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Contextual restrictions on cumulativity*

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Abstract This paper revisits the semantic variability of sentences with simple plural (in)definites in English and German, which permit distributive, cumulative and paired-cover construals. I argue that this variability reflects context-dependency rather than LF ambiguity (Schwarzschild 1996) and that the selection of a particular construal in context is driven by the QUD in the same way as the choice between maximal and non-maximal construals of plural definites (Malamud 2012; Križ 2015; Križ & Spector 2020). I then develop a new semantics for plural predication on which non-distributive and non-maximal construals form a natural class. The system extends the idea that non-maximality involves truth-value gaps (e.g. Križ 2015) to non-distributive construals by making use of Schmitt's (2019) 'plural projection' framework, in which plural sentences involve special composition rules.

Keywords: cumulativity, non-maximality, question under discussion, context-dependency

1 Background: Construals of plural sentences

This paper revisits the semantic variability of sentences with multiple plural expressions ('**multi-plural sentences**'), like (1a) and (1b). Such sentences are true both in **distributive scenarios** like (1c) and in **cumulative** ones like (1d), a fact that is often taken to reflect distinct **distributive and cumulative readings** (see e.g. Kroch 1974; Scha 1984 a.o.). On its distributive construal in (2a), (1a) is true in scenario (1c), but not in (1d); on the cumulative construal in (2b), it is true in both scenarios.

(1) a. *Two of my students have read all the books.*
b. *My students have read all the books.*
c. DISTRIBUTIVE SCENARIO: My student Ann read all ten books on the reading list. My student Belle also read these books.

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d. CUMULATIVE SCENARIO: There are 10 books on the reading list. My student Ann read books 1-5. My student Belle read books 6-10.

(2) a. DISTRIBUTIVE CONSTRUAL: 'Some plurality x of two of my students is such that each atomic part of x has read all the books.'

b. CUMULATIVE CONSTRUAL: 'Some plurality x of two of my students is such that each atomic part of x has read at least one of the books and each book was read by some atomic part of x.'

This paper follows Schwarzschild (1996), Kratzer (2008) a.o. in questioning the view that (2a) and (2b) correspond to distinct LFs (see Maldonado 2018; Champollion 2020 for surveys of the issue). Its empirical scope is restricted to sentences with multiple 'simple plurals' – definites, *all*-DPs and DPs with unmodified numerals – and to the distributive/cumulative contrast. Some of the broader empirical claims might extend to **collective construals**, e.g. a construal of (1b) on which the two students collaboratively worked through each book. However, the technical proposal in Section 4 will not apply to collective predication without substantial changes.

Two alternatives to the **LF-ambiguity view** have been proposed. First, Kratzer (2008) (see also Krifka 1990 on conjunctions) adopts what I call the **single-construal view**: Plural sentences have only one very weak interpretation. For instance, the cumulative truth conditions in (2b) are met in both (1c) and (1d), which raises the question whether a separate distributive construal is needed. As we will see, this view faces the problem that cumulative construals are dispreferred in certain contexts.

Second, Schwarzschild (1996: §5) gives an analysis on which multi-plural sentences have distinct construals, but the choice between them is governed by contextual factors without any LF-ambiguity – a position I will call the **contextual view**. On his approach, sentences with two plurals involve a special contextual parameter – a relation between parts of two pluralities that Schwarzschild calls a **paired cover**. A simplified definition of paired covers (restricted to atomic parts) is given in (3):

(3) A **paired cover** of pluralities x, y is a relation $C \subseteq \{x' \mid x' \leq_{AT} x\} \times \{y' \mid y' \leq_{AT} y\}$ such that $\bigoplus\{x' \mid \exists y'.\langle x', y'\rangle \in C\} = x$ and $\bigoplus\{y' \mid \exists x'.\langle x', y'\rangle \in C\} = y$.

Interpreting a sentence like (1a) or (1b) in context involves selecting a particular paired cover; the sentence is true iff its predicate applies to every pair in that cover. This makes two predictions about the range of available construals. First, there should be contexts that require a distributive construal, since there are 'distributive' paired covers such as (4a) for (1c), which associates each student with all the books. Second, even though each particular cumulative scenario corresponds to a paired cover, these paired covers (such as (4b) for scenario (1d)) give rise to interpretations stronger than (2b), on which the predicate must hold of each pair in the cover.

(4) a. $\{\langle \mathbf{Ann}, \mathbf{b}_1\rangle, \langle \mathbf{Ann}, \mathbf{b}_2\rangle, \ldots, \langle \mathbf{Ann}, \mathbf{b}_{10}\rangle, \langle \mathbf{Belle}, \mathbf{b}_1\rangle, \langle \mathbf{Belle}, \mathbf{b}_2\rangle, \ldots, \langle \mathbf{Belle}, \mathbf{b}_{10}\rangle\}$

b. $\{\langle \mathbf{Ann}, \mathbf{b}_1\rangle, \langle \mathbf{Ann}, \mathbf{b}_2\rangle, \ldots, \langle \mathbf{Ann}, \mathbf{b}_5\rangle, \langle \mathbf{Belle}, \mathbf{b}_6\rangle, \langle \mathbf{Belle}, \mathbf{b}_7\rangle, \ldots, \langle \mathbf{Belle}, \mathbf{b}_{10}\rangle\}$

Indeed, Schwarzschild (1996) observes that sentences with plural definites, like (1b), easily get interpretations sensitive to a particular paired cover. For instance, if I utter (1b) in context (5), its most salient construal is that each student read all the books I assigned to her. On this construal, (1b) could felicitously describe scenario (1d), but not a cumulative scenario in which, say, Ann read books 6-10 and Belle read books 1-5. Its interpretation is therefore stronger than the standard cumulative construal in (2b), but still non-distributive. I will call this a **paired-cover construal**.[1]

(5) SCENARIO: Ann and Belle are taking a guided-reading course. I have compiled a list of ten books and assigned books 1-5 to Ann and books 6-10 to Belle. After two months, I want to check in on their progress.

