

ON THE MEANING OF “ALL” AND “WHOLE”

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1 Introduction

Many languages have a word that expresses totality or universality over sums, across (i) sums of atoms, (ii) sums of mass, (iii) atoms reconceptualized as sums. In Icelandic, for example, the stem *all-* combines with definite plural terms, as in (1), definite mass terms, as in (2), or definite singular count terms, as in (3).

- (1) Hvað myndi breytast ef allir jöklarnir á Íslandi hyrfu?¹
what would happen if all glaciers.DEF on Iceland vanished
‘What would happen if all the glaciers on Iceland disappeared?’
- (2) Til að bræða allan ísinn þyrfti að hlýna verulega á jörðinni...²
To to melt all ice.DEF needed to warm significantly on earth.DEF
‘For all the ice to melt, the Earth would have to warm significantly...’
- (3) Þess vegna finnst mér að ganga eigi alla leið og friða allan jökulinn.³
that cause finds me to go not all way and peace all glacier.DEF
‘Therefore we shouldn’t go all the way and protect the whole glacier.’

Other Germanic languages – Dutch, English, MSc... – belong to the as it seems relatively few languages that make lexical distinctions among these three cases. In particular, Mainland Scandinavian draws a line between case (2) and case (3).

¹Source: https://vefir.mms.is/dagsins/loftslagsdagurinn/pdf/loftslagsdagurinn_midjan.pdf

²Source: <https://www.visindavefur.is/svar.php?id=406>

³Source: <https://www.mbl.is/greinasafn/grein/311612/>

Although English *whole* as in ‘(3)’ has been described, by Moltmann (2005, 628), as inducing a distribution “over all the actual parts of an object”, it has also been argued, by Morzycki (2002), to be very different from *all*. Therefore, section 2 is devoted to arguing that it and *all* are, after all, very similar, and that the lexical distinction drawn in English and some other languages is a superficial one.

Then in section 3, existing accounts of the English determiner *all* are reviewed, with difficulties coming to light along the way. In fact, it appears that theorists have been unduly focused on the plural count case, at the cost of the mass case. Even the recent proposals by Champollion (2017) and by Križ and Spector (2021) face hurdles. In response, I propose a theory where $\llbracket all \rrbracket = 1$.

2 Facts about universal ‘whole’

What may appear as one English word *whole* is at least two-way ambiguous. At one end, there is an ‘integrity’ reading, at the other a reading labeled ‘universal’ by Igel (2021), ‘distributive’ by Moltmann (2005).

- (4) Should I think about regalanising the whole chain or cutting the rusty links out and using a chain connector of some sort?⁴
- (5) With some chains, every second link is welded, usually pressure forged in an induction furnace. Sometimes all the links are done in this way.⁵

The underlined DP in (4) seems synonymous with the underlined DP in (5), and indeed, an intuitive parallel between *all* and *whole* as used here has been noted by Morzycki (2002) and by Moltmann (2005), yet a parallel treatment has so far not been on anyone’s agenda. Two observations have stood in the way:

1. Syntactically, *whole* would seem to be an adjective, which *all* is not.
2. Unlike *all*, *whole* does not seem able to scope over existentials.

I will challenge these two semblances, though, and argue that all the difference is that *all* inputs a sum, a sum of mass or of atoms, while *whole* inputs an atom and transforms it to the sum of its mass or atom parts. Sources of evidence are (i) cross-linguistic facts (2.1–2.3) and (ii) facts about relative scope (2.4).

⁴Source: <https://forums.ybw.com/index.php?threads/anchor-chain-rust.253040/>

⁵<https://www.cruisersforum.com/forums/f118/how-to-strengthen-chain-link-238034-3.html>

2.1 Determiner-like behavior in Norwegian

The Norwegian cognate, *heil-*, can precede a definite without being preceded by an article. This correlates with a universal interpretation.

- (6) Jeg fikk hele det knuste vinduet over meg, sier Sandra.⁶
 I got whole.WEAK the broken window.DEF over me says Sandra.
 ‘The whole broken window fell down on me, Sandra says.’

The preposed definite article normally produces the integrity reading.

