

Group Terms in English: Representing Groups as Atoms

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Abstract

What do terms such as *the committee*, *the league*, and *the group of women* denote? Pre-theoretically, group terms have a dual personality. On the one hand, *the committee* corresponds to an entity as ideosyncratic in its properties as any other object; for instance, two otherwise identical committees can vary with respect to the purpose for which they were formed. Call this aspect the group-as-individual. On the other hand, the identity of a group is at least partially determined by the properties of its members; for instance, a committee will be a committee of women just in case each of its members is a woman. Call this aspect the group-as-set. Elaborating on suggestions in Link (1984) and Lasersohn (1988), I propose that group terms in English denote atomic individuals, that is, entities lacking internal structure. In particular, it is not possible to determine the membership of a group by examining the denotation of a group term. The proposed account correctly predicts that group terms systematically behave differently semantically (as well as syntactically) from plurals such as *the men* and conjunctions such as *John and Bill*. Thus the atomic analysis advocated here stands in sharp contrast to previous proposals, including Bennet (1975), Link (1984), and Landman (1989), in which group terms are considered of a piece semantically with plurals and conjunctions. Additional arguments come from the use of names of groups as rigid designators, from the parallel between group nouns and measure nouns, and from the distribution of group terms across two dialects of English.

I CHARACTERIZING GROUP TERMS

I.1 *A syntactic diagnostic*

Since the prototypical group term contains a group noun, we should begin by characterizing the class of group nouns. All group nouns happen to be morphologically regular with respect to plural marking, so only nouns which take the plural are candidates for group noun status. For instance, we have *group/groups*, *committee/committees*, and *army/armies*.

Since only count nouns take the plural morpheme, group nouns are a proper subclass of the count nouns. A count noun will be a group noun just in case it can take an *of* phrase containing a plural complement, but not a singular complement.

1. a. the group of armchairs
b. one committee of women
c. an army of children
2. a. *the group of armchair
b. *one committee of woman
c. *an army of child
3. a. *the table of woods
b. *one ball of yarns
c. *a piece of cookies
4. a. the table of wood
b. one ball of yarn
c. a piece of cookie

We can call this use of *of* group-noun *of*. These examples show that *group*, *committee*, and *army* are group nouns, while *table*, *ball*, and *piece* are not.¹

Care must be taken with this test, however. There are count nouns which are not group nouns but which can take an *of* phrase with a plural complement, as in (5).

5. a. a picture of horses
b. an ocean of tears
6. a. a picture of a horse
b. an ocean of water

However, the fact that these nouns also take *of* phrases with singular complements as in (6) distinguishes them from group nouns.

Some nouns succeed or fail as group nouns according to which of several senses is intended.

7. a. *the book of pages
b. *the book of page
8. a. the book of matches
b. *the book of match

The examples in (7) suggest that *book* is not a group noun, but the examples in (8) involving a different but closely related sense of *book* clearly is a group noun.

Now we can give a first approximation at giving a more precise definition of 'group': a group is an entity which is in the extension of a group noun. Note that this definition does not presuppose that a group entity is or is not atomic. In other words, a group is an entity which would be appropriate as the denotation of a definite description containing a group noun, such as *the committee*.

1.2 Distinguishing group terms from plurals and conjunctions

The analyses of group nouns in Bennet (1975), Link (1984), and Landman (1989) all class group terms semantically with a variety of nonsingular terms such as *the men* or *John and Bill*. The main empirical point of this paper will be to show that group terms systematically behave differently from plurals and conjunctions, at least with respect to entailments in extensional contexts. Later sections will explain how the formal analysis to be presented in section 2 will account for the observed pattern of facts.

Here a 'term' is any noun phrase which is interpreted as a definite description, including some nonsingular noun phrases. Since we are primarily interested in denotation, I will have little to say about other occurrences of noun phrases, including intensional or non-definite uses.

We will need to distinguish three kinds of term according to their syntactic structure and the nature of their head nouns.

Group terms	Plural terms	Conjoined terms
the committee	the men	Bill and John
that group	those people	the men and the women
the list of reasons	the members of the group	the chairman and the secretary

As suggested by this chart, we will concentrate on simple noun phrases with lexical heads, sometimes modified with *of* phrases. In addition to these prototypical examples, later sections will treat names such as *Committee A* as group terms. Sometimes I will refer to plural terms and conjoined terms collectively as nonsingular terms.

Most theories of plurals allow for definite descriptions involving plural nouns to have an extension identical to the extension of a conjoined noun phrase, and this makes sense. For instance, if John and Bill are the only salient men, the extension of the phrase *the men* will be the same as the extension of the phrase *John and Bill*. This predicts that predicates sensitive only to extensions will not be able to distinguish between these two phrases, and we shall see that this seems to be so.

Now imagine that the only salient committee has John and Bill for its two members. If *the committee* has the same extension as the plural phrase and the conjunction, then all three phrases should be intersubstitutable in extensional contexts without affecting truth value. In order to test this prediction, we need only find a purely extensional predicate and test for entailment relationships.² Although it is plausible that plurals and conjunctions can pattern together, group nouns behave differently.

9. a. The men died.
b. John and Bill died.
c. The committee died.

Clearly (9a) is true just in case (9b) is true, so long as John and Bill are the only men. But the status of (9c) is different. If committees are even capable of dying, it is only in an anthropomorphic sense in which dissolving a committee is compared metaphorically to the death of a living creature. In this sense, the truth of (9c) is independent of (9a) and (9b), since a committee can continue to operate even after losing all of its members, provided new members take their place in good time. Conversely, a committee can certainly die in the sense of dissolve at the same time that John and Bill remain healthy.

However, some speakers allow another reading of (9c) on which (9a) and (9b) do entail (9c). For these speakers, the relevant reading is entirely literal, and would be appropriate if the committee were meeting in a war zone and were slaughtered together. For these speakers, *die* is a predicate which distributes over the members of a group. (See section 7 for a further discussion of group-distributive readings.)

For our purposes here, we need only note that the availability of this reading varies from speaker to speaker, and from situation to situation.

10. a. The men fathered two children.
b. John and Bill fathered two children.
c. The committee fathered two children.

It is difficult, if not impossible, to accept (10c) as an entailment of (10a) or (10b). In general, the further the sense of the predicate from the prototypical activities or properties of the type of group in question, the more clear it becomes that groups in general do not automatically inherit the properties common to their members.

In fact, a slightly more complicated example will block a group-distributive reading for all speakers.

11. a. The men first met ten years ago.
b. John and Bill first met ten years ago.
c. The committee first met ten years ago.

