1 Introduction

- Winter aims to show that distributivity operates over atoms rather than over sets of atoms (as in e.g. Schwarzchild’s ‘cover’ analysis)...

- and that distributivity is a unary operation taking one argument (contrasting with the *-operator operating over a syntactically constructed two-place predicate, for example).

- Winter suggests that the cases of distributivity that appear to require cumulation or something similar (e.g. cases of co-distributivity) can be covered using the concepts of vagueness and dependency.

- Dependency is the notion of anaphoric relations between an object and a subject – so, for example, a sentence like *The soldiers hit the targets* has a reading something like *The soldiers each hit their targets*.

2 Vagueness

The challenge: distinguish between collective and distributive readings.

(1) The girls smiled ⇔ Every girl smiled. (roughly – we’ll revise this)
(2) The girls met ≠ Every girl met. (In fact, *Every girl met* is #.)

*smile* in (1) seems to be distributive – each girl smiled; whereas (2) only makes sense on a collective reading.

The solution: use Scha (1981)’s proposal that (1) is actually a collective reading; we ascribe the property *smile*’ to the plural collectivity of girls. More exactly: we have a lexical stipulation that *smile’*(G) is true iff some ‘large’ proportion of (the atoms of) G smiled. This captures the intuition that *The girls smiled* is not precisely equivalent to *Every girl smiled* – the former does not necessarily require literally every girl to have smiled.
Winter refers to this as the *vagueness* approach to distributivity, and quickly points out that it’s not quite enough on its own:

(3) A wrong prediction of vagueness unaugmented (Winter’s (4)):
   a. The girls are wearing a dress.
   b. [wear a dress] ([the girls])
      \[\forall x \in G \land \exists y. \text{dress}'(y) \land \text{wear}'(x, y)](G)
      \[\forall y. \exists x \in G. \text{dress}'(y) \land \text{wear}'(G, y)\]

The key problem here is that we only assume that *wear’* is cumulative – *not* the whole predicate represented by *wear a dress*. (The meaning postulates encoding cumulativity are in the lexicon, so by definition only lexical items can have them.) That is, what we have just on the vagueness/lexical cumulativity approach is that *the girls are wearing a dress* (only) means that there exists a dress \(x\) such that some large proportion of \(G\) wears \(x\)!

We also have a problem with examples where binding seems to encode distributivity:

(4) a. (Winter’s (7a))
   The boys will be glad if their mothers arrive.
   b. (My very rough translation assuming only vagueness – wrong:)
      \[\text{arrive}'(M) \Rightarrow \text{happy}'(B)\]
      ‘If some large number of mothers arrive, some large number of boys will be happy’.
      (Remains not-the-right-reading even if you find a way of ‘linking’ the boys and their mothers.)

Rather, of course, this means that each boy \(x\) will be happy if \(x\)’s mother arrives. (You don’t need a large amount of mothers to arrive to make the antecedent true.)

This suggests that some other means of encoding distributivity beyond vagueness/lexical cumulativity is required.

### 3 D-operator

The freely-insertable, monadic D-operator will save us:

(5) a. The girls [D wore a dress]
   \[\forall x. x \in G \land \text{at}'(x). \exists y. \text{dress}'(y) \land \text{wear}'(G, y)\]
We would want this to co-exist with vagueness/lexical cumulativity in order to account for the intuition that *the girls smiled* does not really require all the girls to have smiled. (Side question: what are the intuitions about *the girls wore a dress*? Is that true if most but not all of the girls wore a dress?)

Except we’re not really saved:

\[ (6) \] The soldiers hit the targets.

a. The soldiers [hit [the targets]].

\[ \text{hit}'(S, T) \]

The soldiers (collectively) hit the targets (collectively).

b. The soldiers [hit D [the targets]].

\[ \forall x : x \in T \land \text{at}'(x). \text{hit}'(S, x) \]

‘The soldiers (collectively) hit each of the targets.’

c. The soldiers [D [hit [the targets]]].

\[ \forall x : x \in S \land \text{at}'(x). \text{hit}'(x, T) \]

‘Each of the soldiers hit the (collective) targets.’

d. The soldiers [D [hit D [the targets]]].

\[ \forall x : x \in S \land \text{at}'(x). \forall y : y \in T \land \text{at}'(y). \text{hit}'(x, y) \]

‘Each of the soldiers hit each of the targets.’

