

Plural Indefinites and Unexpected Pair-list Readings

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1 Introduction

In this paper, we bring new data from plural indefinites to bear on the questions of how pair-list readings arise in interrogatives, and what their pair-list behavior suggests about the representation of the meanings of these determiners.

In the analysis of *wh*-/quantifier interactions, it has been suggested that *wh*-interrogatives such as (1a), where a universal *c*-commands the *wh*-trace, are said to yield three types of reading: individual (1b), functional (1c) and pair-list (1d) (e.g. Chierchia 1992; Groenendijk and Stokhof 1984).

- (1) a. Which woman does every Italian man we know love *t*?
- b. Every Italian man we know loves Sophia Loren. (Individual reading)
- c. Every Italian man we know loves his mother. (Functional reading)
- d. Pablo loves Rosa, Giovanni loves Sandra, Leo loves Lita, etc. (Pair-list reading)

We re-examine the conditions under which the pair-list reading emerges in interrogatives. In doing so, we focus specifically on plural indefinites, introducing a data set that shows that some plural indefinites yield pair-list readings which would be unexpected under one class of analyses, and that only a subset of these indefinites yield pair-list readings, unexpected from a second class of theories. We provide a new generalization to cover the distribution of determiners which yield pair-list readings, and explore its implications for the analysis of pair-list readings and that of determiner meanings. Specifically, we account for the distribution of determiners with reference to their determiner meaning, while ruling out some alternative approaches, and explore the possibility of accounting for the pair-list readings for indefinites in a manner similar to that which has been proposed for definites by Dayal (1996).

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2 Pair-list Readings in *Wh*-interrogatives

2.1 *Wh*-/Quantifier Interactions

The range of available readings in examples such as (1) remains of interest for the syntax and semantics of questions. Specific attention has been paid, for example, to the phenomenon of subject/object asymmetries; in brief, the pair-list reading like that in (1c) is available when the *wh*-trace is extracted from the object position (see 2c), but not when it is extracted from the subject position (see 3c) (e.g. May 1985, Chierchia 1992, Aoun and Li 1993, among others). The example in (2) is a paradigm case where object *wh*-yields a pair-list reading with *everyone*.

- (2) a. Who/which professor does everyone like *t*?
 b. Prof. Smith. (Individual reading)
 c. Bill likes Prof. Smith, John likes Prof. Jones, etc.
 (Pair-list reading)

In example (3), however, the pair-list reading is not available.

- (3) a. Who/which professor *t* likes everyone?
 b. Mary. (Individual reading)
 c. *Prof. Smith likes Mary, Prof. Jones likes Bill, etc.
 (*Pair-list reading)

(Chierchia 1992)

Chierchia (1992) offered an analysis which sought to account for the subject/object asymmetry in (2–3) as an instance of Weak Crossover, and claimed that quantifying-in to questions was not necessary, but rather a complication to the semantics of questions. As a way into our question, we briefly review Chierchia (1992) below.

2.2 Chierchia's (1992) Analysis

Chierchia (1992) proposes that the pair-list reading can be accounted for as a species of the functional reading (see also Engdahl 1986, Groenendijk and Stokhof 1984, among others), as schematized in (4).

- (4) a. Example: Who does every Italian man love?
 b. which function *f* is such that every Italian *x* loves *f*(*x*)

For Chierchia (1992), the functional reading has two ingredients, functional (5a) and pronominal (5b). This was instantiated by proposing a complex trace, as in 5c.

- (5) a. Function: $\{p: p \text{ is true and for some } f, p = \wedge[\text{every Italian loves } f(x)]\}$
 b. Argument: every Italian_i man loves his_i mother
 c. *Complex trace*: $[\text{who}_i, [\text{every Italian}_j \text{ loves } [e_i^j]]]$
 (The function index is i & the argument index is j)

Under Chierchia's analysis, cases where the pair-list is ruled out can be captured as a weak crossover phenomenon (6a) with respect to argument index j . As such, whatever accounts for classic weak crossover violations would also rule out the pair-list reading under Chierchia's analysis.

- (6) a. $\text{who}_i e_i^j \text{ likes everyone}_j$ (object NP has to cross j to bind it)

However, as Chierchia notes, this functional configuration does not *guarantee* the pair-list reading. The availability of the pair-list depends in part on determiner meaning (Chierchia 1992; see also Groenendijk and Stokhof 1984). As Chierchia observes, if *some* is substituted for *every*, the pair-list is no longer available, although the functional reading remains (7c,d).

