Distributivity and agreement: new evidence for groups as sets

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1 Introduction

It is a well-known observation that morphologically singular group NPs in British English can occur with either a singular or a plural VP (example (1) is from (Jespersen, 1914)):

1. a. Mine is an old family.

   b. My family are early risers.

2. a. The hotel staff is friendly.

   b. The hotel staff are friendly.

This phenomenon has attracted some attention from formal semanticists, who have mainly investigated the way semantics influences agreement choice by attempting to relate the preference for singular or plural to various lexical properties of the predicate (e.g. Bennett, 1974; Barker, 1992; Pollard and Sag, 1994; Schwarzschild, 1996). However, the reverse - whether agreement choice influences semantics - has rarely been investigated.

In this paper, I argue that there are systematic differences in interpretation between British English group noun sentences with a singular VP and their plural-VP counterparts, and that these differences tell us something about the set-theoretic structure of group noun denotations. First, I show how the availability of certain distributive interpretations can be used as a diagnostic for the semantic plurality of an NP. Then, I will show that these distributive interpretations are available with morphologically singular group NPs, but only if the VP is plural. This central observation is exemplified by contrasts like the following:[1]

3. The semanticists are singing or dancing.

4. a. The group (of semanticists) is singing or dancing.

   b. The group (of semanticists) are singing or dancing.

Sentence (3) is compatible with a 'split' situation in which part of the semanticists are singing and the rest are dancing, which is the interpretation we get when we apply the disjunction to each individual member of the plurality *the semanticists*. In contrast, sentence (4a) lacks such a distributive interpretation: it is only compatible with a situation in which the entire team is doing the same thing. This contrast can easily be explained under the common assumption (e.g Barker, 1992; Schwarzschild, 1996) that group NPs denote atomic entities, whose subparts are inaccessible to the compositional semantics. Without access to individual group members, the disjunction can only apply to the group as a whole.

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[1]The contrast in this particular example, which is responsible for inspiring the line of research developed in this paper, was originally pointed out to me by Hazel Pearson and Michelle Sheehan.

However, this analysis is complicated by the fact that the split interpretation is available in British English when the VP is plural, as in (4b). According to our reasoning above, this would suggest that *the group* in (4b) does not denote an atomic entity, but a set, like *the semanticists* in (3). The way we solve this puzzle has consequences for semantic theory in general: do we allow for language-specific assumptions to deal with this cross-linguistic variation (strategies like this have been proposed for independent reasons: Schwarzschild (1996) suggests that group nouns might be systematically ambiguous in British but not in American English, and Sauerland and Elbourne (2002) propose that British English group nouns are semantically plural while their American counterparts are semantically singular), or can we analyse the above facts while maintaining a uniform semantic analysis of group nouns across languages?

In this paper, I propose to solve the puzzle in the following way. We will assume that group nouns basically range over sets in all varieties of English; then, we derive the atomic interpretation by means of a typeshift that is triggered by a type mismatch between the NP (which denotes a set) and a singular VP (which ranges over atoms). Very few of these assumptions are new. Set-based analyses of group nouns are unusual (Bennett, 1974; Pearson, 2011, are two rare examples), but the required typeshifting operation (which maps a set into an 'impure' atom) has been present in the literature since Link (1984); Landman (1989); similarly, the idea that morphologically plural VPs range over sets while morphologically singular NPs range over atoms is quite common and goes back to at least Bennett (1974).[2]

There are two main advantages to this approach. First, there is no need for any language-specific semantic machinery: group nouns are uniformly analysed as sets, and any interpretational differences between languages follow from their morphosyntactic properties. Second, it allows us to analyse the interpretation of group nouns using only general semantic mechanisms; there is no need for an additional typeshifting operation that 'breaks up' groups, as in e.g. Landman (1989); Barker (1992); Schwarzschild (1996); Sauerland (2004).