While paired-cover construals undoubtedly exist, I do not think cumulativity can generally be reduced to them. Consider (1a) uttered in context (6), in which I do not know the identity of the two students or the mapping from students to books. Then (1a) must express a true proposition under some paired cover, but there is no particular paired cover under which it expresses a proposition I believe. If the cumulative construal (2b) is available, (1a) is expected to be felicitous in this context, since (2b) simply says that (1a) is true under *some* paired cover. But if all construals of (1a) involved a particular paired cover, its pragmatic felicity would be surprising.

(6) SCENARIO: I asked my students to review some books from my reading list. I have received ten anonymous reviews, one of each book on the list. Some of the reviews use an unusual page layout; the others are in a weird font. I conclude that two students must have (cumulatively) written all of them. But I don't know who they are and can't recall which reviews had the weird font.

This suggests that multi-plural sentences have a range of interpretations including distributive, cumulative and paired-cover construals. Yet, the existing non-ambiguity approaches do not capture this variability: While the single-construal view would not account for distributive and paired-cover construals, Schwarzschild's version of the contextual view fails to generate cumulative construals.

This paper is structured as follows. Section 2 makes a case against LF-ambiguity and for the contextual view. Section 3 develops an analogy between non-distributivity and **non-maximal construals** of plural definites. Section 4 gives an implementation of the contextual view that is motivated by this analogy and generates the full range of construals. It extends the idea that non-maximality reflects truth-value gaps (Križ 2015) to multi-plural sentences by combining it with the 'plural projection' analysis of Schmitt 2019, which posits special composition rules for plural sentences.

1 It is an open empirical question whether paired-cover construals are as easily available for sentences with plural quantifiers, like (1a). I suspect that they are not, but that the reasons for this are pragmatic.

2 Context-dependency vs. LF ambiguity

This section presents an argument for the contextual view based on German ellipsis data, following previous work by Schwarzschild (1996: 76) and Kratzer (2008: 280). Schwarzschild notes that in English, a non-distributive construal of an elided VP is compatible with a distributive construal of its antecedent, as in (7a), which is judged true in scenario (7b). Under an exact construal of *two*, this can be the case only if the interpretation of *paid for in two installments* is distributive in the first conjunct, but cumulative in the second. An LF-ambiguity account of such mixed construals would arguably be at odds with the standard view that ellipsis requires semantic equivalence between the elided material and its counterpart in the antecedent.

(7) a. *The computers were paid for in two installments, and the diskettes were, too.* (Schwarzschild 1996: 76, (183))

b. SCENARIO: Mr. Slime made five purchases at a computer store. There were four occasions on which he bought one computer. His fifth purchase was a cartonful of diskettes. Each purchase was paid for in two installments.

A potential objection against this argument is that even if the distributive construal had a different LF representation – e.g. with a silent distributivity operator D – this operator could appear outside the constituent targeted by ellipsis, as in (8).

(8) [*the computers* [D [*were paid for in two installments*]]] *and* [*the diskettes* [*were* [~~*paid for in two installments*~~]] *too*]

This issue can be addressed by considering examples in which both of the relevant plurals as well as the entire predicate are elided, such as the German sentence in (9a). Can such sentences have a mixed construal as paraphrased in (9b)?

(9) a. *Beim Verlag Y haben die Lektoren meine Manuskripte positiv*
at.the publisher Y have the editors my manuscripts positively
bewertet, aber beim Verlag X nicht.
rated but at.the publisher X not
'My manuscripts were rated positively by the editors at publisher Y, but not at publisher X.'

b. MIXED CONSTRUAL: 'At publisher Y, each editor gave at least one of the manuscripts a positive rating and each manuscript got a positive rating from at least one editor, but at publisher X, it was not the case that each editor gave each of the manuscripts a positive rating.'

While this construal is unavailable out of the blue, it can be brought out by marked contexts such as (10). In (10), it is not the case that every editor at publisher Y gave

all of Jana's manuscripts positive ratings, so the first conjunct of (9a) would not be true on a distributive construal. At the same time, the second conjunct cannot involve the negation of a standard cumulative construal (11a), since this is not true in the scenario.[2] The actual reading the second conjunct must receive in scenario (10) is the one in (11b), the negation of a standard distributive construal. So given that (9a) is true in this scenario, the mixed construal in (9b) must be available. Since both plurals and all the functional morphology except the negation are elided, it is difficult to see how an LF-ambiguity approach could accommodate this construal.

(10) SCENARIO: Jana submitted her two manuscripts to publishers X and Y. Publisher X is very strict: At X, a manuscript is accepted only if all of the editors give it a positive rating. At publisher Y, a positive rating from one editor is enough.
At X, each manuscript got positive ratings from two out of three editors, but was rejected because one editor disagreed (a different one for each manuscript). At Y, each of the manuscripts got positive ratings from two out of three editors and was accepted.
Jana's friend asks her whether any of her manuscripts were accepted.

(11) a. 'It is not true that each manuscript got a positive rating from some editor at X and each editor at X gave some manuscript a positive rating.'

b. 'It is not true that all editors at X gave each manuscript a positive rating.'

The negated conjunct in (9a) is also a problem for the single-construal view, which predicts its truth conditions to be (11a) or even stronger (see Heim 1994 for similar points). Such data seem to support a contextual view of the distributive/cumulative contrast. At the same time, Schwarzschild's (1996) implementation of this view arguably undergenerates: it only captures construals expressible in terms of a single paired cover. I will now look for a solution to this problem by comparing it to the problem of deriving non-maximal construals of definites. Based on the idea that non-maximality involves pragmatic weakening driven by the QUD (Malamud 2012; Križ 2016), I will develop a proposal on which multi-plural sentences have a default construal that is typically distributive, but can be weakened in various ways (e.g. cumulative or paired-cover construals) depending on the QUD.

