Unifying underspecification in bare plural generics and plural definite sentences

Flavia Naehrlich

Summary: Bare plural generics (*short:* generics) have varying truth-conditional content and defy unification (e.g., Carlson, 1977; Leslie, 2007). Similar behavior in plural definite (*short:* PD) sentences is attributed to homogeneity and non-maximality (e.g., Križ, 2015). Križ and Spector (2021) [*short:*K&S] explain the underspecification of PD sentences via a context-dependent homogeneity parameter that accompanies the predicate. Exploiting K&S's notion of a predicate-dependent parameter, I present a uniform semantic analysis of non-maximality in bare plural generics and plural definite sentences. In the account, generics are relativized to a global context which supplements K&S's notion of contextual relevance with a shared common ground and a notion of shared cognition. A context-dependent saliency parameter selects cognitively salient evidence individuals from the referenced plurality (e.g., *'ravens'* in (1)). Salient individuals determine the informative content of a generic/plural definite sentence. Non-salient individuals raise behaviorally relevant issues, represented as inquisitive content (cf. Ciardelli et al., 2018).

Parallels between generics and PD sentences: Both, PD sentences and generics, are instances of predication over plural objects. Different from quantified statements (e.g. *all*, *some*, *most*, *none*), they do not come with an articulated operator[1] that explicitly specifies the truth-conditions of the plural predication. In addition, the underspecified meaning of PD sentences patterns with established idiosyncrasies of generics. Like PD sentences, generics display homogeneity effects: *'Dogs are intelligent.'* is true if dogs are usually intelligent, and false if they are usually not (Križ, 2015).

(1) Ravens are black. (2) Mosquitoes carry malaria. (3) Ducks lay eggs.

Generics, like PDs, tolerate exceptions; e.g. (1) is true because the majority of ravens is, in fact, black and only a few strange exceptions such as white albinos are not. Moreover, there are existential readings of generics as well as contexts that give rise to *quasi-existential* readings of PD sentences. Malamud (2012) (following Krifka (1996)) put forward the SAFE HOUSE example: A house is not safe from a storm even if only one or a few windows are open. This gives rise to a reading of *'The windows are open.'* that is true in an existential scenario. The same can happen with generics: a very small percentage of infected mosquitoes suffices for the truth of (2). This is, according to Leslie (2007) due to the implied health threat and the fact that all mosquitoes are genetically disposed to be carriers of the disease. In contrast to (2), *'Insects carry malaria.'* is false because we know that flies, for instance, cannot carry malaria and, therefore, are no threat. These data suggest that generic plural predication is - just like underspecified plural definite sentences - context dependent. Križ (2015) attempts to capture non-maximality as is appears in the examples described above in both, PD sentences and generics. However, he highlights that there is a type of exception tolerance in generics, namely subgroup readings like (3), that he cannot account for. We judge (3) as true even though a natural subgroup of ducks, namely the males, cannot lay eggs and not all of the females can lay eggs or do so.

Desiderata: Different from Križ, I argue that we need to analyze underspecification in generics uniformly; simply because (1-3) represent the very same linguistic construction, namely predication over bare plurals in an out-of-the-blue context. Furthermore, the striking parallels between

[1] For K&S, the role of the definite determiner *'the'* is merely to select the maximal plural individual in the given episodic context: $[\![the]\!]^{w,\mathscr{H}} = \lambda P_{\langle e,t\rangle}.\max(P)$; $[\![the\ books]\!]^{w,\mathscr{H}} = \max(books'_w)$.

non-maximal readings of generics and PD sentences we observe above indicate that both constructions display the same type of non-maximality. Therefore, we need a unified account that explains both, non-maximality in generics as well as in PD sentences. In order to achieve that, we can think of the interplay of non-maximality and homogeneity as the tendency to generalize. In this view, the crucial semantic difference between PDs and generics is the referenced plural domain. PD sentences (in English) are episodic and reference a restricted domain. In the case of generics, the referenced plural domain is extracted from a global context. This difference regarding the plural domain is accounted for by K&S, see Footnote 1. Below, I put forward an account that unifies underspecification in generics like (1-3) and can explain non-maximal readings in both, PD sentences and generics. Providing examples how the account applies to PD sentences is beyond the scope of this abstract. Hence, we focus on unifying generics for the remainder of this text. Due to my knowledge, no previous account has achieved this without distinguishing between cases, relying on probability or denying that a formal linguistic analysis is possible (cf. Cohen, 2004; Leslie, 2007; Rooij and Schulz, 2020; Nguyen, 2020).