2   Background: quantificational distributivity

2.1   Two kinds of distributivity

I follow researchers like Roberts (1978); Hoeksema (1988); Winter (1997); Champollion (2010) in assuming that distributive interpretations are sometimes derived lexically and sometimes structurally, by means of a (covert) operator. The sentence in (5a) is an example of the first kind of distributivity, which I will call *P-distributivity* (following Winter 1997). The meaning of (5a) can be derived by simple predication over a plural individual, without the assumption of further covert semantic machinery: information about the way individual members of *the children* participate in the laughing event is not formally specified, but inferred on the basis of the lexical semantics of the predicate. (We know that in order to be able to laugh one needs lungs and a vocal apparatus, and we know that individual children have this but groups as a whole do not.)

5.   a. The children laughed.
      b. The children are hiding somewhere.

On the other hand, the distributive interpretation of (5b) - according to which each of the children is hiding in a potentially different place - cannot be derived in such a way. *Somewhere*

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[2]In this paper, I approach plurality in set-theoretical terms, but everything should carry over straightforwardly to a Link-style lattice-theoretical framework.

is a quantifier, which in the absence of other quantificational elements takes scope over the entire sentence; this derives only the collective interpretation according to which the children are all hiding in the same spot. To derive the distributive interpretation, we need to resort to some kind of covert quantificational mechanism comparable to overt *each*. I will call this kind of distributivity *Q-distributivity* (again following Winter).

2.2   Q-distributivity as a diagnostic for semantic number

The distinction between P- and Q-distributivity is relevant because the first, but not the second, is available with singular group noun subjects (when the VP is also singular). Compare the possible interpretations of (6a-b) with those in (5a-b):

6. a. The cricket team laughed.

    b. The cricket team is hiding somewhere.

While we can easily interpret (6a) distributively, the Q-distributive interpretation for (6b) - according to which each of the cricket players has their own hiding spot - is unavailable. The only interpretation for (6b) is the one according to which everyone is hiding in the same place.

We find the same contrast between plural definites and group NPs with other examples of Q-distributivity:

7. a. The members of the Jones family are blond or red-haired.

    b. The Jones family is blond or red-haired.

8. a. The children are drawing and sleeping.

    b. # The class is drawing and sleeping.

Sentence (7a) is compatible with a situation in which some of the Jones are blond while the others are redheads; for sentence (7b) to be true, however, all the Joneses need to have the same hair colour. Similarly, sentence (8a) but not (8b) is true in a situation where half of the children are drawing and the other half are sleeping (sentence (8b) makes the weird claim that all children are simultaneously doing both).[3]

As already noted in the introduction, these data are not surprising if we assume that group NPs denote atomic entities (following e.g. Landman, 1989; Barker, 1992; Schwarzschild, 1996). Q-distributivity is a quantificational mechanism, so it only works if it has a set to quantify over; if plural definites denote sets but group NPs do not, the observed contrast follows straightforwardly. This means that we can use the availability of Q-distributive interpretations as a diagnostic for the semantic plurality of an NP: if such an interpretation is available, the NP in question should be analysed as a set, and if not, it should be analysed as an atom.

With this idea in mind, it is time to take another look at British English.

3   Q-distributivity with group nouns in British English

3.1   Group nouns and agreement in British English

There does not seem to be a straightforward rule that governs when it is more appropriate to use a singular or a plural VP with a particular group subject - speakers' preferences for singular

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[3]I am not sure how to analyse the semantics of sentences like (8a) that allow these non-Boolean split interpretations. I classify them as Q-distributive here because they pattern with the other Q-distributivity tests in terms of the plural/group contrast.

or plural vary depending on both the group noun and the predicate (Corbett, 2000). Jespersen (1914) notes that the choice of agreement sometimes reflects whether we conceive of a particular group as a single entity (*family* in (1a)) or as a collection of individuals (*family* in (1b)), but this is not necessarily the case: a simple Google search confirms Jespersen's observation that both collective and distributive predicates may take either singular or plural form when they occur with a group subject.