3 Cumulativity as QUD-dependent weakening

To motivate the proposal informally, consider the following question: Why does scenario (10) facilitate a mixed construal of (9a)? The crucial property seems to be

2 Taking homogeneity into account (see Gajewski 2005; Schmitt 2013; Križ 2015 a.o.) would yield an even stronger construal on which no editor at X gave any of Jana's manuscripts a positive rating.

that in this scenario, the two conjuncts of (9a) respond to parallel subquestions of an overarching question, 'Which of the two publishers accepted Jana's manuscripts?' Given the strict policy of publisher X, only a distributive construal of the second conjunct will contextually entail an answer to the subquestion 'Did publisher X accept Jana's manuscripts?'. In contrast, the corresponding subquestion for publisher Y is answered both by a distributive and by a cumulative construal of the first conjunct. In other words, a cumulative construal seems to be available only if the cumulative and the distributive construal answer the implicit question under discussion equally well. The next step is to spell out this idea.

3.1 QUD-dependent truth-value gaps for non-maximal construals

The idea that the proposition expressed by a plural sentence depends on an implicit **question under discussion (QUD)** informs much recent work on **non-maximal construals** of plural definites, e.g. construals of (12a) on which not all windows have to be open (Krifka 1996; Malamud 2012; Križ 2015; Križ & Spector 2020).

Consider the scenarios in (12b-12c), adapted from Malamud 2012. Even though half of the windows are open in both scenarios, (12a) is acceptable only in (12c). As Križ (2015) shows, the two scenarios differ in their status relative to the implicit QUD they make salient. Scenario (12b) gives rise to an existential QUD ('Are any of the windows open?'). If we view this QUD as a partition of the logical space, (12b) falls into the same partition class as a 'maximal' situation in which all the windows are open. Under this condition, a non-maximal construal is available. In contrast, the most salient QUD in (12c) is universal ('Are all of the windows open?'). Relative to this question, (12c) will not be in the same partition class as a 'maximal' scenario with all the windows open, so a non-maximal construal is blocked.

(12) a. A: *The windows are open.* (Malamud 2012)

b. SCENARIO: A and B went on a trip. A storm is coming up. B asks whether the house will be safe. Only half the windows are closed. (12a) **adequate**

c. SCENARIO: A and B hired painters to paint their house. They cannot start working until all the windows are open. A asks B whether the house is ready. Half of the windows are still closed. (12a) **inadequate**

Križ (2015, 2016) formalizes this QUD-dependence within a framework in which plural sentences may have non-complementary semantic truth and falsity conditions. In worlds falling into the gap between the truth and falsity conditions, their perceived truth values are context-dependent. For consistency with my proposal in Section 4, instead of truth and falsity conditions, I will talk about the condition under which a sentence is **strictly true** (i.e. perceived as true in every context) and the condition

under which it is **tolerantly true** (i.e. perceived as true in some context). The latter is the negation of the falsity condition in Križ's framework.[3] For (12a), the strict truth conditions in (13a) encode a maximal construal, while the tolerant truth conditions in (13b) encode the weakest possible non-maximal construal. For sentences lacking non-maximality effects, as in (14), the strict and tolerant truth conditions coincide.

(13) a. (12a) is **strictly true** in *w* iff all the windows are open in *w*

b. (12a) is **tolerantly true** in *w* iff at least one window is open in *w*

(14) *Two of the windows are open* is

a. **strictly true** in *w* iff at least two windows are open in *w*

b. **tolerantly true** in *w* iff at least two windows are open in *w*

The conditions under which a sentence is perceived to be true – or **true enough** in the terminology of Križ 2015, 2016 – depend on a question parameter *Q* (which may be different from the overt QUD) in the way described in (15). Given (15), (12a) is true enough only in worlds *w* such that at least one of the windows is open in *w* and *w* has the same status wrt. *Q* as some world in which all of them are open.

(15) A plural sentence *S* is accepted as **true enough** in a world *w* relative to a question *Q* iff (i) *S* is tolerantly true in *w* and (ii) *w* falls into the same partition class relative to *Q* as some world in which *S* is strictly true.

For my purposes, this analysis has two interesting aspects. First, it amounts to a contextual view of non-maximal construals: a single underspecified meaning is mapped to different propositions in different contexts, depending on the QUD. Second, (15) generates a range of distinct non-maximal construals rather than just one. Some of these construals are expressible in terms of universal quantification over a restricted domain; for instance, if *Q* is the question of whether all the windows facing west are open, (15) predicts (12a) to be true enough if these windows are open and the ones facing east are closed, but not in the reverse situation. But crucially, we also get 'existential' non-maximal construals in scenarios like (12b).[4]

3.2 Extending the truth-value gap approach to non-distributivity

As we've seen, a contextual view of multi-plural sentences is well motivated, but Schwarzschild's (1996) particular implementation undergenerates: It generates

3 Thanks to Keny Chatain for suggesting this mode of presentation. The term 'tolerantly true' is taken from Burnett's (2017) unified treatment of plural predication and vague predication; I have to leave a closer comparison between her framework and the proposal in this paper to future work.

4 For a discussion of whether non-maximality is a form of domain restriction, see Malamud 2012.

paired-cover construals, but does not license the standard cumulative construal in (2b), which involves existential quantification over paired covers. This closely resembles the problem posed by scenario (12b) for a domain-restriction approach to non-maximality. Križ (2015, 2016) overcomes this issue by taking the relevant contextual parameter to be a QUD rather than a particular subplurality (see Malamud 2012 for a similar approach). Does his approach extend to multi-plural sentences?

The existing three-valued approaches to non-maximality (see Križ 2015; Chatain to appear; Križ & Spector 2020) do not make this connection: In these theories, a sentence like (1a), where neither of the two plurals permits non-maximality, is strictly true whenever its cumulative construal is true. However, the disambiguating role of the QUD in such sentences does not seem that different from its role in licensing non-maximality. Consider sentence (1a) in two variants of the cumulative scenario (1d). Given (16a), (1a) seems inadequate even though the cumulative truth conditions are technically met, presumably because only a distributive construal addresses the plausible QUD in this scenario ('Are any of your students well prepared for their individual presentations?') In contrast, a cumulative construal is felicitous in (16b), where it addresses the obvious QUD ('Is any subgroup of your students well prepared for their group presentation?') Further, it is unsurprising that a paired-cover construal of (1b) becomes available in a context like (5), where the QUD suggests a particular paired cover ('Did each student read all the books you assigned them?')