- (7) a. Which woman do some Italian men we know like t ?
 b. Some/a few/several Italian men we know like Queen Elizabeth.
 (Individual reading)
 c. Some/a few/several Italian men we know like their mother-in-law. (Functional reading)
 d. *Pablo likes Rosa, Giovanni likes Sandra, Leo likes Lita, etc.
 (*Pair-list reading)

Chierchia observes that the determiners yielding the pair-list in this configuration are the universal quantifiers. Why should this be so? Chierchia proposes that they all have a generator—they provide a domain over which to map the function. Chierchia speculates that universals provide the answer to how to run through the values of f in a function (Q , the binder of f , determines whether pair-list will be allowed, depending on what Q is).

For Chierchia, this was further support for the argument against quantifying-in to questions—that is, the phenomenon is *partial*, in applying only to

particular determiners, which would be an unexpected result if one supposed quantifying-in to questions to be categorically available.

3 Pair-lists and Indefinites: New Data, New Generalization

3.1 Plural Indefinites (e.g. *Some*) Do Yield Pair-list Readings

Our data suggests that plural indefinites such as *some*, *a few*, and *several* yield pair-list readings under *wh*-, as is shown in the examples in (8), unlike what Chierchia's (1992) generalization would predict. These readings are revealed in contexts in which the *wh*-NP is also plural (compare examples (7–8)).

- (8)
- a. Which women do some/a few/several Italian men we know like?
 - b. Some/a few/several Italian men we know like Queen Elizabeth.
(Individual reading)
 - c. Some/a few/several Italian men we know like their mother-in-law. (Functional reading)
 - d. Pablo likes Rosa, Giovanni likes Sandra, Leo likes Lita, etc.
(Pair-list reading)

The data in (8) suggests that a kind of pair-list reading is available for non-universals, counter to the previous generalization that only universals should generate the pair-list reading. Consider a second example in (9) which shows that the pair-list holds for these indefinites, according to our respondents.

- (9)
- a. Which classes did some/a few/several professors teach last semester?
 - b. Bill taught syntax, John taught semantics, etc. (Pair-list reading)

We will discuss the requirement of plural *wh*- in more detail below (see also Dayal 1996; Hagstrom 2003, among others, for discussion of the role of plurality on *wh*- in other environments).

3.2 Not All Plural Indefinites Yield Pair-list Readings

As example (10) shows, not all plural indefinites yield the pair list reading, even under plural *wh*-. *Most*, and *many*, are notably rejected by respondents who accept a pair-list reading for *some/a few/several* (compare 9–10).

- (10) a. Which classes did many/most professors teach last semester?
 b. *Bill taught syntax, John taught semantics, etc.
 (*Pair-list reading)

What the current data suggests is that an account of the pair-list must address not only the presence of pair-list readings for non-universals, but also the distribution of indefinites yielding the pair-list. That a subset of plural indefinites yields the pair-list is challenging to accounts suggesting that only universals should yield pair-lists, and also those suggesting that in principle any determiner in the right structural configuration should be a candidate for allowing some kind of pair-list reading (e.g. Higginbotham 1996).

To sum up, we have observed that plural indefinites divide into two classes with respect to whether they yield pair-list readings: indefinites such as *some*, *a few*, and *several* yield pair-lists, while indefinites like *many* and *most* do not.

3.3 New Generalization

Based on our observation of the contrasts among examples (7-8, 9-10), we propose the following generalization to account for the distribution of pair-list indefinites.

- (11) *Distribution of plural indefinites yielding the pair-list*
- Plural indefinites that are sensitive to an *absolute cardinality* (e.g. *some*, *a few*, and *several*) yield pair-list readings.
 - Plural indefinites that are sensitive to a *relative cardinality* (e.g. *many* and *most*) do not allow for pair-list readings.

We illustrate this first with the example of *some*, as shown in (12)

- (12) *Some A are B* is true if and only if $|A \cap B| = n$ where n is a (possibly vague) absolute number.

The interpretation of *some* relies on a kind of identity, with a (vague) cardinality. Now, let us consider a relative cardinality case, taking the example of *most*:

- (13) *Most A are B* is true if and only if $|A \cap B| > |A \cap \neg B|$

The cardinality of the set of As that are Bs must be bigger than the cardinality of the set of As that are not Bs. Thus, an indefinite like *most* yields the result of a comparison.

Next, let us consider the case of *many*. We approach *many* as a case of the latter type, as follows.

- (14) *Many A are B* is true if and only if $|A \cap B| > |A \cap \neg B|_C$ (where C is a contextually determined threshold).