However, the choice of singular or plural is not always arbitrary. Pollard and Sag (1994) mention that predicates that express properties of the groups themselves never trigger plural agreement, as in (9) (from Pollard & Sag 1994):

9. *A new committee have been constituted.

Being constituted is a property of the committee as an institution, completely independent from any properties of its members; predicates like these obligatorily appear in the singular. A related observation is made by Barker (1992): unlike (10a), which can mean that the committee is an old institution, (10b) (where the group noun appears with a plural VP) can only mean that the members of the committee are old.[4]

10. a. The committee is old.

    b. The committee are old.

The number of the VP also has more structural semantic consequences, that are not related to the lexical meaning of the predicate itself. As observed by Sauerland and Elbourne (2002), whether certain British English sentences with a group noun subject display scope ambiguity depends on the number of the VP. Sentence (11a) - with a singular VP - has both the surface scope and the inverse scope reading, but sentence (11b) - with a plural VP - only has the former.

11. a. A northern team is likely to be in the final.   ($\exists > likely$, $likely > \exists$)

    b. A northern team are likely to be in the final.   ($\exists > likely$, *$likely > \exists$)

These interesting data suggest that there is a connection between the semantic structure of a group NP and the number of the VP it agrees with: an NP that agrees in the singular apparently has different scope properties than an NP that agrees in the plural. As we will see, the Q-distributivity facts for British English are in line with this.

3.2 Q-distributivity in British English

In this section, I present this paper's main data, which show that the number of the VP influences the availability of Q-distributivity for British English sentences with a group subject. Since the judgements are sometimes subtle, I will support my claims with quantitative evidence obtained from a small group of native BE speakers.[5]

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[4]Barker also claims that (10a) does not have the 'old members' interpretation, but this appears to be too strong a claim: according to my informants, sentence (10a) can have both interpretations, just as it does in other varieties of English.

[5]Judgements were obtained from 6 native speakers from England and Wales by means of a pen-and-paper truth value judgement task. Each test item consisted of a sentence and a picture of a situation that was compatible with a distributive interpretation of that sentence, but incompatible with a collective one; subjects were asked to judge whether the sentence could be true in the depicted situation. The test items (18 in total) were balanced out by fillers. A few days after filling out the first questionnaire, the informants were asked to fill out a second version, with the order of the items reversed. In total, 23% of the singular-VP group-subject sentences was judged true, against 61% of their plural-VP counterparts and 83% of the sentences with a plural subject.

In section 2.2, I have given three different examples of Q-distributive sentences: one involving disjunction, one conjunction, and one involving another quantificational element. All three cases showed the same contrast between plural definites and group NPs: while sentences with the former could all receive a Q-distributive interpretation, that interpretation was absent when the subject was a group NP (with a singular VP). Below, I give the same (or very similar) examples, but this time I also compare group noun sentences with a singular VP with their plural-VP counterparts. The percentages indicate the number of 'true' judgements by my informants, who were asked to evaluate the truth of these sentences in a 'distributive' situation (for example, the picture that accompanied the sentences in (12) showed several different hiding places with a child hiding in each of them).

12.   a. The children are hiding somewhere.   100%

       b. The class is/are hiding somewhere.   40%/83%

13.   a. The Joneses are very short or very tall.   100%

       b. The Jones family is/are very short or very tall.   17%/40%

14.   a. The children are drawing and sleeping.   75%

       b. The class is/are drawing and sleeping.   40%/83%

The variation between informants and between structurally indistinguishable sentences suggests that people's judgements are influenced by many factors that are unrelated to the formal semantics of these sentences - for example, in both the disjunction and the conjunction cases, the group noun sentences were judged 'false' much more often when the coordinated predicates were adjectives (as in 13b) than when they were verbs (as in 14b). Even so, a clear pattern emerges from this small quantitative study: while British English group noun sentences with a singular VP behave as they would in American English, group noun sentences with a plural VP behave similar to plural-subject sentences, and may receive a Q-distributive interpretation. Combined with our earlier observation that the availability of Q-distributivity serves as a diagnostic for semantic number, this leads us to conclude that singular group NPs receive an atomic denotation when they agree with a singular VP, but a set denotation when they agree with a plural VP.

