(Im)possible determiners*

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Abstract

Determiners have been classified into, at most, the following categories based on whether the noun is count or mass (e.g., Chierchia 1998a): singular count (e.g. *each*), plural count (e.g. *several*), unrestricted (e.g. *the*), non-singular (e.g. *all*) and mass (e.g. *much*). Two seemingly universal gaps follow from this classification: no determiner occurs exclusively (a) with singular and plural count, and (b) with singular count and mass nouns. Using English and Spanish data, I show that this classification and the subsequent gaps need revising: count-only determiners are attested, thus not a gap; and purported mass determiners are elsewhere non-plural forms; hence, there are no mass-only determiners. Building on the idea that count and mass nouns differ in their underlying syntax, I argue that the different natural classes of determiners follow from the probing features (e.g. *u*Fs) on Ds, which must be valued by Agree. The revised gaps are concomitants of (i) singular count and mass NPs not sharing any features and (ii) there not being a [MASS] feature.

1 Introduction

The distribution of determiners seems to be conditioned by the grammatical properties of the nouns they occur with. For example, as shown in (1), *the* can occur with any type of noun, *this* can only occur with non-plural marked nouns and *these* can only occur with plural-marked ones.

(1) a. the mud/jewel(-s) b. this mud/jewel(*-s) c. these jewel*(-s)/*mud

Determiners may not only be conditioned by the number-marking properties on the noun, but also by whether the noun is count or not count, i.e., mass. This is shown in (2): both *mud* and *jewel* are non-plural, and yet *every* is only grammatical with *jewel*. The difference between *mud* and *jewel* is generally attributed to the fact that the former is mass and the latter is singular count (e.g. Chierchia 1998a, 2010, Borer 2005a).

(2) every jewel/*mud/*jewels

Chierchia (1998a) observes that the distribution of determiners tracks the count/mass distinction, and proposes that determiners may form at most four different natural classes depending on the type of the noun they select: (a) singular count (e.g., *every*), (b) plural count (e.g., *several*), (c) mass and plural count (e.g., *more*), (d) any type of noun (e.g., *the*) and (e) mass (e.g., *much/little*). With respect to (e), Chierchia speculates that mass determiners are a very small and restricted class in natural language.

From Chierchia's generalizations, and proposed semantic analysis, one can conclude that certain determiner classes are to never be expected in the world's languages. I refer to these gaps as Chierchia's Gaps, formulated in (3).

(3) *Chierchia's Gaps*

a. There is no determiner that exclusively selects singular and plural count nouns to the exclusion of mass ones.

b. There is no determiner that exclusively selects for singular-count and mass nouns to the exclusion of plural-count nouns.

The goal of this paper is twofold. First, at an empirical level, I show that while (3b) is an actual gap, (3a) is in fact not: there are determiners that occur with singular and plural count nouns, but not mass (e.g., *which*). I will also contribute by showing that what has been labeled as a purported mass determiner is not accurate: *much/little* are the elsewhere forms of Quantity Determiners (e.g., *much, little, many, few, more* etc.) that surface when plural is not available in the

morphosyntactic representation. Thus, Chierchia's (1998a) conclusion about the limited distribution of mass determiners is best formulated as universal gap: there is no mass-only determiner.

Second, at a theoretical level, I argue that the determiner facts are best explained by a syntactic approach: the determiner is sensitive to the feature composition of the noun phrase. Building on the idea that count and mass nouns are featurally distinct (e.g., Toquero-Pérez 2026), I argue that the underlying terminal nodes (i.e., D) instantiated by determiners are classified into five natural classes based on the probing features that they bear. Under the assumption that these probing features must be valued by Agree (Chomsky 2000, 2001), the different natural classes of determiners follow from the features available in the extended projection of the noun. The gaps in the determiner systems will also follow from this: (i) singular count and mass nominals do not share any features and (ii) there is no mass-specific feature. Therefore, there is no probe that can exclusively enter a dependency with the classes of nouns in question. I conclude by showing how this account makes more desirable predictions than others, such as the semantic approaches by Chierchia (1998a) and Haslinger et al. (2025) and the syntactic approach by Cowper and Hall (2014).

2 The properties of nouns: count/mass and countable/non-countable.

2.1 count vs. mass

Before looking at the determiners, it is necessary that we set the baseline properties for the types of nouns that are relevant in regulating the choice of determiner. I take (i) the availability of marking contrasts between singular and plural number and (ii) the availability of numeral modification to be exclusive properties of count nouns (e.g., Pelletier 1975, Krifka 1989, Gillon 1992, 1999, 2012, Chierchia 1998a, 2010, Borer 2005a, Bale and Gillon 2020, Doetjes 2021).[1]

The examples in (4) illustrate each of these properties for the expression *jewel* in English, and the examples in (5)-(7) do so for the expressions *mud, fumes* and *jewelry*.[2]

(4) a. the jewel(-s)
b. one jewel / two jewel-s

(5) a. the mud(*-s)
b. * one mud / two mud(-s)

(6) a. the fume*(-s)
b. * one fume(-s) / two fume-s

(7) a. the jewelry(*-s) b. * one jewelry / two jewelry(-s)

There is a difference between expressions such as *jewel* and those such as *mud*, *fumes* or *jewelry*. Only the former mark a contrast between singular (e.g., unmarked) and plural (e.g., *-s*) and allow modification by cardinal numerals. Based on these contrasts, we can conclude that expressions like *jewel(s)* are count whereas expressions like *mud*, *fumes* and *jewelry* are mass.

It is worth noticing that while mass nouns like *mud* and *jewelry* resist number-marking, others like *fumes* must be marked plural. In fact, these nouns show plural agreement with determiners and the verb, as illustrated in (8). Because of this reason, I will refer to them as 'plural mass nouns' (e.g., McCawley 1979, Ojeda 2005, Acquaviva 2008).[3]

(8) a. these/*this fume-s

b. These fume-s were/*was produced by mixing chemicals

The same observations about count and mass nouns can be found in Spanish. Expressions like *mueble* 'furniture piece' exhibit singular/plural contrasts, and allow modification by cardinal numerals. This is shown in (9).

(9) a. el mueble / lo-s mueble-s
the.M furniture.CT the.M-PL furniture.CT-PL
'the furniture piece, the furniture pieces'

b. un mueble / dos mueble-s
one.M furniture.CT two furniture.CT-PL
'one furniture piece, two furniture pieces'

Other expressions such as *barro* 'mud', *mobiliario* 'furniture' and *víveres* 'provisions' do not show either, as illustrated in (10), (11) and (12) for each expression. In fact, expressions like *víveres* in (12) are analogous to *fumes* in English: they are mass but must be marked plural.

(10) a. el barro / *lo-s barro-s
the.M mud the.M-PL mud-PL

b. * un barro / dos barro(-s)
one.M mud two mud-PL

(11) a. el mobiliario / *lo-s mobiliario-s
the.M furniture the.M-PL furniture-PL

b. * un mobiliario / dos mobiliario(-s)
one.M furniture two furniture-PL

(12) a. lo-s vívere-s / *el vívere
the.M-PL provision-PL the.M provision

b. * un vívere(-s) / dos vívere-s
one.M provision-PL two provision-PL

2.2 Countable vs. non-countable

Relatedly, the count/mass distinction is tightly connected to the notion of countability, i.e., measurement in terms of cardinality. While being count entails being countable, e.g., via cardinal numerals in the case of singular count nouns, being mass does not entail being non-countable. As Bale and Barner (2009) observed, the interpretation of some mass nouns under comparatives may parallel plural count nouns.[4] This is shown in (13).

(13) Robin saw ...

a. more mud than Frank did. #cardinality, volume

b. more fumes than Frank did.[5] #cardinality, volume

c. more jewelry than Frank did. cardinality, #volume

d. more jewels than Frank did. cardinality, #volume

While mass nouns like *mud* or *fumes* in (13a-b) cannot be measured in terms of cardinality, mass nouns like *jewelry* in (13c) can. In this respect, they pattern like count nouns. Hence they are countable. Countable mass nouns are referred to in the literature as 'object mass'.

With respect to the countable/non-countable distinction, Spanish behaves like English. Count nouns and object mass nouns are countable, unmarked and plural mass nouns are non-countable. This is shown in (14).[6]

(14) a. El camión rojo lleva más barro que el azul. #cardinality, volume
the truck red carries more mud than the blue.
'The red truck carries more mud than the blue one does'

b. El camión rojo lleva más vívere-s que el azul. #cardinality, volume
the truck red carries more provision-PL than the blue.
'The red truck carries more provisions than the blue one does'

c. El camión rojo lleva más mueble-s que el azul. cardinality, #volume
the truck red carries more furniture.CT-PL than the blue.
'The red truck carries more furniture pieces than the blue one does'

d. El camión rojo lleva más mobiliario que el azul. cardinality, #volume
the truck red carries more furniture than the blue.
'The red truck carries more furniture than the blue one does'

The picture that emerges is summarized in Table 1. I will refer to mass nouns that are neither plural-marked nor object mass as 'unmarked mass' (e.g., *mud, blood*).

Table 1: The count/mass and countable/non-countable distinction

	Countable	Non-countable
Count	singular and plural (*jewel(s)*)	*
Mass	object (*jewelry*)	unmarked and plural (*mud*, *fumes*)

Two important observations can be drawn from this table. First, plural-marking on the noun need not entail count properties.[7] This is supported by the subclass of plural mass nouns like *fumes* or *víveres*. Second, countability does not always correlate with plural-marking; in fact, object nouns such as *jewelry* or *mobiliario* resist number-marking and yet they are countable. These observations are at odds with theories of the count/mass distinction that rely on the idea that the property of being plural-marked is the the key to understanding count and countable expressions (e.g., Chierchia 1998a, 2010, Borer 2005a). Instead, a better characterization is as follows: plural count nouns are just a subset of the set of nouns that are plural, and count nouns are a subset of the set nouns that are countable. This is schematized in (15).

(15) a. {Plural NP} = {{plural count NP}, {plural mass NP}}

b. {Count NP} = {{singular count NP}, {plural count NP}}

c. {Countable NP} = {{Count NP}, {object mass NP}}

Assuming that number and countability are syntactically encoded via a feature or some abstract morpheme (e.g., Ritter 1991, Sauerland 2003, Cowper 2005, Harbour 2007, 2011 for number; e.g., Harley and Ritter 2002, Bale and Barner 2009, Deal 2016, 2017, Smith 2021, Toquero-Pérez 2026, for countability), the membership relation that holds between the subsets and their supersets in (15) must be determined by the features/morphemes that they share. Additionally, the subsets of a set must differ along some dimension. For example, if the set {Count NP} is determined by a morpheme Number[SG/PL] and a feature, e.g., [COUNTABLE], the difference between its members can be due to the value of Number: [SG] or [PL]. Because natural language expressions are sensitive to these abstract syntactic pieces, we expect these differences to be potentially reflected in the determiner system.

2.3 The analysis of count/mass and countable/non-countable nouns

I will be adopting the analysis of the count/mass and countable/non-countable distinction in Toquero-Pérez (2024, 2026). The main idea is that nouns differ along two dimensions, encoded as features: [IND(IVIDUATION)] on the categorizer and and [SG/PL] on Number. Count nouns are marked for both, whereas mass nouns lack Number. However, mass may still be marked for individuation (e.g., object mass), or plural (e.g., plural mass) as long as the source of plural marking is not Number.

Individuation, as a syntactic property, is not a novel idea, and has in fact been proposed to be encoded in various ways (e.g., Harley and Ritter 2002, Borer 2005a, Cowper and Hall 2009, 2012, Smith 2021). Building on insights from Bale and Barner (2009) and Deal (2017), Toquero-Pérez proposes that individuation is encoded via a feature [IND] on the categorizer that the root adjoins to. In this regard, [IND] is a classificatory feature that, when applied to a root, makes said root countable.[8] More formally, and assuming that atomicity is the basis for counting (Rothstein 2010, 2021), [IND] takes the predicate denoted by the root as its argument and makes it atomic: a predicate that is true of atoms and sums of those atoms, defined in (16), where '*' is Link's (1983) closure under sum operator.[9]

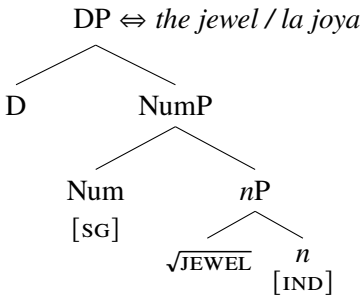
(16) a. A predicate P is Atomic if for all $x \in P, x \in {}^{*}\mathsf{atom}$

b. If $\mathsf{atom}(x) = \{x\text{: } x \text{ is an atom}\} = \{a, b, c\}$, then ${}^{*}\mathsf{atom}(x) =$

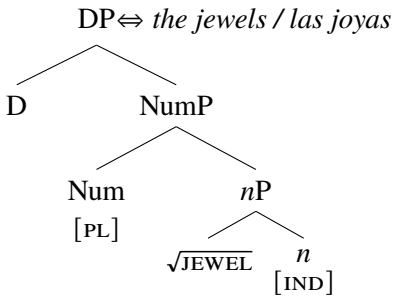
$\{x\text{: } x \text{ is an atom or sum of atoms}\} = \{a, b, c, ab, ac, bc, abc\}$

In addition to this feature, making the countability distinction, the proposal assumes that there are two number feaures, i.e., [SG] and [PL], which in the case of count nouns are located in a Number head (e.g., Ritter 1991, Alexiadou 2004, Cowper 2005, Harbour 2007, 2011 among others). The syntax of count nouns is therefore represented in (17).