Consider the situation where \[ S = \{s_1, s_2\} \] and \[ T = \{t_1, t_2, t_3\}. \] \( s_1 \) hit \( t_1 \) and \( t_2 \), and \( s_2 \) hit \( t_3 \).

None of the truth conditions above seem to be satisfied in this situation; and yet, it doesn’t seem wrong to claim that *the soldiers hit the targets* is true.

Scha (1981) would argue that it is in fact (6a) which is the relevant reading; \( \text{hit}' \) is simply ‘vague’. Presumably the logic goes that the lexical semantics of \( \text{hit}' \) are such that \( \text{hit}'(X, Y) \) is true in a situation where every (or most) \( x \in X \) hits some \( y \in Y \) and every (or most) \( y \in Y \) is hit by some \( x \in X \).

…but there are examples where this would go wrong too:

\[ (7) \] (Winter’s (26, 27))

a. The boys gave the girls a flower.

b. John gave Mary and Sue a flower (each); Bill gave Ann and Ruth a flower (each).

(7b) validates (7a). But we can’t generate such truth conditions using only vagueness and D-operators.
Insertion of the D-operator would give us:

(8) a. \(\forall x : x \in B \land \text{at}'(x) \land \exists y. \text{flower}'(y) \land \text{give}(x, G, y)\)

b. ‘Each boy gave the group of girls a (possibly different) flower.’

(9) a. \(\forall x : x \in G \land \text{at}'(x) \land \exists y. \text{flower}'(y) \land \text{give}(B, x, y)\)

b. ‘The group of boys gave each girl a (possibly different) flower.’

(10) a. \(\forall x : x \in G \land \text{at}'(x) \land \forall y : y \in B \land \text{at}'(y) \land \exists z. \text{flower}'(z) \land \text{give}'(y, x, z)\)

b. ‘Each boy gave each girl a (possibly different) flower.’

None of these are true in the situation in (7b). And Scha-type vagueness can’t save us either; again, the problem is that only give' is taken to be lexically cumulative/vague, not the whole predicate represented by give a flower. Vagueness forces us to talk about only one single flower:

(11) a. The boys gave the girls a flower.

b. \(\exists x. \text{flower}'(x) \land \text{give}'(B, G, x)\)

c. (Some large proportion of) the boys gave (some large proportion of) the girls one and the same flower.

This is not true in the situation in (7b) either; in that situation there’s more than one flower.

We need something else. Schwarzchild could deal with it using covers; stating that there is some pragmatically salient splitting of boys and girls into sets, such that each subset of \(B\) gave each subset of \(G\) a flower. Winter objects to this: while we need the D-operator down to atoms; Winter thinks we can do without distributivity down to ‘non-atoms’, which is what Schwarzchild’s analysis comes down to.

Beck and Sauerland would want to give this an analysis where a * (or **) operator operates over a syntactically constructed predicate \(\lambda x. \lambda y. \exists z. \text{flower}'(z) \land \text{give}'(x, y, z)\). We’ll be hearing about that later, of course.

But Winter thinks we can do without either of the above. For Winter, co-distributive readings can come down to dependence.

4 Dependence

In general, definites DPs can have an anaphoric use. *Every soldier hit the target* more or less means *Every soldier hit their target* (= the target assigned to them). (However we analyze this, it seems true as a phenomenon.)
Winter proposes to exploit this as follows:

(12)  a. Every soldier hit the target.
   i. \( \forall x. \text{soldier}'(x) \Rightarrow \text{hit}'(x, t(x)) \), where \( t \) is a function that maps soldiers to contextually salient targets.
   ii. 'Every soldier hit that target that was assigned to him.'

b. Every soldier hit the targets.
   i. every soldier \( x \) [hit [the targets \( x \)]]
   ii. \( \forall x. \text{soldier}'(x) \Rightarrow \text{hit}'(x, t(x)) \), where \( t \) is a function that maps soldiers to contextually salient target-plurals.
   iii. 'Every soldier hit those targets that were assigned to him.'

c. The soldiers hit the targets.
   i. The soldiers\( n \) [D [hit [the targets\( n \)]]]
   ii. \( \forall x : x \in S \land \text{at}'(x). \text{hit}'(x, T(x)) \), where \( T \) is a function mapping soldiers to contextually salient targets.
   iii. 'Each soldier hit the target(s) that was/were assigned to him.'