The correlation between the missing ‘adjective’s definite article’ and a universal interpretation suggests that *heil-* is not an adjective in these cases but a word with an argument slot for the type of things definites denote, namely, individuals.

This view is corroborated by the fact that *heile* is able to combine with just any referring expression, not just definites but pronouns and names as well.

- (7) Universitetet har studenter fra hele Afrika, ...⁷
 university.DEF has students from whole.WEAK Africa
 ‘The university has students from all (of) Africa, ...’

2.2 *Ganz-* across the board in German

German *ganz-* has a very wide field of use. It spells out ‘whole’, but it is also an exponent of ‘all’ in connection with mass nouns and even, although to a lesser extent, with plural count nouns:

- (8) Das ganze Geld war weg.⁸
 the whole money was gone
 ‘All the money was gone.’
- (9) Die ganzen Tassen sind verschwunden.
 the whole cups have disappeared
 ‘All the cups are gone.’ (Cited by Haspelmath 1995, 366)

This blurs the line between the sum cases and the atom case and raises doubts about any deep difference between *whole* and *all*.

⁶Source: <https://www.klikk.no/produkt/hjemmesider/herogna/3159138>

⁷Source: <https://sosiologen.no/student/782-2/>

⁸Source: <https://www.krone.at/2618190>

2.3 It’s all all in many languages

It is not uncommon that one stem is used indiscriminately to cover universality in regard to parts of the denotations of three different kinds of expressions:

1. DEFINITE PLURAL COUNT NOUNS (‘the links of the chain’),
2. DEFINITE MASS NOUNS (‘the steel of the chain’),
3. DEFINITE SINGULAR COUNT NOUNS (‘the chain’).

This situation obtains in Hebrew, Icelandic and Ukrainian, as shown in Fig. 1.⁹

	+ U pl	+ U mass	+ U sg	- U
German	<i>alle</i>	<i>ganze</i>	<i>ganze</i>	<i>ganze</i>
Norwegian	<i>alle</i>	<i>all</i>	<i>heile</i>	<i>heil(e)</i>
English	<i>all</i>	<i>all</i>	<i>whole</i>	<i>whole</i>
Icelandic	<i>allar</i>	<i>öll</i>	<i>öll</i>	<i>heil(a)</i>
Ukrainian	<i>vsi</i>	<i>vsja</i>	<i>vsja</i>	<i>cíla</i>
Hebrew	כָּל	כָּל	כָּל	שְׁלֵמָה

Fig. 1: Uses of an ‘all’ word and uses of a ‘whole’ word across six languages; the framed column represents the ‘universal reading’ with singular count nouns; U = universal; the listed forms are nominative feminine, plural in leftmost column

Below are samples of the four lower, lightgray cases in the framed column.

- (10) Þess vegna finnst mér að ganga eigi alla leið og friða allan jökulinn.¹⁰
 that cause finds me to go not all way and peace all glacier.DEF
 ‘Therefore we shouldn’t go all the way and protect the whole glacier.’

⁹Hebrew is like Arabic: כָּל ≈ كَلٌّ.

¹⁰(= (3))

- (11) Zaznačymo, vijs’ka RF, ..., zaminuvaly majže vse misto.¹¹
 note troops RF mined almost all town
 ‘Note that the Russian troops, ..., had mined almost the whole town.’
- (12) צה"ל הרס את כל הכפר, הוץ מהמסגד.¹²
 mosque.DEF apart village.DEF all ACC destroy IDF
 ‘The IDF destroyed the whole village, except the mosque.’

Key lesson from this survey: A lexical line is commonly drawn not between the meaning of *all* and the meaning of *whole* but through the meaning of *whole*.

2.4 Scopal interactions

There is an “initially clear intuition”, Morzycki (2002, 184) writes, that *the whole* means ‘all the parts of the’. Indeed, one can observe flexible scope interactions with negation: (13) can be read in the sense of $\forall > \neg$, or in the sense of $\neg > \forall$.

- (13) Der ganze Bodensee ist nicht zugefroren.
 the whole Bodensee is not over-frozen
 ‘The whole Lake of Constance isn’t frozen over.’