The truth of (11a) and (11b) remains exactly equivalent, but the entailment for (11c) becomes more remote. Even for people who conclude from the fact that John and Bill met that the committee also met (the group-distributive reading of *meet*), the entailment becomes more difficult in the presence of the modifier *first*. If it happens that the committee was formed several years after Bill and John first met, it becomes uncooperative at best to suggest that (11c) is true whenever (11a) and (11b) are.

Furthermore, there are properties common to all of the members of a group which are never true of the group itself.

12. a. The men are members of the committee.
- b. Bill and John are members of the committee.
- c. The committee is a member of the committee.

The sentences in (12a) and (12b) are contingent on the situation, but (12c) is a contradiction.

Clearly, then, it is possible for the members of a group to have a property not shared by that group. In the other direction, it is possible for a group to have properties that the collection of its members do not. For instance, if the committee was formed (having different members) before Bill and John were born, then (11c) can be true when (11a) and (11b) are not, even without the modifier *first*. In general, any predicate which emphasizes the existence of a group as an individual independent of its membership can show this pattern. As an extreme example, some predicates can be true only of groups.

13. a. # The men had two members.
- b. # John and Bill had two members.
- c. The committee had two members.

Even if (13a) and (13b) are judged acceptable, surely they are false.

In addition, notice that all of the (a) and (b) examples in this section are never grammatical with singular agreement marking on the verb, but the (c) examples are always grammatical with singular agreement. (In the examples as given above this contrast is neutralized by the use of the past tense for the sake of naturalness, but it can be revealed by attempting to insert perfective *has/have* immediately following the subject noun phrase in each example.) This difference in syntactic number is presumably related to the fact that group terms cannot appear as the complement to group-noun *of* (**the group of the committee*), as well as to the fact that group terms cannot serve as the antecedent for *each other* (**the committee fought each other*).³ To the extent that the agreement marking triggered by a definite description depends on its extension (see section 7), subject-verb agreement supports the claim that group nouns behave differently than plurals or group nouns.

In any case, it is clear that group terms differ systematically from plurals and conjunctions in extensional contexts. I take these facts to motivate an analysis in which group terms differ in denotation from plurals and conjunctions.

2 A MODEL-THEORETIC ANALYSIS

After setting out the structure of the ontology, I will give enough syntactic rules, translation rules, and lexical interpretations to build a small fragment of English involving simple group terms, group nouns with *of* complements, simple plural terms, and conjunctions.

2.1 Syntactic and semantic rules

Following Link (1983) and others, I assume that the domain of discourse E is a set with a certain amount of internal structure. In particular, let E be a set with an associative, commutative, and idempotent join operator $+$. In other words, $\langle E, + \rangle$ is a join semilattice. Then the join operator determines a unique partial order \leq (Link's *i-part* relation). Specifically, \leq is that partial order such that $a \leq b$ (' a is dominated by b ') if and only if $a + b = b$. An element $a \in E$ is an atom just in case it dominates no other entity; that is, a is an atom just in case $\forall x \in E [x \not\leq a \vee x = a]$.⁴ Non-atoms will be called proper sums.

In general, atoms and sums are the semantic counterpart to singular and plural definite descriptions. That is, a singular term like *John* will denote an atom, and plural terms like *the men* or *John and Bill* will denote a proper sum. Furthermore, we shall see that the sum denoted by *John and Bill* dominates the atom denoted by *John*. These relationships established by the structure that the join operator induces on the domain of discourse will provide a means for describing the behavior of plurals and conjunctions.

Definite descriptions, both singular and nonsingular, denote entities in the domain of discourse. Predicate phrases, then, including common nouns and intransitive verb phrases, denote functions from entities to truth values (either **true** or **false**). Such a function characterizes a set of entities, and I will treat a set and its characteristic function as completely equivalent. Since we are interested only in denotation, this paper does not discuss either generalized quantifiers or intensionality, although there is some discussion of intensional issues in sections 3, 4, and 6.1.

A model for the fragment will be a tuple $\langle E, +, [\cdot], f \rangle$. The set E and the join operator $+$ are as described above; $[\cdot]$ is the interpretation function mapping expressions to their denotations; and f , the membership function, maps E into E so that $f(a + b) = f(a) + f(b)$ (i.e. f is an automorphism on E).

The membership function exploits the fact that each proper sum corresponds in an obvious way to a collection of individuals, namely, the set of atoms dominated by that sum. This enables f to associate each group with its membership, or, more precisely, with the proper sum corresponding to the join of its members. Other treatments have membership functions, in particu-

lar Link (1984) and Landman (1989); however, f is more closely aligned in spirit to the 'constitutes' function described in Link (1983). The constitutes function associates an entity such as Jane with the portions of matter that make it up, such as Jane's hands. Similarly, the membership function associates a group with the collection of (discrete) objects that constitute its membership. Later sections will discuss f in more detail, especially sections 5 and 7.

The interpretation function $\llbracket \cdot \rrbracket$ will be constrained so that syntactically complex expressions are mapped onto their denotations according to the following schemata, where parentheses indicate functional application.

	Syntactic structure	Interpretation
14. a.	S → NP VP	$\llbracket S \rrbracket = \llbracket VP \rrbracket(\llbracket NP \rrbracket)$
b.	NP → Det CN	$\llbracket NP \rrbracket = \llbracket Det \rrbracket(\llbracket CN \rrbracket)$
c.	CN → CN PP	$\llbracket CN \rrbracket = \llbracket PP \rrbracket(\llbracket CN \rrbracket)$
d.	PP → <i>of</i> NP	$\llbracket PP \rrbracket = \llbracket of \rrbracket(\llbracket NP \rrbracket)$
e.	NP → NP <i>and</i> NP	$\llbracket NP \rrbracket = \llbracket and \rrbracket(\llbracket NP \rrbracket, \llbracket NP \rrbracket)$

Furthermore, we will restrict our attention to models in which

15. a. $\llbracket and \rrbracket = \lambda x \lambda y [x + y]$
 b. $\llbracket of \rrbracket = \lambda y \lambda Q \lambda x [Q(x) \& f(x) \leq y]$

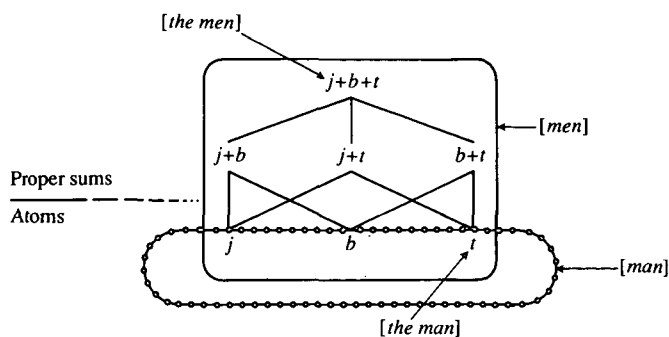
That is, the denotation of the conjunction *and* is a function that returns the join of the denotations of the conjuncts.⁵

The interpretation for *of* is more complicated, and I will defer a detailed discussion to section 5.1. Briefly, an entity will be in the extension of a predicate such as $\llbracket committee\ of\ the\ men \rrbracket$ just in case it is a committee and each of its members is a man. Since the sum of the members of a committee x is given by $f(x)$, x will be a committee of men if $\llbracket committee \rrbracket(x)$ is true and $f(x) \leq \llbracket the\ men \rrbracket$. More generally, if y is the entity denoted by the complement of *of*, and P is the predicate denoted by the group noun, we require $P(x)$ and $f(x) \leq y$, as given in the definition.