(17) a. Singular count DP



b. Plural count DPs



The presence of the Number head, with these two features, is responsible for the availability of singular/plural contrasts as well as for enabling numeral modification. On the latter see, for example, Ritter (1991), Scontras (2013, 2022), Martí (2020b), Pancheva (2022, 2023) and Toquero-Pérez (2023, 2025).[10] In terms of the semantics, [SG] maps a predicate P, i.e., the nP it takes as argument, to a property of minimal parts. That is, applied to a predicate that is Atomic in the sense of (16), [SG] returns a predicate that is true of just the atoms: the objects in (16b) that have no proper parts. [PL] maps P to a property of pluralities X every non-minmal part of which satisfies P. If P is Atomic, then the minimal parts will be the atoms and the non-minimal parts will be the sums of said atoms. The denotations are illustrated below for *jewel(s)*.[11]

(18) a. $[\![[\text{SG}]]\!] = \lambda P.\lambda x.P(x) \wedge \mathsf{minimal}(x)$

b. $[\![[\text{PL}]]\!] = \lambda P.\lambda X.\forall x(X(x) \rightarrow P(x) \wedge \neg\mathsf{minimal}(x))$

c. An object x is a minimal part for a set of objects P if for all $x \in P$, there is no y such that $y \in P$ and $y \prec x$.

(19) a. $[\![I\ saw\ a\ jewel]\!] = \exists x\colon [\text{jewel}(x) \wedge x \in {}^{*}\text{atom} \wedge \text{minimal}(x)][\text{saw}(I,x)] \quad (x = \{a,b,c\})$

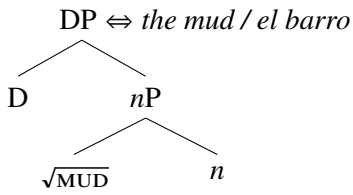
b. $[\![I\ saw\ jewels]\!] = \exists X\colon [\forall x(X(x) \rightarrow \text{jewel}(x) \wedge x \in {}^{*}\text{atom} \wedge \neg\text{minimal}(x))][\text{saw}(I,X)]$
$(X = \{ab, ac, bc, abc\})$

If the categorizer does not bear [IND], the root will not be marked for individuation and the expression will lack the basis for counting, i.e., the atoms. Hence, it will be non-countable. In terms of the semantics, the unmarked nominalized predicate will be Anti-Atomic in the sense of (20) (Bunt 1979, Gillon 1992, Wellwood 2019): while anything that satisfies P will have at least one proper part that also satisfies P, there are no atomic parts in the extension of P.

(20) A predicate P is Anti-Atomic if for all $x \in P$ such that $x \notin \text{atom}$, there is a $y \in P$ such that $y \notin \text{atom}$, and $y \prec x$.

This is the case of non-countable mass nouns such as unmarked and plural mass. But given that not all mass nouns are non-countable, unmarkedness for [IND] cannot be the defining feature for this natural class. Instead and in line with insights from Borer (2005a), Harbour (2007) and Mathieu and Dali (2021), the reason why all mass nouns form a natural class is because of the absence of the Number projection . Given what was said above about the role of NumP, the unavailability of singular/plural contrasts and numeral modification follow from the absence of NumP. The structure of unmarked mass nouns like *the mud* or *el barro* is in (21).

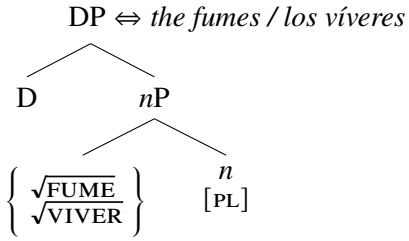
(21) Unmarked mass DP



Number may not be the sole location of [PL]. Lexical plurals, including plural mass nouns, have been argued to encode [PL] lower in the structure (Alexiadou 2004, 2011, Wiltschko 2008,

Acquaviva 2008, Kramer 2016, Kouneli 2019). Under this view, said location is the categorizing head, as shown in (22).

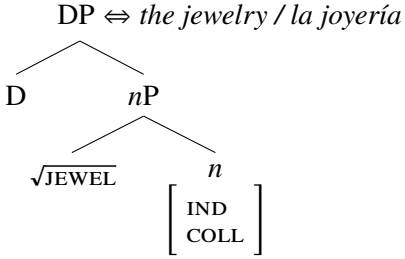
(22) Plural mass DP



The denotation of [PL] is not restricted Atomic(P), and the model makes it possible for $[\![[\text{PL}]]\!]$ to compose with an Anti-Atomic predicate. If, as a result of the root not being marked for n[IND], P is Anti-Atomic, i.e., closed under sum but not generated from the set of atoms, $[\![\textit{fumes}]\!]$ is true of pluralities of anti-atomic subparts.

Last but not least, given that object mass nouns are countable, they must be marked for n[IND]. In addition to [IND]-marking, and following De Belder (2013) and Alexiadou (2015), Toquero-Pérez (2026) proposes that these nouns are also marked for a feature called [COLL(ECTIVE)]: (23). This feature is then spelled out as *-ery, -age, -ware* etc. in English, and as *-ería, -mento, -aje* etc. in Spanish.[12] In terms of the semantics, [COLL] will map the individuated root predicate to a property of pluralities, as in (24).[13]

(23) Object mass DP



(24) $[\![\text{COLL}]\!] = \lambda P\colon \text{Atomic}(P).\lambda X.\forall x(X(x) \rightarrow \exists y, R(P(y) \wedge \text{minimal}(y) \wedge y \neq x \wedge R(x,y)))$
'For every x among the Xs, there is a minimal y in (Atomic) P which is different from x and stands in some relation R with x'

In addition to accounting for the properties of count and (different types of) mass nouns, this feature-based approach to the count/mass distinction has a series of welcome consequences.

In particular, by separating the roles of individuation and number, it is able to find an explanation for the natural classes represented by the sets in (15): the membership relation of (15a) is markedness for [PL] (i.e., natural class of plural nouns); the membership relation of (15b) is markedness for [IND] and Number (i.e., natural class of count nouns); and the membership relation of (15c) is markedness for [IND] (i.e, natural class of countable nouns). Moreover, it also accounts for the class of mass nouns: the membership relation is defined in terms of the absence of Number. The sets in (15), with the addition of a mass NP set, are formally represented in (25).

(25) a. A nominal expression $N \in$ {Plural NP}, iff [PL] $\in N$.
{Plural NP} = {{plural count NP}, {plural mass NP}}

b. A nominal expression $N \in$ {Count NP}, iff n[IND] & Number $\in N$
{Count NP} = {{singular count NP}, {plural count NP}}

c. A nominal expression $N \in$ {Countable NP}, iff n[IND] $\in N$
{Countable NP} = {{Count NP}, {object mass NP}}.

d. A nominal expression $N \in$ {Mass NP}, iff Number $\notin N$
{Mass NP} = {{unmarked mass NP}, {object mass NP} {plural mass NP}}.

It thus follows that being count entails being countable but being mass does not entail being non-countable. In addition, the motivation to separate the two features calls into question analyses for which number-marking, namely plural, entails individuation or atomicity, whether for semantic reasons, syntactic reasons or both. Importantly, these accounts make different predictions with respect to the classes of determiners that are available in natural languages. For example, if plural is bundled with individuation (e.g., Borer 2005a), determiners are not expected be sensitive to plural NPs in (25a), regardless of the count/mass distinction; and because there is no way to differentiate plural count nouns from object mass nouns, we expect determiners to be sensitive to these two nouns to the exclusion of singular count. There is, however, no way in which these nouns seem to form a natural class to the exclusion of singular count nouns, which may be problematic for said approaches.

Similarly, if plural depends on individuation, whether this is accomplished via a feature geometry (e.g., Harley and Ritter 2002, Cowper and Hall 2009, 2012) or a lexical semantic requirement (e.g., Chierchia 1998a, 2010), determiners are not expected to be sensitive to all plural NPs in (25a) either. And, while determiners that are sensitive to (i) just plural count and (ii) countable NPs are expected, no determiner is expected to occur with both singular count and plural count nouns to the exclusion of object mass nouns.

Having set the baseline for the count/mass and the countable/non-countable distinction, in what follows I address the distribution of determiners given the types of nouns identified. Among other generalizations, we will observe that determiners may in fact be sensitive (i) to the noun being count and (ii) to plural-marked nouns as opposed to non-plural-marked ones. Besides, there does not seem to be any determiner that is sensitive to just plural count and object mass. All these three observations are at odds with the expectations outlined above. In addition, there is no evidence for a mass-only determiner. If determiners track the features in the extended projection of the noun, lack of mass determiners is expected under the set-theoretic definition of the class in (25c): they are best defined as the absence of a feature, i.e., Number. First, I will focus on English and then on Spanish.

3 Classes of determiners based on the count/mass distinction

3.1 The case of English

3.1.1 Sensitivity to count NPs (singular, plural or both)

Determiners may fall into different categories depending on (i) whether the noun is count or mass and (ii), if the former, whether it is singular or plural-marked (e.g., Chierchia 1998a, Borer 2005a, Cowper and Hall 2014). For instance, some determiners such as *a, every* and *each* are only compatible with singular count nouns: (26).

(26) Exclusively singular count determiners: {*A, Every, Each*}

a. a/every/each jewel
b. * a/every/each jewel-s
c. * a/every/each mud
d. * a/every/each jewelry
e. * a/every/each fume-s

Other determiners such as *several/both* are only compatible with plural-marked count nouns: (27). Mass nouns, including plural-marked ones in (27e), are ungrammatical with these determiners. This is evidence that *several/both* is tracking not just plural-marking.

(27) Exclusively Plural Count determiners: {*Several/Both*}

a. * several/both jewel
b. several/both jewel-s
c. * several/both mud
d. * several/both jewelry
e. * several/both fume-s

A third category of determiners includes those that occur with count nouns, both singular and plural-marked, but do not occur with mass nouns. In English, this group is limited to *wh*-determiner *which*, as illustrated in (28).[14]

(28) a. Which jewel(-s) are you talking about? (count)
b. * Which mud/fume-s/jewelry are you talking about? (mass)

Importantly, the fact that *which* is grammatical with count nouns in (28a) but ungrammatical with object mass nouns such as *jewelry* in (28b) is evidence that these determiners are not just tracking individuation-marking on the noun.[15] Rather, they are tracking individuation and Number-marking. In this regard, *which* differs from *wh*-determiner *what*. As illustrated in (29), *what* is grammatical with all types of count and all types of mass nouns.

(29) What jewel(-s)/mud/fume-s/jewelry are you talking about?

The observed contrasts between *which* and *what* cannot be reduced to the presence or absence of overt agreement on the determiner since the surface form of the determiner remains invariant in both cases. Therefore, *what* is unrestricted to the count/mass distinction.

3.1.2 Unrestricted to count/mass, but potentially sensitive to plural

In addition to these categories, example (29) is indicative of a fourth one: determiners that are unrestricted, i.e. compatible with both mass and count nouns. We should distinguish two types of said determiners based on their surface forms: determiners that are non-plural and those that are plural-marked.

Non-plural determiners come into two guises. The first one is invariant non-plural determiners: the determiner has the same surface form across the count/mass paradigm regardless of number marking on the noun. This includes interrogative *what*, the definite article *the* and indefinites *no, some* and *any*: (30).

(30) Unrestricted determiners: non-plural invariant, e.g. {*The, Some, No, Any*}

a. the/some jewel(-s)
b. the/some mud
c. the/some jewelry
d. the/some fume-s

The second type of non-plural determiner has a corresponding plural-marked allomorph. These are the demonstratives in (31).

(31) Unrestricted determiners: non-plural and plural-marked allomorphs, e.g. {*This/These*}

a. this/*these jewel
b. these/*this jewel-s
c. this/*these mud
d. this/*these jewelry
e. these/*this fume-s

As illustrated in (31), the plural-marked forms are not restricted to plural count nouns and the non-plural forms are not limited to singular count nouns either. In other words, the former are compatible with nouns that share [PL], whereas the latter seem to be the elsewhere case: *these/those*+N-PL, *this/that* elsewhere.

3.1.3 Everything but singular

The last attested category includes those determiners that are only compatible with plural count nouns and (all) mass nouns, to the exclusion of singular count nouns. This category includes the universal *all* and the class of Quantity Determiners (QDs) in their positive (e.g., *much/many/little/few*), comparative (e.g., *more/less/fewer*) and superlative forms (e.g., *most/least/fewest*). Examples are in (32), excluding the positive forms of QDs for the moment.

(32) Non-Singular determiners: {*all*, QDs}

a. * all/more/most jewel
b. all/more/most jewel-s
c. all/more/most mud
d. all/more/most jewelry
e. all/more/most fume-s

As illustrated in (32a), none of the mentioned determiners is acceptable with singular count nouns. However, when the noun is count and plural-marked, as in (32b), or any type of mass, as in (32c)-(32e), said determiners are acceptable.

3.1.4 What about much/many?

While the distribution of *more* and *most* is not controversial with respect to the count/mass distinction, the same cannot be said about their positive forms *much* and *many*. There are two main approaches. The lexical ambiguity approach, since Bresnan (1973), argues that *much* is an exclusive mass determiner and *many* is an exclusive plural count determiner, like *several* or *both*. The idea is that *much* and *many* lexicalize two distinct underlying morphemes (e.g., MUCH and MANY), each with their own selectional properties: MUCH selects for mass nouns, whereas MANY selects for plural count nouns and is associated with cardinality (Chierchia 1998a, Borer 2005a, Solt 2009, 2015). On the other hand, the allomorphy approach, motivated in the work of e.g., Bobaljik (2012), Dunbar and Wellwood (2016), Wellwood (2019), Smith (2021) and Cleani and Toquero-Pérez (2022), considers that *much* and *many*, as well as their negative counterparts,

are allomorphs of the same underlying morpheme: *many/few* surfaces in plural contexts, and *much/little* surfaces as the elsewhere form. Hence, under this approach, *much* and *many* are both instances of non-singular determiners, just like *more* or *all*.

Here, I go over some of the predictions of each approach, ultimately adjudicating in favor of the allomorphy approach. Overall, the facts discussed here question (i) the exclusive mass nature of *much/little*, (ii) the exclusive plural count nature of *many/few* and (iii) their separation from other non-singular determiners.