Proposal: Existing accounts (Križ, 2016, K&S) of the meaning of English plural definite sentences provide a starting point to formally account for the versatile truth-conditions of bare plural generics. These accounts treat non-maximality as a specific form of context-dependence. Because K&S do not introduce context-dependence via the plural constituent but via a homogeneity parameter that accompanies the predicate, the parameter may appear for episodic and global predication alike. Leslie (2007, 2008, 2015, 2017) and other authors (e.g., Nguyen, 2020) plausibly connect the exceptionally flexible truth-conditional content of generics to basic cognitive mechanisms. My account integrates the irrefutable role of cognitive biases via a saliency parameter that is like K&S's homogeneity parameter context-dependent and accompanies the predicate. In this way, we achieve a unified formal analysis of bare plural generics whilst acknowledging the importance of fundamental cognitive mechanisms for their interpretation. To capture (1-3), and beyond, in one (non-probabilistic(!)) semantic entry, we construct a global context C_G, a saliency parameter $\mathscr{S}_{C_G}$, and distinguish informative and inquisitive content (cf. Ciardelli et al., 2018).

I. Global context: We can assess the truth of bare plural generics such as (1-3) without context because we invoke common ground belief w.r.t. the referenced global plural domain. To account for that, I construct a global context C_G that combines common ground and discourse context. C_G represents not only our knowledge base (declarative propositions) but also issues we care about (inquisitive propositions/questions) in a discourse context or in general (e.g., we avoid health threats).

II. Saliency parameter: We assume that generic plural predication (just like K&S assume for plural definite sentences) is guided by a context-dependent parameter that accompanies the predicate (*not* the plural(!)). Instead of filtering out strongly relevant candidate interpretations w.r.t. a *current issue* like K&S, we filter out cognitively salient individuals that might or might not be salient due to a contextually relevant issue.[2] The saliency parameter $\mathscr{S}_{C_G}$ depends on the global context C_G and filters out cognitively salient individuals. They represent pieces of information that we treat as evidence. Salient individuals are what first crosses our mind (heavily influenced by cognitive biases) when we hear a sentence such as say (1), or *'Women can't drive.'* They can be prototypical individuals, familiar individuals, recently mentioned (i.e., contextually introduced) individuals, etc.

[2]Note that we replace K&S's notion of candidate interpretations and focus on the atoms of the plurality because we are, for the purposes of this paper, only concerned with distribute plural predication. Extension to collective predicates seems possible but is beyond the scope of this text.

The predicate modulates which individuals of a plurality are considered salient. Therefore, $\mathscr{S}_{C_G}$ requires both a predicate index i and a plural individual a as input, see (4-a). The predicate index is a way to specify w.r.t. which (argument slot of the) predicate the parameter $\mathscr{S}_{C_G}$ filters individuals. The output of $\mathscr{S}_{C_G}$ is a generalized quantifier that distributes the predicate P over the salient individuals (informative content) and raises issues in the form of a polar question (inquisitive content) for the non-salient individuals, see (4-c).

(4) a. $[\![P_i]\!]^{\mathscr{S}_{C_G}} = \lambda a.((\mathscr{S}_{C_G}(i,a))(P))$; for predicate $P_{\langle e,t\rangle}$ with index i; plural individual a

b. $\oplus Q$ is a plural individual of kind $Q_{\langle e,t\rangle}$. The polar question $[\![?\underline{P(x)}]\!]$ yields $\{\underline{P(x)}, \neg P(x)\}$.

c. $[\![Q\text{s are } P_i]\!]^{\mathscr{S}_{C_G}} = (\mathscr{S}_{C_G}(i,\oplus Q))(P) = \underbrace{\forall x.[(x \text{ is salient in } C_G(P,Q)) \rightarrow P(x)]}_{\text{informative content}} \wedge \underbrace{\forall y.[Q(y) \rightarrow ?\underline{P(y)}]}_{\text{inquisitive content}}$