Finally, for the sake of explicitness, we must specify two technical details needed in any analysis involving plurals, although nothing crucial rests on the decisions made here as far as the main line of argumentation in this paper is concerned. First, our system must guarantee upward closure. Note that it follows from the fact that John is a man and Bill is a man that John and Bill are men. Thus the properties shared by atoms automatically move up the lattice to their sums. We say that the predicates for which such entailments hold exhibit upward closure with respect to the join operator. For our purposes, we shall simply stipulate that plural predicates denote the closure of the denotations of their singular counterparts. If $j \in \llbracket man \rrbracket$ and $b \in \llbracket man \rrbracket$ (in (16)), then it follows that $j + b \in \llbracket men \rrbracket$ by upward closure. Since $\llbracket John\ and\ Bill \rrbracket = j + b$, we predict

the desired entailment. (See Link (1983) and Landman (1989, section 2.3) for discussion.)

16.



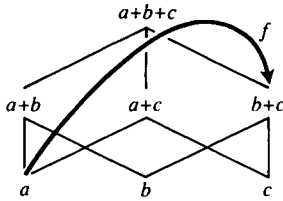
Second, we must say something about the behavior of the determiner *the* in an ontology containing sums. Syntactically, *the* combines with a common noun phrase to form a noun phrase. Since common noun phrases denote predicates, i.e. sets of entities, and definite descriptions denote entities, *the* will be a context-dependent function which maps a set of entities onto an entity. Moreover, *the* (like all lexical determiners) is conservative: *the* always picks out some entity which satisfies the predicate in question, so that $\llbracket \textit{the man} \rrbracket$ will be some entity in the extension of *man*.

Now assume that John and Bill and Tom are men, and consider the noun phrase *the men*. By upward closure, the predicate $\llbracket \textit{men} \rrbracket$ will contain $\llbracket \textit{John and Bill} \rrbracket = j + b$, $\llbracket \textit{Bill and Tom} \rrbracket = b + t$, $\llbracket \textit{John and Tom} \rrbracket = j + t$, and $\llbracket \textit{John and Bill and Tom} \rrbracket = j + b + t$. But these (proper) sums are entities just like any other, so that all $\llbracket \textit{the} \rrbracket$ needs to do is pick one, say, $j + b + t$. Thus *the men* will denote a single entity, a sum corresponding to some contextually specified set of men. Entities appropriate on this view for the denotations of *the man* and *the men* have been indicated in the diagram in (16).⁶

Now that we have specified the fragment, we can say what group nouns will denote. The main proposal of this paper is that we say nothing special about group nouns at all; that is, a singular group noun denotes a set of atomic entities just like any other singular noun. The only special property of a group noun is that the membership function f maps elements in its denotation onto proper sums.

We can now be more precise about what a group is in this model. Recall that a group was provisionally defined as an element in the extension of a group noun. A group, then, is any entity which f maps onto a proper sum. Thus a model for the fragment will have a structure as schematized in (17). Since f maps the atom a on to the sum of b and c , a is a suitable representation for a group which has b and c for its members.

17.



2.2 An example

This subsection gives a model for a state of affairs which will provide interpretations for many of the examples in the remainder of the paper.

For the sake of concreteness, let $+$ be the least-common-multiple operator on integers, and let E be the closure under $+$ of the primes greater than 1. Thus $E = \{2, 3, 6, 5, 10, 15, 30, 7, \dots\}$. There is nothing special involved in building E on the primes; it is simply a convenient choice for exposition in that atoms are easy to distinguish from proper sums (atoms are prime), and the \leq relation is transparent ($a \leq b$ just in case b is a multiple of a). Also, given that predicates are represented by (characteristic functions of) sets, the fact that proper sums are simply integers helps prevent the typographical confusion resulting from sets of sets.

As for the basic expressions in the various syntactic categories, assume that *man*, *group*, and *committee* (and their plural forms) are common nouns, that *died*, *meets on Tuesday*, and so on (and their plural forms) are verb phrases, and that *John*, *Bill*, *Tom*, *Committee A*, *Committee B*, and so on are noun phrases.

Then let the denotation function $\llbracket \cdot \rrbracket$ be consistent with (18).

18. a. $\llbracket \text{Committee A} \rrbracket = 2$
- b. $\llbracket \text{Committee B} \rrbracket = 3$
- c. $\llbracket \text{Committee C} \rrbracket = 5$
- d. $\llbracket \text{John} \rrbracket = j = 7$
- e. $\llbracket \text{Bill} \rrbracket = b = 11$
- f. $\llbracket \text{Tom} \rrbracket = t = 13$
- g. $\llbracket \text{committee} \rrbracket = \llbracket \text{group} \rrbracket = \lambda x [x \in \{2, 3, 5\}]$
- h. $\llbracket \text{man} \rrbracket = \lambda x [x \in \{7, 11, 13\}]$
- i. $\llbracket \text{woman} \rrbracket = \lambda x [x \in \{17, 19, 21\}]$
- j. $\llbracket \text{meets on Tuesday} \rrbracket = \lambda x [x \in \{2\}]$
- k. $\llbracket \text{meets on Wednesday} \rrbracket = \lambda x [x \in \{3\}]$
- l. $\llbracket \text{died} \rrbracket = \lambda x [x \in \{7, 11\}]$

Furthermore, let f be consistent with (19).

19. a. $f(2) = 77$
 b. $f(3) = 77$
 c. $f(5) = 323$

Finally, assume that $\llbracket the \rrbracket$ takes (the characteristic function of) a set of entities and returns that entity in that set which is arithmetically largest (a somewhat arbitrary but plausible choice). For instance, since $\llbracket man \rrbracket$ characterizes the set $\{7, 11, 13\}$, $\llbracket the man \rrbracket = 13 = \llbracket Tom \rrbracket$; and since $\llbracket men \rrbracket$ is the closure of $\llbracket man \rrbracket$ under the join operator, $\llbracket men \rrbracket$ characterizes $\{7, 11, 13, 77, 143, 1001\}$, and $\llbracket the men \rrbracket = 1001 = \llbracket John and Bill and Tom \rrbracket$. In addition, in order to allow bare plural terms such as *men*, we can add a zero determiner to the lexicon which behaves like *the*. In other words, I assume (for the purposes of this paper) that a bare plural noun phrase, when definite, denotes the same thing as the same plural count noun combined with *the*.