(16) a. SCENARIO: My students Ann and Belle each had to do an individual presentation on a list of ten books. They are expected to cover all the books. But Ann only read the first half of them, and Maria only read the second half. (1a) **inadequate**

b. SCENARIO: My students Ann and Belle had to do a joint presentation on a list of ten books. They split the workload among them: Anna only read the first half of the list, and Belle only the second half. (1a) **adequate**

This contrast suggests the following generalization: If (1a) is true on a distributive construal, it is perceived as true regardless of context; if only a weaker construal is satisfied, its perceived truth value depends on the QUD. This generalization would follow from (15) if sentences like (1a) had a truth-value gap, as in (17):

(17) a. (1a) is **strictly true** in *w* iff two students have each read every book in *w*

b. (1a) is **tolerantly true** in *w* iff two students have each read at least one book in *w* and each book was read by at least one of them in *w*

The strict truth conditions in (17) are distributive, while the tolerant truth conditions reflect the weakest possible construal of the sentence – the cumulative one. Given this semantics, generalization (15) predicts (1a) to lack a cumulative construal in

scenario (16a), which makes the sentence tolerantly true, but is not in the same partition class relative to its QUD as a scenario in which two students each read all of the books. It also correctly generates a paired-cover construal, rather than a cumulative one, in context (5) where the QUD mentions a particular paired cover.

The assumption that cumulative scenarios fall into a QUD-dependent truth-value gap also accounts for the ellipsis example (9a). Here each conjunct responds to a subquestion of the form: 'Did each manuscript get enough positive ratings to be accepted?' Given the liberal policy of publisher Y, cumulative and distributive scenarios give rise to the same answer to this QUD; the first conjunct is then true enough in the scenario. But given the stricter policy of publisher X, distributive and cumulative scenarios will have a different status wrt. the QUD, so that the proposition negation applies to in the second conjunct of (9a) won't count as true enough.

This proposal entails that there must be a second source of truth-value gaps in plural semantics besides non-maximal construals of definites. Specifically, any combination of two or more plurals gives rise to a gap, even if neither plural permits non-maximality. The combined effect of these two sources of underspecification may be seen in a sentence like (1b) with a definite plural and a quantifier (cf. Chatain to appear). Some of the possible construals of (1b) (disregarding paired-cover construals) are listed in (19). Note that since *all the books* disallows non-maximality, (1b) can never be true enough if some books were not read by any student.

(18) a. (1b) is **strictly true** in *w* iff each of my students has read all the books in *w*

b. (1b) is **tolerantly true** in *w* iff at least one of my students has read some of the books in *w* and each book was read by at least one of my students in *w*

(19) a. MAXIMAL/DISTRIBUTIVE: 'Each of my students has read all the books.'

b. NON-MAXIMAL/DISTRIBUTIVE: e.g. 'Some of my students have individually read all the books.'

c. MAXIMAL/CUMULATIVE: 'Each of my students has read some books, and each book was read by one of my students.'

d. NON-MAXIMAL/CUMULATIVE: e.g. 'Some plurality of my students have cumulatively read all the books.'

In sum, I propose that non-maximal and non-distributive construals are instances of a broader pattern of semantic underspecification. Since non-distributivity does not always reduce to a non-maximal construal of a particular plural, it must reflect a kind of 'global' non-maximality effect that emerges only in multi-plural sentences.

3.3 Further support for the analogy

So far, I have simply assumed that there is a linguistically significant parallel between the role of the QUD in licensing non-maximality and its effect on the availability of

cumulative construals. The question arises whether there are any other similarities between non-maximality and non-distributivity that justify this conclusion – after all, as the work of Gualmini, Hulsey, Hacquard & Fox (2008) on scope ambiguity shows, the effect of the QUD on disambiguation seems to be quite general.

One additional parallel is what I'll call **alternative sensitivity** (Križ 2015, 2016). (20a) is much easier to accept as true in the non-maximal scenario (20c) than in (20d), although the extension of *asleep* is the same in both scenarios. Non-maximal construals are therefore sensitive not just to the number of 'exceptional' individuals which do not satisfy the plural predicate in question, but also to the alternative predicates they satisfy instead. The same phenomenon is found with cumulativity: (21a) is easier to accept in scenario (21c) than in (21d), even though the extension of *like* is the same in both scenarios.[5] This suggests that alternative sensitivity is a hallmark of semantic underspecification in plural sentences more generally[6], which supports a uniform approach to non-maximal and non-distributive construals.

(20) a. *The neighbors are asleep.*

b. SCENARIO: 7 out of 10 neighbors are asleep . . .

c. . . . the others are reading quietly in their apartments.

d. . . . the others are having a noisy street party.

(21) a. *The girls like (all) the boys.*

b. SCENARIO: You want to take two girls and four boys on a school trip, but you're worried whether they will get along. Girl 1 likes boys A and B and girl 2 like boys C and D, but . . .

c. . . . girl 1 has no opinion on C and D, and girl 2 has no opinion on A and B.

d. . . . girl 1 hates C and D, and girl 2 hates A and B.

3.4 Default construals and conceptual knowledge

Given generalization (15), we would expect the **default construal** of multi-plural sentences in the absence of a non-trivial QUD to be distributive.[7] There is some support for this prediction in in the experimental literature on predicate and sentential conjunctions, assuming that these are plural expressions (Schmitt 2013, 2019). For instance, in an experiment conducted in Dutch, Poortman (2016: §3) found that

5 Thanks to Viola Schmitt for convincing me that this phenomenon is not specific to cumulative construals of conjunctions and providing example (21).

6 That said, I suspect it might not arise in *all* cumulative sentences: My own judgment is that with two plural quantifiers, as in *Two boys like all the girls*, the effect is less clear.

7 This is because a maximally unspecific QUD, such as 'What is the world like?', would never put a cumulative and a distributive scenario in the same partition class.

for sentences with predicate conjunctions of the type (22), a cumulative construal was dispreferred: Such sentences were often, although not consistently, rejected in cumulative scenarios (e.g. a scenario where some men are sitting and not cooking, while the others are cooking but not sitting). Poortman's experimental sentences were not presented in context, so one can reasonably assume that most participants did not accommodate a non-trivial QUD. If so, her result is in line with generalization (15). Tieu, Romoli, Poortman & Winter (2018) report similar data for English.[8]

(22) *The men are sitting and cooking.*

That said, the generalization that all multi-plural sentences have a distributive default construal is too strong (see also Poortman 2016):[9] If the distributive construal violates conceptual or world knowledge, as in German (23a), weaker construals seem to be the default. In a context with a very unspecific QUD such as (23b), the preferred construal of (23a) is a cumulative and non-maximal one.

