Chapter 23:
The comparative syntax of nominal quantifiers

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1 Introduction

Quantificational expressions pervade natural languages. Quantificational notions are needed for analyses of conditionals, modality, tense and aspect, as well as quantification over individuals, or nominal quantification, the primary focus of this chapter.

There is an extensive literature dating back to the 1980s on the typology of nominal quantification, a literature which is somewhat unusual in the extent to which it has been characterized by a collaboration between formal syntacticians, semanticists, and typologists. Book-length collections on quantification include Bach et al. (1995), Matthewson (2008), and Kook-Hee Gil & Tsoulas (2013). In addition, detailed descriptive questionnaires providing descriptions of quantification in a typologically diverse array of languages have been conducted in Keenan & Paperno (2012) and Paperno & Keenan (2017). The main orientation of these volumes is towards semantics and typology; we will draw on this body of work heavily, and try to orient its content as is relevant for the purposes of comparative syntax.

In very general terms, nominal quantification is typically described (e.g. in the papers in Bach et al. 1995) as falling into two basic categories: D-quantifiers and A-quantifiers. As they are most often used (e.g. by Partee 1995), these are general terms for syntactically related but heterogenous classes of quantifiers:

(1) a. *D-quantifier*: A nominal quantifier which forms a constituent with a DP, including quantificational determiners, quantifiers which requires a determiner, or quantifiers which are adjoined to DP.

b. *A-quantifier*: A (nominal) quantifier whose distribution is that of an adverb, a verbal auxiliary, or of a verbal affix.

The Basque quantifier *guzti* is a D-quantifier which requires a definite article to occur as its suffix (Etxeberria & Giannakidou 2010; Etxeberria 2012):

(2) Ume guzti*(-ak) etorri ziren.
child all-D.PL.ABS come AUX.PL

'All of the children came.' (Etxeberria 2012: p. 117)

The term D-quantifier is sometimes used to refer only to quantifiers which are narrowly D heads (e.g. in (Davis & Matthewson 2019)), but this definition excludes other quantifiers which form constituents with DPs. This distinction is relevant to some of the typological claims which have been made about quantifiers discussed in section 3.4.

An example of an A-quantifier is provided below, from Mayali, where the distributive quantifier *bebbe* is a verbal affix (Evans 1995):

(3) Gunj barri-**bebbe**-yame-ng.
kangaroo 3A.P-DISTR-spear-PP

'They each killed a Kangaroo.' (Mayali, Evans 1995: p. 221)

The term A-quantifier sometimes includes both quantifiers over times (like *always*) and A-quantifiers which only take nominal restrictions like Mayali *bebbe-*, hence the parentheses in the definition in **??**. The term also sometimes includes predicative uses of cardinality quantifiers equivalent to 'The children are three', but these are arguably not instances of quantification (see Section 3.2), so are not included. Finally, Partee (1995) includes the phrase 'argument structure adjusters' in her definition, to capture the observation for example that many Mayali affixal quantifiers do have argument structure effects. However, since this term describes a syntactic function rather than a syntactic distribution, and one which is only true of some A-quantifiers, it is excluded from the definition above.

Numerous examples of D- vs. A-quantification, as well as an overview of the syntactic subtypes of each, are provided in section 3. The fact that nominal quantification is so regularly expressed by both D- and A-quantifiers is unique to this category: no other nominal modifier finds such regular expression by adverbial content. Furthermore, many quantifiers show syntactically unique alternations between adnominal and adverbial positions, i.e. quantifier float, the topic of section 4.

After establishing basic notions of quantification (section 2) and surveying the many different syntactic realizations of quantification 3, section 3.4 discusses the claim of Jelenik (1995), Partee (1995), and others, that many polysynthetic langauges systematically lack D-quantification which has been shown to be false.

Section 4 surveys the cross-linguistic distribution of quantifier float, focusing in particular on the conclusion that it does not constitute a typologically uniform phenomenon. We will see that looking at quantifier float through the lens of the D- vs. A-quantifier distinction clarifies the properties of different floating quantifiers, in particular illustrating that certain classes of adverbial floating quantifiers and A-quantifiers are likely best analyzed as instances of the same syntactic phenomena which has been given two names.