This dependent reading is true in a 'co-distributive situation' where \( s_1 \) hits \( t_1 \) and \( t_2 \), and \( s_2 \) hits \( t_3 \).

It also does good things for us in the boys/girls/flowers situation. With a judicious combination of dependency and D-operator insertion, we can get the semantics to come out right:

(13)  Situation: John gave Mary and Sue a flower; Bill gave Ann and Ruth a flower.
   a. The boys gave the girls a flower.
   b. The boys\( n \) [D [give [the girls\( n \)]]]
   c. \( \forall x : x \in B \land \text{at}'(x). \exists y. \text{flower}'(y) \land \text{gave}'(x, n(x), y) \), where \( n \) is a function mapping boys to contextually salient girl-plurals.
   d. Each boy gave 'his' (!) plurality-of-girls a (possibly different) flower.

(A caveat, however: note that Winter does not predict The boys gave the girls a flower to be true in the situation where, say, John and Ryan give Mary and Sue a flower collectively, and Bill gives Jane and Susan a flower. We had to insert that D operator distributing down to atomic boys. Yet the sentence seems OK in that situation. In contrast, Schwarzchild could do this with covers precisely because a cover analysis would not distribute down to atomic boys.)
There are other examples which seem dependent on definiteness. Consider *The fathers are separated from the children by a wall*. Vagueness won’t do: it’s not that a large number of fathers are separated from a large number of children by *one wall*. Rather, each father is separated from *his children* by a wall. Similarly for sentences like *The circles are connected to the triangles by a dashed line*.

In conclusion: Winter asserts that vagueness, D-operators, and dependency together are enough to account for ‘co-distributive’ readings; polyadic approaches such as covers or *-type analyses aren’t required. Now we need ways of testing this hypothesis…

**References**


Part 2: S. Kan

5. Deciding between polyadic distribution and dependency

This section is devoted to illustrate the empirical strength(s) of the dependency approach (DA) its advantages over the polyadic cover mechanism (PCM) in terms of predicting the presence/absence of codistributivity effects across a set of constructions and related contexts.

In particular, we will discuss:

- The absence of codistributivity in proper name conjunctions
- The overgeneration problem of the cover mechanism w.r.t. numeral definites
- Non-exhaustivity effects and codistributivity
- Island-insensitivity of codistributivity

5.1 Proper name conjunctions

Unlike definite descriptions, proper names cannot be used anaphorically in English.

In the context of DA, this observation predicts that there is no codistributivity effect in the environment of proper name conjunctions.

For instance (14a) can be True in the context below but (14b) cannot.

(14) **Context:** In Figure 1, Mary and Sue are John’s children and Ann and Ruth are Bill’s children.

a. The fathers are separated from the children by a wall. T
b. John and Bill are separated from Mary, Sue, Ann and Ruth by a wall. F

![Figure 1. Fathers and children.](image)
Likewise (15b), where the definite descriptions in (15a) have been replaced by proper names, cannot be True in the respective context:

(15) a. The circles are connected to the triangles by a dashed line.  
    b. Circles 1 and 2 are connected to triangles A, B, C, and D by a dashed line.

In contrast with DA, PCM does not predict the proper name effect on codistributivity because it does not essentially rely on anaphoric relations.

For example, PCM could potentially involve the pragmatically salient splitting of the sets of subject and object proper names, say $S = \{\text{Circle A}, \text{Circle B}\}$ and $O = \{A, B, C, D\}$ into $S = \{\{\text{Circle A}\}, \{\text{Circle B}\}\}$ and $O = \{\{A, B\}, \{C, D\}\}$, where each subset of $O$ is connected to each subset of $S$ by a dashed line.

This is an undesirable prediction.