It is easy to see that the fragment gives the following interpretations:

20. a. $\llbracket the group \rrbracket = \llbracket the committee \rrbracket = 5$
 b. $\llbracket the man \rrbracket = 13$
 c. $\llbracket the groups \rrbracket = \llbracket the committees \rrbracket = 30$
 d. $\llbracket John and Bill and Tom \rrbracket = \llbracket the men \rrbracket = j + b + t = 1001$
 e. $\llbracket John and Bill \rrbracket = j + b = 77$
 f. $\llbracket John and Bill died. \rrbracket = \mathbf{true}$
 g. $\llbracket The committee died. \rrbracket = \mathbf{false}$
 h. $\llbracket the committee of John and Bill \rrbracket = 3$
 i. $\llbracket the committees of men \rrbracket = 6$
 j. $\llbracket the committees of men and women \rrbracket = 30$

The appropriateness of these representations will be discussed more fully in sections 4 and 5.

3 ALTERNATIVE PROPOSALS

Link (1984) suggests that groups as individuals denote atoms, and the connection between a group and its members resides in a function mapping group atoms onto sums. These special atoms are called 'impure' atoms. The analysis given in section 2 adopts the same formal technique. However, the version in Link (1984) differs in two substantive ways. As pointed out by Landman (1989), the version in Link (1984) does not allow for groups whose members are groups. This seems overly restrictive, since committees can form coalitions as easily as people can form committees. On my analysis, there is nothing to prevent the membership function f from mapping a group onto a sum that dominates

individuals, groups, groups whose members are groups, and so on, or even mixtures of these types of members.

More importantly, Link (1984) provides impure atoms not only for groups, but also for plurals and conjunctions when they are understood as individuals. Thus Link (1984) does not distinguish between group terms on the one hand and plurals and conjunctions on the other. I argue in section 1 that group nouns behave differently from plurals and conjunctions.

The obvious alternative to the atomic approach is to take the denotation of a group term to be the collection of its members, and to calculate the group as individual on the basis of that collection. This is essentially the approach taken by Bennet (1975). I will not discuss Bennet's proposal in detail here; instead, I will present a more elaborate version based on set formation as developed in Landman (1989), on the assumption that my comments on the latter analysis will carry over by and large to the former.

In order to understand the approach taken in Landman (1989), assume the domain of discourse is a join semilattice containing atoms and proper sums as described in section 2.1. A group term denotes a sum, and the atoms dominated by that sum are taken to be the members of the group. If *the committee* denotes $j + b$, for instance, then John and Bill are the two members of that committee. In addition, however, for each proper sum x there is a unique new entity $\uparrow x$ which is added to the domain of discourse. The simple sum is used when we wish to have access to the members of the group; but when a group seems to be acting as an entity with properties independent of its membership, we can associate these properties with $\uparrow x$ instead.

More technically, let the join operator be set union. If John, Bill, and Tom are the only men, and they are also the entire membership of Committee A, then $\llbracket \textit{the men} \rrbracket = \llbracket \textit{John and Bill and Tom} \rrbracket = \llbracket \textit{Committee A} \rrbracket = \{j, b, t\}$, (assuming $\llbracket \textit{John} \rrbracket = j$ and so on). Then \uparrow corresponds to an application of set formation which takes any proper sum and returns the singleton set containing only that sum. So in a context which demands an atomic reading of a group, in addition to the group as set denotation, we have $\llbracket \textit{Committee A} \rrbracket = \uparrow \{j, b, t\} = \{\{j, b, t\}\}$.

Let us call the entities in the range of \uparrow upsums. In general, then, definite descriptions are assumed to be systematically ambiguous between sums and upsums. Landman (1989) argues that not only group terms, but plurals and conjunctions may denote upsums. For instance, upsums are crucially involved in providing an interpretation for *the cards above 7 and the cards below 7* (which denotes the sum of the upsums of the conjuncts).

Furthermore, since upsums are also in the domain of the join operator (by virtue of being entities in the domain of discourse), this means that *John and Bill and Tom* is ambiguous between the three entities $\{j, b, t\}$, $\{j, \{\{b, t\}\}\}$, and $\{\{\{j, b\}\}, t\}$, in addition to their respective upsums, depending on the syntactic constituency and semantic need.

My main objection to the use of upsums to represent groups is that it predicts that group terms are potentially indistinguishable from plurals and conjunctions (in extensional contexts). It is a mystery on this alternative why plurals and conjunctions should be intersubstitutable with each other but not with group terms, as illustrated in section 1.2.

More specifically, upsums do not provide sufficient resolving power. Given the membership of a group, there are exactly two entities in the domain of discourse capable of representing that group: the sum of the members, and their upsum. But it is certainly possible for more than two distinct groups accidentally to have the same membership. Landman (1989) discusses the resolution problem at some length; I will discuss the position advocated there more fully in section 4.

Furthermore, if group terms denote proper sums, then by default a group should have any property shared by its members. I argue in section 5 that this is not so, that it is more natural to consider groups as atomic individuals. Thus I claim that interpreting groups as sets makes access to members too easy.

Finally, it is not clear when a noun phrase will denote a sum and when it will denote an upsum. On my analysis, group nouns uniformly denote sets of atoms. There is one case in which I believe a definite description referring to a group may alternate between an atom and the sums of its members, namely British English; but in this case, agreement morphology clearly signals which interpretation is appropriate (see section 7).

4 RESOLVING POWER

This section explores situations in which a group has properties not shared by the sum of its members. In addition, we will see how the atomic analysis distinguishes among groups which accidentally have identical memberships.

Recall that section 1.2 argues that groups may fail to have a property which is true of the sum of its members, and let the pair in (21) represent the examples that appear there.⁷

21. a. The men met on Tuesday.
b. The committee met on Tuesday.

If the committee in question meets only on Friday afternoons, then (21a) can be true at the same time that (21b) is false. In the situation modelled in section 2.2, if John and Bill are the only salient men, then $[[the\ men]] = j + b$. But the denotation of *the committee* is an atom, so that $[[the\ committee]] \neq j + b$, and (21b) evaluates to false at the same time that (21a) evaluates to true, as desired. Thus the model can distinguish a group from the sum of its members.