In other words, the actual cardinality of the set of As that are Bs must be bigger than the “expected” or “standard” cardinality of the very same set (see Partee 1989 for some discussion on approaches to *many*.) Note that the account of *many* raises important and interesting additional issues regarding the nature of determiner meanings, among them the issue of conservativity (e.g. Partee 1989, Barwise and Cooper 1981, among others).

3.4 Further Predictions

If the generalization in (11) is on the right track, we should be able to predict the pair-list behavior of additional indefinites along the same lines. Let us consider some additional examples here. At a minimum, we would predict that bare numerals should yield pair-lists, which is the case (example 15b).

- (15) a. Which classes did two professors teach last semester?
 b. Bill taught syntax, and Mary taught neurolinguistics.
 (Pair-list reading)

Quantifiers like *more than half*, which we take to yield the result of a comparison, as does *most*, should not yield pair-lists, which is also the case (example 16b).

- (16) a. Which classes did more than half the professors teach last semester?
 b. *Bill taught syntax, Mary taught neurolinguistics, etc.
 (*Pair-list reading)

A few, which we take to yield a vague cardinality like *some*, should yield the pair-list, but *few*, which we take to yield the result of a comparison, should not. This is also the case, as shown in example (17b vs. 17d).

- (17) a. Which classes did a few professors teach last semester?
 b. Bill taught syntax, Mary taught neurolinguistics, etc.
 (Pair-list reading)
 c. Which classes did few professors teach last semester?
 d. *Bill taught syntax, Mary taught neurolinguistics, etc.
 (*Pair-list reading)

We thus claim that the indefinites sensitive to absolute cardinality and those involving comparison behave as different classes with respect to their pair-list behavior, as represented in the generalization in (11) above.

3.5 Some Alternatives which do not Account for this Data

3.5.1 Problems for Strong/Weak Distinction

It is tempting to account for the distribution of pair-list indefinites using the well-articulated distinction among strong/weak determiners (Milsark 1977, Barwise and Cooper 1981). In brief, the strong/weak distinction as introduced by Milsark captures the behavior of the universal quantifier and indefinites in environments such as English *there*-constructions. However, the strong/weak distinction shows a lack of parallelism with the current phenomenon.

For example, *most* patterns with *every* and other universals as a strong quantifier (see example (18) below).

- (18) a. *There is every deer in the garden.
 b. *There are most deer in the garden.

In contrast, *most* and *every* pattern in opposite directions regarding their pair-list behavior (as in example (19)).

- (19) a. Which book did every student read?
 b. John read *Ulysses*, Bill read *Finnegan's Wake*, etc.
 c. Which book did most students read?
 d. *John read *Ulysses*, Bill read *Finnegan's Wake*, etc.
 (*Pair-list reading)

This suggests that what underlies the pair-list behavior of the plural indefinites constitutes a separate phenomenon from their strong/weak properties (Gary Milsark, p.c.).

Further, within the plural indefinites, the strong/weak distinction if applicable would suggest a divergence among *most* and *many*, whereas *most* and *many* pattern alike with respect to their pair-list behavior (20–21 below).

- (20) a. *There are most deer in the garden.
 b. There are many deer in the garden.
- (21) a. Which books did most students read? (*Pair-list reading)
 b. Which books did many students read? (*Pair-list reading)

Thus, we suggest that treating the pair-list behavior of plural indefinites as a case of the strong/weak distinction is not likely to be promising.

3.5.2 Problems for Pragmatic Scale

At first glance, it is also tempting to try to capture the distinction among those indefinites yielding the pair-list and those which do not, by making reference to some kind of pragmatic scale. On that view, one would predict that indefinites which call for pair-lists that are in some sense “larger” are less felicitous.

- (22) a. A possible scale: some/a few < several < many < most

However, this kind of analysis cannot capture the range of facts. First, if the pragmatic scale analysis were on the right track, the pair-list judgments for the indefinites which did not previously yield pair-lists for our respondents should be ameliorated if the context specifically supports a large list response request. Thus, we again elicited judgments for the range of plural indefinites under study. However, in this set of judgments we manipulated the context to create situations in which large samples are needed; for example, a department-wide vote for a new chair and vice chair did not achieve a majority, and the current chair wanted to get a good cross-section of the faculty’s preferences. Regardless, our respondents would not accept pair-lists for *most/many* in such contexts.

Second, pair-lists are available for very large cardinalities. That is, it is felicitous to request a very large numerical sample with cardinals. Think of those responsible for analyzing a standardized test asking “Which answers to #18 did 1,000 students record?” Therefore, it does not seem to be the case that large samples cannot yield the pair-list reading.