This chapter has two limitations. First, it does not engage with the important literature on scope-taking mechanisms such as quantifier raising. For surveys of that topic, see, Beghelli & Stowell (1997), and Fox (2003), Dayal (2013), and see Abels and Dayal (this volume).

Second, this chapter does not contain a systematic survey of the literature on the exceptional movement of quantificational noun phrases, for example quantifier focus-movement in Hungarian (Kiss 1991; Szabolsci 1997; Surányi 2002), quantifier fronting in Mixtec (Ostrove 2018), or the scrambling of quantifiers to a preverbal position in Scandanavian (Svenonius 2000). This topic is excluded partly for reasons of space and partly because it is clear that these constitute quite distinct syntactic phenomena in different languages. A survey and comparison of these and similar phenomena across languages remains an important topic for future research.

2   Quantification as a semantic notion

This section provides a brief introduction to nominal quantification from a semantic perspective, and then turns to an examination of some syntactic universals of quantification proposed by Barwise & Cooper (1981).

2.1   *Semantic categories of quantification*

Most contemporary textbook treatments of nominal quantification take as their starting place the theory of generalized quantifiers introduced by Barwise & Cooper (1981).

Generalized quantifier theory treats D-quantifiers (just 'determiners' in this theory[1]) as higher-order transitive predicates, meaning that quantifiers must take two semantic arguments, each of which is a set. The first argument is typically called the *restriction*, which corresponds to the meaning of the NP complement of the determiner. The second set is the quantifier's *scope*; in many cases this is the rest of the clause that the DP is in.[2] So in an English sentence like the following:

(4) [TP [DP All [NP young children]] [T′ are happy]]

The word 'all' is the determiner takes the NP 'young children' as its restriction, and the T′ constituent 'are happy' as its scope.

The idea that quantifiers denote a relation between two sets can be understood by reference to the following examples

(5) a. All young children are happy.
     b. Some young children are happy.
     c. Most young children are happy.

The quantifier *all* in (5a) asserts that the set of young children is included in the happy set; the quantifier *some* in (5b) claims that at least one member of the set of young children is also in the happy set; while the quantifier *most* in (5c) says that more members of the set of young children are in the happy set than not. Hence, if (5c) is uttered in the context of the three children described above, we would have no guarantee that any of them were happy, only that they are likely to be. And while (5a) does guarantee that all three children are happy, it does so only by virtue of the inclusive meaning of universal quantification.

These relations can be captured with the set-theoretic formulas below:

(6) Let A = the set of children, B = the set of happy entities
     a. $A \subset B$ = 'All children are happy'
     b. $|A \cap B| > 0$ = 'Some children are happy'
     c. $\dfrac{|A \cap B|}{|A|} > 0.5$ = 'Most children are happy'

These three types of meaning roughly correspond to the three basic quantifier types (cf. Keenan 2012): universal quantifiers (*all*), existential quantifiers (*some*), and proportional quantifiers (*most*). Universal quantifiers claim that all members of the restriction are members of the scope. Existential quantifiers claim that at least one member of the restriction is a member of the scope, or, in the case of a negative existential quantifier like English *no*, that the intersection between restriction and scope is the empty set. Proportional quantifiers, which include *half* or *most* make claims about what proportion of As are Bs. Some cardinal quantifiers (see section 3.2) have a life as both existential and proportional quantifiers (Partee 1988). Consider the following pair:

(7) Many children like vegetables.
(8) Many of the children like vegetables.

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[1] For Barwise & Cooper (1981), the entire DP is a (generalized) quantifier. I will follow in this paper the more common syntactic practice of describing only the determiner or other D/A-quantifiers as 'quantifiers'

[2] See Szabolcsi (2010) for a more detailed overview of the semantics of quantification, and Keenan (2002) for an overview of generalized quantifier theory including historical contextualization. Most formal semantics textbooks contain introductions of these core concepts as well.

Sentence 7 only requires that there be some number of children who like vegetables, even if the great majority do not; this is an existential reading. Sentence 8 suggests that, of the contextually relevant set of children, a relatively high proportion like vegetables; this is a proportional reading.

The fact that quantifiers take two arguments, one an NP and the other some semantically partitioned portion of the clause, provides a helpful explanation for why they seem to pattern as D- vs. A-quantifiers. In the former case they are attaching to their restriction; in the latter case they are attaching to their scope.