The failure of entailment in (21) clearly poses a problem for analyses which identify a group with the set of its members. On the upsum analysis, however, the entailment correctly fails to go through if we assume that the group term denotes an upsum. Then $\llbracket \textit{the men} \rrbracket = \{j, b\} \neq \llbracket \textit{the committee} \rrbracket = \uparrow \{j, b\} = \{\{j, b\}\}$. Thus it is entirely possible that $\llbracket \textit{the committee} \rrbracket$ has properties different from $\llbracket \textit{the men} \rrbracket$. However, if terms can freely be interpreted as upsums, then there should always be a construal of (19) in which the entailment holds (in both directions), independent of the facts of the situation. But this prediction is not borne out.

Even if the upsum analysis can describe the failure of entailment in (21), it fails to distinguish among groups with identical memberships.

22. a. Committee A meets on Tuesdays.
- b. Committee B meets on Tuesdays.

The value of the denotations of (22a) and (22b) are entirely independent, even assuming that Committee A and Committee B have the same members. This presents no difficulty on the atomic account, since Committee A and Committee B denote distinct individuals. In the model given in section 2, (22a) is true and (22b) is false. The fact that both committees happen to have the same membership is the result of the membership function f accidentally mapping them onto the same sum.

On a set analysis, a group is entirely determined by its members, so two groups with the same members must be extensionally equivalent. Given upsums, a group can denote the set of its members or the upsum of its members, so we could potentially discriminate among at most two committees with identical memberships by means of sums and upsums alone. But we can have a Committee D, Committee E, and so on, any number of committees with identical membership, so upsums are not sufficient to model the relationship between a group and its members.

One possibility is that Committee A and Committee B have different intensions, since there is some possible world in which their memberships differ. But this will only help if predicates normally taken to be extensional, such as *meet*, are sensitive to intensions just in case their arguments are group terms, a rather uncomfortable solution. Furthermore, notice that all of the examples seen so far involve terms in subject position, and subject position is normally taken to be transparent to intensionality (see e.g. Montague 1970). Therefore I will reject intensionality as a solution to the group resolution puzzle.

Landman (1989) also rejects intensionality, and proposes that committees with identical memberships differ in intention (note the t). He suggests providing a level of intentional objects called 'pegs' built on top of the domain of discourse, so that distinct terms can denote distinct pegs at the same time their extensions in the domain of discourse coincide. Apparently intentional

predicates such as *meet*, then, are functions on pegs, rather than entities in the domain of discourse.⁸ Augmented with intentionality, the upsum analysis clearly can provide the necessary resolving power. But the atomic analysis achieves exactly the right resolving power without any additional assumptions. Furthermore, Landman (1989) argues that intentions are available to plurals and conjunctions as well as to group terms, once again assimilating group terms with plurals and conjunctions. To the extent that the resolution puzzle does correlate with the other behavior of group nouns distinguishing them from plurals and conjunctions, the atomic analysis gives a more satisfying explanation.

5 ACCESS TO MEMBERS

There is an intuitive connection between a group and its members, and this correspondence is lost if a group is simply an atomic individual. Thus the atomic analysis unadorned suggests that this intuitive connection resides in our conception of the world independent of linguistic structure. However, there are at least two constructions for which truth conditions clearly depend on recovering the membership of a group. The first is the *of* phrases mentioned above: a committee of women has only women for members. In order to provide *of* phrases with an interpretation, we must make the members of a group available to the semantics. Section 5.1 shows how the membership function f can provide an interpretation for *of* phrases. The second case involves the interaction of agreement marking with truth conditions involving subject group terms in British English, as described in section 7.

In addition to these two constructions, Landman (1989) proposes that there are systematic entailment relations between sentences with denotations involving a group and sentences with denotations involving the members of that group. Such examples seem to motivate allowing a group to denote the sum of its members, as in the upsum model, so that the semantics can guarantee that the desired entailment relations go through. For instance, if a group meets at a particular location, it follows that the members of that group were present at that location. This seems more like non-linguistic reasoning about the real world than a constraint imposed by the semantics on possible interpretation functions. However, section 5.2 shows how to guarantee such entailments on an atomic analysis if necessary. Furthermore, I show that the upsum model does not give the correct predictions when groups denote upsums rather than sums; once the upsum analysis is adjusted, the two proposals seem equivalent in complexity. Therefore locational predicates do not argue in favor of an upsum analysis over an atomic one.

5.1 of phrases

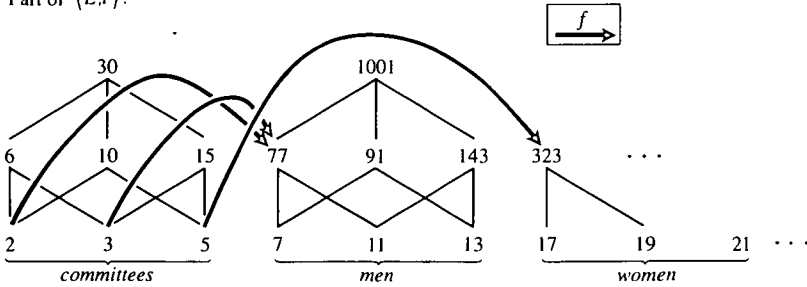
The denotation given for *of* in (15b) is repeated here:

$$23. \llbracket of \rrbracket = \lambda\gamma\lambda Q\lambda x[Q(x)\&f(x) \leq \gamma]$$

Since this interpretation is the most complex element in the fragment given in section 2, it will be helpful to work through a concrete example in some detail.

We want the predicate *committee of men* to have in its extension only groups whose members are men. The diagram in (24) summarizes the parts of the model specified in section 2.2 which are relevant to calculating the denotation of this phrase. The predicate *committee* accepts the atoms 2, 3, and 5. Only two

24. Part of $\langle E, I \rangle$:



of these committees are committees of men: the two that the membership function maps into the sublattice of men, namely, 2 and 3. Both the committee 2 and the committee 3 have the same members, namely, 7 and 11 (representing John and Bill), whose sum is 77. The committee 3, however, has a pair of women for its membership. The interpretation of *of* picks out the correct groups by comparing their image under *f* to the denotation of the restricting noun phrase *men*. Recall that this fragment treats the zero determiner as if it were *the*, so that *men* as a definite description coincides with *the men*. Since $\llbracket men \rrbracket$ is the closure of $\llbracket man \rrbracket$ under the join operator, $\llbracket men \rrbracket = \{7, 11, 13, 77, 91, 143, 1001\}$. Since $\llbracket the \rrbracket$ picks out the arithmetically largest sum, $\llbracket men \rrbracket = 1001$. The interpretation of *committee of men*, then, accepts any atom which is a committee and whose image under *f* is dominated by 1001.