(23) a. *Die Großparteien haben beide Wahlen gewonnen.*
the major.parties have both elections won
'The major parties won both elections.'

b. CONTEXT: There were two local elections. Three major parties with very similar platforms ran in both elections. As expected, each election was won by one of the major parties. The next day, you ask me what happened.

As Poortman (2016) points out, this suggests the following weaker version of (15): Let C_c be the set of worlds compatible with the conceptual and world knowledge available in context c. Then we consider those worlds in C_c that come 'maximally close' to making the sentence S strictly true. Typically, these will be worlds in which it is actually strictly true, but this won't hold in exceptional cases like (23a). Then S counts as true enough in worlds that have the same status relative to the QUD as some of these 'maximally close' worlds. This is stated informally in (24).

8 Tieu et al. (2018) did provide discourse contexts, but with very general QUDs on which any difference between two scenarios would come out as relevant.

9 In addition to the issue mentioned in the text, the experimental findings on sentences with indefinite plural objects like (i) also seem problematic at first sight: Several studies, discussed by Dotlačil (2010: §2), show that cross-linguistically sentences like (i) are more easily accepted in non-distributive than in distributive scenarios when presented out of context. However, unlike my examples, the distributive scenarios in these studies involved 'covariation', e.g. two different girls for each boy in (i). In the languages discussed by Gil (1988), a scenario in which three boys each saw the same two girls was actually preferred over a cumulative scenario. This suggests that while (15) cannot be the whole story, it could still hold together with a general preference for scenarios without 'covariation'.

(i) *Three boys saw two girls.*

(24) Let c be a context that provides a question Q_c and a set C_c of worlds compatible with the conceptual knowledge available in c.

a. The **default construal** of a plural sentence S in c contains those worlds that are 'maximally close' to making S strictly true among the worlds in C_c that make S tolerantly true.

b. S is **true enough** in a world w relative to c iff w is in the same partition class relative to Q_c as some world in the default construal of S in c.

Interim summary The pragmatics of multi-plural sentences gives rise to some new desiderata for their semantics. First, they should be underspecified between distributive, cumulative and paired-cover construals in the same way that definite plurals are underspecified wrt. non-maximality. This underspecification does not reduce to non-maximality, but is a 'global' property of multi-plural sentences. Second, definition (24a) makes reference to an undefined notion of worlds that are 'maximally close' to making a sentence strictly true. To make this precise, we need a way of modelling different degrees of deviation from the strict truth conditions.

4 An analysis: Plural sentences as three-valued predicates of propositions

The semantics I will sketch here is two-dimensional: each expression α that contains a plural has a **strict denotation** $[\![\alpha]\!]^w_+$ and a **tolerant denotation** $[\![\alpha]\!]^w_?$. Composition for these two components proceeds in parallel; the composition rules will be defined in such a way that a 'gap' between $[\![\alpha]\!]^w_+$ and $[\![\alpha]\!]^w_?$ opens up if both immediate constituents of α are plural. This encodes the generalization that underspecification arises whenever two plurals meet. At the sentence level, the two components map to strict and tolerant truth conditions. But in order to meet the second desideratum mentioned above – that scenarios can be more or less 'close' to making a sentence strictly true – I will make use of the **plural projection** approach of Schmitt 2019, in which $[\![\alpha]\!]^w_+$ and $[\![\alpha]\!]^w_?$ are not simply propositions, but have internal structure. This system provides a natural way of generating the full range of construals.

4.1 Plural projection and paired covers

The ontological assumption underlying Schmitt's (2019) approach is that semantic plurality is a cross-categorial notion, so that there are pluralities of predicates or propositions. These pluralities can be thought of as standing in a one-to-one correspondence to nonempty sets of predicates or propositions (see Haslinger & Schmitt 2018 for details). Thus, a predicate conjunction like *sitting and cooking* essentially contributes a predicate plurality, $[\![\textit{sitting}]\!] \oplus [\![\textit{cooking}]\!]$, with the atomic parts $[\![\textit{sitting}]\!]$ and $[\![\textit{cooking}]\!]$, to the semantic composition.

This type-general notion of plurality makes it possible to maintain that (in the absence of certain intervening operators) **any expression containing a plural has a plural denotation**. Specifically, any expression containing a plural denotes a predicate of pluralities of some type. Thus, take a simple plural expression like *two students*, which is assumed to denote a predicate true of pluralities of two students, as in (25a). Combining this with the non-plural predicate $\mathbf{A} = [\![\textit{asleep}]\!]$ as in (25b), we get a structurally analogous predicate of **pluralities of propositions**, whose parts correspond to the parts of a student plurality from (25a).

(25) a. $[\![\textit{two students}]\!]^w = \{\mathbf{a}\oplus\mathbf{b}, \mathbf{b}\oplus\mathbf{c}, \mathbf{a}\oplus\mathbf{c}\}$ (for $[\![\textit{student}]\!]^w = \{\mathbf{a},\mathbf{b},\mathbf{c}\}$)

b. $[\![\textit{two students are asleep}]\!]^w = \text{PL}([\![\textit{two students}]\!]^w, \{\lambda x.\lambda w.\mathbf{A}_w(x)\})$
$= \{\lambda w.\mathbf{A}_w(\mathbf{a})\oplus\lambda w.\mathbf{A}_w(\mathbf{b}), \lambda w.\mathbf{A}_w(\mathbf{b})\oplus\lambda w.\mathbf{A}_w(\mathbf{c}), \lambda w.\mathbf{A}_w(\mathbf{a})\oplus\lambda w.\mathbf{A}_w(\mathbf{c})\}$