The two accounts make different predictions regarding plural mass nouns. In particular, if *many* is a plural count determiner it will never occur with these nouns, but *much* will. On the contrary, if *many* is a non-singular determiner that is sensitive to plural, it will occur with these nouns. When testing these predictions, we observe that there is variation: while it is true that some speakers seem to only accept *much* with plural mass nouns, as reported by Solt (2009), there are also many speakers who only accept *many*, e.g., Smith (2021, ch.8).[16] My own elicitations with native English speakers confirm this variation: some speakers only accept *much* and some only accept *many*, as illustrated in (33). Although variation does not seem to correlate with geographical variety, there is a slight tendency for millennials (born after 1984) and younger to prefer *many*.

(33) %Much/%Many fume-s were inhaled by the miners.

Importantly, this variation with plural mass nouns only affects the surface form of the QD. It does not affect the interpretation, which remains non-countable. That is, speakers who accept *many fumes* and those who accept *much fumes* both understand the expressions to mean 'the volume of fumes is larger than some degree'.

This variation with plural mass nouns seems to be syntactically conditioned, however. The sentences in (34) show the distribution of *much/many* in ellipsis contexts. When a noun is a hanging topic, and the associated noun in argument position is elided under identity stranding the QD, *many* is acceptable if the hanging topic is plural count, and *much* if it is unmarked or object mass.

(34) a. As for jewels, Greg didn't buy many/*much (during his trip to the mall).

b. As for blood, Greg didn't loose much/*many (on his way to the hospital).

c. As for jewelry, Greg didn't buy much/*many (during his trip to the mall).

When the noun in the hanging topic position and elided associate in argument position is a plural mass noun, *many*, and not *much*, is acceptable. This is true even for those speakers who only accepted *much* in (33). This is illustrated in (35), where, again, the interpretation is a non-countable one.

(35) As for fumes, our plants didn't produce many/*much (during the performed inspection).

The situation, therefore, aligns with the data for plural count nouns in (34a). The data further suggest that the choice of *much* over *many* for the speakers may be mediated by a local or adjacent relation between the QD and the low plural in mass nouns. This locality or adjacency is disrupted by ellipsis: [QD ~~[$n_{[PL]}$ $\sqrt{ROOT}$]~~].

This idea seems to receive additional support from comparatives with a differential argument. Comparatives with differentials in English generally allow two frames, depending on what NP is spelled out (e.g., Bhatt and Homer 2019, Homer and Bhatt 2020): *two books more* or *two more books*. But, when the measure word in the differential is a QD, instead of a numeral, only the frame in (36) is possible: the NP in the differential argument position must deleted.

(36) [[*much/many* ~~NP~~] *more* NP]

a. * Jebediah saw many students more / much blood more

b. Jebediah saw many more students / much more blood

As shown in (37), when the NP is plural mass, such as *fumes*, only *many* is acceptable. Again, this is the case even for those speakers who only accepted *much* in cases like (33).

(37) Our plant produced many/*much more fumes this week than last week

Most of the discussion in the literature assumes that *little/few* behave on a par. However, closer examination shows that the reported variation is absent with these QDs. The relevant examples are in (38).

(38) a. Few/#Little jewel-s are left in stock.

b. Few/*Little fume-s are coming out of the chemical plant.

c. Little/*Few mud is left on John's shoes.

As illustrated in (38b), native English speakers readily accept *few*, and not *little*, to occur with plural mass nouns. This is unexpected under the approach where *few*, like *many*, is exclusively plural count and associated with cardinality.[17]

These data, taken together, indicate that *many* is not an exclusive plural determiner like *several*. But rather, *many* is acceptable when the noun is plural marked, which for some speakers involves meeting certain morphosyntactic requirements, and *much* is the elsewhere form. Moreover, there is independent evidence supporting the conclusion that *much* is the elsewhere form rather than an exclusively mass determiner.

One piece of evidence in support for this comes from the VP domain. The count/mass distinction in the individual/NP domain has been argued to have correlates in the event/VP domain (Mourelatos 1978, Bach 1986a, Krifka 1989, Borer 2005b, van Geenhoven 2005, Alexiadou et al. 2010, Wellwood et al. 2012): (i) imperfective telic predicates seem to correspond to plural count NPs and (ii) atelic predicates to mass.

Given this generalization, the approach that treats *much* as mass and *many* as plural count predicts the following: *much* is limited to occur with atelic predicates, and *many* with imperfective telic ones. (39a) is an example of an imperfective telic predicate. As a baseline, (39b) shows that *more*, understood in terms of cardinality, is grammatical. Of the positive forms of the QD, only *much/little* are acceptable, contrary to what the lexical ambiguity approach would predict.

(39) a. Jebediah ran to the store (in/*for one hour).

b. Jebediah ran to the store (in the past hour) more than Bill did.

c. Jebediah ran to the store (in the past hour) as much/little/*many/*few as Bill did.

The other piece of evidence involves adjectival *so*-substitution. As noted in Bresnan (1973) and Corver (1997), adjectival expressions in predicative position can undergo a special case of ellipsis in which the adjective is replaced by pro-form *so*. When this happens, an overt QD is required to license the substitution. This is illustrated in (40) with *more*.

(40) Of all persistent people, nobody is more so than Jebediah.

It is also possible to have the positive form of a QD license the adjectival ellipsis. In such cases, it is *much/little* and never *many/few* that must surface. This is illustrated in (41).

(41) a. Jebediah is persistent; in fact, he is too much/*many so.

b. Emilia is not too persistent; in fact, she is very little/*few so.

What these environments have in common is (i) the absence of a noun and (ii) the absence of plural-marking. The fact that *much/little* surface in these contexts is consistent with the idea that they are elsewhere forms: their distribution is a superset of more specific surface forms such as *many/few*. The latter are restricted to contexts in which there is a noun and there is plural.

3.2 The case of Spanish

Determiners in Spanish are also sensitive to the noun being count and to the number properties of the noun in question (e.g., Bosque 1999, ch.1). We can identify the same five categories of determiners that we did for English.

3.2.1 Sensitivity to count NPs (singular, plural or both)

Some determiners such as *cada* 'each' and *cualquier* 'any' belong to the exclusively singular count category: (42).[18] Others like *vari-o/a-s* 'several-M/F-PL' are only grammatical with plural count nouns: (43).

(42) Exclusively Singular Count determiners: *cada* 'each', *cualquier* 'any'.

a. cada/ cualquier mueble
each any furniture.CT
'each/any furniture piece '

b. * cada/ cualquier mueble-s
each any furniture.CT-PL
'each/any furniture pieces'

c. * cada/ cualquier barro
each/ any mud
'each/any mud.'

d. * cada/ cualquier mobiliario
each/ any furniture
'each/any furniture.'

e. * cada/ cualquier vívere-s
each/ any provision-PL
'each/any provisions.'

(43) Exclusively plural count determiners: *vari-o/a-s* 'several-M/F-PL'

a. * vario-s mueble
several.M-PL furniture.CT
'Several furniture piece '

b. vario-s mueble-s
several.M-PL furniture.CT-PL
'Several furniture pieces'

c. * vario-s barro
several.M-PL mud
'Several mud.'

d. * vario-s mobiliario
several.M-PL furniture
'Several furniture.'

e. * vario-s vívere-s
several.M-PL provision-PL
'Several provisions.'

Count-only determiners are widely attested in Spanish. This category of determiners is comprised of existential indefinites such as *algún* 'some', *un* 'a', *ningún* 'no' and universal *todo* 'every'. Some examples are in (44).[19,20]

(44) a. Algún/ Ningún/ Todo mueble/ *barro/ *mobiliario estaba en el suelo.
some.M.SG no.M.SG every.M.SG furniture.CT mud furniture was on the floor
Lit.: 'Some/ No/ Every furniture piece/*mud/*furniture was on the floor.'

Int.:'A / Not a single/ Every furniture piece/*mud/*furniture was on the floor.'

(✓singular count, *unmarked & *object mass)

b. Alguno-s/ Ninguno-s/ Todo-s mueble-s/ *vívere-s estaban en el suelo.
some.M-PL no.M-PL every.M-PL furniture.CT-PL provision-PL were on the floor
Lit. ' Some/No/Every furniture pieces/*provisions were on the floor.'

Int. 'A few / Not a single one of the / Every single one of the furniture pieces/*provisions were on the floor.' (✓plural count, *plural mass)

From (44), we can conclude that (i) not a single one of these determiners is acceptable with mass nouns and (ii) the differences in number-marking on the determiner indicate whether the count noun is singular or plural.

In addition to the determiners in (44), Spanish *wh*-determiner *cuál* 'which' is sensitive to the count/mass distinction. As shown in (45), *cuál* is only grammatical with singular and plural count nouns. When the noun is plural, *cuál* is plural-marked.

(45) (*De lo que visteis* 'of what you saw')

a. A cuál mueble/ *barro/ *mobiliario os referís?
DOM which.SG furniture.CT mud furniture SE.2PL refer.2PL
'Which furniture piece/mud/furniture are you referring to?'

b. A cuále-s mueble-s/ *vívere-s os referís?
DOM which-PL furniture.CT provision-PL SE.2PL refer.2PL
'Which furniture pieces/provisions are you referring to?'

3.2.2 Unrestricted to count/mass, but potentially sensitive to plural

Spanish also has a *wh*-determiner *qué* 'what' which is grammatical with count nouns and all types of mass nouns. This is illustrated in (46). In this regard, *qué* is unrestricted to the count/mass distinction.

(46) A qué mueble(-s)/ barro/ mobiliario/ vívere-s os referís?
DOM what furniture.CT-PL mud furniture provision-PL SE.2PL refer.2PL
'What furniture piece(s)/mud/furniture/provisions are you referring to?'

Unrestricted determiners like *qué* are non-plural invariant. But Spanish also has non-plural determiners that have a corresponding plural allomorph. This is the case of definite articles and demonstratives, as shown in (47) with the masculine forms. The non-plural allomorphs are limited to environments where plural is absent: singular count, unmarked mass and object mass.

(47) Unrestricted determiners: demonstratives and definite article

a. el/ este mueble
the.M this.M furniture.CT
'the/this furniture piece '

b. lo-s/ esto-s mueble-s
the.M-PL this.M-PL furniture.CT-PL
'the/these furniture pieces'

c. el/ este barro
the.M this.M mud
'the/this mud.'

d. el/ este mobiliario
the.M this.M furniture
'the/this furniture.'

e. lo-s/ esto-s vívere-s
the.M-PL this.M-PL provision-PL
'the/these provisions.'

3.2.3 Everything but singular

Last but not least, there are determiners that can be found with plural count nouns and all types of mass nouns. This is the case of QDs such as *mucho* 'much' and *más* 'more' in (48).

(48) Non-Singular determiners: QDs

a. mucho-s/ más/ *mucho mueble-s
much.M-PL more much.M furniture.CT-PL
'many/more/*much furniture pieces'

b. mucho/ más/ *mucho-s barro
much.M more much.M-PL mud
'much/more/*many mud.'

c. mucho/ más/ *mucho-s mobiliario
much.M more much.M-PL furniture
much/more/*many furniture.'

d. mucho-s/ más/ *mucho vívere-s
much.M-PL more much.M provision-PL
'many/more/*much provisions.'

While the comparative form of the QD *más* 'more' is invariant, the positive form *much-* 'much' has a plural and non-plural allomorph:[21] if the noun is plural such as *mueble-s* or *vívere-s*, plural agreement on the QD is obligatory, e.g., (48a) and (48d). The non-plural form surfaces in contexts where plural marking is absent: (48b) and (48c). In other words, the surface forms of the QD are sensitive to there being plural.

QDs, however, are not acceptable with singular count nouns. As shown in (49), the surface form of the QD does not impact the acceptability of the expression.

(49) * mucho(-s)/ más mueble
much.M-PL more furniture.CT
'much/more furniture piece'

4 Where do we stand?

4.1 Summary and discussion of the facts

By looking at the distribution of determiners, we have observed that they could be sensitive to count nouns. Within this group, some determiners discriminated count nouns depending on their Number feature: exclusively singular or exclusively plural. Other count determiners are not as selective, and are grammatical with both singular and plural count nouns. Their surface forms could alternate between a (plural-)marked and an unmarked one, depending on whether Number was or not plural (e.g., Spanish *todo(s)*, *uno(s)* etc.). The three categories are summarized in Table 2.

Table 2: Count determiners: singular, plural or both

Category of Determiner	**Mass**			**Count**		**Selected examples**	
Count	Ø	PL	Object	SG	PL	English	Spanish
Exclusively singular count	*	*	*	✓	*	*each, every*	*cada, cualquier*
Exclusively plural count	*	*	*	*	✓	*several*	*varios*
Count-only	*	*	*	✓	✓	*which*	*todo(s), algún(os)*

These findings go against approaches that bundle individuation and plural (e.g., Borer 2005a): under those approaches, every determiner that occurs with plural count nouns is expected to occur with object mass nouns. This prediction is not borne out. In fact, the observations summarized in the table, paired with the adopted theory of the count/mass distinction in subsection 2.3, leads to the descriptively adequate generalization in (50). D refers to the abstract syntactic terminal DETERMINER.

(50) If D is sensitive to [IND], it will also be sensitive to Number.

We also observed that the same determiner, or allomorphs of the same determiner, could occur with count and mass nouns. These are the unrestricted determiners. Determiners whose surface form is the same are invariant (e.g., *the, some*); determiners whose surface forms are in allomorphic variation can be non-plural (e.g., *this*), if the nouns lack plural, or plural marked (e.g., *these*) if the nouns have plural. This is summarized in Table 3. The data also cast doubt on analyses where plural depends on individuation (e.g., Harley and Ritter 2002, Cowper and Hall 2009, 2012): if this were the case, sensitivity to plural should be restricted to count nouns, excluding mass plurals.

