\text{TC}(x, y, P, C, Z)$ holds iff $z_1 = x, z_n = y, \text{C}(z_i, z_{i+1})$ holds for $1 \le i < n$ and $P(z_i)$ holds for $1 \le i \le n$.

(5) $\text{CLSTR}_C(P)(x) \overset{\text{def}}{=} \exists Z [x = \bigsqcup Z \land \forall z \forall z' \in Z \exists Y \subseteq Z [\text{TC}(z, z', P, C, Y)]]$

Definitions (1)–(5) allow us to distinguish between predicates of integrated objects (MSSC entities) (6), plurals captured via Link's (1983) *-operator and aggregate predicates, which prototypically denote properties of clusters, but are also true of MSSC objects and arbitrary sums thereof (7).

(6) $\text{OBJ}(P) \overset{\text{def}}{=} \forall x [P(x) \rightarrow \text{MSSC}(P)(x)]$

(7) $\text{AGGR}(P) \overset{\text{def}}{=} \forall x [P(x) \rightarrow \text{CLSTR}(P)(x) \lor {}^*P(x) \lor \text{MSSC}(P)(x)]$

Let us now propose the semantics for Ukrainian singulatives. First of all, following Grimm (2012) we assume that in Ukrainian, similarly as in English, granular nouns corresponding to 'sand' and 'hail' denote aggregate predicates (8). The suffix *-yna* denotes a predicate modifier that takes an aggregate predicate and yields a predicate of MSSC objects (9). Thus, when it combines with (8), we obtain the truth conditions in (10), specifically the singulative *hradyna* denotes a set of separate hailstones. This accounts for the effect of the singulative designating a unit within an aggregate. Applying * to such a predicate would yield a set of arbitrary sums. From a mereotopological perspective, such arbitrary sums are different entities than clusters, and thus pluralized singulatives are not redundant. In fact, they differ semantically from the base expressions they are derived from.

(8) $[\![\text{hrad}]\!] = \lambda x [\text{CLSTR}(\text{HAIL})(x) \lor {}^*\text{HAIL}(x) \lor \text{MSSC}(\text{HAIL})(x)]$

(9) $[\![\text{-yna}]\!] = \lambda P : \text{AGGR}(P)\ \lambda x \exists y [P(y) \land x \sqsubseteq y \land \text{MSSC}(P)(x)]$

(10) $[\![\text{hradyna}]\!] = [\![\text{-yna}]\!]([\![\text{hrad}]\!]) = \lambda x \exists y [[\![\text{hrad}]\!](y) \land x \sqsubseteq y \land \text{MSSC}([\![\text{hrad}]\!])(x)]$

Conclusion. The main advantage of our analysis compared to other accounts is that by modelling structured part-whole relations in mereotopological terms it neatly captures the intuitions concerning individuation and the relationship between singulatives and uncountable predicates they are derived from. Unlike regular plurals, which simply designate arbitrary sums of objects, aggregate predicates designate structured pluralities, i.e., collections conceptualized as clusters. Ukrainian singulative morphology yields integrated objects from those clusters. Hence, pluralization of singulatives is not redundant since it expresses a different type of part-whole structure. This is further corroborated by the following series, where the use of the pluralized singulative implies disconnectedness: *brov-a* 'an eyebrow' ~ *brov-y* 'eyebrows' ~ *%brov-yn-a* 'an eyebrow' ~ *%brov-yn-y* 'eyebrows (on different faces)'. Consequently, our proposal accounts naturally for the distributional properties of Ukrainian singulatives, e.g., the fact that they are formed from predicates of entities conceptualized as clusters and never from abstract nouns receive a straightforward explanation.

(11) pisok ⇒ pišč-yna
      sand   sand-SGV
      'sand' ⇒ 'a grain of sand'

(12) hrad ⇒ hrad-yna
      hail   hail-SGV
      'hail' ⇒ 'a hailstone'

(13) *dvi trav-y   ~ dvi trav-yn-y
      two grass-PL   two grass-SGV-PL
      '*two grasses' ~ 'two grass blades'

(14) *dvi odež-i   ~ dvi odež-yn-y
      two clothing-PL   two clothing-SGV-PL
      '*two clothings' ~ 'two items of clothing'

Table 1: Ukrainian singulatives: types of derivational bases

	GRANULAR	OBJECT MASS	AMBIGUOUS	LIQUID	PL TANTUM
BASE	*žyto*	*posud*	*cybuľa*	*rosa*	*korali*
	'rye'	'dishes'	'onion(s)'	'dew'	'coral beads'
SINGULATIVE	*žytyna*	*posudyna*	*cybulyna*	*rosyna*	*koralyna*
	'a grain of rye'	'a dish'	'an onion'	'a dew drop'	'a coral bead'

References. Acquaviva (2015) *Singulatives* • Casati & Varzi (1997) *Parts and places* • Corbett (2000) *Number* • Dali & Mathieu (2021) *Singulative systems* • Dimmendaal (2000) *Number marking and noun categorization in Nilo-Saharan languages* • Grimm (2012) *Number and individuation* • Kagan, Geist & Erschler (t.a.) *Mass-count distinction and the Russian singulative suffix -in* • Kagan & Nurmio (t.a.) *Diminutive or singulative? The suffixes -in and -k in Russian* • Mathieu (2014) *Flavors of division* • Link (1983) *The logical analysis of plural and mass nouns* • Scontras (2014) *The semantics of measurement* • Wągiel (2021) *Slavic derived collective nouns as spatial and social clusters* • Wierzbicka (1988) *The semantics of grammar*