**Side Note:**

How about the sentences below, which display a codistributivity effect by triggering a respectively reading?

(i) John and Bill are separated from Mary and Sue AND Ann and Ruth (respectively) by a wall.

(ii) John loves and hates Mary and Sue (respectively).

The “respectively” effects are independent of polyadic distribution or the dependency approach (see Wagner (2010) and Winter (2007) on this issue).
5.2 Numeral definites

Winter assumes that just like simple definite descriptions, numeral definites can be anaphoric expressions, as well.

Consider the sentences below. In the situation described in Figure 1 above, (16) and (17) are True; whereas (18) and (19) are False:

(16) The (two) fathers are separated from the two children by a wall.  T
(17) Every father is separated from the two children by a wall.  T
(18) The (two) fathers are separated from the four children by a wall.  F
(19) Every father is separated from the four children by a wall.  F

The asymmetry above is not predicted by PCM, once again. For (18), PCM predicts the possibility of the splitting of the set of four children $C = \{\text{Ann, Ruth, Mary, Sue}\}$ into two subsets each consisting of two atoms, $C = \{\{\text{Ann, Ruth}\}, \{\text{Mary, Sue}\}\}$ such that each subset is mapped onto each father. This is, once again, an undesirable prediction.

Winter assumes an anaphoric dependency between the bound (anaphoric) definite description (i.e. the two children) and its antecedent (i.e. the two fathers each) in (16). And in the light of the anaphoric dependency of numeral definites, if (18) were actually calculated in terms of DA, the cardinality of children in the context would have to be eight. Thus, DA provides a natural explanation to why (18) is False under the given context.

5.3 (Non-)Exhaustivity

We know that sentence (20b) below can be interpreted as True in the following situation:

(20) a. Every circle contains two triangles.
   b. The circles are connected to the triangles by a dashed line.  T

Figure 3. Exhaustivity.

And one of the triangles is not contained in any circle. . .
Recall that cover theory assumes *exhaustivity* in its formalization and therefore it would automatically rule out (20b) in (20a).

**Reminder:**

Let \( S \) be a set of entities. A set \( C \) is a cover of \( S \) if and only if:

a. \( C \) is a set of subsets of \( S \).
b. Every member of \( S \) is in some set in \( C \) (\( C \) exhausts the members of \( S \)).
c. The null set is not in \( C \).

(Schwarzschild 1996: 64)

However, DA only requires that every circle is connected to the relevant triangles without a further requirement that all the triangles be covered by a circle.

**5.4 Islands and codistributivity**

Anaphoric dependency and the polyadic cover approach have distinct predictions in relation to syntactic structure:

- The former only requires a c-command relation between the antecedent and the anaphoric definite description.

- The latter predicts a more restrictive theory of codistributivity: two NPs can be codistributive only if they are arguments of the same predicate.

- However such a restrictive theory of codistributivity is not supported by empirical facts since codistributivity relations can be established across island boundaries in syntax.

Consider the context and the sentences below.

(21) **a. Context:** Every company bought some new computers.

**b. Adjunct islands (here, the if-clause)**

[The companies will go bankrupt [if the computers are not powerful enough]]

**T**

**c. RC islands**

[The companies [that will use the computers efficiently] will succeed]

**T**

**d. Coordinate structures (here, VP coordination)**

[The companies will have to [\( \text{ConjP} \ [\text{VP} \text{ start using the computers}] \) and [\( \text{VP} \text{ adapt to some other new technologies in order to succeed}] \]

**T**

The three sentences can all be True in (20a). This is an expected result in the dependency approach since in all cases, the higher definite NP c-commands the other.
To account for the readings above, PCM has to put forth an analysis of codistributivity for (21b) such as the following:

(22) \( R = \lambda x. \lambda y. [x \text{ will go bankrupt if } y \text{ is not powerful enough}] \)
\[ \forall (A, B) \in Cov(\text{companies, computers}) \ [R(A)(B)] \]

For this analysis to work, i.e. to satisfy the predicate R, which would be taken by the polyadic D- operator, [the computers]DP must be extracted from the conditional adjunct island.

This is assumed to be unlikely since adjunct islands are known to be scope islands; an element inside an adjunct island cannot take scope outside of the domain of the island.