Table 3: Unrestricted determiners

Category of Determiner	**Mass**			**Count**		**Selected examples**	
Unrestricted	Ø	PL	Object	SG	PL	English	Spanish
Invariant	✓	✓	✓	✓	✓	*the, some, what*	*qué*
non-plural (unmarked)	✓	*	✓	✓	*	*this, that*	*el, este*
plural (marked)	*	✓	*	*	✓	*these, those*	*los, estos*

The last category of determiners was the one that discriminated singular count nouns. Despite this peculiarity, this category shares with unrestricted determiners in Table 3 an important property: the division of surface forms into invariant or allomorphic. This is shown in Table 4, not considering *much/many* for the moment.

Table 4: Non-singular determiners

Category of Determiner	**Mass**			**Count**		**Selected examples**	
Non-singular	Ø	PL	Object	SG	PL	English	Spanish
Invariant	✓	✓	✓	*	✓	*all, more, most*	*más*
non-plural (unmarked)	✓	*	✓	*	*	*little*	*mucho*
plural (marked)	*	✓	*	*	✓	*few*	*muchos*

This category of determiners encompassed universal *all* and the class of QDs. Comparative and superlative forms such as *more, most* and *más* are invariant, but other QD forms are allomorphic. As before, the allomorphy is also conditioned by the absence or presence of plural on the noun: non-plural (unmarked) or plural (marked). In Spanish, this complementary distribution is

shown via overt plural agreement between the noun (i.e., both plural mass and plural count) and the QD. In English, the alternation surfaces in the form of suppletion: *few* when the noun is plural, and *little* otherwise (including non-nominal contexts). Therefore, the complementarity is not determined by plural count vs. mass. What is more, from the discussion of allomorphic pairs in Table 3 and Table 4, the generalization in (51) follows.

(51) If D occurs with mass nouns, it will also occur with count nouns.

The generalization in (51) is seemingly challenged by the inter-speaker variation in the case of *much* and *many* with plural mass nouns. For one group of speakers (i.e., Group 1) it seemed like *many* was exclusively count and *much* was exclusively mass; but for a different group (i.e., Group 2), *many* tracked plural forms and *much* occurred elsewhere. Despite these differences, I argued that this was a case of syntactically-driven morphological variation: a configuration in which the QD and the plural mass noun are local makes Group 1 lexicalize the QD as *much*. Once that local relation is disrupted, e.g., ellipsis, Group 1 only accepted *many*. The facts are summarized in Table 5.

Table 5: Inter-speaker variation between *much* and *many* with plural mass NPs

	Local configuration [QD [$nP_{[PL]}$]]		Argument NP ellipsis [QD [~~$nP_{[PL]}$~~]]		Differential NP ellipsis [[QD [~~$nP_{[PL]}$~~]] *more* $nP_{[PL]}$]	
	much	*many*	*much*	*many*	*much*	*many*
Group 1	✓	*	*	✓	*	✓
Group 2	*	✓	*	✓	*	✓

Based on these facts, we can conclude that *much* and *many* are also in the same complementary distribution as *little* and *few*. This is captured by the empirical generalization in (52). Note that this generalization is also meant to account for the fact that only *much/little* surfaces in non-nominal contexts. It would be difficult to account for that observation under the view that *much/little* is a mass-only determiner.

(52) *The QD-markedness Generalization*

The marked forms of QDs (e.g., *many, few, muchos* etc.) are restricted to contexts in which the noun is marked plural; the unmarked forms (e.g., *much, little, mucho* etc.) are found elsewhere.

Variation among English speakers can be thus indicative of the following: while inserting the marked vocabulary item is the default when the noun is plural-marked, failing to do so can be the result of Impoverishment (e.g., Bonet 1991, 2008, Arregi and Nevins 2007, 2012, 2013): a morphological rule deletes the relevant plural features before vocabulary insertion of the marked item. Variation can thus be reducible to the availability, or lack there-of, of such a rule.

4.2 Classes and gaps

Categorizing determiners in this descriptively adequate way is the first step towards understanding the abstract representational properties that D-nodes might have in common. The goal is to identify and explain what makes certain Ds form a natural class.[22] And by doing so, not only do we gain an understanding of the natural classes that are possible but also shed light on those that might in fact be impossible.

Based on similar observations to the ones presented here, the literature has identified the following natural classes of Ds (e.g., Doetjes 1997, 2021, Chierchia 1998a, 2010, Borer 2005a, Bale 2016): singular-count Ds, plural-count Ds, unrestricted Ds and non-singular Ds. In addition, with the exception of Bale (2016), it is also acknowledged that there is a natural class of mass-only Ds, but that it is limited. From these natural classes, the purported universal gaps in (3), repeated below, had been established since Chierchia (1998a).

(3) *Chierchia's Gaps*

a. There is no determiner that exclusively selects singular and plural count nouns to the exclusion of mass ones.

b. There is no determiner that exclusively selects for singular-count and mass nouns to the exclusion of plural-count nouns.

The data presented here continue to support (3b) as a gap in natural languages. While it is true that some surface forms of determiners can occur with unmarked, object mass and singular count nouns, these stand in complementary distribution with a plural allomorph. Hence, there is one D underlying the two forms. If mass and singular count nouns have no exclusive properties (e.g., a feature, pieces of structure) in common, as implicated in subsection 2.3, it is potentially unsurprising that no D that can select both at once.

However, the establishment of the category of count-only determiners, in Table 2, is a novel empirical contribution and it uncovers a natural class that was considered a universal gap in natural language: (3a). In addition, given the observations about QDs and the generalization in (52), there seems to be no dedicated mass D. All this said, we can conclude that a revision of Chierchia's gaps is need. I propose that the actual gaps are best stated as in (53).

(53) *D-gaps*

a. There is no D that exclusively selects for singular-count and mass nouns to the exclusion of plural-count nouns. =(3b)

b. There is no D that exclusively selects for mass nouns.

In next section, I develop a proposal that explains the empirical generalizations formulated here and the D-gaps in (53).

5 The analysis

D terminals are sensitive to the features in the extended projection of the NP. Evidence for this comes from the covariance in φ-features between D and NP which has been argued to be the result of the operation Agree(D,NP) (e.g., Chomsky 2000, Carstens 2000, Harbour 2007, Baker 2008b, Wiltschko 2009, Kramer 2010, Danon 2011). Under the traditional modeling of the operation (e.g., Chomsky 2000), D bears a set of probing features, i.e., unvalued and uninterpretable features [*u*F:_], which must receive a value [F] from the closest matching goal under c-command. Failure to provide a value for a *u*F will cause the derivation to crash.[23] This approach to Agree is

schematized in (54), where '...' indicates c-command. Post-syntactically, D, including its valued probes, will be mapped to a vocabulary item (e.g., Halle and Marantz 1993, Halle 1997, Embick and Noyer 2001).

(54) a. [D [*u*F:_] ... NP [F]] $\xrightarrow[\text{probe valuation}]{\text{Agree(D, NP)}}$ [D [*u*F:F] ... NP [F]]

b. [D [*u*F:_] ... NP [G]] $\xrightarrow[\text{probe remains unvalued}]{\text{No Agree(D, NP)}}$ *[D [*u*F:_] ... NP [G]]

Assuming the mechanics for Agree in (54), the realization of φ-features in D is straightforward: it depends on the set of probes that D bears, the value that the relevant probes copy from the matching goal, and the vocabulary item to which D is mapped.[24]

Having established (i) that count and mass nouns differ in their feature representation, (ii) that D probes are sensitive to the features in the extended projection NP, and (iii) that probe valuation is obligatory, I formulate the hypothesis in (55) regarding natural classes of determiners. What counts as 'the same set' is defined in (56).[25]

(55) *The D-Class hypothesis*

A natural class of determiners, i.e., D-Class, is characterized by D terminals that have the same set of probes.

(56) Two sets, X and Y, are the same iff $X \subseteq Y$ and $Y \subseteq X$ (i.e., there is no $x \in X$ such that $x \notin Y$ and there is no $y \in Y$ such that $y \notin X$)

According to (56), a D-Class is then a set such that for every D in it, D has $\{u\text{F}_1 ... u\text{F}_n\}$. Identity in set membership also includes the empty set: if $X = \{\ \}$, and $Y = \{\ \}$, then there are no members of X that are not in Y and viceversa. Given the featural approach to the count/mass distinction adopted, we expect D-Classes to reflect those underlying differences.

In what follows, I draw on the distributional properties of the categories of determiners that I have identified to argue for the need of five distinct D-Classes. I show how the hypothesis in (55), paired with the proposal for the count/mass distinction, explains D-Classes and the gaps in (53).

6 D-Classes for the different categories of determiners

6.1 Exclusively singular count, exclusively plural count, and count-only determiners

Given the generalization in (50), I propose that the determiners in Table 2 instantiate the D-Classes in (57).

(57) a. D-Class 1
$$\mathrm{D}\left[\begin{array}{l} u\text{IND:\_} \\ u\text{SG:\_} \end{array}\right]$$

b. D-Class 2
$$\mathrm{D}\left[\begin{array}{l} u\text{IND:\_} \\ u\text{PL:\_} \end{array}\right]$$

c. D-Class 3
$$\mathrm{D}\left[\begin{array}{l} u\text{IND:\_} \\ u\text{Num:\_} \end{array}\right]$$

The commonalities across (57) stem from the fact that all three Ds in Class 1, 2 and 3 share a subset of probes: *u*IND. This feature already eliminates the possibility of Ds from occurring with unmarked and plural-marked mass nouns. Despite this commonality, the Ds in each class in (57) differ with respect to the granularity of the number probing feature that they bear.

The probes in D-Class 1 and D-Class 2 are relativized to a certain number feature: *u*SG and *u*PL, respectively. However, Ds in D-Class 3 have a general *u*Num probe allowing them to occur with both singular and plural count nouns. The relevant Agree dependencies are illustrated in (58), where thick lines indicate search and match, and dashed lines indicate the copying of values.

(58) a. $[_{\mathrm{DP}}\ \mathrm{D}_{[\ u\text{IND:\_}\ u\text{SG:\_}\ ]}\ [_{\mathrm{NumP}}\ \mathrm{Num}_{[\mathrm{SG}]}\ [_{n\mathrm{P}}\ n_{[\mathrm{IND}]}\ \sqrt{}\ ]]]$ ⇔ *each book, cada libro*

b. $[_{\mathrm{DP}}\ \mathrm{D}_{[\ u\text{IND:\_}\ u\text{PL:\_}\ ]}\ [_{\mathrm{NumP}}\ \mathrm{Num}_{[\mathrm{PL}]}\ [_{n\mathrm{P}}\ n_{[\mathrm{IND}]}\ \sqrt{}\ ]]]$ ⇔ *several books, varios libros*

c. $[_{\mathrm{DP}}\ \mathrm{D}_{[\ u\text{IND:\_}\ u\text{Num:\_}\ ]}\ [_{\mathrm{NumP}}\ \mathrm{Num}_{[\mathrm{SG/PL}]}\ [_{n\mathrm{P}}\ n_{[\mathrm{IND}]}\ \sqrt{}\ ]]]$ ⇔ *which book(s), cuál(es) libro(s)*

In all three cases, the Agree operation proceeds satisfactorily: each probe is able to find a matching goal and copy its features leading to a successful valuation.

This system also explains why certain D+count NP sequences, such as **each books* or **several book*, are unacceptable: Agree cannot be established. The derivations are schematically represented in (59).

(59) a. * $[_{\text{DP}}\ \text{D}_{\left[\begin{smallmatrix} u\text{IND}\text{:}\ \underline{val} \\ u\text{SG}\text{:}\ \_ \end{smallmatrix}\right]}\ [_{\text{NumP}}\ \text{Num}_{[\text{PL}]}\ [_{n\text{P}}\ n_{[\text{IND}]}\ \sqrt{}\ ]]]$ (*D-Class 1+plural count NP)

b. * $[_{\text{DP}}\ \text{D}_{\left[\begin{smallmatrix} u\text{IND}\text{:}\ \underline{val} \\ u\text{PL}\text{:}\ \_ \end{smallmatrix}\right]}\ [_{\text{NumP}}\ \text{Num}_{[\text{SG}]}\ [_{n\text{P}}\ n_{[\text{IND}]}\ \sqrt{}\ ]]]$ (*D-Class 2+singular count NP)

While the *u*IND probe is able to find a goal both in (59a) and (59b), neither the *u*SG probe in (59a) nor the *u*PL probe in (59b) can, which leaves them unvalued. Because probe valuation is obligatory, the ungrammaticality of said expressions results from the *u*SG/PL probe's failure to establish an Agree-dependency. Consequently, D-Class 1 is instantiated by exclusively singular count determiners, D-Class 2 by exclusively plural count determiners, and D-Class 3 by count-only determiners.

6.1.1 Syncretisms

Before proceeding with the VI rules that generate the relevant vocabulary items for every member of each D-Class, we must consider the paradigms of English and Spanish count-only determiners. These are given in Table 6 and Table 7 for each language respectively.