But as Morzycki (2002, 186f.) observes, *whole* shows an “unwillingness to scope like normal, well-behaved universal quantifiers with respect to existentials”.

There is reason to doubt this, however – in fact, there are two reasons.

One: Morzycki fails to note that it is also rare to find cases where *all the Q* scopes over an existential when *Q* is a mass noun – and in case *the whole Q* does mean ‘all the parts of the’, it will mostly be *mass* parts we are talking about. So: It may be unusual for *the whole Q* to scope over existentials, but it does happen. (15) mirrors the way *all* evidently scopes over existentials in cases like (14):

- (14) This means that while most of the water in your soda has never been in another soda, almost all of it has been drunk by at least one dinosaur.¹³
- (15) There was an entire wall of screens indicating the whole building was covered by at least one camera, and some areas by two or three.¹⁴

¹¹Source: <https://prm.ua/v-kherson-povernuly-elektroenerhiu/>

¹²Source: <https://www.makorrishon.co.il/nrg/online/54/ART2/068/776.html>

¹³Source: <https://what-if.xkcd.com/74/>

¹⁴Source: Julie Rowe, *Hell and Back*

In addition, it is not unusual for *the whole* to evidently scope over a disjunction. (16) shows that *all* can do this, and (17) that *whole* can too; see also (18).

- (16) All the timber was either recycled or derived from renewable sources.¹⁵
- (17) For one thing, they wanted to redo the paint.
 “The whole house was either brown or gray,” says Renee.¹⁶
- (18) Das ganze Haus ist entweder abgebrannt oder durch den giftigen Rauch nur mit Gasmasken zu betreten.¹⁷

3 Theories about *all*

The cumulative evidence suggests that e.g. Arabic *kull* has a uniform semantics whether its argument is a sum of atoms, a sum of mass, or apparently an object; and that e.g. ‘universal’ *whole* essentially shares the meaning of *all*.

But what is the meaning of *all*?

The theories on the shelf can be sorted into two drawers, labeled

- UNIVERSALITY THEORIES
- MAXIMALITY THEORIES

There is also a pigeonhole in between for a theory of STRATIFIED REFERENCE.

3.1 Universality theories

It is often assumed that *all* is a quantificational determiner, and in fact, that it is basically synonymous with *every* as defined by Barwise and Cooper (1981, 169). The definition of *all* given by Westerståhl (1984, 152) is a case in point.¹⁸ Recent work broadly in this spirit includes (Ivlieva, 2020) and (Minor, 2022).

$$(19) \quad \| \textit{all} \mu \| = \{ X \subseteq E : \| \mu \| \subseteq X \}$$

But *all* differs from *every*. For one thing, it can combine with definite plurals – see (5) – which do not denote sets but sum individuals.

¹⁵Source: <https://mini-ielts.com/1228/view-solution/reading/stadium-australia>

¹⁶Source: <https://www.cvhomemag.com/new-beginnings/>

¹⁷Source: <https://gymnasiummellendorf.de/wp-content/uploads/Löwenblatt-Ausgabe-9.pdf>

¹⁸As a matter of fact, Gentzen (1935, 178) chose \forall as a symbol for universal quantification because the German word *alle* starts with A (“ \forall “für alle” ... als All-Zeichen”).

Ivlieva (2020, 442) resolves this by quantifying universally over parts of sums:¹⁹

$$(20) \quad \llbracket all \rrbracket = \lambda x \lambda P_{(et)} P(x) \wedge \forall y (y \leq x \wedge \text{ATOM}(y))(P(y))$$

But secondly, *all* can combine with definite mass nouns, and then according to (20), the sentence is trivially true because such sums have no atomic parts:

$$(21) \quad \text{All the steel is galvanised, which results in excellent rust protection} \dots^{20}$$

This could be repaired by removing the conjunct $\text{ATOM}(y)$ from (20):

$$(22) \quad \llbracket all \rrbracket = \lambda x \lambda P_{(et)} \forall y (y \leq x)(P(y))$$

However, another challenge becomes visible in the light of sentences like (23).²¹

$$(23) \quad \dots \text{all the water either infiltrates into the soil or runs off} \dots^{22}$$

The truth conditions in (22) are too strict for the intended reading of (23), where some of the water infiltrates into the soil and the rest runs off; according to (22), the sentence is false in such a scenario. The reason is that the predicate *infiltrate into the soil or run off* is not homogeneous: it is divisive, but cumulative it isn't.