In this system, any expression usually thought to have some type a actually has type $\langle a,t\rangle$ if it contains a plural. Therefore, composition cannot always proceed by means of regular functional application. Instead, Schmitt (2019) defines an operation PL which combines a predicate of functions (type $\langle\langle a,b\rangle,t\rangle$) with a predicate of matching arguments (type $\langle a,t\rangle$). The result is a predicate of type $\langle b,t\rangle$. For instance, to derive (25b), the set of individuals in (25a) combines with the singleton predicate $\{\lambda x.\lambda w.\mathbf{A}_w(x)\}$ that is true of the property of being asleep. If only one plural is involved, the operation PL implements a kind of alternative projection for indefinites (cf. Kratzer & Shimoyama 2002). However, things become more interesting in multi-plural sentences. Consider the composition of (1a), sketched in (26c). *All the books* denotes a singleton predicate true of the sum of the books. As (26b) shows, the VP ends up denoting a structurally parallel predicate true of a plurality of properties. These properties amount to reading book **d** and reading book **e**.

In the next, crucial step, this plural predicate is composed with $[\![\textit{two students}]\!]^w$ in (25a). As in (25b), the outcome is a set of pluralities of propositions. To derive this set, Schmitt (2019) makes use of the notion of a paired cover, defined in (3) above. Recall that paired covers and cumulativity are closely related: The cumulative construal of (1a) is satisfied if and only if there is some paired cover of two students and the sum of all books such that the reading relation holds of all the pairs in the cover. Or equivalently, there is a paired cover of two students and the predicate plurality in (26b), such that each predicate is true of each student it is paired with.

The composition rule assumed in Schmitt 2019 exploits this correspondence as follows: It takes all the paired covers of a predicate plurality in the set (26b) and an individual plurality in (25a). For each cover, functional application is performed for the predicate-individual pairs in the cover, and the resulting propositions are collected into a plurality. For instance, the paired cover $\{\langle\lambda x.\lambda w.\mathbf{R}_w(\mathbf{d})(x), \mathbf{a}\rangle, \langle\lambda x.\lambda w.\mathbf{R}_w(\mathbf{e})(x), \mathbf{c}\rangle\}$ gives rise to the last plurality listed in (26c). In general, each plurality in (26c) expresses a particular paired-cover construal of the sentence in

(1a). The operation PL that achieves this effect is defined in (27); the 'projection' behavior in (25b) or (26b) also falls out from this definition.

(26) a. $[\![\textit{all the books}]\!]^w = \{\mathbf{d} \oplus \mathbf{e}\}$ (for $[\![\textit{book}]\!]^w = \{\mathbf{d}, \mathbf{e}\}$)

b. $[\![\textit{read all the books}]\!]^w = \text{PL}([\![\textit{all the books}]\!]^w, \{\lambda y.\lambda x.\lambda w.\mathbf{R}_w(y)(x)\})$
$= \{\lambda x.\lambda w.\mathbf{R}_w(\mathbf{d})(x) \oplus \lambda x.\lambda w.\mathbf{R}_w(\mathbf{e})(x)\}$

c. $[\![\textit{two students read all the books}]\!]^w$
$= \text{PL}([\![\textit{two students}]\!]^w, [\![\textit{read all the books}]\!]^w) = \{\bigoplus\{\lambda w.\mathbf{R}_w(y)(x) \mid \langle x, y\rangle \in C\} \mid C$ is a paired cover of some element of $[\![\textit{two students}]\!]^w$ and some element of$[\![\textit{all the books}]\!]^w\}$
$= \{\lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{b}), \ldots,$
$\lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}),$
$\lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{b}), \ldots, \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{b}),$
$\lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}), \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{c}), \ldots\}$

(27) For a predicate F of type $\langle\langle a, b\rangle, t\rangle$ and a predicate A of type $\langle a, t\rangle$:
$\text{PL}(F, A) = \{\bigoplus\{g(b) \mid \langle g, b\rangle \in C\} \mid \exists f \in F, a \in A.C$ is a paired cover of f and $a\}$

To summarize, Schmitt 2019 takes sentences to denote predicates of pluralities of propositions, derived from particular paired covers. Schmitt's proposal is motivated by compositionality problems involving complex cases of cumulativity, which are independent of the pragmatic phenomena discussed here. Still, the propositional pluralities her system derives happen to represent the different paired-cover construals generated by Schwarzschild (1996). This makes the proposal a natural starting point for a uniform pragmatic treatment of non-maximality and non-distributivity.

4.2 Three-valued plural predicates and pragmatics

The next step towards such a uniform treatment is to add a notion of truth-value gaps to the system. I assume that a plural expression α has a **strict denotation** $[\![\alpha]\!]^w_+$ and a **tolerant denotation** $[\![\alpha]\!]^w_?$, which are both sets of pluralities.[10] For plural quantifiers like *two students* or *all the books*, the strict and tolerant denotations coincide. Non-maximality amounts to having distinct strict and tolerant denotations: While $[\![\textit{the windows}]\!]^w_+$ in (28) contains the sum of all windows, $[\![\textit{the windows}]\!]^w_?$ also contains smaller window pluralities. As (29) shows, this gap 'projects' to the sentence level. (The operation PL_+ combining strict denotations is discussed below.)

(28) $[\![\textit{the windows}]\!]^w_+ = \{\mathbf{a} \oplus \mathbf{b} \oplus \mathbf{c}\}$; $[\![\textit{the windows}]\!]^w_? = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{a} \oplus \mathbf{b}, \mathbf{b} \oplus \mathbf{c}, \mathbf{a} \oplus \mathbf{c}, \mathbf{a} \oplus \mathbf{b} \oplus \mathbf{c}\}$ (for $[\![\textit{window}]\!] = \{\mathbf{a}, \mathbf{b}, \mathbf{c}\}$)

10 Bledin's (2021) recent work on plural predication in truthmaker semantics also uses pairs of plural sets as denotations, although the details of his system and the empirical motivation differ from the present work. Thanks to Keny Chatain (p.c.) for this reference.