Table 6: Paradigm of English count-only determiners

[SG]-marked N	**[PL]-marked N**
which	

Despite [PL] being generally mapped to an exponent, as opposed to [SG] (e.g., Nevins 2011, Bale et al. 2011), [PL] is not overtly marked in English *which*. This leads to the syncretism observed in Table 6. On the contrary, plural is always overtly marked in Spanish, and there is no syncretism. The invariance in surface forms in English, and the differences with Spanish, cannot

Table 7: (Masculine) Paradigm of Spanish count-only determiners

[SG]-marked N	**[PL]-marked N**
todo	*todos*
cuál	*cuales*
algún	*algunos*
un	*unos*
ningún	*ningunos*

be due to the underlying syntax of these terminals: in both languages, these determiners instantiate D-Class 3, and thus bear a *u*Num probe that must be valued via Agree. Instead, we can take the syncretic forms to be the result of Impoverishment: a deletion operation, the target of which is typically language-specific, that removes a feature or set of features in a particular syntactic context before VI (e.g., Bonet 1991, 2008, Noyer 1992, Halle and Marantz 1993, Arregi and Nevins 2007, 2012, 2013, Harley 2008). In particular, for the case of English, an Impoverishment rule deletes the valued plural feature in the context of a [DEF] feature. For the time being, this is formulated in (60), where α represents a variable over any feature:

(60) $\mathrm{D}[\alpha, u\textsc{pl}{:}\underline{\textsc{pl}}] \rightarrow \mathrm{D}[\alpha]/\mathrm{D}[\alpha = \textsc{def}, \_\_]$

'delete a valued plural in the context of a definite D' (first attempt)

6.1.2 Vocabulary Insertion (VI)

At the point of VI, the D terminals are spelled out as (61) for English and for Spanish.[26] Building on insights from decompositional analyses of determiners, such as Beghelli and Stowell (1997) and Cowper and Hall (2014, 2022) among others, I will be assuming that, in addition to their probes, Ds can bear the interpretable features in Table 8.[27,28]

(61) a. D-Class 1 (Exclusive singular count determiners)

i. $\mathrm{D}[\textsc{univ}, u\textsc{ind}{:}\underline{\textsc{ind}}, u\textsc{sg}{:}\underline{\textsc{sg}}] \Leftrightarrow$ *every*

ii. $\mathrm{D}[\textsc{univ}, \textsc{distr}, u\textsc{ind}{:}\underline{\textsc{ind}}, u\textsc{sg}{:}\underline{\textsc{sg}}] \Leftrightarrow$ *each*

iii. $\mathrm{D}[\textsc{indef}, u\textsc{ind}{:}\underline{\textsc{ind}}, u\textsc{sg}{:}\underline{\textsc{sg}}] \Leftrightarrow a(n)$

Table 8: Inherent interpretable features on D heads

Feature	Meaning	Source
[DEF]	definite (referentially indexed in the discourse)	(Cowper and Hall 2014)
[INDEF]	indefinite (existential not referentially indexed in the discourse)	
[DEM]	demonstrative (deictic specifying a particular location)	
[PROX]	proximal (near the point of attachment)	(Cowper and Hall 2022)
[DIST]	distal (situated away from the point of attachment)	(Cowper and Hall 2014)
[UNIV]	universal (universal, not necessarily distributed)	(Beghelli and Stowell 1997)
[DISTR]	distributed (strongly distributed)	(Beghelli and Stowell 1997)
[GROUP REF]	group reference (existential denoting groups)	(Beghelli and Stowell 1997)
[WH]	*wh*-operator	(e.g., Chomsky 1977)
[DEG]	degree (introducing reference to degrees)	(e.g., Corver 1997)

iv. D[UNIV, DISTR, *u*IND:IND, *u*SG:SG] ⇔ *cada*

b. D-Class 2 (Exclusive plural count determiners)

i. D[GROUP REF, *u*IND:IND, *u*PL:PL] ⇔ *several*

ii. D[GROUP REF, *u*IND:IND, *u*PL:PL] ⇔ *varios*

c. D-Class 3 (Count-only determiners)

i. D[DEF, WH, *u*IND:IND] ⇔ *which*

ii. D[DEF, WH, *u*IND:IND, *u*Num:SG/PL] ⇔ *cuál*(*es*)

iii. D[UNIV, *u*IND:IND, *u*Num:SG/PL] ⇔ *todo*(*s*)

iv. D[INDEF, *u*IND:IND, *u*Num:SG/PL] ⇔ *algun*(*os*), *un*(*os*)

v. D[INDEF, *u*NEG:NEG, *u*IND:IND , *u*Num:SG/PL] ⇔ *ningun*(*os*)

6.2 Unrestricted determiners

The group of unrestricted determiners in Table 3 included those compatible with any noun, may it be count or mass. They were distinguished depending on whether their surface forms were invariant, or alternated between a non-plural and a plural allomorph. Using the conventional cell-uniting notation to indicate syncretisms, the paradigms of English and Spanish unrestricted determiners look like Table 9 and Table 10 respectively. From the vocabulary items in both tables, the patterns of syncretism in (62) can be observed.

Table 9: Paradigm of English unrestricted determiners

non-[PL] marked N			**[PL]-marked N**	
Ø mass	object mass	singular count	plural mass	plural count
the, some, no, any, what				
this, that			*these, those*	

Table 10: (Mascuilne) Paradigm of Spanish unrestricted determiners

non-[PL] marked N			**[PL]-marked N**	
Ø mass	object mass	singular count	plural mass	plural count
qué				
el			*los*	
este, ese, aquel			*estos, esos, aquellos*	

(62) Patters of syncretism from Table 9 and Table 10

a. In both languages, the non-plural determiners do not contain [SG].

b. In English, [PL] is not marked in definite and indefinite determiners.

c. In Spanish, [PL] is not marked in the *wh*-indefinite determiner.

All invariant and non-plural determiners may occur with nouns that have no NumP or bear no number features, such as unmarked or object mass nouns. Thus, we can conclude that the Ds underlying these surface forms cannot bear a number probing feature such as *u*SG or *u*Num. If they did, the D terminal underlying these forms would not be able to establish an Agree dependency with a singular count noun as well as with an unmarked mass noun and object mass noun.

It also seems justified to conclude that a subset of the Ds underlying these surface forms must bear a *u*PL probe. First, some determiners show allomorphic variation triggered by [PL]. Second, the plural and non-plural allomorphs are in true complementary distribution: *these book*(-s), estos libro*(-s)*; and, *this book(*-s), este libro(*-s)*.

The key to understanding the category of unrestricted determiners, while maintaining our formulation of Agree and our hypothesis about D-Classes as Ds sharing the exact same probes, is as follows. Unrestricted determiners are actually split into two D-Classes: the one in (63a) and the

one in (63b). The former is the elsewhere case, found in non-plural environments (e.g., unmarked mass, object mass and singular count). The latter is restricted to contexts where [PL] is part of the derivation.

(63) a. D-Class 4: D b. D-Class 5: D[*u*PL:_]

In principle, nothing restricts the underspecified D in (63a) from occurring in plural environments: feature underspecification entails that there is no Agree dependency to be established, making D-Class 4 compatible with the superset of nouns. While seemingly a welcome result if we just focus on the syncretic surface forms in Table 9 and Table 10, it is in fact problematic: our model predicts that merger of a D from D-Class 4 with a plural-marked noun is acceptable, contrary to what the facts indicate. In order to avoid this wrongful prediction, I assume that the condition in (64) must hold.

(64) *Plural Licensing Condition*

[PL] must always be licensed via Agree.

The idea that certain interpretable features are subject to a licensing condition via Agree has its roots in a tradition started by Béjar and Rezač (2003, 2009) for person, and continued by Kalin (2018, 2019) for specificity and animacy (in differential object marking). What is more, the need for a licensing condition on [PL] has been argued independently by Fong (2021, 2023).[29] Applied to the cases at hand, the proposal is at work in (65) for the non-plural environments and in (66) for the plural environments.

(65) No Agree, and no Plural Licensing Condition

a. $[_{\text{DP}}\ \text{D}\ [_{\text{NumP}}\ \text{Num}_{[\text{SG}]}\ [_{n\text{P}}\ n_{[\text{IND}]}\ \sqrt{\text{JEWEL}}\ ]]]$

b. $[_{\text{DP}}\ \text{D}\ [_{n\text{P}}\ n\ \sqrt{\text{MUD}}\ ]]]$

c. $[_{\text{DP}}\ \text{D}\ [_{n\text{P}}\ n_{[\ \substack{\text{IND}\\\text{COLL}}\ ]}\ \sqrt{\text{JEWEL}}\ ]]$

(66) No Agree but *Plural Licensing Condition

a. $*\ [_{\text{DP}}\ \text{D}\ [_{\text{NumP}}\ \text{Num}_{[\text{PL}]}\ [_{n\text{P}}\ n_{[\text{IND}]}\ \sqrt{\text{JEWEL}}\ ]]]$

b. * [$_{DP}$ D [$_{nP}$ $n_{[PL]}$ $\sqrt{\text{FUME/VÍVER}}$]]]

In the non-plural cases in (65), there is no Agree dependency and since there is no [PL], the Plural Licensing Condition in (64) does not apply. As a result, the generated expressions are grammatical. However, in the plural cases in (66), the ungrammaticality is not due to a failed Agree dependency – there is none to be established – but due to the fact that [PL] (on Num in (66a) and [PL] on *n* in (66b)) is not licensed. Hence, the Plural Licensing Condition is violated.

Merger of D[*u*PL:_] yields the reversed grammaticality patterns, which is the desired result. (67) schematizes the non-plural environments and (68) schematizes the plural ones.

(67) *Agree

a. * [$_{DP}$ $D_{[\ u\text{PL}:\_\ ]}$ [$_{NumP}$ $Num_{[SG]}$ [$_{nP}$ $n_{[IND]}$ $\sqrt{\text{JEWEL}}$]]]

b. * [$_{DP}$ $D_{[\ u\text{PL}:\_\ ]}$ [$_{nP}$ n $\sqrt{\text{MUD}}$]]]

c. * [$_{DP}$ $D_{[\ u\text{PL}:\_\ ]}$ [$_{nP}$ $n_{[\ \text{IND}\ \text{COLL}\ ]}$ $\sqrt{\text{JEWEL}}$]]

(68) Successful Agree and Plural Licensing Condition satisfaction

a. [$_{DP}$ $D_{[\ u\text{PL}:\underline{val}\ ]}$ [$_{NumP}$ $Num_{[PL]}$ [$_{nP}$ $n_{[IND]}$ $\sqrt{\text{JEWEL}}$]]]

b. [$_{DP}$ $D_{[\ u\text{PL}:\underline{val}\ ]}$ [$_{nP}$ $n_{[PL]}$ $\sqrt{\text{FUME/VÍVER}}$]]

In (67) Agree for [PL] fails leading to ungrammaticality. On the contrary, in (68), Agree($D_{[uPL]}$, [PL]) is successful. As a result of this dependency, the Plural Licensing Condition is satisfied.

In (69), I provide a list of the vocabulary items that spell out the relevant D nodes, as in the paradigms in Table 9 and Table 10.

(69) D-Class 4 and D-Class 5 (unrestricted determiners)

a. D[INDEF] ⇔ *some*

b. D[INDEF, NEG] ⇔ *no*

c. D[INDEF, *u*NEG:NEG] ⇔ *any*

d. D[INDEF, WH] ⇔ *what*, *qué*

e. D[DEF] ⇔ *the*, *el*

f. D[DEF, *u*PL:PL] ⇔ *los*

g. D[DEM, PROX] ⇔ *this*, *este*

h. D[DEM, PROX, *u*PL:PL] ⇔ *these*, *estos*

i. D[DEM] ⇔ *ese*

j. D[DEM, *u*PL:PL] ⇔ *esos*

k. D[DEM, DIST] ⇔ *that*, *aquel*

l. D[DEM, DIST, *u*PL:PL] ⇔ *those*, *aquellos*

There is a potential caveat of this analysis regarding the relation between the syntactic terminals and the vocabulary items they expone as indicated by the rules in (69). Namely, this is concerned with the syncretisms in (62b-c): why do English definite and indefinite determiners not expone the valued plural feature, as demonstratives do? Why does Spanish *wh*-indefinite not expone the valued plural feature either? While we seem to be invited to stipulate additional VI rules for these items leading to accidental syncretism, we would loose an important generalization: these syncretisms hold for a particular feature in the languages, namely [PL].

Instead, and in concert with the analysis of the syncretism for *which*, I propose that these syncretisms are also the result of Impoverishment. In fact, in English they could be handled by a more generalized version of the rule in (60), such as (70a). To handle the Spanish case, we need a rule that is for indefinite (and non-human) *wh*-determiners. Said rule is in (70b).

(70) a. D[α, *u*PL:PL] → D[α]/D[α = (IN)DEF, __] (final version)

'Delete a valued plural feature in the context of a (in)definite D'

b. D[α, *u*PL:PL] → D[α]/D[α = {INDEF, WH}, __]

'Delete a valued plural feature in the context of a (non-human) *wh*-indefinite D'

The rules generate the syncretisms in Tables 9 and 10. By virtue of eliminating the valued plural feature in the specified contexts, the VI rules in (69a)-(69e) can now be applied. This has the additional welcome consequence that we achieve a uniform syntactic analysis of determiners across languages, despite their surface differences. For example, English and Spanish definite determiners only differ with respect to whether Impoverishment removes the valued probe blocking surface plural agreement on the vocabulary item.[30]

6.3 Non-singular determiners

This category of determiners seems to present a challenge to the hypothesis in (55) because there is no common set of features between mass nouns and plural count nouns that excludes singular count. As a result, there is no set of said probing features on D either. However, recall that these determiners patterned with unrestricted determiners regarding the division between non-plural and plural forms.

Because of this, I propose that, in terms of their probing features, the Ds underlying non-singular determiners are no different from the Ds underlying unrestricted determiners in §6.2: D-Class 4 and D-Class 5. Thats is, they can either be underspecified for any features or bear a [*u*PL:_] probe. Where they differ, however, is in whether the relevant D terminals encode or not a cumulative restriction as part of their lexical semantics.[31]

Under this analysis, the Ds underlying non-singular determiners are syntactically compatible with singular count nouns. This is shown in (71a) which is then compared to (unmarked and object) mass nouns in (71b)-in (71c), and plural (count and mass) nouns in (72a) and (72b).