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**The sensitivity of distributive quantification to scope islands**

(i) If three relatives of mine die, I will inherit a fortune. (Ruys 1992)

\[ = \text{There is a group } x \text{ of three relatives of mine such that, if each of the members of } x \text{ dies, I inherit a fortune. (existential quantification over choice functions – which is not island-sensitive, after all)} \]

\[ \neq \text{There is a group } x \text{ of three relatives of mine such that, for each member of } x, \text{ if he or she dies, I inherit a fortune. (distributive quantification)} \]

In conclusion, PCM is too restrictive to account for codistributivity relations between arguments across islands.

The dependency approach requires only a c-command relation to form a dependency and therefore it predicts the availability of the readings in (21b, c, d) in the given context.

**Intuition check**

What are people’s intuitions about the sentences below pertaining to Context (21a)?

(i) The companies, which will use the computers efficiently, will succeed.

(ii) Using the computers efficiently, the companies will succeed.

(iii) The companies, using the computers efficiently, will succeed.
6. Cumulativity and codistributivity

Any identification of codistributivity with cumulative quantification would have to explain why cumulativity is sensitive to islands but codistributivity is not, which illustrates that the two phenomena arise from distinct properties of grammar.

Consider (23) below. It is False in a situation such as (24) where the cumulated NPs have to be syntactically close but they cannot be since the lower NP is embedded inside an adjunct island.

(23) [Exactly 600 companies will go bankrupt [ if exactly 5,000 computers are not powerful enough] ]

(24) The total number of companies that will go bankrupt if a computer is not powerful enough is exactly 600, and the total number of computers x such that a company will go bankrupt is x is not powerful enough is exactly 5,000.

Therefore any theory of cumulative quantification cannot automatically cover codistributivity effects and the two phenomena must be kept essentially distinct.

References


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**Part 3**

In the following sections:

- Winter spells out the predictions that are made by Dependency and addresses several possible counterexamples.
- He argues that there is no non-atomic distributivity. Apparent cases of such is also reducible to vagueness or dependency.
- Finally, we’ll see an argument for the retention of a distributivity operator despite the theoretical coverage offered by Dependency.

**Establishing falsifiability (Section 3.5)**

Here, we’ll lay out the predictions that the dependency theory makes and discuss a few potential counterexamples.

### 1.1 The predictions of dependency

As we know, we’re adhering to the assumption about the nature of DPs in English. Definite descriptions may be used anaphorically, while proper names and numeral definites (at least) may not.

- Let DNP₁ be a plural definite that c-commands another DNP₂. In case the two NPs codistribute and vagueness interference is eliminated:
  
  1. Replacing DNP₁ by any quantificational NP preserves a “dependency” effect on DNP₂.  
     
     *(That is, (1) = (2).)*
     
     (1) *The soldiers* put a bullet through the targets.
     
     (2) *Every soldier* put a bullet through the targets.

  2. Replacing both NPs by coreferential proper name conjunctions or numeral definites eliminates the codistributivity effect. *(That is, (3) ≠ (4) and (3) ≠ (5).)*
     
     (3) = (33b.) *The fathers* are separated from *the children* by a wall.
     
     (4) = (41b.) *John and Bill* are separated from the *Ann, Ruth, Mary, and Sue* by a wall.
     
     (5) = (47a.) *The two fathers* are separated from *the four children* by a wall.

But notice that (5) can still receive a dependent interpretation. Crucially, though, *the four children* has to be interpreted as a non-maximizing numeral definite. In other words, there have to be eight children total.

And (6) and (7) show that whatever the prediction in 2 might capture, it need not be sensitive to DNP₁.

(6) a. Bill and John are separated from the children by a wall.
   
   b. The two fathers are separated from the children by a wall.

(7) a. John and Bill gave the girls a flower.
   
   b. The two boys gave the girls a flower.

We might modify 2 slightly, then. We could say instead that a referential DP or a maximizing numeral definite may not be anaphoric on a plural definite. So, replacing DNP₂ with a definite description that may not be interpreted anaphorically will eliminate the codistributivity effect.