$$\begin{aligned}
 25. \llbracket committee\ of\ men \rrbracket &= \llbracket of\ men \rrbracket(\llbracket committee \rrbracket) \\
 &= \llbracket \llbracket of \rrbracket(\llbracket men \rrbracket) \rrbracket(\llbracket committee \rrbracket) \\
 &= \llbracket \llbracket \lambda\gamma\lambda Q\lambda x[Q(x)\&f(x) \leq \gamma] \rrbracket(\llbracket men \rrbracket) \rrbracket(\llbracket committee \rrbracket) \\
 &= \llbracket \lambda Q\lambda x[Q(x)\&f(x) \leq \llbracket men \rrbracket] \rrbracket(\llbracket committee \rrbracket) \\
 &= \lambda x[\llbracket committee \rrbracket(x)\&f(x) \leq \llbracket men \rrbracket] \\
 &= \lambda x[\llbracket committee \rrbracket(x)\&f(x) \leq 1001] \\
 &= \lambda x[\llbracket \lambda\gamma[\gamma \in \{2, 3, 5\}] \rrbracket(x)\&f(x) \leq 1001] \\
 &= \lambda x[x \in \{2, 3, 5\}\&f(x) \leq 1001]
 \end{aligned}$$

In order to calculate the set characterized by this predicate, we need only test entities in the extension of $\llbracket \textit{committee} \rrbracket$, since all others will be excluded by the requirement that the candidate entity be either 2, 3, or 5.

26. a. $\llbracket \lambda x[x \in \{2, 3, 5\} \& f(x) \leq 1001] \rrbracket(2) = 2 \in \{2, 3, 5\} \& f(2) \leq 1001$
 $= \text{true} \& 77 \leq 1001 = \text{true}$
- b. $\llbracket \lambda x[x \in \{2, 3, 5\} \& f(x) \leq 1001] \rrbracket(3) = 3 \in \{2, 3, 5\} \& f(3) \leq 1001$
 $= \text{true} \& 77 \leq 1001 = \text{true}$
- c. $\llbracket \lambda x[x \in \{2, 3, 5\} \& f(x) \leq 1001] \rrbracket(5) = 5 \in \{2, 3, 5\} \& f(5) \leq 1001$
 $= \text{true} \& 323 \leq 1001 = \text{true} \& \text{false}$
 $= \text{false}$

Therefore $\llbracket \textit{committee of men} \rrbracket = \{2, 3\}$, as desired, so that $\llbracket \textit{the committee of men} \rrbracket = 3$. In other words, the result is that *committee of men* denotes all and only those committees whose members are exclusively men.

Now consider $\llbracket \textit{committees of men} \rrbracket$, in which the group noun is plural. The entities to be checked against the $\llbracket \textit{men} \rrbracket$ sublattice are now potentially proper sums. This leads to the requirement stated in section 2.1 that f be an automorphism, which ensures that the membership of a sum depends only on the membership of the parts of that sum. In particular, the membership of the join of two groups is the join of the memberships of the groups. For instance, if John and Bill are the members of Committee A, and Mary and Sandy are the members of Committee C, then the members of the entity $\llbracket \textit{Committee A and Committee C} \rrbracket = f(\llbracket \textit{Committee A} \rrbracket + \llbracket \textit{Committee C} \rrbracket) = f(\llbracket \textit{Committee A} \rrbracket) + f(\llbracket \textit{Committee C} \rrbracket) = j + b + m + s$. Given this assumption, the fragment gives the reasonable prediction that $\llbracket \textit{committees of men} \rrbracket = \{2, 3, 6\}$, and $\llbracket \textit{the committees of men} \rrbracket = 6$.

Along the same lines we also have $\llbracket \textit{the committees of men and women} \rrbracket = 30$. On this account, a committee of men and women is any committee whose image under f is dominated by the sum of $\llbracket \textit{men} \rrbracket$ and $\llbracket \textit{women} \rrbracket$. The account automatically excludes many implausible readings. In particular, it is not necessary that any committee member be both a man and a woman; it is not necessary that each committee be uniformly composed of men or uniformly composed of women; it is not necessary that any particular committee have at least one male member and also at least one female member; and so on. Thus the account automatically gives a reasonable representation of group noun *of* when it has a conjoined complement.

As a last comment on the predictions made by the analysis of group noun *of*, consider what would happen if we attempt to evaluate $\llbracket \textit{group of the committee} \rrbracket$. There is a grammatical reading where *of* occurs in its possessive or attributive use; but this phrase cannot be used to pick out groups of people whose members are all taken from the membership of the most salient committee. Since groups always contain at least two members, the image of any group under f will be a

proper sum. But the denotation of *the committee* is an atom, by hypothesis. Since an atom can never dominate a proper sum, the extension of *group of the committee* would be empty in every model. The atomic analysis, then, gives an explanation for why singular group terms are ungrammatical as complements to group-noun *of*. On the upsum analysis, however, a group term can denote a proper sum just like a nonsingular term, so there is no semantic reason why they cannot serve as the complement to group noun *of*.

5.2 Locational predicates

Landman (1989) notes that certain predicates, including locational predicates, are sensitive to the membership of a group. More specifically, if a locational predicate is true of a group, it will also hold the members of the group.

27. a. Committee A stayed in Boston yesterday.
 b. John and Bill stayed in Boston yesterday.

It seems reasonably graceful to say that in any situation in which (27a) is true, (27b) is necessarily also true. We can express the generalization illustrated in (27) by referring to f , once we have some way of talking about the location of an entity. Assume that every entity x has a value under a function τ such that $\tau(x)$ is interpreted as the location of x . We need only stipulate that f constrains τ as in (28).

28. $\tau(f(x)) = \tau(x)$

This will guarantee that if the committee is in Boston, then its members are also in Boston.

We should also stipulate that that τ is a homomorphism from the domain of discourse into the hierarchy of locations which preserves the sense of the join operator. That is, if Bill and John are in Boston, then Bill is in Boston, and so on. In the other direction, if Bill is in Boston and John is in New York, then the location of the sum representing the pair of John and Bill is not a discrete location in the normal sense; but there is not room here for a detailed development of a theory of location. (See e.g. Lasersohn 1988 for a detailed proposal.)

On the upsum analysis, the desired entailment goes through automatically only on the sum reading, that is, only when $\llbracket \textit{the committee} \rrbracket = \llbracket \textit{the men} \rrbracket$. Notice that this extensional identity predicts that the entailment relation should be symmetrical, so that (27b) entails (27a). As argued in section 2.2, this prediction is too strong, since John and Bill may happen to be in Boston for reasons having nothing to do with the operation of the committee.

In any case, the upsum analysis predicts that the locational entailment will be guaranteed only when a group term and a plural term have identical denotations, that is, only when they both denote sums or both denote upsums. But

meet has locational entailments even when it distinguishes between a group and its members.

29. a. The men first met this year.
 b. The committee first met this year.
 c. The men were all in the same place this year.