Perhaps because they are directly affixed to their scope argument, A-quantifiers often have more fixed scopal possibilities than D-quantifiers, which often show scopal variability. Compare the two sentences below, with (10) representing a case of quantifier float (section 4):

(9) All young children aren't happy.

(10) Young children aren't all happy.

Sentence (9) is ambiguous between two meanings: i) no children are happy, or ii) some children are not happy. To derive meaning (i), the clausal negation realized on *aren't* is included in the scope argument of *all*, i.e., it is part of the second set that is its second argument (11a). For meaning (ii), negation somehow escapes the scope of *all*, perhaps because the subject reconstructs to its vP-internal position (McCloskey 1997). As a result, the scope argument of *all* is simply the predicate *happy*, as shown in (11b). This quantificational relation between two sets, familiar from (6a), is itself negated:

(11) Let A = the set of children, B = the set of happy entities
   a. A ⊂ not B = 'All children are such that they are not in the set of happy entities, i.e. no children are happy'
   b. not(A ⊂ B) = 'It's not the case that all children are happy, equivalent to 'some children are not happy'

Interestingly, sentence (10) only has the second meaning (see e.g. Boškoviç 2004), and this scope is marked transparently in the syntax: the floated quantifier *all*, an A-quantifier (see section 4.3), is attached below the negative auxiliary *aren't*.

2.2 *Some syntactic universals of quantification*

The following two syntactic universals for quantification were proposed by Barwise & Cooper (1981):

(12) NP-Quantifier Universal (Barwise & Cooper 1981: 177)
   Every language has syntactic elements (called noun phrases) whose semantic function is to express generalized quantifiers over the domain of discourse.

(13) Determiner Universal (Barwise & Cooper 1981: 179)
   Every natural language contains basic expressions, (called determiners) whose semantic function is to assign to common count noun denotations (i.e. sets) *A* a quantifier that lives on *A*.

As discussed in Partee (1995), these universals as stated are quite weak, as they only require that all languages have NPs which *can* be analyzed as generalized quantifiers, an analysis which is available even for definite articles (e.g. by Russell 1905). Partee proposes the more restrictive (and hence more interesting) version of (12) below:

(14)   NP-Quantifier Universal (Stronger form) (Partee 1995: p. 542)
       All languages have *essentially quantificational* NPs, i.e., NPs which can be analyzed
       as generalized quantifiers but not reasonably as referential or predicative.

Partee (1995), along with Von Fintel & Matthewson (2008), conclude that the strong form
of the NP-Quantifier Universal in (14) has been falsified, based on the proposed absence
of D-quantifiers in Salish (Jelenik 1995), Mohawk (Baker 1995), and other languages.
We will revisit this discussion after introducing the different class of quantifiers in more
detail in the following sections; that discussion will consider the possibility that Partee's
NP-quantifier Universal in (14) may actually have some chance of being correct, despite
earlier conclusions to contrary.

   While the universality of D-quantification is debated, no language has been claimed to
systematically lack A-quantification, so the following universal has a very good chance
of being true:[3]

(15)   A-Quantifier Universal (Proposed)
       All languages have strategies for expressing nominal quantification using adverbs,
       affixes, or clause-level particles.

This universal is likely to be correct in part because A-quantifiers can be realized in
a number of ways in different languages (see section 3.3).   Additionally, we will see
in 4 that many floating quantifiers can be analyzed as A-quantifiers in their adverbial
occurrences, increasing the likelihood that (15) may be true.

3   The syntactic diversity of nominal quantification

Universal, cardinal, and proportional quantifiers have a wide variety of syntactic realiza-
tions in different languages. However, there are general regularities in the positions that
they occur in, the types of interpretations that they allow, and the restrictions they place
on nouns in those different positions.

   Section 3.1 discusses the syntax of D-quantifiers and the ways they pattern with other
determiners. Section 3.2 reviews the syntactic distribution of cardinal quantifiers, includ-
ing numerals and value judgment cardinals such as 'many' (under its cardinal reading)
or 'several.' Finally, A-quantifiers expressing nominal quantification are discussed in sec-
tion 3.3, where a preliminary typology is proposed for the different types of A-quantifiers.
Section 3.4 re-examines the proposed universals in 2.2, and reexamines in particular the
strength of the evidence against the NP-Quantifier Universal. Throughout the discussion,
we will see that the semantic properties of quantifiers generally provide the clearest ex-
planations for why they occur where they do.