Note also that these predictions say nothing about the availability of interpretations that may correspond to a codistributive reading. Winter holds, and we will see here, that similar readings may be available, but they have a source other than dependency.

### 1.2 Testing the predictions

Any instance in which the claims above don’t seem to hold are potential deal-breakers for the current account. So, we should be interested in finding examples where:

- i.) a c-commanding definite plural or quantificational plural fails to trigger a dependency relationship. This would challenge 1.

- ii.) a low proper name conjunction or a maximizing numeral definite appears to be dependent on a higher DP. This would challenge 2 or the restated version of it.
1.2.1 Potential Counter-examples to prediction 1

- **Multiple dependent DPs**

Consider the sentences in (8) and (9) relative to the figure provided in (10).

(8) = (72) The single lines run parallel to the double lines.
(9) = (73) #Every single line runs parallel to the double lines.

(10) *Figure 5* (Winter 2000, 55)

![Figure 5](image)

*Figure 5*. Lines.

It appears that a quantificational plural doesn't preserve plural dependency (as was predicted in 1). Even if we wanted to, we can't explain it away by resorting to vagueness of the predicate *run parallel to* or else we would predict that (11) and (12) are appropriate in the same way as (8).

(11) = (74) #Lines A and B run parallel to lines 1, 2, 3, and 4.
(12) = (75) #The (two) single lines run parallel to the four double lines.

Winter's proposed solution is to assume that both the subject and object in (8) are dependent definites licensed by an implicit quantifier provided by the context (13).

(13) = (76) In each part of figure 5a, the single lines run parallel to the double lines.

Such an analysis could do some good work for us. Winter suggests that it might account for why (11) and (12) are bad. Remember that conjoined DPs and maximizing numeral definites may not be dependents. This implicit operator also has a purpose in capturing the observation that (a) in Figure 5 in (10) is much more acceptable than (b) with the sentence in (8).

**ASIDE:**

What about the examples below? If the higher DP must be a dependent definite, then we shouldn't allow it to be a conjoined DP or a maximizing numeral definite. Maybe by being a referential DP a contextually salient implicit quantifier is no longer needed, but (14) is still weird if you don't know you're talking about *Figure 5a* and not *Figure 5b*.

(14) a. Lines A and B run parallel to the double lines.
   b. The two single lines run parallel to the double lines.

And (15) is bad either way, which suggests that we're looking at the same phenomenon that we have been discussing all along or that there is a "dependency chain".

(15) a. #The single lines run parallel to lines 1, 2, 3, and 4.
   b. #The single lines run parallel to the four double lines.

Notice, too, that these quantifiers are extremely vacuous.

And what about more complex situations like Andrew will discuss now. Any implicit quantifier we might come up with would be completely meaningless.

- **Interference by dependent plurals**

Consider the examples in (16) and (17) relative to the figure in (18).

(16) = (77) The circles are connected to the triangles by a dashed line.
(17) = (78) #Every circle is connected to the triangles by a dashed line.

(18) *Figure 6* (Winter 2000, 57)

![Figure 6](image)

*Figure 6*. Circles and triangles.

This seems to be another case in which a quantificational plural does not preserve plural dependency (as predicted in 1). Winter suggests that the triangles above is a dependent plural and therefore doesn't entail semantic plurality. This produces the reading where each *the triangles* is semantically equivalent to a low scope reading of *a triangle*. (17) is bad, then, because dependent plurals may only be licensed by a plurality that is interpreted distributively.
First, this seems to fit his story because (16) has a property of exhaustiveness (add a triangle to (18) and it’s bad) and we know that codistributivity is non-exhaustive. However, dependent plurals are non-exhaustive as well.

(19) The circles are connected to triangles by a dashed line.

Second, the triangles in (16) does not have the same shape and distribution as recognized dependent plural readings. So, still with an extra triangle:

(20) a. The circles are connected to triangles by a dashed line.
    b. The circles are connected to the triangles by a dashed line.
(21) a. Most circles are connected to triangles by a dashed line.
    b. Most circles are connected to the triangles by a dashed line.

Instead, something like their triangles is needed in (20b.) suggesting that this observation is more similar to the codistributivity facts being discussed.

