Singular 'Donkey' Pronouns Are Semantically Distributive, Not (Necessarily) Singular
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The goal of this paper is to provide a lexical entry for singular number morphology in English that: (i) allows for the 'plural' use of singular pronouns in 'donkey' sentences like (1) below, which (preferably) receive a strong reading, and (ii) derives the incompatibility between singular 'donkey' pronouns and collective predicates, as illustrated in (2) below (from [1]).

(1) Every farmer who owns a donkey beats it.  (2) #Every farmer who owns a donkey rounds it up at night.

Bringing together insights from [3] and [5], I describe a new dynamic system formulated in many-sorted type logic in which: (i) (the LF’s of) sentences like (1) are compositionally interpreted, (ii) a new analysis of the weak/strong ambiguity exhibited by (1) is provided in terms of two minimally different lexical entries for the indefinite article and (iii) singular number morphology is interpreted as a 'modifier' of a generalized quantifier (GQ) ensuring that the GQ applies to a nuclear scope built out of atomic entities. This requirement clashes with the fact that round up (usually) selects for a non-atomic direct object – hence the infelicity of (2).

The phenomenon and the basic proposal. As noted in [1], (1) and (2) raise the following problem: the most salient interpretation of (1) is that every farmer who owns a donkey beats every donkey he owns (and not the or some donkey he owns), so it seems that singular number morphology is neutral with respect to semantic number; however, the incompatibility of singular (but not plural) 'donkey' pronouns with collective predicates seems to indicate that singular number morphology is interpreted as semantically singular: it requires the cardinality of the set of entities under consideration to be at most one. Semantic singularity is what [1] argues for.

However, I propose that singular 'donkey' pronouns are not semantically singular, but semantically distributive: for any property \( P \) predicating a property \( \delta P \) as the atoms (i.e. singleton sets) in \( P \) or unions of such atoms. As in [2], pronouns are interpreted as the GQ-lift of a variable (see (4) below). Singular morphology, which is syntactically above the DP 'layer' (as in [4]), is interpreted as a GQ 'modifier', ensuring that the GQ applies to a distributed nuclear scope – see (5) below.

(3) \( \delta P := \lambda X. \forall Y (Y \subseteq X \land |Y|=1 \rightarrow P(Y)) \)  (4) \( \mathit{it}x \thicksim \lambda P. P(X) \)  (5) \( \mathit{sing} \thicksim \lambda Q. \lambda P. Q(\delta P) \)

As in [2], the transitive verb takes a GQ as its first argument and is interpreted by means of a non-logical constant round_up, i.e. round_up \( \thicksim \lambda Q. \lambda X. Q(\lambda Y. round_up(X, Y) \land |Y|>1) \). For simplicity, the selectional restriction to non-atoms \(|Y|>1\) is not modeled as a presupposition, but as an assertion. Given fairly standard assumptions about LF’s and type-driven translation, the sentence \( \text{John round it up} \) is interpreted as round_up(\( \text{john} \), \( \mathit{sing}(\mathit{it}x) \)), i.e. as \( \forall Y (Y \subseteq X \land |Y|=1 \rightarrow \text{round_up}(\text{john}, Y) \land |Y|>1) \), which is contradictory given that \( X \neq \emptyset \).

The compositional dynamic system and the interpretation of singular number morphology. In a Fregean framework, the compositional aspect of the interpretation is largely determined by the types for the 'saturated' expressions, i.e. names and sentences. Let's abbreviate them as e and t. An extensional static logic without pluralities is the simplest: e is e (atomic entities) and t is t (truth-values); own, for example, is of type (e(e(t)), i.e. (e(et)), and the GQ every man is of type ((et)(t)), i.e. ((et)t). This basic setup can be complicated in various ways, e.g. we can add pluralities by resetting
e to (et); own, still of type (e(et)), relates pluralities now, its interpretation is by default collective and distributive interpretations are obtained by means of a distributive operator.

Going dynamic involves a similar procedure: following [3], we add another basic type s whose elements model dynamic info states (i.e. variable assignments). A sentence is interpreted as a relation between an input and an output info state, hence t:=(s(st)); a name denotes a discourse referent (dref), i.e. e:=(se): own is of type (e(et)): it takes two dref's u and u' of type e and it relates two info states i and i' of type s if and only if i=i' and the entities denoted by u and u' in state i (i.e. ui and u'i) stand in the own relation of type (e(et)) (i.e. the static 'own'-relation).

Going dynamic and plural seems to be straightforwardly cumulative, i.e. e:=(s(et)) and t:=(s(st)). However, I will let e:=(se) and, following [5], I will build the plurality into the info states, i.e. I will use plural info states I of type st. Sentences are relations between them, i.e. t:=(st)(st)). A dref u (type se) stores a plurality (a set of entities) with respect to an info state I, abbreviated ul:={u_i: i∈I}. There are two reasons for this design choice. First, we account for structured cross-sentential plural anaphora, e.g. (1) above can be followed by Moreover, they feed them poorly, which is interpreted as saying that each farmer feeds every donkey he owns (and not some other donkey) poorly, i.e. the owning and the feeding are structured in the same way. We encode the owning structure in an info state I, i.e. for each i∈I, ui is a farmer owning donkey u'i, and pass it on to the next sentence, where we test that the feeding structure is the same. Second, we can give a new and simple account of the weak/strong 'donkey' ambiguity.

A sentence is represented as a 'box' [new dref's | conditions], which is the abbreviation of a term of type t: λI, I∈J, [new dref's]J ∧ conditionsJ, i.e. the output state J differs from the input state I at most with respect to the new dref's and each condition is satisfied in the output state J. In addition, we need two operators over 'boxes', defined in the spirit of [5]: a distributivity operator dist_i(B), which means that 'box' B is interpreted distributively with respect to the dref u, and a maximizing operator max^u(B), which introduces the dref u and makes sure that it stores the maximal set of entities that satisfies 'box' B (a kind of dynamic λ-abstraction).

(6) dist_i(B) := λI, I∈J, I[J V uI ∈ uI ∧ ∀x∈uI (BI_uI=Jx)], where I_uI := {i∈I: ui=x}
(7) max^u(B) := λI, I∈J, ∃H (I[u]H ∧ BHI) ∧ ∀K (∃H (I[u]H ∧ BHK) → uK⊆I)

The lexical entries for the relevant items are given below. The symbol 't' stands for dynamic conjunction, defined as B:B' := λI, I[H (BHI ∧ B'H'I)]. The indefinite article is ambiguous: the entry without max yields the weak 'donkey' reading; the one with max yields the strong reading.

(8) δP := λV_e, dist (P(v)) (9) it_u ▼ λP et. P(u) (10) sing ▼ λQ et.t. λP et. Q(δP) (cf. (3),(4),(5) above)
(11) every ▼ λP et. λP et. max^(δP(u)); P(u) (12) awk/str (weak) ▼ λP et. λP et. [u |]; δP(u); P(u)
(13) awk/str (strong) ▼ λP et. λP et. max^(δP(u)); P(u))

Based on these lexical entries, (1) is compositionally assigned the intuitively correct strong and weak interpretations and (2) is ruled out as contradictory. Finally, the account extends to the following more complex example from [1]: Every man who brought awkward friend to the party introduced him to at least four people – given the plausible assumption that at least four introduces a dref for groups of four people.