3.3   A related observation: reciprocity

The observed pattern is also found with reciprocal predication in British English, which should not come as a surprise given that reciprocity, like Q-distributivity, is usually analysed as a form of quantification and hence requires a semantically plural argument. It has been noted in the literature that reciprocal expressions are fine with plurals, but at best marginal with group nouns (Schwarzschild, 1996; Lønning, 2011):

15.   a. The cricket players are friends / usually coach each other.

       b. *The cricket team is friends / usually coaches each other.

However, Schwarzschild hypothesises that reciprocal predication over a group subject may be grammatical with British English when the VP is plural, a suggestion supported by the data in (16) (from Pearson, 2011). Many examples of these sentences 'in the wild' can be found with Google (17a-d):

16. The family can't stand each other.

a. The Team are friends on track as well as off track, and are as much family as we are friends.

b. Can a scientific program really change the way the Diaz family love each other?

c. It is puzzling when medical staff disagree with each other.

d. Remember that your group are neighbours who have to get along outside the group as well as within it.

Like the Q-distributivity data, these reciprocity data are in line with the idea that the semantic number of a morphosyntactically singular group NP depends on the number of the VP it agrees with.

4 Analysis: group NPs as sets

In principle, there are a couple of ways to account for the observed 'mixed' behaviour of group NPs. We could say that British English group nouns are ambiguous between set and atom predicates (cf. Schwarzschild, 1996). Alternatively, we could take one of the denotations as basic and derive the other one by a typeshift of some kind (cf. Landman, 1989; Barker, 1992; Schwarzschild, 1996; Sauerland, 2004). I will propose an analysis along the second lines; however, in contrast to previous accounts, I will take the set denotation to be basic and the atom denotation to be derived. (We will see an empirical advantage of this in section 4.1.)

Apart from the assumption that group nouns basically range over sets, we will adopt the following two common assumptions from the literature. First, that syntactically plural predicates range over sets (cf. Bennett, 1974; Link, 1983; Winter, 2002, and many others); I will follow Link in assuming that these semantically plural predicates are derived from their singular, et-type counterparts by a pluralisation operation $*$ (where $*P$ is defined as $\wp(P) - \emptyset$). Second, that set-denoting referential NPs can be mapped onto a corresponding 'impure' atom (cf. Link, 1984; Landman, 1989; Winter, 2002) by a type-shifting operation that we will write as $\uparrow$ (following Landman 1989).[6] Together, these assumptions present a problem that every language will have to solve in some way: with 'correct' agreement (a singular VP to match the singular group NP), it is impossible to say anything meaningful about groups, as group NPs denote sets but singular predicates range over atoms; in other words, we always end up with a type mismatch, as exemplified in (17).

17. $[\![\textit{The group is tall}]\!] = \textbf{tall}_{et}(\textbf{the\_group}_{et})$

There are two ways to resolve this type mismatch. The semantic way, which I propose is always available, is to shift the group NP into its corresponding impure atom (18a); the morphosyntactic way, which is available in British but not in American English, is to allow the group NP to occur with a plural VP (18b):

18.   a. $[\![\textit{The group is tall}]\!] = \textbf{tall}_{et}(\uparrow(\textbf{the\_group})_e)$
      b. $[\![\textit{The group are tall}]\!] = *\textbf{tall}_{et,t}(\textbf{the\_group}_{et})$

From this system, it follows that group NPs behave like sets when they occur with a plural VP, but like atoms when they occur with a singular VP. To further illustrate how this accounts for the observed pattern with Q-distributivity, let's have a look at an example:

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[6]Even though I adopt Landman's notation, I am not committed to his or any other particular formalisation of impure atom formation.