As argued in section 2.2, (29b) does not entail (29a), since (29b) will be true at the same time that (29a) will be false in a situation in which the men were first introduced to each other years before the committee was formed. Nevertheless, (29b) does entail (29c), since the members of a committee must all gather in the same place in order for a meeting to take place. This means that the upsum analysis unadorned does not predict the full range of locational entailments.

Therefore we must stipulate for the upsum analysis that $\tau(x) = \tau(\uparrow x)$ in parallel with (28). Thus (28) is not an artefact of the atomic analysis, but must be stated in any semantics which attempts to model entailments involving location. Landman (1989) appeals to examples similar to (27) as a partial motivation for providing group terms and plurals with (the optional of) identical denotations. Once a requirement similar to (28) is in place, however, the desired entailments go through without assuming that the group term is ever co-extensive with a plural. Thus locational predicates do not provide an argument in favor of the upsum analysis over the atomic analysis.

Landman (1989) gives other examples of entailments. For instance, we can conclude from the fact that The Talking Heads is a pop group that David (a member of the Talking Heads) is a pop star. Although I do not have space to develop arguments parallel to the one above given for location predicates here, my position on these other sorts of entailments is that they too are facts about the way the real world works which should not be included in a description of semantic regularity. If an analysis on which they go through is desired anyway, then the entailments will continue to go through even in contexts in which an upsum is needed. A separate stipulation will be needed for each sort of entailment, so that the upsum analysis will offer no advantage over the atomic analysis.

6 ADDITIONAL ARGUMENTS THAT GROUPS ARE ATOMS

6.1 *Names of groups as rigid designators*

Traditionally, names are rigid designators. That is, a name denotes the same entity at every intensional index. This means that if two names ever denote the

same entity, they cannot be distinguished (by means of truth conditions) even in intensional contexts (ignoring propositional attitudes). Thus if Richard and Dick are two names for the same person, you are seeking Richard just in case you are seeking Dick.

Clearly names of groups should be rigid designators just like any other names. Say that Committee A and the House Ways and Means Committee are two names for the same committee; then you are seeking the approval of Committee A just in case you are seeking the approval of the House Ways and Means Committee.

Assuming that names of groups are rigid designators is a problem for the set analysis. If a group term denotes the sum or the upsum of its members, then the extension of a group-denoting expression must change with every variation in the membership of the group. Rigid designators could no longer denote the same individual at every index, and it would become more difficult to guarantee that two names for the same group were intensionally equivalent.

But if groups correspond to atomic entities, no such problem arises. For instance, we can have $[[\textit{Committee A}]] = [[\textit{The House Ways and Means Committee}]] = \epsilon$ for some atom ϵ at every world-time index, in the normal fashion of rigid designators. The membership of the committee can still vary over time or across possible worlds, since the membership function f is free to give a different value for ϵ at each index. Thus the atomic analysis but not the set analysis automatically extends to the standard treatment of names as rigid designators.

6.1 *Similarity to measure nouns*

Group nouns bear a strong similarity to measure nouns.

30. a. two committees of Hungarians
b. two cups of flour
31. a. a flock of geese
b. a bowl of rice
32. a. a forest of elm trees
b. an acre of elm trees

Intuitively, measure nouns provide a means of referring to a portion of matter as a unit. Similarly, group nouns are nothing more than the counterpart of measure nouns in the count domain. That is, group nouns also provide a means of referring to a collection of countable objects as a unit.

A potential objection to this comparison might come from the tendency of measure nouns to specify the exact quantity of the portion of matter they describe: a cup of water is a fixed amount, but a committee can have any

number of members (although it should have more than two). But this alleged contrast between group nouns and measure nouns fails in both directions. There are measure nouns which are vague in the same way as group nouns, for instance *piece* or *portion*, and there are group nouns which specify the precise cardinality of their membership, such as *platoon*, *pair*, or *cabinet*.

Given this parallelism, it makes sense that the denotation of group terms should resemble the denotation of measure nouns. And since there is no reason to suppose that measure terms denote anything other than an atomic entity, at least as far as their behavior in the count domain is concerned, the most natural assumption is that group nouns also denote atoms. See Krifka (1987) for an analysis of measure nouns on which measure terms denote atoms.

7 AGREEMENT

Additional support for the hypothesis that group nouns denote atomic entities comes from their agreement properties. A large part of the plausibility of distinguishing between atoms and proper sums in the ontology is the close correspondence between noun phrases which are syntactically singular and those which denote atoms. For instance, *the man* is singular and denotes an atom, and *the men* is plural and denotes a sum. Given this observation, an analysis on which a group term denotes the same entity as a nonsingular term predicts that group terms should be syntactically plural; however, this is generally not the case. On the other hand, if group terms denote atomic entities as proposed here, they are correctly expected to behave like singular terms.

I continue to use the terms ‘singular’ and ‘plural’ exclusively to refer to morphosyntactic properties of phrases. They correspond roughly in the semantics to ‘atomic’ and ‘proper sum’.

Group nouns in the plural morpheme always trigger plural verb agreement:

33. a. The committees have left.
b. *The committees has left.

But group nouns in the plural behave just like other plural terms, and we can ignore them henceforth.

More relevantly, singular group nouns are always capable of triggering singular agreement marking on the verb.

34. The committee has left.

This much is unsurprising (on the atomic analysis). However, in some dialects, the singular of some group nouns is systematically capable of triggering plural agreement, although singular agreement continues to be grammatical:

35. a. The committee is old.
b. The committee are old.

British dialects typically allow both (35a) and (35b) as grammatical. Other dialects reject the plural agreement in (35b). There is considerable variation among speakers; at the very least, there is a dialect in which plural agreement as in (35b) is always ungrammatical. I will refer to the most finicky dialect as the standard American dialect, and I will ignore the variation between the two extremes of the American and the British dialect.

Note that the atomic analysis describes the American dialect without further modification. Since group terms denote atoms, it is unsurprising that they trigger only singular agreement.

Thus we need only provide an explanation for the British dialect. Fortunately for the atomic analysis, the difference in agreement between (35a) and (35b) corresponds to a difference in meaning. In the British dialect, singular agreement as in (35a) is appropriate only when it is the age of the committee as a group which is of interest; it can be true even if the individual members are all young. Plural agreement as in (35b) is appropriate only when it is the age of the members of the committee which is important, and (35b) can be true even when the committee itself was chartered recently.

Before we attempt to formulate a rule characterizing the dialect split, there are several other semantic constraints on the availability of plural agreement which should be noted. Specifically, plural agreement with singular group terms is possible in British English only when the members of the group are human, or at least sentient.

36. a. The group of people are sitting on the lawn.
b. # The group of statues are sitting on the lawn.