(71) D-Class 4 (non-singular determiners)

a. $[_{\text{DP}}\ \text{D}\ [_{\text{NumP}}\ \text{Num}_{[\text{SG}]}\ [_{n\text{P}}\ n_{[\text{IND}]}\ \sqrt{\text{JEWEL}}\ ]]]$

b. $[_{\text{DP}}\ \text{D}\ [_{n\text{P}}\ n\ \sqrt{\text{MUD}}\ ]]]$

c. $[_{\text{DP}}\ \text{D}\ [_{n\text{P}}\ n_{[\ \substack{\text{IND}\\\text{COLL}}\ ]}\ \sqrt{\text{JEWEL}}\ ]]$

(72) D-Class 5 (non-singular determiners)

a. $[_{\text{DP}}\ \text{D}_{[\ u\text{PL}:\underline{val}\ ]}\ [_{\text{NumP}}\ \text{Num}_{[\text{PL}]}\ [_{n\text{P}}\ n_{[\text{IND}]}\ \sqrt{\text{JEWEL}}\ ]]]$

b. $[_{\text{DP}}\ \text{D}_{[\ u\text{PL}:\underline{val}\ ]}\ [_{n\text{P}}\ n_{[\text{PL}]}\ \sqrt{\text{FUME}}\ ]]$

D in (71a) has the same syntactic properties as it does with mass nouns in (71b) and (71c): since there are no probes, there is also no Agree. As before, merger of an underspecified D with

a complement XP that has [PL] is ruled out because it does not satisfy the Plural Licensing Condition. In the case of plural (count/mass) nouns in (72a)-(72b), D must bear the *u*PL probe, which finds a value and licenses the feature on Num and *n*, respectively.

As shown in (71), nothing in the syntax prevents a derivation with an underspecified D and [SG]-marked noun from converging. Their ill-formedness must stem from elsewhere in the grammar. We know that mass nouns and plural count nouns form a semantic natural class, to the exclusion of singular count ones: their extensions are closed under sum (e.g., Quine 1960, Cheng 1973, Link 1983, Bach 1986b, Krifka 1989, Chierchia 1998b,a, 2010, Borer 2005a, Schwarzschild 2006). This property, known as cumulativity, is defined in (73).[32]

(73) $\mathsf{CUM}(P) = \forall x[P(x) \rightarrow \forall y[P(y) \rightarrow P(x \cup y)]]$

'A predicate P is cumulative if for every member in P, their sum is also in P.'

Given the semantics assumed in subsection 2.3, mass nouns and plural count nouns are true of predicates that are closed under sum, regardless of whether those sums are generated from the set of atoms. However, singular count nouns denote properties of atomic minimal parts, lacking sums, which makes them non-cumulative. Hence, I hypothesize that the subset of D-Class 4 and D-Class 5 instantiated by non-singular determiners impose a cumulativity requirement on their restrictor argument at LF: the ill-formedness with [SG]-marked nouns results from a failure to satisfy said requirement.[33] This requirement can be encoded via a presupposition, as in (74), where $\mathscr{D}$ stands for all potential domains.

(74) For any set $P \subseteq \mathscr{D}$, $[\![\mathrm{D}_{\text{non-singular}}]\!](P)$ is defined if $\mathsf{CUM}(P) = 1$

At LF, the meanings of the syntactic representations in (71)-(72) are composed as in (75). When $[\![\mathrm{D}_{\text{non-singular}}]\!]$ composes with a singular count restrictor argument as in (75a), the expression will not be defined: D's restrictor argument is not cumulative. This contrasts with (75b) and (75c): D's restrictor argument is cumulative in both cases.

(75) a. $[\![\mathrm{D}_{\text{non-singular}}]\!]([\![[\mathrm{Num}_{[\mathrm{SG}]}[n_{[\mathrm{IND}]}\sqrt{\mathrm{JEWEL}}]]]\!])$ is not defined

b. $[\![\text{D}_{\text{non-singular}}]\!]([\![[n\sqrt{\text{MUD}}]]\!])$ is defined

c. $[\![\text{D}_{\text{non-singular}}]\!]([\![[\text{Num}_{[\text{PL}]}[n_{\text{IND}}\sqrt{\text{JEWEL}}]]]\!])$ is defined

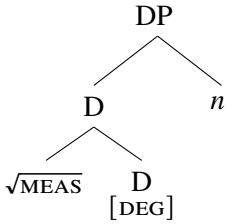
7 Explaining the situation with QDs

7.1 The QD-markedness generalization

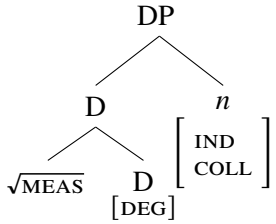
The generalization that remains to be explained is concerned with the distribution of the surface forms of QDs. Because QDs are non-singular determiners, they must be split into (cumulative) D-Class 4 and D-Class 5. From this, it follows that some QDs will be unmarked for number and be found in non-plural contexts, whereas others will be will be sensitive to [PL] and limited to plural contexts.

I assume that QDs are internally complex: they consist of a lexical part (i.e., a measure root $\sqrt{\text{MEAS}}$) and a functional part (i.e., a cumulative D head specified for [DEG]). The relevant syntactic structures for unmarked and object mass nouns are as in (76); the VI rules are as in (77) for English and in (78) for Spanish.[34]

(76) a. QD + unmarked mass



b. QD + object mass



(77) VI rules for $\{\sqrt{\text{MEAS}}, \text{D}\}$ (English)

a. $\sqrt{\text{MEAS}} \Leftrightarrow$ *many*/_D[DEG, *u*PL: PL]

b. $\sqrt{\text{MEAS}} \Leftrightarrow$ *much*

(78) VI rules for $\{\sqrt{\text{MEAS}}, \text{D}\}$ (Spanish)

a. $\sqrt{\text{MEAS}} \Leftrightarrow$ *mucho*

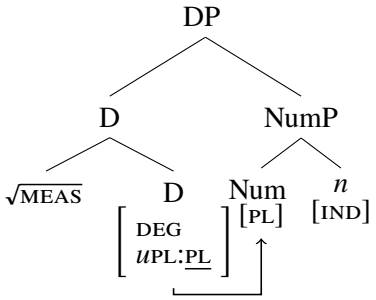
b. [*u*PL: PL] $\Leftrightarrow -s$

In the case of unmarked and object mass nouns, D must be underspecified for any features. Otherwise, merger of a D[*u*PL:_] would result in a failed Agree-relation. As a result, and according to the VI rules, the vocabulary item inserted in English is the one in (77b). In Spanish, this

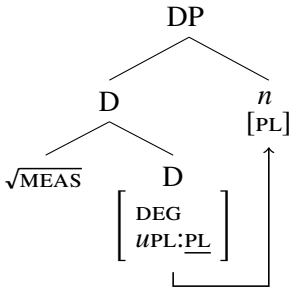
means that plural is not realized as an affix on the measure root.

When D bears a plural probe, as in (79a) and (79b), said probe is valued against the [PL] matching feature in its c-command domain.[35] This triggers suppletion of the measure root in English, per the VI rule in (77a). In Spanish, the valued plural feature surfaces as an agreement marker on the determiner, as it generally does.

(79) a. QD + plural count



b. QD + plural mass



7.2 Inter-speaker variation in surface forms

As they stand, the structures and the VI rules predict the following: in both Spanish and English [PL] univocally triggers the (plural-)marked form of the QD. While this is the desired outcome for Spanish, it does not predict the observed inter-speaker variation with plural mass nouns in English. Namely, for a group of speakers, the choice of *much* over *many* correlated with the QD and the low plural *n*P being in a local configuration: Table 5. I propose that we can still maintain the uniform syntactic representations and VI rules, while accounting for said variation if, once again, Impoverishment for the valued plural feature occurs. More specifically, the Impoverishment rule in (80) deletes the plural feature on the positive [DEG]-marked D in the context of a low plural.

(80) $\mathrm{D}[\alpha, u\mathrm{PL}{:}\underline{\mathrm{PL}}] \rightarrow \mathrm{D}[\alpha] / \mathrm{D}[\alpha = \mathrm{DEG}, \_]]\ n[\mathrm{PL}]]$

'delete the valued plural feature in the context of a positive degree D that is local to a plural feature on *n*'

The rule in (80) is not universally shared across English speakers. The group of speakers who have this rule as part of their grammar will apply (80) after the structure is sent to PF. Impover-

ishment will then block the application of the more specific rule in (77a), and trigger the application of the elsewhere rule in (77b) instead. As a result, the QD surfaces as *much*. For the group of speakers who lack the rule altogether, no additional post-syntactic process occurs and the more specific VI rule in (77a) will win over. This variation for the two groups of speakers can be summarized in Table 11. The two grammars converge when the context of application for the rule is not met, such as NP ellipsis.[36]

Table 11: Variation in $\sqrt{\text{MEAS}}$-exponence (English)

Grammar	Agree(uPL, PL)	Impoverishment in (80)	VI rule
$\mathbb{G}1$	✓	✓	(77b) = *much*
$\mathbb{G}2$	✓	*	(77a) = *many*

The analysis of QDs proposed has several advantages. First, it derives the QD-markedness generalization as well as the facts summarized in Table 5. Second, it pushes the variation away from the lexicon: the surface form of QDs is not lexically determined (e.g., Chierchia 1998a, Borer 2005a, Solt 2009, 2015) but morpho-syntactically so, based on the presence of [PL] (e.g., Wellwood 2015, 2018, 2019, Bale 2016, Smith 2021, Cleani and Toquero-Pérez 2022); third, it opens the possibility that variation in surface forms may be subject to very fine-grained conditions on how certain terminal nodes are lexicalized.

8 Accounting for the gaps

I have proposed that D-terminals fall into five different natural classes based on the set of probes that they have. This, I argued, explains the distribution of determiners in section 4. Each D-Class and the determiners that instantiate each of them are given in Table 12.[37]

Equally important is to explain the existence of the two gaps in (53). The first of these gaps is concerned with the absence of Ds that occur with singular count and mass nouns, to exclusion of plural count nouns. The proposed theory explains this gap in a straightforward manner: there is no feature that singular count nouns and any mass nouns share. As a result there is no potential combination of probes on D that would restrict the search to these particular nominals.

Table 12: D-Classes, their properties and correspondences with categories of determiners

D-Class	*u*IND	*u*SG	*u*PL	*u*Num	Instantiations of D-Classes
Class 1	✓	✓	–	–	Exclusively singular count
Class 2	✓	–	✓	–	Exclusively plural count
Class 3	✓	–	–	✓	Count-only
Class 4	–	–	–	–	Unrestricted & Non-singular (non-plural)
Class 5	–	–	✓	–	Unrestricted & Non-singular (plural)

The second gap was concerned with Ds that only occurred with mass nouns. This gap is also explained away: there is no [MASS] feature and hence no *u*MASS probe. In fact, mass nouns form a rather heterogeneous class, which is best understood as the absence of a Number projection. The lack of [MASS] marking is consistent with the robust cross-linguistic observations that few grammatical markers, if any, track or encode 'mass'. Being mass seems to be better understood as the absence of count properties (see also Doetjes 2021).

While it is true that some have argued that QDs like *much* are mass-only determiners, I argued at length that this was not empirically accurate. QDs are better understood in terms of unmarked or elsewhere forms (i.e., D-Class 4) and (plural-)marked forms (i.e., D-Class 5). In fact, this markedness division is a widely attested phenomenon beyond the languages discussed, including but not limited to Greek (Tsoulas 2006, 2009, Alexiadou 2011, Kouneli 2019), Norwegian and Italian (Cleani and Toquero-Pérez 2022) and Telugu (Smith 2021). Therefore, the cases where the distinction has been neutralized in the surface need not be taken as evidence (i) for a distinction that considers the two morphemes as lexically independent from each other (one mass and the other count) and (ii) for the view that mass determiners are attested, but limited.

Last but not least, a generalization that has emerged on the basis of English and Spanish is that bearing a *u*IND probe entails bearing a *u*Number probe (whether general or relativized to some Number feature). We still need to explain why this is so and probe whether it is universal or subject to variation. In fact, the proposal presented here makes an additional typological prediction that may be important in answering these questions: a D-Class characterized by just [*u*IND] is predicted to exist. This class would be instantiated by countable determiners; that is, determiners

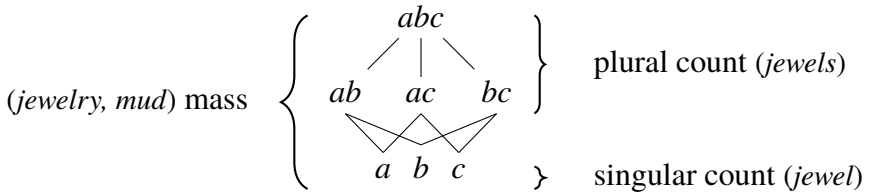
that are grammatical with object mass nouns and count nouns, both singular and plural. English and Spanish seem to lack this class, but whether this class exists is an empirical question.

9 Previous approaches

9.1 Chierchia (1998a)

Chierchia (1998a) proposes an analysis of the count/mass distinction that is built (i) on the assumption that the denotations of singular count nouns, plural count nouns and mass nouns differ and (ii) on the hypothesis that mass nouns are inherently plural; it is the property of denoting a plurality that they have in common with plural count nouns. Assuming an algebraic semantics, as established by Link (1983), these denotational differences are best illustrated in Figure 1, which represents a complete join semi-lattice.

Figure 1: The denotations of count and mass nouns from Chierchia (1998)



In a model where there are three distinct elements a, b and c, the extension of singular count nouns like *jewel* is a singularity: a set of atoms that have no smaller subparts. The PL morpheme applies to that set of atoms and returns just the sums of those atoms (i.e., an exclusive plurality). The extension of a mass noun like *mud* or *jewelry* is an inclusive plurality: a set that is true of minimal elements, not necessarily atoms, and their sums. In other words, mass nouns have minimal parts, like singular count nouns, and their sums, like plural count nouns. The difference between count and mass noun denotations lies in that the latter "do not single out a set of atoms, but a whole, qualitatively homogeneous sublattice" (Chierchia 1998a, p.68). This homogeneity, or lack of atomic granularity, cannot provide a basis for counting and it is the reason why numerals

– and by extension cardinality measurement – are disallowed with mass nouns.[38] Chierchia takes the inherent plurality of mass nouns as the source for their incompatibility with PL.