(29) a. $[\![\textit{the windows are open}]\!]^w_+ = \text{PL}_+([\![\textit{the windows}]\!]^w_+, \{\lambda x.\lambda w.\mathbf{O}_w(x)\})$
$= \{\lambda w.\mathbf{O}_w(\mathbf{a}) \oplus \lambda w.\mathbf{O}_w(\mathbf{b}) \oplus \lambda w.\mathbf{O}_w(\mathbf{c})\}$

b. $[\![\textit{the windows are open}]\!]^w_? = \text{PL}([\![\textit{the windows}]\!]^w_?, \{\lambda x.\lambda w.\mathbf{O}_w(x)\})$
$= \{\lambda w.\mathbf{O}_w(\mathbf{a}), \lambda w.\mathbf{O}_w(\mathbf{b}), \lambda w.\mathbf{O}_w(\mathbf{c}), \lambda w.\mathbf{O}_w(\mathbf{a}) \oplus \lambda w.\mathbf{O}_w(\mathbf{b}),$
$\lambda w.\mathbf{O}_w(\mathbf{b}) \oplus \lambda w.\mathbf{O}_w(\mathbf{c}), \lambda w.\mathbf{O}_w(\mathbf{a}) \oplus \lambda w.\mathbf{O}_w(\mathbf{c}), \lambda w.\mathbf{O}_w(\mathbf{a}) \oplus \lambda w.\mathbf{O}_w(\mathbf{b}) \oplus$
$\lambda w.\mathbf{O}_w(\mathbf{c})\}$

The sets $[\![S]\!]^w_+$ and $[\![S]\!]^w_?$ straightforwardly map to strict and tolerant truth conditions:

(30) A plurality of propositions is **true** in a world w iff all of its atomic parts are true in w.

(31) A plural sentence S is **strictly true** in a world w iff some plurality in $[\![S]\!]^w_+$ is true in w, and **tolerantly true** in w iff some plurality in $[\![S]\!]^w_?$ is true in w.

Given (29), *The windows are open* is strictly true iff all the windows are open, and tolerantly true iff at least one of them is. So far, this seems like an unnecessarily complex way of deriving a three-valued proposition. However, the additional structure provided by the propositional pluralities actually has a pragmatic use. Recall our definition of the 'default construal' in (24), which made reference to worlds that come 'maximally close' to making a sentence strictly true without violating conceptual knowledge. We can now model degrees of divergence from a strict interpretation by exploiting the part-of relation $\leq$ that partially orders the pluralities in $[\![S]\!]_?$. For instance, $\lambda w.\mathbf{O}_w(\mathbf{a}) < \lambda w.\mathbf{O}_w(\mathbf{a}) \oplus \lambda w.\mathbf{O}_w(\mathbf{c}) < \lambda w.\mathbf{O}_w(\mathbf{a}) \oplus \lambda w.\mathbf{O}_w(\mathbf{b}) \oplus \lambda w.\mathbf{O}_w(\mathbf{c})$. This reflects the intuition that a world in which only window **a** is open is less 'close' to making (29) strictly true than a world in which both **a** and **c** are open.

We can then formalize default construals as in (32). Typically, the default set of a sentence S will be its strict denotation, as in (29). But in examples like (23a) where conceptual knowledge rules out the strict denotation, the default set will contain the maximal pluralities in $[\![S]\!]^w_?$ that are still compatible with conceptual knowledge. For (23a), these pluralities require that each election was won by one major party.

(32) Given a plural sentence S and a set C of worlds compatible with conceptual knowledge, we define the **default set** $D(S)$ as follows:

a. If $[\![S]\!]^w_+$ contains a plurality that is true in a world in C, then $D(S) = [\![S]\!]^w_+$.

b. Otherwise, $D(S)$ contains all pluralities $p \in [\![S]\!]^w_?$ such that (i) p is true in some world in C and (ii) there is no $p' \in [\![S]\!]^w_?$ such that $p < p'$ and p' is true in some world in C.

The final step we need is a formal definition of 'true enough'. (33) basically states that a sentence is true enough in worlds that make it tolerantly true and have the same status relative to the QUD as some world compatible with its default construal.

(33) Let c be a context that provides a question Q_c, a set C_c of worlds compatible with the conceptual knowledge available in c, and an evaluation world w.

a. Let Q_S be the union of those partition classes of Q_c that contain some world in which a propositional plurality from $D(S)$ is true.

b. c is **adequate** for a plural sentence S iff there is a subset $P \subseteq [\![S]\!]^w_?$ such that Q_S is exactly the set of worlds in which some element of P is true.

c. If c is adequate for S, S is **true enough** wrt. c in a world w iff w is in Q_S.

The additional constraint in (33b) says that in any context, the weakened construal of a plural sentence S must correspond to the disjunction of a subset of $[\![S]\!]_?$. This ensures that (29) cannot convey any information unrelated to windows being open.[11] The additional structure provided by the predicates of pluralities therefore serves two pragmatic purposes: First, it let us define the default construal of a plural sentence in a context-dependent manner, formalizing the description in Poortman (2016), and second, it helps put certain constraints on the semantic variability of plural sentences.

4.3 Non-distributivity as global non-maximality

With the pragmatic system in place, let us return to the problem of deriving cumulative, distributive and paired-cover construals of multi-plural sentences like (1a). We already computed a tolerant denotation for (1a) in (26c) above that accounts for the cumulative construal. What is its strict denotation? Recall that we assumed that (1a) is strictly true only in a distributive scenario (cf. (17)). So its strict denotation should only contain propositional pluralities corresponding to 'distributive' paired covers:

(34) $[\![(1a)]\!]^w_+ = \text{PL}_+([\![\textit{two students}]\!]^w_+, [\![\textit{read all the books}]\!]^w_+)$
$= \{\lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{b}),$
$\lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{c}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{c}),$
$\lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{b}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{c}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{c})\}$

In our system, *two students* and *all the books* lack denotation gaps since they do not exhibit non-maximality effects. Instead, I will assume that the denotation gap emerges from the compositional system: While the tolerant denotations of two subexpressions combine via Schmitt's (2019) PL operation, their strict denotations will combine by means of an operation that encodes distributivity, which I call PL_+.