One way to make (22) fit both non-cumulative and cumulative predicates is to not use P as is in the definiens but to substitute for it the set of sums that can be formed from members of it, its algebraic closure $*P$ introduced by Link (1983):

$$(24) \quad \llbracket all \rrbracket = \lambda x \lambda P_{(et)} \forall y (y \leq x)(*P(y))$$

This move means that the water no longer needs to infiltrate into the soil *in toto* or run off *in toto* – it is sufficient if it can be divided into parts that do.

Now a silent distributivity operator like $*$ is required in any case when definites combine with disjunctions, as noted by de Vries (2017, 180f.).

$$(25) \quad \text{During rainfall, the water either infiltrates into the soil} \dots \text{or runs off} \dots^{23}$$

But then, (23) and (25) mean the same, and one must ask what *all* does at all!

¹⁹(20) abstracts away from the event argument. Actually, Ivlieva does not define *all* in isolation but *all the boys*, but the way she would define *all* can be interpolated from that definition.

²⁰Source: <https://hipages.com.au/connect/leebrofencing>

²¹That such cases are potentially problematic was observed by Roeper (1983, 254).

²²Source: https://link.springer.com/referenceworkentry/10.1007/1-4020-4497-6_130

²³Source: <https://www.frontiersin.org/articles/10.3389/fsufs.2022.806920/full>

This issue persists in the theory of Lønning (1987). That all the water infiltrates means: the sum object denoted by *water* is a part of that denoted by *infiltrates*. This line of analysis is broadly adopted by Higginbotham (1994).

$$(26) \quad \| \textit{all } \mu \| = \{x \in E : \|\mu\| \sqsubseteq x\}$$

Both (23) and (25) are predicted to be true just in case

$$(27) \quad \| \textit{the water} \| \sqsubseteq \| \textit{infiltrates into the soil} \| \oplus \| \textit{runs off} \|$$

Korat (2016) has proposed an analysis of Hebrew כֻּל ‘all’ that resembles (26):²⁴

$$(28) \quad \llbracket \textit{kol} \rrbracket = \lambda x \lambda P_{(et)} \downarrow x \sqsubseteq \oplus P$$

It is to account not just for the mass case but also for the plural case and even for the singular count case (the English *whole* case).

But it is difficult to see how to bring out a difference between, say, (23) and (25). Besides, all universality theories run into trouble with collective predications – more on this below – because they are inherently distributive:

$$(29) \quad \text{All the children lifted the rock. (Cited by Fodor 1982)}$$

3.2 Stratified reference

In the theory of Champollion (2017), *all* is an “almost distributive” determiner – it ensures a measure of distributivity by introducing the presupposition that the predicate under consideration has ‘stratified reference’ (Champollion, 2017, 94).

$$(30) \quad P \text{ has stratified reference if and only if any } x \text{ in } P \text{ can be divided into one or more small parts that are in } P.$$

The vagueness and relativity of the term “small parts” is intentional, as the size of the parts will depend on a contextually determined *granularity parameter*, *g*.

Champollion (2017, 250ff.) assumes that *all* introduces stratified reference as a presupposition, making sure the predicate distributes down to small sums.²⁵

²⁴The ‘downsum’ function \downarrow is adapted from Landman (2011): it maps x to the sum of its parts; if x is non-atomic, it does nothing, if x is atomic (a pure atom or a group, an ‘impure atom’), it is the mass or plural individual that corresponds to it.

²⁵(31) and (32) are simplified versions of Champollion’s event-based definitions.

(31) $\llbracket all \rrbracket = \lambda x \lambda P : \text{any } x \text{ in } P \text{ is the sum of } g \text{ size parts of } x \text{ in } P . P(x)$

When the presupposition is not satisfied by an inherently distributive predicate, stratified reference can be provided through a covert operator whose output is true of something iff the input is true of suitably sized parts of it:

(32) $\llbracket D \rrbracket = \lambda P . * \lambda x P(x) \wedge x \text{ is } g \text{ size}$

The reason P is not required to be divisible down to atoms in the plural case, or infinitely in the mass case, is that cases like (33) are also to be accounted for.