3.1   The syntax of D-quantifiers

In cross-linguistic surveys of quantification such as Keenan & Paperno (2012) and Pa-
perno & Keenan (2017), the elements described for different languages as quantificational
determiners or D-quantifiers are not syntactically uniform, but fall into several different
position classes in different languages:

(16)   Classes of D-quantifiers

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[3] Partee (1995) makes a suggestion along these lines: "Examples of non-NP means of expressing quantification
can be found in many, perhaps all, languages that have NP quantification as well as in languages that
probably or definitely lack essentially quantificational NPs" (p. 546-547).

a. Quantificational determiners proper, which are those that are in complementary distribution with articles or other non-quantificational determiners

b. Quantifiers that obligatorily co-occur with other determiners

c. Adjoined D-quantifiers, i.e. those which optionally occur with determiners, or whose syntax is largely independent from determiners

d. Quantifiers in partitive structures

This section provides examples of these different positions for quantifiers along with their structural analysis.

First, many quantifiers occupy the same syntactic position as articles and other determiners, and are typically analyzed as D heads. Representative examples include English *every* and *some*. These quantifiers both license singular nouns which would otherwise require that a determiner to be present and compete with articles such as *a(n)* and *the*:

(17) a. every book

b. some book

c. the book

d. *the/a every book

e. *the/a some book

Even in languages without definite articles, some compete with demonstratives and can be analyzed as D heads. In Mandarin, for example, demonstratives and the universal quantifier *mei* both require numeral classifiers on their own, can occur above numerals, and are in complementary distribution with one another:

(18) a. Nei (yi)   ben shu   hen gui
         that (one) CLF book very expensive

         'Those give books are very expensive.'

b. Mei   (yi)   ben shu   dou hen gui
   every (one) CLF book all   very expensive

   'Every book is expensive.' (Mandarin, Yang 2001: p. 66)

c. *Nei mei   (yi)   ben shu   dou hen gui
    those every (one) CLF book all   very expensive

The idea that demonstratives are D heads in Mandarin was proposed by Tang (1990) and has been adopted in other work which admits a DP at all in Mandarin (Wu & Bodomo 2009; Jenks 2018). If demonstratives are D heads, then so too is the quantifier *mei*.

D-quantifiers which are D heads often place selectional requirements on the grammatical number or countability status of the nouns they take as their restriction. For example, English 'every' and 'a(n)' both require a singular count noun. A similar example is the Wolof quantifier CL-*epp* 'all,' (CL is gender/number concord), which, when it occurs before the noun, in complementary distribution with a (postnominal) definite article, requires a singular count noun:

(19)   b-epp xale   (*b-i)
       CL-all child (CL-DEF.PROX)

       'every child' (Wolof, Tamba et al. 2012: p. 917)

A prenominal indefinite/existential quantifier occurs in the same position in Wolof; the two quantifiers cannot co-occur either with each other or with the definite article, confirming that this position is a plausible D head (Tamba et al. 2012: p. 917). The restriction to singular count nouns is especially common with distributive universal quantifiers

roughly equivalent to English *each* (*each child/*children/*water*); such quantifiers are very likely to be D heads which combine directly with NP (Matthewson 2013: p. 36-37).

The second syntactic pattern for D-quantifiers is for them to co-occur with but require articles. In the Interior Salish language St'át'imcets (Lillooet) (Matthewson 2004), universal and proportional quantifiers must occur with the indefinite article *i …-a.*

(20) a. léxlex [takem i   smelhmúlhats-a]
    intelligent all DET.PL woman(PL)-DET

    'All (of the) women are intelligent.'

  b. úm-en-phkan [zí7zeg' i   sk'wemk"uk'wm'it-a] [ku kándi]
    give-TR-1SG.SUBJ each DET.PL child(PL)-DET   DET candy

    I gave each of the children candy.'

  c. [cw7it i   smelhmúlhats-a] léxlex
    many DET.PL woman(PL)-DET intelligent

    'Many of the women are intelligent.' (St'át'imcets, Matthewson 2004: p. 150)

St'át'imcets lacks a definite article, so *i …-a* spans definite and referential indefinite readings (Matthewson 1999; 2001).