1.2.2 Potential counter examples to prediction 2

“Dependent” maximizing numeral definites

Consider (23) relative to the scenario in (22) assuming the total number of soldiers is two and the total number of targets is four.

(22) = (17) At a shooting range, each soldier was assigned a different set of targets and had to shoot at them. At the end of the shooting we discovered that
(23) = (81) the two soldiers hit the four targets.

(23) is intuitively true in the situation in (22) which suggests that a maximizing numeral definite could be acting as a dependent definite. Winter accepts that there is no dependency relationship here and so there is no co-distributivity.

But, remember that the predictions made were careful not to exclude the possibility that a “codistributive-like” reading might appear independently of a dependent definites. Winter suggests that this observation should be attributed to vagueness resulting from lexical cumulativity.

“Dependent” proper name conjunctions

The sentence in (25) is intuitively true in a situation such as (24).

(24) John had relations with Mary, and Bill had relations with Sue and Ann.
(25) = (82) John and Bill had relations with Mary, Sue, and Ann.

Winter suggests that, again, this is an issue of the vagueness of the lexical cumulativity of the predicate and that this is expected as a result of the plural predication.

(26) = (83) \[ \exists R \{ | R | \geq 2 \land R \in \text{relation'} \land \text{have}'([i', b'], [m', s', a'], R) \}\]

But we can eliminate the apparent codistributive reading by replacing relations with an indefinite singular.

(27) John had an affair with Mary, and Bill had an affair with Sue and Ann.
(28) = (84) (\#)John and Bill had an affair with Mary, Sue, and Ann.

1.2.3 Further objections

Impossible dependency

Examples exist where a codistributive reading is available in environments where dependency shouldn’t be possible such as in (29).

(29) = (90) The boys gave girls one through fifteen a flower.

The DP girls one through fifteen is referential and therefore is not predicted to be possibly anaphoric on the boys.

Winter proposes LF raising of the object to put the boys in its scope. In this way, the boys becomes anaphoric on girls one through fifteen.

Winter supports this analysis with the following examples.

(30) = (92) John, Bill, George, and Sam gave girls one through fifteen a flower.
(31) = (92) Boys one through four gave girls one through fifteen a flower.

Replacing the subject with a referential DP blocks a codistributive reading for this construction. Still assuming raising of the object, this analysis correctly predicts that no dependency relationship can be established and that codistributivity is not an option.

ASIDE:

But we would have to reconsider what blocks the possibility of raising the object in the following example relative to the Figure 1 (Winters 2000, 41).

(32) The fathers are separated from Mary, Sue, Ann, and Ruth by a wall.

Supposedly, the proper name conjunction should be able to take scope over the fathers at LF thereby licensing a codistributive reading for this sentence. However, such a reading does not seem to be available.
2 Non-non-atomic distributivity (Section 4)

In section 3, we saw evidence for employing a unary distributivity operator rather than a polyadic one. Here, Winters argues that distributivity operators range purely over atoms as opposed to arbitrary pluralities (covers). He essentially claims that apparent non-atomic distributivity is the result of:

i.) the vagueness of the collective reading

ii.) or dependency on an implicit quantifier.

2.1 Non-atomic distributivity as vagueness

Previous work has suggested neither pure atomicity nor covers are sufficient to capture the range of possible expressions.

\[(33) = (93) \quad \text{The composers wrote operas.}\]

\[(34) = (95) \quad \#\text{The three men are a nice couple.}\]

Atomicity undergenerates for (33), but it captures (34). A cover type analysis will capture (33), but it overgenerates in (34).