(33) ... he had once met Jelke in an elevator. “All the women surrounded him, as if he were a cross between St. Francis of Assisi and Truman Capote,”²⁶

Following Kuhn (2020), Champollion distinguishes between predicates that are “a bit distributive”, like *surround* x , and such that are not even a bit distributive, like *be numerous*; these are generally held to be incompatible with *all*.

But the problem is that even quantized predicates do seem compatible with *all*, for many users of English or, *mutatis mutandis*, of other languages.²⁷

(34) Alle Steine wiegen in etwa soviel wie rund 3,5 Millionen iPads.²⁸
all stones weigh in some somuch as around 3,5 million iPads
'All the slabs weigh about the same as 3,5 m iPads.'

(35) Das ganze Metall hat ein Gewicht von 9 Kg.²⁹
the whole metal has a weight of 9 kg
'All the metal has a weight of 9 kg.'

So, that *all* has a meaning of its own is good – but *this* meaning means trouble.

3.3 Maximality theories

Maximality theories are designed to bring out a difference between the presence and absence of *all* – the core fact is that on their own, definite plurals permit a non-maximal interpretation, with exceptions, while *all* adds maximality.

²⁶Source: <https://www.nydailynews.com/sex-sinful-girl-article-1.719959>

²⁷ P is quantized iff whenever P holds of something, it does not hold of any of its proper parts.

²⁸Source: <https://www.bayern.de/soeder-steinbibliothek-feiert-150-geburtstag-heute-ersetzt-bayernatlas-1-700-tonnen-steine/>

²⁹Source: <https://www.gitarrebassbau.de/viewtopic.php?t=9513>

- (36) a. ..., naturally, when class lets out, the girls are crying.
Not all 12 of them, but a good half.³⁰
- b. #..., naturally, when class lets out, all the girls are crying.
Not all 12 of them, but a good half.

The loci classici are Lasersohn (1999) and Brisson (2003).

3.3.1 Brisson (2003)

Brisson starts from the notion of distribution restricted by a contextual cover.³¹ (37) is a version of the distribution operator defined by Schwarzschild (1996):

$$(37) \quad \llbracket \text{Part}_C \rrbracket = \lambda P \lambda x \forall y [C(y) \wedge y \sqsubseteq x \rightarrow P(y)]$$

A definite plural term may now have a non-maximal interpretation because the cover C may fail to contain each and every atomic part of its denotation or even, for each and every atomic part, any nonatomic bigger part. In the example (36), the context might determine a cover such that, say, four of the girls are neither members of it nor parts of parts of the girls that are members of it.

But *all* keeps this from happening by requiring C to be a ‘good fit’ wrt. x .

$$(38) \quad C \text{ is a good fit wrt. } x \text{ iff } \forall y : y \sqsubseteq x \rightarrow \exists z : C(z) \wedge y \sqsubseteq z \wedge z \sqsubseteq x$$

This contribution of *all* “is not a component of truth-conditional meaning, but something more like presupposition” (Brisson 2003, 142).

3.3.2 Križ and Spector (2021)

Križ and Spector (2021) develop a theory where sentences with plural definites have a range of possible interpretations, not just the maximal one but beside it also weaker, non-maximal ones, and where a special contextual parameter, \mathcal{H} , selects the one that is strongly relevant to the current issue.

- (39) The movers are going to lift the piano onto a dolly.

This sentence might have the following set of candidate interpretations:

³⁰Source: <https://www.nytimes.com/2002/02/24/magazine/girls-just-want-to-be-mean.html>

³¹A set C is a cover of the domain of discourse D if everything in D is a part of something in C and the sum over C is the same as that over D .