The pluralities returned by PL_+ will be based not on arbitrary paired covers, but on what I will call **distribution functions**, defined in (35). These are functions that take a plurality from one of the two sets to be composed, and map each of its atomic

11 For instance, there is no context in which *The windows are open* can mean 'Either all the windows are open, or some windows and the door are open' (see Križ 2015 for a discussion of such cases).

parts to a whole plurality from the other set.[12] An example of a distribution function for $[\![\textit{two students}]\!]^w_+$ and $[\![\textit{read all the books}]\!]^w_+$ is given in (37). It maps each of the students **a** and **b** to the only element of $[\![\textit{read all the books}]\!]^w_+$, the predicate plurality that encodes reading both **d** and **e**. Definition (36) then states that the pluralities returned by PL_+ are derived by taking a distribution function and composing each atomic part in its domain with each part of the plurality it maps to. Thus, for the distribution function in (37), each student is individually composed with each part of the predicate plurality, which gives us the first propositional plurality listed in (34).[13]

(35) A **distribution function** for a plurality x and a set A is a function from the atomic parts of x to elements of A.

(36) For a predicate F of type $\langle\langle a,b\rangle,t\rangle$ and an expression A of type $\langle a,t\rangle$:
$\text{PL}_+(F,A) = \{\bigoplus\{g(a)|\ g \leq_{AT} f, a \leq_{AT} D(g)\}$
$|\ f \in F, D$ is a distribution function for f and $A\}$

(37) $\mathbf{a} \mapsto \lambda x.\lambda w.\mathbf{R}_w(\mathbf{d})(x) \oplus \lambda x.\lambda w.\mathbf{R}_w(\mathbf{e})(x), \mathbf{b} \mapsto \lambda x.\lambda w.\mathbf{R}_w(\mathbf{d})(x) \oplus \lambda x.\lambda w.\mathbf{R}_w(\mathbf{e})(x)$

Definition (36) derives the strict denotation in (34) for our motivating example (1a). Since the strict and tolerant denotations of this sentence diverge, it is now predicted to exhibit 'global' semantic underspecification, even though neither of the individual plural arguments is underspecified. This accounts for the context-dependency of such sentences: The default set of (1a) will coincide with the distributive strict denotation in (34), but its tolerant denotation includes pluralities corresponding to all the paired covers of two students and all the books. Definition (33) will then permit it to be true enough in various non-distributive scenarios, if these scenarios fall into the same partition class relative to the QUD as at least one distributive scenario.

As a further example of the pragmatic flexibility this system provides, consider sentence (1b) in a scenario with students **a** and **b**. Given (38), it is strictly true only if each student has read all the books. But its tolerant denotation sketched in (39) also contains pluralities derived from smaller paired covers; some of these pluralities won't entail that both students read books, reflecting non-maximality of *the students*.

(38) $[\![\textit{my students read all the books}]\!]^w_+$
$= \{\lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{R}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{R}_w(\mathbf{e})(\mathbf{b})\}$

12 Unlike paired covers, distribution functions are an asymmetric concept, so that PL_+ requires one of the two plural predicates it combines to 'take scope' over the other. This raises the problem of determining which of the two arguments of the rule has wider 'scope'. I will gloss over this issue in the text, but as I noted in my SALT presentation, the simplest generalizable solution would be to assume that a plural predicate of a functional type always takes 'scope' over a plural predicate of the matching argument type, and lift the pluralities of individuals mentioned in the main text to a quantifier type. For instance, $\mathbf{a} \oplus \mathbf{b}$ would be lifted to $(\lambda P_{\langle e,st\rangle}.P(\mathbf{a})) \oplus (\lambda P_{\langle e,st\rangle}.P(\mathbf{b}))$.

13 It is worth noting that if A is a set with multiple elements, e.g. $[\![\textit{read three books}]\!]_+$, definition (35) permits 'covariation', i.e. a distribution function may map each student to a different plurality.

(39) $[\![\textit{my students read all the books}]\!]^w_? = \{\lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{b}),$
$\lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{b}), \ldots, \lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{b}), \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{b}),$
$\lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{a}) \oplus \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{a}), \lambda w.\mathbf{read}_w(\mathbf{d})(\mathbf{b}) \oplus \lambda w.\mathbf{read}_w(\mathbf{e})(\mathbf{b})\}$

The pragmatics we've developed in Section 4.2 then predicts that any disjunction of a subset of (39) should correspond to a possible construal of the sentence. This includes all the construals listed in (19), but also others, such as a paired-cover construal on which student **a** read book **d** and student **b** read book **e**.

5 Conclusion and outlook

This paper formulated three desiderata for the semantics and pragmatics of multi-plural sentences and presented the first compositional system that satisfies all three of them. First, distributive, cumulative and paired-cover construals should be derivable from a single LF. Second, non-maximal and non-distributive construals should form a natural class. Third, plural sentences should have a default construal, which is as 'close' to a distributive construal as one can get without violating world knowledge.

That said, there are several aspects of the context-dependency of plural predication that the technical proposal in Section 4 fails to capture. The most pressing issue is that I have implicitly assumed that distributive construals are logically stronger than non-distributive construals, an assumption that is violated in examples like (40). I suspect that modified-numeral DPs are pragmatically quite different from simple unmodified plurals, so that we might not want a uniform pragmatics for all cumulative sentences. Still, there is an obvious problem here: the distinct construals of (40) should not be treated as unrelated to those of examples like (1a).

(40) *My students read exactly five books.*

Collective predication, which I have ignored in this paper, poses another challenge. Križ & Spector (2020) develop a radically different way of applying the notion of alternative projection to plurals, motivated largely by homogeneity and non-maximality effects with collective predicates. The question arises whether the three desiderata in this paper could be met within a variant of their framework.

At the same time, my use of a composition-based 'projection' mechanism (instead of pluralization operators that attach to the predicate) also has advantages over existing versions of the contextual view (e.g. Schwarzschild 1996): It extends to sentences with three or more plurals and to non-lexical cases of cumulativity (see e.g. Schmitt 2019) without any further assumptions. This suggests that, even if certain aspects of the present formalization are on the wrong track, the general idea of interpreting plural sentences as three-valued predicates is of some interest.

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Contextual restrictions on cumulativity

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