On the basis of this analysis, Chierchia then proposes that determiners may lexically encode one of the three functions in (81). $\mathscr{D}$ is all potential domains, '*' is Link's (1983) sum-closure operation and AT is the set of atoms in $\mathscr{D}$.

(81) a. Singular function: S is a function from subsets of $\mathscr{D}$ to truth values, such that for any set X, $S(X) = 1$ iff $X \subseteq$ AT

b. Plural function: P is a function from subsets of $\mathscr{D}$ to truth values, such that for any set X, $P(X) = 1$ iff for some $Z \subseteq$ AT, $(^*Z - Z) = X$.

c. Non-Singular function: $\cup$ is a function from subsets of $\mathscr{D}$ to truth values, such that for any set X, $\cup(X) = 1$ if from some $Z \subseteq$ AT, $P(Z) = X$ or if $^*X = X$.

Exclusively singular count determiners (e.g., *every, each*) encode the singular function in (81a), and are defined only if their restrictor denotes a set of atoms. Exclusively plural count determiners (e.g., *several*) encode the plural function in (81b) and are defined only if their restrictor denotes a set of sums of atoms. Non-singular determiners encode the function in (81c), and are defined only if their restrictor denotes sums. Determiners that do not encode any of these functions are always defined, and thus unrestricted (e.g., *the, some*). Chierchia's gaps in (3) follow as a consequence of this theory: there is no determiner that encodes a function f defined iff the noun's denotation is a set of atoms or a set of (non-atomic) minimal parts and their sums; and there is no determiner that encodes a function f' defined iff the noun's denotation has atoms or sums of those atoms.

However, there are some issues with this theory as it stands. With respect to D-Classes, while able to explain why there is no determiner that selects mass and singular count nouns only, the theory does not predict D-Class 3: count-only Ds regardless of number-marking. In addition, by virtue of assuming that *much* and *many* are lexically independent of each other, the QD-markedness generalization is lost, and so is the D-gap concerning the lack of mass determiners.

Beyond the domain of determiners, it cannot be the case that PL requires its (syntactic) complement and (semantic) argument to be a SG-marked count noun: (i) plural count nouns are just a subset of plural-marked nouns and (ii) PL, by itself, does not entail countability either, e.g., (25). From (i), it also follows, as a consequence, that the inherent plurality of mass nouns is independent of their (in)compatibility with plural marking. Relatedly, (ii) if counting requires atomic reference, object mass nouns must have it contrary to Chierchia's (1998a, 71) claims.

9.2 Cowper and Hall (2014)

Cowper and Hall (2014) propose a theory of the count/mass distinction based on different number features. Singular count NPs are unspecified for any features, while mass and plural count NPs form a natural class: they are both [Non-Atomic]. To further distinguish between mass NPs and plural count NPs they propose that the latter are also marked for the feature [Discrete], which is contained by [Non-Atomic]. The bundle [Non-Atomic, Discrete] spells-out plural on the N and the D heads. [Non-Atomic] is in charge of introducing the property of cumulativity, and [Discrete] ensures that the NP has separable individuals (i.e., atoms) that can be counted. A schematic representation of the feature distribution is in (82) from Cowper and Hall (2014, p.69, ex: 10).

(82)

a. Singular Count	b. Mass	c. Plural Count
Ø	[Non-Atomic]	[Non-Atomic, Discrete]

This proposal also suffers from several issues. With respect to the D-Classes, it undergenerates; in particular, as it relates to D-Class 1. Because [SG] is syntactically absent, given their privative feature system, it is impossible for a probe on D to enter an Agree-dependency with a potential SG-marked goal. Consequently, D-Class 1 is universally ruled out; and, because singular and plural count nouns do not form a natural class, D-Class 3 is also ruled out. In fact, their approach predicts that D-Class 1 and D-Class 4 are indistinguishable: the Ds underlying both exclusively singular count and unrestricted determiners must be underspecified.

Additional concerns include the following. If [Discrete] is what makes an NP countable, ob-

ject mass nouns should not only be marked for [Non-Atomic] but also for [Discrete]. But that wrongly predicts that object mass nouns are indistinguishable from plural count nouns. What is more, if the bundle [Non-Atomic, Discrete] spells out plural on N and D, we expect expressions like *furnitures* to be grammatical, and yet they are not. While they do not discuss plural mass nouns, their non-countable properties and their being plural-marked seem to be at odds with their system as well.

9.3 Haslinger et al. (2025)

Unlike the other two proposals, the focus of Haslinger et al. (2025) is not the count/mass distinction but the availability, or lack thereof, of distributive interpretations of universal quantifiers.[39] They propose the Distributivity-Number-Generalization: if the restrictor of a universal quantifier is singular count, the quantifier is understood distributively; if it is non-singular (i.e., mass or plural count), the quantifier is understood non-distributively. They show that the generalization holds for languages like English, where the vocabulary items for distributive and non-distributive universal quantifiers differ (e.g., *every, each* vs. *all*), and languages like Western Armenian, where the same vocabulary item is used (e.g., *amen* 'every/all').

They hypothesize that universal quantification in natural language is encoded by one morpheme (i.e., $\mathcal{Q}\forall$) and that said morpheme has a unified semantics. The distributive or non-distributive interpretations arise as the result of the semantics of $\mathcal{Q}\forall$'s restrictor argument: if quantized, in the sense of Krifka (1989), the distributive interpretation obtains; if cumulative, the non-distributive one does. This is schematized in (83).

(83) a. $[\![\textit{every student}]\!] = [\![\mathcal{Q}\forall]\!]([\![\mathsf{QUANT}(P)]\!])$ distributive

b. $[\![\textit{all students}]\!] = [\![\mathcal{Q}\forall]\!]([\![\mathsf{CUM}(P)]\!])$ non-distributive

While semantic in nature, at the core of the proposal is the idea that quantifiers interpreted distributively lexicalize a morpheme, or series of morphemes, ONE. Thus, the VI items for English universal quantifiers are as in (84). These differ from Western Armenian in that the universal quantifier does not lexicalize ONE, shown in (85)

(84) a. $\mathcal{Q}\forall \Leftrightarrow$ *all*

b. $[\mathcal{Q}\forall\ [\text{ONE}_{\emptyset}]] \Leftrightarrow$ *every*

c. $[\mathcal{Q}\forall\ [\text{ONE}_{\emptyset}\ [\text{ONE}_{\text{AT}}]]] \Leftrightarrow$ *each*

(85) a. $\mathcal{Q}\forall \Leftrightarrow$ *amen*

b. ONE $\Leftrightarrow$ *meg*

$\text{ONE}_{\emptyset}$ encodes a presupposition that the individuals in the set denoted by the argument NP do not overlap and ONE_{AT} encodes a presupposition that the predicate it combines with is true of atoms. These presuppositions preclude the restrictor argument of distributive quantifiers from being mass or a plurality. Number, thus, only plays an indirect role via the semantics of $\text{ONE}_{\emptyset/\text{AT}}$. By stipulation, however, both instances of ONE are restricted to environments in which the universal quantifier combines with a singular NP.

By and large, the insights from Haslinger et al.'s (2025) proposal and the insights from the one here are not incompatible with each other. For example, like them, here, universal quantification is encoded by one and only feature: [UNIV] from Beghelli and Stowell (1997). Differences between *each* and *every* are encoded via the feature [DIST], also from Beghelli and Stowell (1997). Similarly, nothing crucial differs in the extensions of count and mass nouns across the two proposals. However, where the two proposals differ is in the role of Number, which I advocated to be central for the count/mass distinction and the distribution of determiners. Below, I outline some challenging aspects for Haslinger et al.'s (2025), suggesting that a more syntactico-centric approach might be a better fit.

Under my proposal, because the D head that spells out *every* and *each* bears the set of probes $\{u\text{IND},\ u\text{SG}\}$ and these must be valued via Agree, their restrictor (i.e., NumP) is always going to denote a set of atoms. In other words, because of the satisfactory Agree relation, the distributive interpretation is the result of composing a singular count restrictor with a [UNIV]-marked D. The distributive semantics, thus, are enabled by, and follow directly from, the syntax. This explanation is superior to Haslinger et al's, for who the syntax of ONE has to be stipulated.[40]

Relatedly, if the vocabulary items for universal quantifiers interpreted distributively in English-type languages lexicalize ONE, it is not expected to find the same vocabulary item in the plural form. This is because (i) ONE is stipulated to only occur in cases where the NP is singular, and

(ii) it introduces a singularity presupposition. A prediction of this system is that D-Class 3 cannot include universal quantifiers. However, as shown with the Spanish data in this paper, *todo(s)* is such an example, e.g. (44).[41] St'át'imcets *zí7zeg'*, as acknowledged in Haslinger et al. (2025, p.3204), is potentially another one. These facts receive a straightforward explanation under the syntactic approach.

The reason why the morphosyntax and semantics of number only plays an indirect role in Haslinger et al. (2025) is due to their assumed syntax for mass nouns. Namely, because both singular count nouns and mass nouns trigger singular agreement, Haslinger et al. (2025) conclude that they must be [SG]-marked and have the syntax in (86). Hence, the driving force of the distributive interpretation cannot be just the [SG] feature on the NP.

(86) [SG [n $\sqrt{\text{WATER/STUDENT}}$]]

However, the claim that mass nouns encode [SG] deserves independent motivation beyond singular agreement: singular agreement can emerge as the default form of agreement in the absence of Number (e.g., Nevins 2007, 2011, Preminger 2014, Coon and Keine 2021, Toquero-Pérez 2024). In addition, by virtue of sharing [SG], mass and singular count nouns purportedly form a natural class, which leads to predicting a class of determiners that is compatible with these nouns to the exclusion of plural count nouns. However, this is precisely one of the natural classes argued to be impossible, both in Chierchia (1998a) and this paper.

Given these considerations, the syntax of nominal expressions, in particular Number, plays a central role in determining the natural classes of determiners available cross-linguistically; and the differences in syntactic structure of the target nominal, in concert with its semantic properties, can affect the interpretation of the individual determiners.

10 Conclusion

This paper has focused on the distribution of determiners as illustrated by the count/mass distinction. In particular, building on previous work (e.g., Doetjes 1997, 2021, Chierchia 1998a,

Borer 2005a), it has aimed at (i) establishing the empirical categories of determiners that can be observed across languages, and (ii) at uncovering what constitutes a possible and an impossible natural class of Ds.

What makes a group of Ds form a natural class is sharing identical sets of probes, which must be valued by Agree. This, paired with a feature-based approach to the count/mass distinction (Toquero-Pérez 2024, 2026), led to explaining the distribution of determiners into five possible natural classes as well as correctly ruling out two that are impossible. The features available in the extended projection of the noun facilitate what is and what is not a possible natural D-Class. The gaps follow from the fact that the relevant nominal expressions have no features in common.

In the latter respect, one of the contributions has been to argue that there are no mass-only Ds. A purported counterexample involved QDs. Making the case that QDs were not to be understood as mass determiners was particularly challenging because of the inter-speaker variation observed in English. However, it was shown that that the vocabulary items lexicalizing QDs are conditioned by plural even in cases where there is variation. Hence, QDs are best understood as cumulative underspecified (i.e., D-Class 4) or plural probing Ds (i.e., D-Class 5). The cases where the markedness contrasts have been neutralized are the result of syntactically conditioned morphological variation: plural impoverishment.

Relatedly, an important finding is concerned with the markedness of plural impoverishment on D, and how languages seem to differ with respect to the scope of this operation. In the case of English, it seems like plural impoverishment is a rather regular rule across nodes of category D. This finding receives independent support from the pronominal paradigm (e.g., Harley 2008). As a result of this generalized plural impoverishment, we observe large amounts of syncretisms. These syncretisms are, however, largely absent in languages like Spanish, where plural concord is the unmarked option and plural impoverishment is much more marked. This tension between impoverishment and concord can potentially shed some light on our understanding of variation in the encoding of number concord. A working hypothesis could be to say that, in English-type languages, plural impoverishment is responsible for the general lack of number concord.

All in all, by looking at the morphosyntactic and semantic properties of the nominals that determiners combine with, the proposal has laid out the foundation for probing into D-terminals and establishing why certain Ds form a natural class. As a result, we have increased our understanding of the predicted and attested D-Classes as well as any potential gaps. Languages may only instantiate some of the possible classes, and while this deserves further explanation, it should not be taken as evidence against the proposal. In fact, variation could be the result of (a) idiosyncratic differences in the inventory of features that D can inherently bear and/or (b) differences in the conditions that need to be satisfied at the interfaces, both in terms of lexicalization and interpretation. The gaps, on the contrary, are predicted to be universal across the determiner systems of natural languages.

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Notes

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[1]These are not the only properties. See references in text for more.

[2]The English judgments come from 20 native speakers of different varieties of North American English. Unless noted directly in the text, speakers' judgments were uniform. The Spanish judgments come from 20 native speakers of Peninsular Spanish.

[3]Some other examples include *dregs, suds, brains, goods* or *valuables*.

[4]Another diagnostic for countability is concerned with dimensional adjective modification: only countable nouns can be modified by dimensional adjectives like *big, small* (e.g., Schwarzschild 2011, Deal 2017)

[5]Imagine the following context: Frank saw two small blobs of fumes, and Robin saw one big blob of fumes.

[6]A possible context for (14b) is the following: the Spanish government and the US government both sent provisions to an affected town: the former sent a red truck with 60 kilos of provisions contained in 6 boxes; the latter sent a blue truck with 30 kilos contained in 10 boxes. If the relevant intended dimension of measurement was cardinality, as in the case of countable nouns, the sentence in (14b) would not be interpreted as true in said context.

[7]For this, see also Rothstein (2021).