- (40) { 1 ⊕ 2 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly ,
 1 ⊕ 2 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly or
 1 ⊕ 2 ⊕ 3 are going to lift the piano onto a dolly or
 1 ⊕ 2 ⊕ 4 are going to lift the piano onto a dolly or
 1 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly or
 2 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly ,
 1 ⊕ 2 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly or
 1 ⊕ 2 ⊕ 3 are going to lift the piano onto a dolly or
 1 ⊕ 2 ⊕ 4 are going to lift the piano onto a dolly or
 1 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly or
 2 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly or
 1 ⊕ 2 are going to lift the piano onto a dolly or
 1 ⊕ 3 are going to lift the piano onto a dolly or
 1 ⊕ 4 are going to lift the piano onto a dolly or
 2 ⊕ 3 are going to lift the piano onto a dolly or
 2 ⊕ 4 are going to lift the piano onto a dolly or
 3 ⊕ 4 are going to lift the piano onto a dolly }

Let us now say that all we are interested in is how the piano will be transported, and we know that it takes three persons to lift it onto a dolly – then the second interpretation is strongly relevant and will be selected by \mathcal{H} :

- (41) $\llbracket (39) \rrbracket^{\mathcal{H}} = 1 \oplus 2 \oplus 3 \oplus 4$ are going to lift the piano onto a dolly or
 1 ⊕ 2 ⊕ 3 are going to lift the piano onto a dolly or
 1 ⊕ 2 ⊕ 4 are going to lift the piano onto a dolly or
 1 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly or
 2 ⊕ 3 ⊕ 4 are going to lift the piano onto a dolly

That's a non-maximal interpretation, in contrast to the interpretation of (42):

- (42) All the movers are going to lift the piano onto a dolly.

Križ and Spector (2021, 1166) define the meaning of adnominal *all* as a function (from sum objects and properties) that quantifies universally over \mathcal{H} functions, which select candidates from denotation sets derived from their arguments.

- (43) $\llbracket all \rrbracket^{\mathcal{H}} = \lambda x \lambda P \mathcal{H}'(x)(P)$ for any \mathcal{H}'

The upshot is that (42) means the conjunction of all the three members of (40), a conjunction that reduces to just the first member, the maximal interpretation.

3.3.3 Križ (2016) and Dobrovie-Sorin and Giurgea (2021)

According to Križ (2016, 493), *all* removes the ‘homogeneity property’ of plural predicates “as a matter of its semantics”.

- (44) P is homogeneous iff $P(x)$ is undefined whenever $P(x)$ is not true but $P(y)$ is true for a y that overlaps with x

This notion of homogeneity is to account for so-called homogeneity effects and also for non-maximality when *all* is absent.

Homogeneity effects are when we predicate something of a sum and it is not true unless the predication holds of *every* part, but the negation seems not to be true unless the predication holds of *no* part. The rest is, says Križ (2016), not defined.

- (45) ... more and more film footage, where the soldiers were not smiling, at least not so much, ...³²

Non-maximal interpretations are accounted for by saying that while not true, a predication that is not false still counts as true if it answers the current issue.

Now Križ (2016) does not spell out how *all* removes those truth value gaps. It can hardly be through universality, for collective readings are part of it.

Dobrovie-Sorin and Giurgea (2021) assume that *all* is ambiguous. One analysis explicates Križ’s (2016) idea that *all* removes the homogeneity property (188):

$$(46) \quad \llbracket all_1 \rrbracket = \lambda x \lambda P \begin{cases} 1 & \text{iff } P \text{ is homogeneous and } P(x) = 1 \\ 0 & \text{iff } P \text{ is homogeneous and } P(x) \neq 1 \end{cases}$$

But this is problematic because it effectively plugs in any (other) presupposition that may come from P . In fact, Križ (2016, 510) stresses that homogeneity is not a bona fide presupposition and that homogeneity violation undefinedness is not the same as (other) presupposition violation undefinedness.

(47) gives the alternative analysis, meant to cover collective, non-homogeneous predication (Dobrovie-Sorin and Giurgea, 2021, 193):

$$(47) \quad \llbracket all_2 \rrbracket = \lambda x \lambda P \exists y y \sqsubseteq x \wedge \mu(y) = \mu(x) \wedge P(y)$$

μ is the general measure function that can measure cardinality or, say, volume.