In Greek (Giannakidou 2012), Basque (Etxeberria 2012), and Hungarian (Csirmaz & Szabolsci 2012), some quantifiers require an article while others do not. For example, the Basque universal quantifier *guzti* 'all' and proportional quantifier *gehien* 'most' must occur with the enclitic definite article attached to them:

(21) a. Ume guzti*(-ak) etorri ziren.
    child all-D.PL.ABS come AUX.PL

    'All of the children came.' (Etxeberria 2012: p. 117)

  b. Langile gehien*(-ak) berandu iritsi ziren.
    worker most-D.PL.ABS late arrive AUX.PL

    'Most of the workers arrived late.' (Basque, Etxeberria 2012: p. 124)

An obvious restriction on this pattern is that it is only meaningfully found in languages with a grammaticalized article system. Languages like these seem to provide relatively clear evidence that at least some quantifiers should be analyzed as a separate quantificational head Q which directly selects for a DP.

The third pattern is that some D-quantifiers freely attach to DPs regardless of whether an article is present, which I will refer to *adjoined D-quantifiers,* as the most obvious candidate for their analysis is as adjuncts to DP. In Basque, for example, while *guzti* 'all' requires the definite article, a second universal quantifier *oro* 'all,' can attach to nouns with or without a definite suffix (22a, 22b). While the definite suffix attaches to the quantifier *guzti*, with *oro*, the definite suffix attaches directly to the noun. *Oro* can occur with a complex demonstrative as well (22c).

(22) a. [Ikasle oro-k] lan bat egin zuten ikasgaia gaindi-tze-ko
    student all-ERG work one-ABS make AUX.PL subj-D.SG pass-NOM-GEN

    'All of the students must write a paper to pass the subject.'

  b. [Ikasle-ek   oro-k] lan bat egin zuten ikasgaia
    student-D.PL.ERG all-ERG work one-ABS make AUX.PL subj-D.SG
    gaindi-tze-ko
    pass-NOM-GEN

    'All of the students must write a paper to pass the subject.'

    c. [Ikasle hauek   oro-k] lan bat   egin zuten ikasgaia
        student these.ERG all-ERG work one-ABS make AUX.PL subj-D.SG
        gaindi-tze-ko
        pass-NOM-GEN

        'All these students must write a paper to pass the subject.' (Basque, Etxeberria 2012: p. 117-118)

In Wolof, the same quantifier *-epp* which occurs as a prenominal distributive quantifier in (19) can also take plural agreement and show up after the noun, in which case it patterns as an adjoined D-quantifier, occurring either with (23) or without (24) the definite article.

(23)   xale (%y-i)   y-epp
       child (CL.PL-DEF.PROX) CL.PL-all

       'all of the children' (Wolof, Tamba et al. 2012: p. 917)

(24)   Xale y-epp   bëgg-na-ñu ceeb.
       child CL.PL-all like-FIN-3PL rice

       'All children like rice.' (Wolof, Tamba et al. 2012: p. 917)

The presence of the definite article in Wolof and the other languages described above typically corresponds to a domain-restricted quantifier interpretation (quantifying over a contextually supplied set of children) versus a generic interpretation without the definite article.

    English *all* similarly patterns as an adjoined D-quantifier, as it can occur with or without a definite article or demonstrative:

(25)   a. All students attend class regularly.

       b. All the students attend class regularly.

       c. All these students attend class regularly.

A final example of an adjoined D-quantifier in a language with articles comes from the Coast Salish language Sḵwx̱wú7mesh (Squamish), which despite its genetic affiliation with St'át'imcets allows quantifiers to occur with or without determiners, although the determiner is "strongly preferred" (Gillon 2013: p. 28).

    In languages without articles, adjoined quantifiers quantify over the noun without any clear evidence of determiner status. For example, the Northern Sotho (Bantu) quantifier *ka moka,* 'PREP all' can occur either before or after the noun which occurs as its restriction (26a,26c), or in a floated position at the end of the clause, where it orders freely with other PPs (26b,26d):

(26)   a. Ba-na   [ka moka] ba raloka ka   ntle.
          CL2-child PREP all   SC2 play   PREP outside

          'All children are playing outside.'

       b. Bana ba raloka ka ntle [ka moka].

       c. [Ka moka] bana ba raloka ka ntle.

       d. Bana ba raloka [ka moka] ka ntle. (Northern Sotho, Zerbian & Krifka 2008: p. 395)

The option to float is a predictable property of adjoined D-quantifiers, as is the presence of agreement morphology often not present in quantificational D-heads, as will be discussed below.