19. a. $[\![\textit{the group is singing or dancing}]\!] = 1$ iff $\uparrow(\textbf{the\_group}) \in \textbf{sing} \cup \textbf{dance}$
$\Leftrightarrow \uparrow(\textbf{the\_group}) \in \textbf{sing}$ or $\uparrow(\textbf{the\_group}) \in \textbf{dance}$

b. $[\![\textit{the group are singing or dancing}]\!] = 1$ iff $\textbf{the\_group} \in *(\textbf{sing} \cup \textbf{dance})$
$\Leftrightarrow$ for all $x \in \textbf{the\_group}$: $x \in \textbf{sing}$ or $x \in \textbf{dance}$

In (19a), where *the group* receives an atomic interpretation, the sentence is truth-conditionally equivalent to 'the group is singing or the group is dancing', which is incompatible with a split situation. In (19b), *the group* is interpreted as a set, and the pluralised predicate *singing or dancing* denotes the set of all sets whose members are either singing or dancing; because of the way $*$ is defined, the set **the_group** is in the extension of this predicate just in case each of its members is either singing or dancing. This is the distributive interpretation, compatible with a split situation in which part of the group is singing and the rest is dancing.

Along similar lines, we can now explain our earlier data from Barker (1992) and Pollard and Sag (1994) ((9) and (10) from section 3.1), who observed that group-level predicates (like *be constituted* and *be old* when the age of the group is intended) are incompatible with plural morphology. Under our assumptions, the semantics of *The committee are old* is analysed as $*\textbf{old}(\textbf{the\_committee})$. For this to be true, each individual member of **the_committee** needs to be in the extension of (unstarred) **old**; in other words, *The committee are old* is true just in case the committee's members are old. Similarly, *The committee were constituted in 2001* requires, nonsensically, that each individual member of the committee was constituted in 2001. On the other hand, *The committee is old* and *The committee was constituted in 2001* require that the impure atom corresponding to **the_committee** be in the extension of **old** or **constituted_in_2001**. In the first case, we may still draw a P-distributive inference about the individual members of the group, which is in line with our observation that *The committee is old* can have both an old-members and an old-committee interpretation.

4.1   Additional support: *there*-sentences in colloquial English

One of the main distinctions between the present analysis and its two main alternatives (ambiguity and a typeshift the other way around) is that the present analysis has general applications beyond the domain of group NPs. Whether this is an advantage or not depends on whether the analysis makes the right predictions in those cases. There seems to be at least one phenomenon in English that suggests that it does. In colloquial English, many speakers accept *there*-sentences with mismatched agreement, as in (20b):

20. a. There are two semanticists singing or dancing in my garden.
    b. There's two semanticists singing or dancing in my garden.

According to most of my informants, these sentences show a contrast similar to the British English Q-distributivity cases: while (20a) is compatible with a split situation, (20b) is not. It seems that our present analysis can account for this in a straightforward way: in (20b), the type mismatch between the singular VP and the plural NP coerces the latter to shift into an impure atom, which rules out a Q-distributive interpretation. Since these cases involve 'ordinary' plurals rather than group nouns, neither of the alternative analyses can be extended in a way that covers them.

5   Conclusions

I have shown that morphologically singular group NPs in British English behave like atoms when they occur with a singular VP, but like sets when they occur with a plural VP. If we assume

that group NPs are basically set-denoting, their behaviour with different kinds of agreement follows from common assumptions about the semantics of number morphology. The advantage of this proposal is that it reduces crosslinguistic variations in interpretation to morphosyntactic differences between languages, allowing us to maintain a uniform semantics for group nouns. It also has the empirical advantage of being applicable to a much wider range of semantic phenomena involving number mismatches - our next step should be to look beyond English and see if the analysis holds up under further typological scrutiny.

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