³²Source: <https://stevenewmanwriter.medium.com/1917-a-film-by-sam-mendes-a2a142a95710>

It is not thought to be necessary in connection with *all* (see, e.g., Korat 2016, 49), where the relation between the two measures is identity. So (47) reduces to (48).

$$(48) \quad \llbracket all_2 \rrbracket = \lambda x \lambda P \exists y y \sqsubseteq x \wedge y = x \wedge P(y) = \lambda x \lambda P P(x)$$

And then we are back to *all* meaning nothing at all – it seems.

3.4 Summary

The theories that have so far been reviewed differ as to whether they

1. predict that *all* makes a **difference** for distributive predicates,
2. can handle **collective** predication,
3. are theoretically **reasonable**.

A theory can be unreasonable because it is monstrous in the sense that it makes *all* shift a contextual parameter (as does the theory of Križ and Spector 2021), or because the meaning it ascribes to *all* has an unclear status or is not coherently defined (as with Brisson 2003, Križ 2016, or Dobrovie-Sorin and Giurgea 2021).

	difference	collective	reasonable
Universality	no	no	yes
Stratification	no	no	yes
Maximality	yes	yes	no

Fig. 2: Pros and cons of Universality, Stratification, Maximality

We must keep looking for a theory with “yes”, “yes” and “yes”.

4 All there is

So – theories struggle to bring out a difference between *all* and not *all* without obstructing collective readings or imposing undue burdens on the surrounding semantic theory. Could there be a way to bend to the pressure without breaking?

4.1 Pragmatic halos and alternatives

There might be, taking a cue from Kennedy and McNally (2005, 356f.) and their treatment of adjectives like *full*, which can have non-maximal interpretations, in terms of Lasersohn's (1999) 'pragmatic halos'.

(49) The channel is full but not quite up to the rim...³³

(50) ...with dark colors to express that the townspeople are asleep...³⁴

Just as (50) is, according to Lasersohn (1999), false in case some townspeople are awake but true enough as long as they do not matter for current purposes, (49) is, according to Kennedy and McNally (2005), contradictory but contingent once the pragmatic halo is taken into account, the ignorable deviation, the slack.

The challenge is to account for the maximal interpretations that sentences with *quite full* or *all the townspeople* can only have. It seems natural to say here that words like *quite* and *all* activate and contrast with alternatives like *half*.

But to make this more precise, we need a semantics for words like *half*.

(51) Half the employees had left for the West.

A reasonable definition of the meaning of *half* to fit this case is (52).

(52) $\llbracket \textit{half}_1 \rrbracket = \lambda x \lambda P \mu (\oplus (\Pi x \cap P)) = \frac{1}{2} \mu (x)$

In words: the sum of the intersection between the set of parts of the employees and those having left for the West amounts to half of the employees.

But this only works for distributive interpretations. For collective cases like (53), it is an ill fit, and we need a 'cardinal' analysis like (54), patterned on (48):

(53) Half the class performed one play about the Constitution for the other half, then we switched...³⁵

(54) $\llbracket \textit{half}_2 \rrbracket = \lambda x \lambda P \exists y y \sqsubseteq x \wedge \mu (y) = \frac{1}{2} \mu (x) \wedge P(y)$

In words: there is a part of *x* (the class) as a sum that amounts to half of *x* and belongs to *P* (the sums that performed a play about the Constitution).

³³Source: <https://www.usgs.gov/index.php/media/images/overflight-kilauea-volcanos-lower-east-rift-zone-assesses-changes-fi>

³⁴Source: <https://www.bartleby.com/essay/Starry-Night-Van-Gogh-PKAXDMT36ZKQ>

³⁵Source: <https://www.cindyderosier.com/2017/05/>

(52) is a *definite* analysis: the part of x that overlaps with P makes up half of x – while (54) is an *indefinite* one: a part of x makes up half of x and is a P .³⁶

There is evidence for this latter analysis in distributive cases too:

(55) 2016... Half the country made the wrong choice. The other half did, too.

How about *all* now? The idea is that it, like *ganz*, means the double of *half* –

(56) $\llbracket all_1 \rrbracket = \lambda x \lambda P \mu (\oplus (\Pi x \cap P)) = \frac{1}{1} \mu (x)$ ‘definite’

(57) $\llbracket all_2 \rrbracket = \lambda x \lambda P \exists y y \sqsubseteq x \wedge \mu (y) = \frac{1}{1} \mu (x) \wedge P(y)$ ‘indefinite’

and that, being uttered, it activates the alternative fractions – $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \dots$ – and so excludes the pragmatic halo by calling attention to them.