III. Informative and inquisitive content: According to (4-c), a generic conveys that all cognitively salient Q-individuals have property P (informative) and raises issues via $?\underline{P(y)}$ for each (non-salient) Q-individual y (inquisitive). I assume that $?\underline{P(y)}$ comes with a weak commitment to the alternative marked on the surface level, expressed as the underlined proposition, see (4-b). Note that the inquisitive component of (4-c) does not mean generics are questions: inquisitive semantics (e.g. Ciardelli et al., 2018) views, e.g., disjunctions as inquisitive, with the disjuncts as alternatives. We can also employ inquisitive semantics to model informative and inquisitive content in a unified way. A partially inquisitive common ground update $C_G[Q\text{s are } P_i] := C_G \cap [\![Q\text{s are } P_i]\!]^{\mathscr{S}_{C_G}}$ provides information and adds issues. In this view, the (sometimes malicious, e.g., *'Women can't drive.'*) generalization does not happen at the level of informative but inquisitive content. These generalizations are guiding behavior via an enriched knowledge base $\Theta(C_G)$. The Θ-function supplements common ground belief with the highlighted issue alternatives (weak commitments) in C_G.
Empirical coverage: Analyzing (2) w.r.t. (4-c) yields (5) and matches the discussed intuitions.

(5) $[\![$ mosquitoes carry-malaria$_j$ $]\!]^{\mathscr{S}_{C_G}} = (\mathscr{S}_{C_G}(j,\oplus mosqu'))(carry\text{-}m') = \text{(i)} \wedge (ii)$

(i) All mosquitoes that are cognitively salient (considering the predicate *carry-m'*) carry malaria.

(ii) For any (non-salient) mosquito y, we raise the common ground issue whether y carries malaria and mark the positive answer (*'y carries malaria.'*) as behaviorally relevant.

We interpret (5-i) as existential because the predicate *carry-m'* implies a health-threat: if we know that there's a mosquito carrying malaria, this is immediately salient and we do not call on additional evidence. Note that this is *not* a circular explanation of the truth of (2) because *'Insects carry malaria'* is correctly predicted to be false. The *carry-m* predicate doesn't overwrite the salience of, e.g., bees as typical insects. In addition, there is no generalization on the level of inquisitive content as in (5-ii). Being uncertain whether a mosquito y is a carrier makes us behave as if it were in all cases; e.g., we avoid mosquito-areas. *'Insects...'* does not bring about such a behavior.

Below, we sketch why the informative (i) and inquisitive (ii) contents of (1) and (3) predict the right truth-conditions. **(1):** (i) We usually encounter black ravens which makes only these individuals cognitively salient. (ii) If we hear the sound of a raven, we search for something black. **(3):** (i) Our prototypical duck is sexless, even if we think about their mode of reproduction. (ii) We consider ducks as egg-laying and, e.g., try to prevent them from nesting at our favorite spot without wondering whether the ducks around are females.

Note that my account predicts varying truth-value judgments between speakers. This is desir-

able. Canonical examples like (1-3) feature species/animals to ensure uniform judgments.

References

Carlson, G. N. (1977). *Reference to kinds in English.* PhD thesis, University of Massachusetts Amherst.

Ciardelli, I., Groenendijk, J., and Roelofsen, F. (2018). *Inquisitive semantics*. Oxford University Press.

Cohen, A. (2004). Generics and mental representations. *Linguistics and Philosophy*, 27:529–556.

Krifka, M. (1996). Pragmatic strengthening in plural predications and donkey sentences. *Semantics and Linguistic Theory*, 6:136–153.

Križ, M. (2015). *Homogeneity effects in natural language semantics*. PhD thesis, University of Vienna.

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

Križ, M. and Spector, B. (2021). Interpreting plural predication: Homogeneity and non-maximality. *Linguistics and Philosophy*, 44(5):1131–1178.

Leslie, S. (2007). Generics and the structure of the mind. *Philosophical Perspectives*, 21(1):375–403.

Leslie, S. (2008). Generics: Cognition and acquisition. *Philosophical Review*, 117(1):1–47.

Leslie, S. (2015). Generics oversimplified. *Noûs*, 49(1):28–54.

Leslie, S. (2017). The original sin of cognition. *The Journal of Philosophy*, 114(8):395–421.

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

Nguyen, A. (2020). The radical account of bare plural generics. *Philosophical Studies*, 177(5):1303–1331.

Rooij, R. v. and Schulz, K. (2020). Generics and typicality: a bounded rationality approach. *Linguistics and Philosophy*, 43:83–117.

BEGGARS:

(6) Keth's slow speech, occasional stammer, and slight clumsiness went unnoticed in a district where ***the beggars*** were missing body parts.