The observation that atomicity fails is classically based on the following paraphrases of the possible readings for (33), both of which are false in S₁ provided in (35).

\[(35)_{S_1}: \quad \text{A situation where John, Bill, and George are composers.}\]

\[(36) = (98) \quad \text{Distributive}\]

\[
\begin{array}{c}
\text{Every composer wrote operas on his own.} \\
\text{John and Bill wrote one opera together, and so did Bill and George.}
\end{array}
\]

\[(37) = (99) \quad \text{Collective}\]

\[
\begin{array}{c}
\text{There are some operas that the composers wrote together as a group.}
\end{array}
\]

Winters rejects the conclusion saying we’ve had the facts all wrong. First, the distributive reading can be treated as a dependent plural reading. Second, the collective reading is not necessarily any more than what follows in (38) and doesn’t entail the supposed “group” requirement.

\[(38)_{M} \exists X [ \{X \geq n \wedge X \in \text{opera'} \wedge \text{wrote'}(M, X) \}]

Thus, the paraphrase should be along the lines of:

\[(39) = (101) \quad \text{There are operas that the composers wrote.}\]

Intuitively, (39) is true in S₁. Because this paraphrase based on the vagueness of the collective reading is true in S₀, and because the distributive reading is captured by a dependent plural reading, then Winter concludes that non-atomicity is in fact unnecessary to account for (33).

2.2 Non-atomic distributivity as dependency

Winter suggests that cases of apparent non-atomic distributivity that can’t be reduced to vagueness may actually be the result of a dependency relationship with a contextually provided implicit quantifier.

Consider Figure 11 along with the sentences below.

\[(40) = (111) \quad \begin{align*}
\text{a.} & \quad \text{The (two) circles are connected by a line.} \\
\text{b.} & \quad \#\text{Circles A, B, C, and D are connected by a line.} \\
\text{c.} & \quad \#\text{The four circles are connected by a line.}
\end{align*}\]

\[(41) \quad \text{Figure 11 (Winter 2000, 65)}\]

A cover analysis incorrectly predicts all of these to be good, but only the dependency analysis predicts that only the (two) circles will be licensed in the situation in Figure 11.

By allowing the context to provide an implicit quantifier that may license a dependent definite such as the (two) circles we get readings such as (40a.), which superficially appear to be non-atomic distributivity.

Under the dependency analysis, replacing the subject with a referential, however, blocks the apparent non-atomicity (codistributivity) as expected (as seen in 40b.-c.).
2.3 Polyadic distributivity as dependency

Cases of polyadic distributivity can be treated as above. Consider the situation $S_2$ in (42) and the sentence in (43).

$$(42) = (113) \quad S_2: \text{The boys are John, Bill, and George. The girls are Mary, Sue, Ann, and Ruth. John gave Mary and Sue a flower. Bill and George gave Ann and Ruth a flower, as a shared present between them.}$$

$$(43) = (112) \quad \text{The boys gave the girls a flower.}$$

(43) is intuitively true in (42). Instead of conceding to polyadic distributivity, Winter suggests that the boys might be dependent on an implicit quantifier like in each meeting.

So, just as above, replacing the boys with a non-dependent DP should result in unacceptability.

$$(44) \begin{array}{l}
\text{a. (}
\text{#} \text{)John, Bill, and George gave the girls a flower.} \\
\text{b. (}
\text{#} \text{)The three boys gave the girls a flower.}
\end{array}$$

That this seems to be the case is support for a dependency analysis of definite plurals as opposed to accounting for these observations with a polyadic distributivity operator.

\textbf{ASIDE:}

Wait, why can’t the girls be dependent on John, Bill, and George.

$$(45) \quad \text{John and Bill are separated from the children by a wall.}$$

4 Conclusion

\begin{itemize}
  \item In part 1, we saw:
    \begin{itemize}
      \item Distributivity over atoms is preferable to a cover analysis
      \item Distributivity results from a monadic operator
      \item Codistributivity and apparent cumulation are reducible to vagueness and dependency
      \item The mechanics of Dependency
    \end{itemize}
  \item In part 2, we went over the empirical evidence for the dependency approach and its advantages over the polyadic cover mechanism based on:
    \begin{itemize}
      \item The absence of codistributivity in proper name conjunctions
      \item The overgeneration problem of the cover mechanism w.r.t. numeral definites
      \item Non-exhaustivity effects in codistributive readings
      \item Island-insensitivity of codistributivity
    \end{itemize}
  \item In part 3, we saw:
    \begin{itemize}
      \item Dependency makes specific predictions that may or may not be borne out given the data at hand
      \item Apparent cases requiring non-atmoic distributivity can be handled by vagueness and dependency
      \item Dependency cannot replace distributivity operators
    \end{itemize}
\end{itemize}