Finally, D-quantifiers in many languages participate in a partitive construction, where they take partitive PP complements (typically headed by a adposition or a case equivalent to 'from' or 'of'). This pattern is highly productive in English, including most subtypes of quantifiers:

(27) All/each/most/some/three/several of the students attend class regularly.

The partitive construction typically exists alongside other strategies for D-quantification. For example, both St'át'imcets and Basque have partitive structures in addition to the D-quantifier patterns described above.

(28) zí7zeg' lhél = ki = smelhmúlhats = a ít-em
each from = DET.PL = woman = EXIS sing-MID

'Each of the women sang.' (St'át'imcets, Matthewson 2013: p. 25)

(29) Ikasle-etatik asko/gutxi/batzuk/hamar berandu iritsi ziren.
student-D.PL.ABL many/few/some/ten late arrive AUX.PL

'Many/few/some/ten of the students arrived late.'(Basque, Etxeberria 2012: p. 25)

The quantifiers which occur with partitive complement seem to be those which also can occur as independent DPs. For example, the English quantifiers which can occur in the partitive can occur independently when NP-ellipsis is licensed (*Three were outside, but most were inside*), but not *every*, which cannot be an independent DP, as it does not license ellipsis of its complement NP, nor can it occur in the partitive (**every of the students*). One the other hand, *everyone* can be an independent DP and its equivalent with stressed *one* can occur with a partitive complement (*every one of the students*).[4] While this generalization is true for English it is not clear the extent to which it is true for all partitive constructions across languages.

In summary, the four patterns below are all attested for D-quantifiers both within and across languages:

(30) a. Q (*D) NP   Quantifier as determiner
      b. Q *(D) NP   Obligatory quantifier-determiner co-occurrence
      c. Q (D) NP   Adjoined D-quantifier
      d. Q of DP   Partitive quantifier

What syntactic structures do the patterns in (30) correspond to? The structure for (30a) is clear: the quantifier is a D head with a NP restriction. The other three patterns will be proposed to correspond to a Q head above DP (30b and sometimes 30c), a DP adjunct (typically 30c), and a partitive, where Q often contains an anaphoric element (30d).
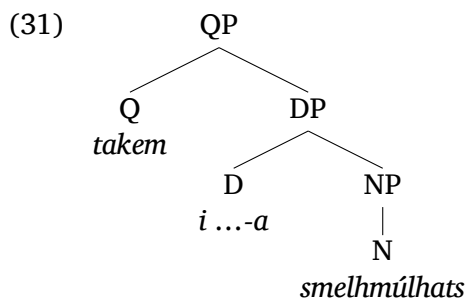
Beginning with the pattern in (30b), the explanation for why some quantifiers occur with determiners has been the topic of debate. (Matthewson 2001) proposes this requirement is universal, and proposes that D-quantifiers always take an individual-denoting DP (of type *e*) as their complement, in contrast to Barwise and Cooper's Generalized Quantifier analysis discussed in section 2.1 where quantifiers combine with a predicate.[5]

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[4] The fact that partitive constructions exist alongside constructions where Q and D must co-occur in St'át'imcets and Basque shows that the Q-D constructions cannot themselves be reduced to partitives, a point made in (Matthewson 2013).

[5] Semantically, Matthewson proposes that for quantifiers which take type-*e*, the quantification is over the (atomic) subparts of the plural individual denoted by the DP, illustrated for the distributive quantifier *zí7zeg'* Matthewson (2001: p. 154):

(1) $|[\text{zí7zeg'}]| = \lambda x \in D_e \,.\, \lambda f \in D_{\langle e,t\bot\rangle}.\; \forall y \leq x\, [\text{atom}(y) \rightarrow f(y) = 1]$

So the tree for the St'át'imcets QP in (20a) would be the following, where the function of the D head is to produce an individual-denoting DP.