4.2 Standard deviations

A more semantic way to use an analogy to closed-scale adjectives like *full* is to follow McNally (2011) and Smith (to appear) to assume that (i) *full* has relative uses and (ii) we can define what it means to be so-and-so many percent full.

Note that the fraction $\mu (\oplus (\Pi x \cap P)) / \mu (x)$ in (52) or (56) can be understood as the ratio to which x is ‘full’ of P .

The idea is that

- words like *all* or *half* specify that ratio,
- when no such ‘measure’ word is there, an analog to a positive formative brings in non-maximality by relating the ratio to a contextual standard.

4.2.1 A possibly covert partitive genitive

For compositionality, let us assume a possibly covert partitive genitive:

(58) $\llbracket (of)_1 \rrbracket = \lambda x_e \lambda R_{n(nt)} \lambda P_{et} R (\mu (\oplus (\Pi x \cap P))) (\mu (x))$

This ‘proto-determiner’ takes an individual x , a relation R , and a set P to return 1 ‘true’ iff R holds between the relevant measure μ of the sum of the intersection between the set of parts of x Πx and P and the relevant measure of x .

³⁶This distinction between definite and indefinite determiners corresponds roughly to that between quantificational and individual (or group) denoting NPs drawn by Roberts (1987, 190ff.), or between proportional and cardinality quantifiers drawn by Kamp and Reyle (1993, 452ff.).

4.2.3 Another possibly covert partitive genitive

(58) defines the proportional case; we also need the cardinal case:

$$(63) \quad \llbracket (of)_2 \rrbracket = \lambda x_e \lambda R_{n(nt)} \lambda P_{et} \exists y y \sqsubseteq x \wedge P(y) \wedge R(\mu(y))(\mu(x))$$

(58) is inherently weakly distributive – it’s about how many or much of x can be divided into members of P – but (63) fits collective cases too, like (64) or (65).

(64) All the screws weigh a little over 9 lbs.³⁹

(65) All the wood cost me about 70 bucks plus nails.⁴⁰

The bare definite plural cases will have equivalent readings, based on $P(x)$.^{41 42} But how about ‘team credit’ cases like (66)?

(66) ... the robbers had brought a bag for collecting cash and valuables, ...⁴³

For Križ (2016) and for Križ and Spector (2021), they are non-maximality cases, but for Koss (2002, 69ff.), ‘representative predication’ is a distinct phenomenon. They can be derived in any case, based on (63) and (59) or simply on $P(x)$.

4.2.4 Non-maximality and homogeneity

Homogeneity – that (67) seems to mean that practically no geese are honking, or (45) that the soldiers are generally unsmiling – does not follow here.

(67) The geese in the V are not honking.

For Križ (2016), homogeneity and non-maximality are two sides to the same coin, but Sbardolini (2023, 410) argues that the two phenomena pattern differently.

In fact, when the atom or mass parts of the sum are presupposed to behave alike, this presupposition often comes from the QUD – an alternative question like (68) or (69) – so that plural predication is not its probable source.

³⁹Source: <https://vatican.com/2/Screws-Pyuoian-Head>

⁴⁰Source: <https://www.truckmountforums.com/threads/bosshoggs-box-truck-setup.40017/>

⁴¹In fact, *all* seems to only have a contrastive meaning here, clarifying that one is not referring to, say, a previously mentioned sub-kind.

⁴²The non-maximal readings that they can in principle have too, based on (59), will be ruled out in practice because the differences cannot be ignorable.

⁴³Source: <https://www.thenews.com.pk/print/222584-Authorities-lose-face-as-robbers-run-riot>

- (68) Are the geese migrating, in which case almost all are honking, or just in casual flight, in which case almost none are?
- (69) What is the mood among the soldiers in the picture: one of pessimism, in which case most are not smiling, or optimism, in which case most are?

But a proper argument must await another occasion.

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