Third, emphatically marking the desire for a large sample in the sentential context by adding ‘so many’ or ‘extremely many’ does not, counter to

what would be expected under the pragmatic account, improve the reading at all, as is shown in example (23).

- (23) a. Which books did *extremely many* students purchase last year?
 b. *Sue purchased *Ulysses*, Mary purchased *The Waves*, etc.
 (*Pair-list reading)

For these reasons, a pragmatic scale account would not suffice to capture the distinction among indefinites which yield the pair-list and those that do not.

4 Analysis

4.1 Relation among the Meaning of Indefinites and Pair-list Generation

In the previous sections, we saw that some plural indefinites yield pair-list readings under *wh-*, as does the universal quantifier, in apparent contrast to the speculation under *functional wh-* that only universals should generate pair-lists. Further, we offered a new generalization to account for the indefinites which yield the pair-list and those which do not. In the next sections, we consider what kind of analysis might best capture the pair-list for indefinites and its sensitivity to determiner meaning. We begin by considering the possibility of treating the pair-list for indefinites in a manner similar to that of plural definites in Dayal (1996).

4.2 Pair-list Definites (Dayal 1996)

Dayal (1996) noted that definites also seem to yield pair-list readings under *wh-*, as in (24) below which contains the demonstrative *these* in the same configuration which yielded the pair-list for the universal quantifier *every* (1) and for a class of plural indefinites, such as *some*, *a few*, and *several* (8).

- (24) a. Which women do these men love?
 b. Mary and Sue. (Individual reading)
 c. John loves Mary and Bill loves Sue. (Pair-list reading)

Plural *wh-* is required to yield the pair-list reading, as is shown in the contrast among (24) and (25).

- (25) a. Which woman do these men love?
 b. Mary. (Individual reading)
 c. *John loves Mary and Bill loves Sue. (*Pair-list reading)

Note that this requirement of plural *wh*- was also observed for indefinites in the present paper (examples 7–8 above).

Dayal (1996) proposed that the pair-list reading for plural definites could be treated as a species of individual rather than functional answer, given a theory of plurals allowing for plural individuals with parts, and some method for mapping among the parts of plural individuals under plural *wh*- (for Dayal, cumulativity).

- (26) a. Which women do these men love?
 b. a+b+c love d+e+f (schema showing plural individuals)

Dayal (1996) suggests that list answers for definite plurals are allowed in cases where the list exhaustively pairs the parts of one plural individual with the parts of the other plural individual (*John and Bill and Dave love Mary and Sue and Sally, or John loves Mary and Bill loves Sue and Dave loves Sally, etc.*)

4.3 Extension to Indefinites

If plural indefinites from the class sensitive to absolute cardinality represent plural individuals, semantically similar to plural definites, then it may be possible to account for the pair-list for indefinites as a species of individual answer mapping the parts of plural individuals. The intuition is that the plural indefinites which are sensitive to an absolute cardinality (such as *some/a few/several*) would yield a (vague) *n* individuals, whose parts may be mapped to those of the plural *wh*-NP on analogy to the mapping among the *wh*-NP and the plural definite.

We note that although the spirit of this proposal is reminiscent of the phenomenon of *specific indefinites* (e.g. Fodor and Sag 1982, Schwarzschild 2002, among others), the readings of these indefinites do not seem to have the flavor of specific indefinites in several respects; however, we will not explore the relations among the analysis of specific indefinites and pair-list indefinites in detail here.

If the pair-lists for plural indefinites and definites arise in a similar way, we would expect the plural indefinites to pattern like plural definites regarding the kind of pairings available. Consider the data in (27–28). The list answer for the plural indefinite (as in 27b) indeed patterns like that for the

plural definite (as in 27a) under *wh*-; both are compatible with an answer like that in (27c), in contrast to the universal quantifier (28a).

- (27) a. Which women do these men love?
 b. Which women do a few men we know love?
 c. John loves Mary, Bill loves Sue, and Dave loves Sally.

An answer like (27c) mapping each man to one woman is not compatible with the universal under plural *wh*-, as shown in (28a–b).

- (28) a. Which women does every man love?
 b. *John loves Mary, Bill loves Sue, and Dave loves Sally.

For Dayal (1996) the cumulative mapping among the parts of plural individuals is characteristic of the pair-list reading for definites. If the mapping among the parts of plural individuals for definites is governed by cumulativity, at a minimum it suggests that the requirement of plural-*wh* and also plurality on the definite or indefinite may be accounted for with respect to cumulativity, as the cumulative reading can only arise among two plurals (see the examples in (29a–b) below, from Dayal (1996); see also Scha (1981) for further discussion of the cumulative reading.)