Also, note that plural agreement is possible with proper group nouns:

37. a. Chrysler are pulling out of South Africa.
b. Parliament are pulling out of South Africa.

This makes it clear that the rule for British English operates only when the denotations of definite descriptions are available, rather than at the level of, say, common noun phrase denotations.

We can now describe the British dialect as given in (38).

38. Group term agreement in British English:

Syntax	Semantics
$NP[\textit{plural}] \rightarrow NP[\textit{singular}]$	$[[NP[\textit{plural}]]] = f([[NP[\textit{singular}]]])$

We must also stipulate that invoking this rule forces the referent of the noun phrase to be interpreted as sentient.

The rule in (38) says that a group term can denote either an atom or the sum of its members, as disambiguated by the marking on the verb. This interpretation rule brings the British dialect in line with the generalization that singular verb phrases take noun phrases which denote atoms, and plural verb phrases take those which denote sums.

This account predicts the difference in truth conditions as described for (35a) and (35b), and, assuming that $\llbracket \textit{the members of the committee} \rrbracket = f(\llbracket \textit{the committee} \rrbracket)$, it predicts that the following two sentences are synonymous:

39. a. The committee are old.
b. The members of the committee are old.

In sum, the atomic group hypothesis supplemented with a membership function f provides a simple account of the dialect split.

Even in the American dialect there are certain situations in which plural agreement is more acceptable. For instance, plural agreement is preferred when the subject is a name with plural morphology, as in (40).

40. a. The Talking Heads are giving a concert in Belgium.
b. ?The Talking Heads is giving a concert in Belgium.
41. a. ?The Clash are giving a concert in Belgium.
b. The Clash is giving a concert in Belgium.

However, when the proper group noun is morphologically singular, as in (41), singular agreement is preferred, and in no case is the agreement in free variation as it is in the British dialect. I take (40) to be a fact about the morphology of proper names, rather than a reliable probe on the denotation of a group term.

More problematic are the cases where the sum interpretation is inescapable despite singular agreement. For some speakers of the American dialect, *the committee is old* is ambiguous between the atomic reading and the sum reading. In fact, there are even some cases in which every American speaker seems to have a sum reading despite singular agreement.

42. a. John and Bill have risen to their feet.
b. The committee has risen to its feet.

If group terms are atoms independent of their membership, then the truth of (42b) should be independent of the truth of (42a). However, if John and Bill are the only members of the committee, then (42a) entails (42b). It is as if the properties common to the members of the committee are extended to the group entity as if by courtesy. In general this does not happen, as argued in section 1.2; and the effect is enhanced by non-linguistic reasoning about the real world. For instance, committees do not have feet, but committee members do, so the use of *feet* in (42b) makes a group-distributive reading more salient.

But no matter how these last two problems are resolved, the British-

American dialect split supports the claim that group terms denote atoms rather than sums. There are two arguments in this direction. First, all dialects permit singular agreement where any dialect has singular agreement, but only some dialects permit plural agreement. This asymmetry makes sense if the interpretation of a group as an atomic entity is basic and its incarnation as the sum of its members is more remote. Second, even in those dialects which permit the extraordinary plural marking on the verb, singular marking is always grammatical, but the special plural is available in a more restricted set of cases. Once again, we would expect the atomic interpretation to have a wider availability if it is the basic denotation of the group noun. Thus the evidence from number agreement supports the atomic hypothesis, and argues against the set formation perspective.

CONCLUSION

I have proposed that group terms, like all terms containing a singular noun, denote atomic entities, and that the membership of a group is available only through the mediation of a function f . This scheme provides exactly the resolving power needed for discriminating among groups, at the same time that rigid designators operate exactly as expected. Furthermore, the membership function f mapping group atoms onto their memberships provides limited but effective access to members when it is needed, most notably for group-noun *of* phrases and for describing group term agreement in the British dialect.

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NOTES

1. There is a parallel test involving the partitive which usually gives the same result. A partitive phrase is just like the *of* phrases above except that the complement noun phrase is definite, e.g. *a group of the students* versus *a group of students*. However, the bare plural test is preferable, since noun phrases in the partitive do not always contain group nouns. For instance, we have *a few of the men* and **a few of the man*, even though *few* is not a group noun: it is not regular with respect to the plural, it is not a count noun, and there is no contrast with a bare plural *of* complement: **a few of men*, **a few of man* (cf. *a few men*, **a few man*).
2. Landman (1989) shows that there are many seemingly innocent predicates which are not extensional enough for our purposes. For instance, the hangmen may be on strike without the judges being on strike, even if the hangmen happen to be the judges in a particular situation. Thus the predicate *be on strike* can distinguish between the two plural terms *the judges* and *the hangmen* even when they have the same extension. However, if the hangmen die, then it follows that the judges die, and vice versa, so I will take *die* to be a purely extensional predicate.
3. It should be noted that plural group terms (e.g. *the committees*, *the groups of women*) behave like other plural terms in all respects, including the ability to trigger plural agreement marking.
4. This definition of atom reflects the non-crucial assumption that the domain of discourse lattice does not contain a zero element.
5. Of course, this interpretation only covers one restricted use of *and*; see e.g. Hoeksema (1983, 1988).
6. This treatment of *the* diverges from the traditional treatment given in Montague (1970) as well as the plurals-theory oriented proposal in Link (1983). Nothing crucial hinges on this decision, but it will be convenient for a sentence such as *the man died* to have a chance at being true in a model in which the predicate $\llbracket \textit{man} \rrbracket$ contains more than one entity. Assume that Bill and John are men, so that the extension of *man* contains two entities. Given such a situation, in the fragment in Montague (1970), *the man* denotes a generalized quantifier which is true of no predicate, so *the man died* is always false; in the fragment in Link (1983), there is a uniqueness requirement, so that *the man* fails to denote. The version of *the* given here is more along the lines of the type shifting analysis proposed in Partee and Rooth (1983), where the job of *the* is to take a predicate and package it as a noun phrase denotation.
7. For clarity in the discussions which follow I will let an example with a plural term stand for similar examples involving conjunctions. In each case I will assume that it is clear how the analysis presented in section 2 predicts that plurals and conjunctions pattern together with respect to truth value whenever they denote the same sum.
8. We can roughly approximate pegs by allowing spontaneous upsums of upsums. A group term such as *the committee* could be ambiguous between $\{j, b\}$, $\{\{j, b\}\}$, $\{\{\{j, b\}\}\}$, ... Then we could have $\llbracket \textit{Committee A} \rrbracket - \{\{j, b\}\}$, $\llbracket \textit{Committee B} \rrbracket - \{\{\{j, b\}\}\}$, and so on. The technical machinery involved in a fully explicit intentional system is rather elaborate; see Landman (1989, part 3) for details.

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