[8]The idea is that individuation of a nominal root happens at the 'lexical' level, which, within non-lexicalist approaches to morpho-syntax like Distributed Morphology (Halle and Marantz 1993), is as close to the root as possible; in this case, this is the categorizing head that the root adjoins to. For Bale and Barner (2009), there are two *n*s: one marked [COUNT] and the other unmarked. This *n*[COUNT] imposes what they call an individuating semi-lattice on the root. The crucial component of the individuated semi-lattice is that it has atoms as minimal parts. For Deal (2017) individuation is encoded via an abstract morpheme that is located between the root and Num terminals. Deal's individuating morpheme makes the predicate denoted by the root true of atoms. These ideas are very much in line

with what is being adopted here.

[9]Determining what counts as an atom is left underdetermined here. For some discussion and details on this see e.g., Rothstein (2010) and Sutton and FIlip (2016, 2021).

[10]Whether numerals are introduced in the specifier of NumP or as the specifier of their own functional head is orthogonal for our purposes. See Scontras (2013, 2022), Pancheva (2022, 2023) and Toquero-Pérez (2025) for the latter.

[11]The denotations of [SG] and [PL] follow insights from Harbour (2007, 2011, 2014), Wellwood (2018, 2019) and Martí (2020b,a). For Wellwood (2018, 2019) the denotation of [PL] is as in (87). She proposes a structural containment relation according to which the representation of plural XPs contains singular: [PL [SG $\sqrt{\text{ROOT}}$]]. Effectively, Wellwood's [SG] is what I am calling [IND]. In addition, the denotation of the plural morpheme encodes a presupposition that its first argument be atomic, which is to be understood as in (87a).

(87) $[\![[\text{PL}]]\!] = \lambda P\text{: Atomic}(P).\lambda X.\forall x(X(x) \rightarrow P(x))$

a. Atomic(P) = a predicate P is Atomic if for all x in P, x is an atom

b. atom(x) = for all x, x is an atom if there is no y such that $y \prec x$

For Harbour (2007, 2011, 2014) and Martí (2020b,a), the denotation of the plural morpheme is in (88). Their definition of the function atom is the same as my definition of minimal part.

(88) $[\![[\text{PL}]]\!] = \lambda P.\lambda x.P(x) \wedge \neg\text{atom}(x)$

$\text{atom(x)} = \neg\exists y[y \prec x]$

[12]Toquero-Pérez (2026) observes that, cross-linguistically, the root morphemes that participate in the class of object mass NPs also participate in the class of count NPs giving rise to doublets: *jewelery/s*, *kitchen-ware/s*.

[13]The idea behind this denotation is to capture the intuition that object mass nouns such as *jewelry* or *kitchenware* do not simply refer to a set of jewels/kitchens etc. but to a set in which the members are related in some way to the individual jewels or kitchens. This relation between the members, which is underspecified, is what Corbett (2000, p.141) refers to as the 'cohesion of a group', and it also re-

sembles the relation between the focus and its associates in associative plural constructions, e.g. Tomioka (2021).

[14]The distribution of *which* parallels *one*-substitution, a phenomenon which is also exclusive to (singular/plural) count nouns (e.g. Bloomfield 1933, Harley 2005, Payne et al. 2013, Bale and Gillon 2020, Toquero-Pérez 2024).

(89) I talked about the brown jewel(-s) and you talked about the black one(-s).

(90) * I talked about the brown mud/fume-s/jewelry and you talked about the black one(-s).

[15]The ungrammaticality of *which* with mass nouns is also found in relative clauses:

(91) a. I saw the mud/fumes/jewelry (*which) you told me about.

b. I saw the jewel(-s) (which) you told me about.

[16]For example, Smith (2021) reports a corpus search showing that (i) few tokens with a plural mass noun accompanied by a QD were found, and (ii) of those tokens found, the QD chosen was generally *many*.

[17]The choice of lexical item does not seem to affect the *much/many* distinction either. This is illustrated below with *dregs* (i.e., sediments).

(92) a. As for dregs, we didn't find many/*much at the bottom of the glass.

b. A robust porter leaves many/*much more dregs at the bottom of a pint glass.

c. Few/*Little dregs were left at the bottom of the pint glass.

[18]*Cada* and *cualquier* do not inflect for gender. *Cualquier* should be understood as free choice *any*.

[19]Postverbal *ningún* is a negative concord item subject to matrix negation, but preverbal *ningún* is not (Bosque 1980, Vallduví 1994). Given that in English *a* is exclusively singular and *some* is unrestricted, translations of Spanish determiners *algún/un* will reflect their most idiomatic interpretation: 'a' when the noun is singular count, and 'a few' when it is plural count. In the singular, *todo* is best interpreted as 'every X' and in the plural it is best interpreted as 'every single one of the Xs'. In

both cases it is distributive. Similarly, *ningún* is translated as 'not a single X' and 'not a single one of the Xs'.

[20]For subtle semantic differences between *algún* and *un*, see Gutiérrez-Rexach (2001), Martí (2008, 2015) and Alonso-Ovalle and Menéndez-Benito (2010, 2011).

[21]The same agreement pattern is also observed with *tanto(-s)* 'as/so much' and the interrogative counterpart *cuánto(-s)* 'how much': if the noun is unmarked, plural-marking on the QD is ungrammatical, e.g. (93a); but if the noun is plural-marked, plural-marking on the QD is obligatory, e.g., (93b).

(93) a. tanto(*-s) barro/ mobiliario, cuánto(*-s) barro/ mobiliario
as.much.M-PL mud furniture how.much.M-PL mud furniture
Lit. 'as much mud/furniture, how much mud/furniture'

b. tanto*(-s) mueble-s/ vívere-s cuánto*(-s) mueble-s/ vívere-s
as.much.M-PL furniture.CT-PL provision-PL how.much.M-PL furniture.CT-PL provision-PL
Lit. 'as many furniture pieces/provisions, how many furniture pieces/provisions'

[22]From now on, I reserve Class for the abstract and model-theoretic natural classes of Ds, the lower case 'determiner' to refer to the surface realizations of D, and 'category' to refer to the five descriptively different groups of determiners identified in this paper.

[23]This approach of Agree as an infallible operation has been criticized by Preminger (2014).

[24]Lack of certain agreement distinctions across a paradigm does not entail that Agree has not occurred. There are many cases where the realization of features on a terminal node are not overt and yet that node must have participated in Agree. Take subject-verb agreement in English, for example.

[25]The definition of subset is from Bale and Reiss (2018).

[26]See Rullmann and Beck (1998) and Beck and Rullmann (1999) for evidence that *which* is [DEF]. For differences between *every* and *each*, see Beghelli and Stowell (1997) and Gagnon and Wellwood (2011).

[27]The feature [DEM(ONSTRATIVE)] stands for what Cowper and Hall (2014) call [SPECIFIC].

[28]The motivation for [INDEF] is found in scope with respect to other operators such as negation. NPs

with non-definite determiners such as *algunos/unos* can take scope over negation, whereas non-definite bare NPs cannot (e.g. Carlson 1977, Wilkinson 1991, McNally 2004, Martí 2008): (94).

(94) a. A la reunión no asistieron alguno-s/ uno-s profesore-s.
to the meeting NEG attended some-PL a-PL teacher-PL
'The meeting was not attended by some teachers'

¬ > ∃: it is not the case that any teachers attended the meeting'

∃ > ¬: there are some teachers that didn't attend the meeting'

b. A la reunión no asistieron profesores.
to the meeting NEG attended teacher.PL
'The meeting was not attended by teachers'

¬ > ∃: it is not the case that any teachers attended the meeting'

*∃ > ¬: there are some teachers that didn't attend the meeting'

The contrasts can be explained if the scope-taking DPs are marked for [INDEF], while non scope-taking DPs are truly unmarked for any (in)definiteness feature. Further evidence supporting the fact that true indefinites, i.e., [INDEF]-marked elements, are subject to certain syntactic properties such as movement, scope or clitic left dislocation, is found in e.g., Fodor and Sag (1982), Reinhart (1997), Kratzer (1998), Arregi (2003), Espinal and Cyrino (2022).

[29]I would like to note that (64) does not pose any issues for the D-Classes analyzed in §6.1. This is so because Ds from D-Class 2 and D-Class 3 have either a plural or Number probe, respectively. This ensures that, when [PL] is part of the syntax, it is always licensed.

[30]For a similar analysis of syncretisms in pronominal paradigms, see Harley (2008).

[31]See Deal (2016, 2017) for a similar analysis of cumulative quantifiers in Nez Perce.

[32]Mass nouns are cumulative because if *x* is water/furniture and *y* is also water/furniture, then their sum is also water/furniture. Similarly, plural count nouns like *books* are cumulative because adding books to books is still books. In contrast, singular count nouns are not cumulative: the sum of two separate books is not a book.

[33]An argument in favor of the cumulativity restriction hypothesis comes from the following observation: the relevant subset of non-singular D-Class 4 and D-Class 5 is limited to those expressions

that encode measure or measure-like functions. These functions assign a dimension of measurement to the predicate that they apply to and provide a basis for ordering. That is, dimensions of measurement are structure-preserving, just like part-whole relations are (Cartwright 1975, Link 1983, Krifka 1989). What is more, dimensions of measurement applied to nominal predicates must be monotonic (Schwarzschild 2006): if for two objects that stand in a part-whole relation, the measure of the part is smaller than that of the whole. Because singular count nouns lack such ordering relations, these functions cannot be applied to them.

[34]The idea that some surface forms which do not correspond to 'lexical' items are comprised of a root/lexical element and a functional head can be found in e.g., Lowenstamm (2015), De Belder and van Craenenbroeck (2015) and Gouskova and Bobaljik (2022). For the particular case of QDs, see Dunbar and Wellwood (2016). What I am representing as a measure root here is what the latter authors represent as an abstract morpheme MUCH.

[35]I am assuming that roots are adjoined in the syntax; roots then undergo some post-syntactic operation that makes them local to the relevant categorizing head (e.g. Matushansky 2006, Harley 2014, Merchant 2019, Folli and Harley 2020). Thus, when Agree occurs, the structure is as in (95), where the root is an adjunct to DP:

(95) $[_{\text{DP}}\ \sqrt{\text{MEAS}}\ [_{\text{DP}}\ \text{D}_{[u\text{PL:\_}]}\ [_{\text{NumP}}\ \text{Num}_{[\text{PL}]}\ \ldots]]]$

[36]We can speculate that possibly the specific Impoverishment rule in (80) is a subcase of the more generalized Impoverishment rule in (70a). That is, the following unidirectional entailment might hold: the availability of the rule in (80) in a grammar $\mathbb{G}$ is dependent on the availability of the more general rule in (70a), but not the opposite. Taking an approach to (synchronic and diachronic) variation in terms of dependent hierarchies (e.g., Baker 2008a, Roberts 2012, 2019, 2022), having/not having the general rule can be thought of as a higher level parameter regulating overt surface realizations of agreement across a large set, or naturally definable class, of functional heads: definites and indefinites. On the contrary, having/not having the less general rule can be thought of as a low level (micro) parameter, which does not affect a large set of functional heads, but it is restricted to a small and lexically definable subclass: measure roots. It is this very restricted distribution that is responsible

for the 'instability' of the phenomenon, making it more likely to be subject to variation.

[37]A reviewer wonders about the proper treatment of a noun like *majority*: it is compatible with *a* making it seemingly singular count, and yet it does not seem to true of minimal atomic parts which satisfy the predicate *majority*. Upon closer examination, however, the situation is more involved: *majority* behaves like neither a (singular) count nor a mass noun. For instance, unlike most singular count nouns, it lacks a plural counterpart, e.g., (96a); and it cannot occur with the other exclusively singular determiners like *each/every* or numeral *one*, e.g., (96b). Unlike all mass nouns, it cannot occur bare in argument position: (97b).

(96) a. * The majorities of students voted.

b. * Each/Every/One majority of students voted.

(97) a. I saw furniture/water.

b. I saw *(a/the) majority of students.

I want to note that *Majority* instead behaves like a nominalized adjectival superlative similar to *the largest part*. In addition to its adjectival base and the fact that superalives can be introduced by *a* (e.g., Herdan and Sharvit 2006), *majority* is compatible with *by*-measure phrases which, as pointed out by Matushansky (2008), can modify superlatives. This is shown in (98). Count and mass nouns in (98d) do not accept these measure phrases.

(98) a. John is the tallest (boy) by the factor of three.

b. They are a/the majority of students by the factor of three.

c. They are the largest part of the students by the factor of three.

d. * They are (the) students / It is (the) furniture by the factor of three.

Hence, it is likely that *a/the* is realizing some terminal node within the superlative constituent (e.g., Szabolcsi 1986, 2012, Krasikova 2012). I leave a more detailed comparison and the analysis for future work.

[38]Note, however, that this is not entirely accurate given that object mass nouns like *jewelry* or *furniture* are measured in terms of cardinality (Bale and Barner 2009). Hence, they must single out the atoms in their extension.

[39]I am grateful to an anonymous reviewer for suggesting this work.

[40]This syntactic view can also accommodate the lexicalization differences observed in (85) for Western Armenian. Under this view, we can hypothesize that *meg* 'one' spells out the valued φ-features on D. D, in both English and Western Armenian, bears the same probes, (99); post-syntactically, Fission (Noyer 1997, Halle 1997, Embick and Noyer 2001) occurs in Western Armenian, splitting D into two nodes prior to VI (100a). VI rules target each node separately, (100b)-(100c).

(99) Syntax:

D[UNIV, *u*IND:IND, *u*SG:SG]

(100) Post-syntax:

a. Fission(D[UNIV, *u*IND:IND, *u*SG:SG]) → D[UNIV], D[*u*IND:IND, *u*SG:SG]

b. D[UNIV] ⇔ *amen*

c. D[*u*IND:IND, *u*SG:SG] ⇔ *meg*

[41]Importantly, the Spanish case cannot be reduced to a partitive construction. Like *every*, *todo* is ungrammatical with partitives.

(101) * todo(-s) de lo-s estudiante-s
every-PL of the.M-PL student-PL
Lit. 'Every of the students' (Int. 'Every single one of the students')