- (29) a. The boys solved the problems. (cumulative reading)
 b. The boys solved the problem. (no cumulative reading)

4.4 Specificational Sentences

We note briefly that a disparate phenomenon involving list readings and indefinites, Specificational sentences (see e.g. the example in (30) below), can also be accounted for by this generalization and analysis. Specificational sentences, as is discussed in Romero (2002), yield pair-list like readings when they contain plural indefinites like *some*, *a few*, *several*, but not when they contain plural indefinites like *most* and *many* (30).

- (30) Some/a few/several/*many/*most prices at the market are the following: milk is \$1.99, cheese is \$2.39, etc.

As Romero (2002) notes, these paired readings come about in plural-plural contexts, which was also observed for definites by Dayal (1996) and for indefinites yielding pair-list readings in the current study. As with plural definites and indefinites under *wh*-, these constructions yield cumulative

paired readings. The observation that the same distribution of indefinites yields a cumulative paired reading in this domain is further supporting evidence that plural indefinites yielding pair-lists under *wh*- form a class, and that their pair-list may indeed be linked to the availability of a cumulative mapping possible only for these and not for other plural indefinites.

4.5 Cumulativity and Indefinites: Non-interrogative Contexts

If the relation among the pair-list readings for plural indefinites and the availability of cumulative readings is on the right track, then we might expect to find evidence that *many/most* resist cumulativity in other non-interrogative environments. Thus, we elicited judgments for cases like those in (31–32) to test whether these items indeed resist cumulative readings.

- (31) a. At 7:00 last night, some/a few/several students rented three videos and watched them in the classroom.
 b. At 7:00 last night, *many/most students rented three videos and watched them in the classroom.
- (32) a. At 7:00 last night, some/a few/several robbers burglarized three people at this bus stop.
 b. At 7:00 last night, *many/most robbers burglarized three people at this bus stop.

The judgments in (31–32) confirmed our expectation that *many/most* would resist a cumulative interpretation while *some*, *a few*, and *several* would allow a cumulative reading in this environment.

4.6 An Alternative Analysis and its Problems: Cooperative Answers

An alternate approach could attempt to account for the emergence of pair-list readings for plural indefinites with reference to cooperativity or informativeness. Recall the speculation under the *functional wh*- account, that the universal quantifier was needed to provide the domain over which to map the function. In the absence of a universal, one could make a cooperative attempt to generate some of the graph of the function. In other words, the respondent makes a next-best attempt to answer the question for some partial set, with greater or lesser ease.

To handle the distribution of determiners, one could claim that having some cardinality n happens to be the next best generator. If it could be explained why the class of indefinites which our generalization circumscribes constitutes the next best generator, then such an account would have the at-

tractive property of accounting for universal and non-universal pair-list readings with the same semantic mechanism, modulo some pragmatic interaction. The latter would suggest a semantic/pragmatic interaction with determiner meaning in a way that is potentially interesting.

However, this is also a serious challenge for the cooperative approach. The cooperative account would need to capture *why* it should be more or less cooperative to answer for determiners like *some*, *several*, *twenty* and *every*, for example, but not for *many* or *most*. A second fundamental challenge to this type of approach comes from the plurality data. It is not clear where the effect of plurality would arise based on a cooperative/informativity-based approach to the licensing of pair-list readings.

5 Conclusion

We have demonstrated that plural indefinites yield pair-list readings, contrary to the generalization that the universal quantifier is required in order to generate a pair-list reading (e.g. Chierchia 1992). We observed that this phenomenon is partial; not all plural indefinites yield pair-lists under *wh*-. We proposed a new generalization to capture the distribution of indefinites yielding the pair-list, focusing on the contribution of absolute and relative cardinality, and this generalization allowed us to predict the pair-list behavior of additional indefinites. Finally, we have suggested that, if an account for plurality which is independently needed to handle cases like “The boys solved the problems” (example 29a) also yields a reading like Dayal (1996) described for definites, then the pair-list behavior of plural indefinites could be accounted for in a manner similar to that proposed for plural definites in Dayal (1996). Both this analysis, and one potential alternative analysis (cooperative answers) face challenges which remain outstanding and require further examination. However, we hope to have offered a new generalization with which to describe the plural indefinites yielding pair-list readings, and also to have sketched out some attractive features and potential challenges for the analysis of the pair-list behavior of these indefinites.

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