(31)

```
              QP
           ╱      ╲
         Q          DP
       takem      ╱    ╲
                D        NP
             i …-a        │
                          N
                     smelhmúlhats
```

While Matthewson 2001 conjectures this structure is universal for D-quantifiers, Matthewson (2013) weakens this claim somewhat, concluding that this structure only applies for cases where quantifiers transparently combine with an article.

The structure in (31) assumes that quantifiers head a distinct functional projection above DP. This proposal was first made in Shlonsky (1991) to account for quantifier float in Hebrew (see below), and since then it is commonly assumed that quantifiers head their own projection.

Since Matthewson's work, it has been proposed that articles occur with D-quantifiers because they supply an overt contextual domain restriction to the quantifier (Giannakidou 2004; Etxeberria 2008; Etxeberria & Giannakidou 2010; Gillon 2013; Matthewson 2013). Here, 'contextual domain restriction' referes to the the ability of the article to restrict which contextually supplied set of children or workers are actually being quantified over (Westerståhl 1984; von Fintel 1994). This idea was taken up in Etxeberria (2005; 2008) and Etxeberria & Giannakidou (2010), who explicitly propose that the D and Q are base generated as a complex head in Basque (21a), which directly takes an NP complement:

(32)

```
             QP
          ╱      ╲
        NP          Q
        │         ╱    ╲
        N        Q      D
       ume     guzti   -a(k)
```
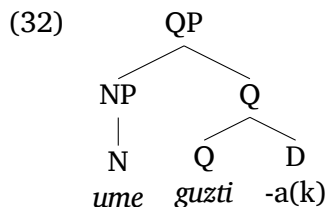
However, the syntactic motivation for such a structure is not particularly compelling, and I would like to suggest that the more widely assumed proposal in which quantifiers are a separate head above DP, as in (31), is sufficient to account for this structure.

First, the fact that the relevant quantifier requires a definite DP in Basque and Greek is best captured as an instance of syntactic selection, which would follow from the Q-head proposal in (31), where Q selects for D; clearly, as we have seen above, quantifiers in many languages happily occur without D heads, so the fact that they sometimes do is best encoded in the particular Q heads that have such a requirement. Second, the structure in (31) is fully compatible with a semantics where a definite article contextually restricts the DP—as definite articles typically do—and the quantifier then composes directly with that DP, as in the semantics in Matthewson (2001), hence, there is no compelling semantic reason to adopt the structure in (32). Third, there is strong tendency for 'all'-type Q-Determiners to occur more peripherally to the DP than the article (Matthewson 2013), suggesting separate head positions. Fourth, Matthewson (2013) observes that *all*-type quantifiers in many languages are able to occur with plural pronouns (*They saw us all*, *All of them left*.) in addition to definite DPs. If pronouns are DPs, the Q-head analysis

extends directly to these cases. The fact that D-quantifiers in Greek and Basque require definite articles, then, might simply indicate that those quantifiers syntactically select definite D heads. The fact that D is a suffix on Q in Basque could simply be explained by head movement from D to Q.
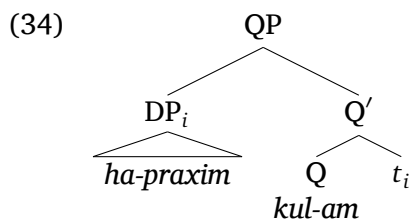
Compare this situation with adjoined D-quantifiers such as English *all*, which occur with or without a definite article, suggesting the absence of selection of a particular D head by Q. Matthewson (2001) observes that generic, determinerless, QPs such as English *all men* is facilitated by the independent availability of bare plurals, hence, does not need to be grammatically encoded in the quantifier. In summary, then, the structure in (31) can easily accommodate the Greek and Basque cases.

The cases of 'adjoined' D-quantifiers in (30c) likely fall under two analyses. The Q-head analysis of (31) can likely be extended to account for cases where the quantifier clearly functions as a head, as evidenced by strict word order, for example. Other instances of the adjoined D-quantifier structure would be better analyzed as adjunction of an independent QP to a DP.

In Hebrew, for example, both of these analyses are necessary. Hebrew is the language for which Shlonsky (1991) originally argued for a QP projection. This proposal was based on the alternation between agreeing and non-agreeing universal quantifiers in Hebrew, both of which can occur with the definite article. Non-agreeing quantifiers precede the DP (33a), agreeing quantifiers follow it (33b).

(33)   a.   Katafti   ʔet   **kol** ha-praxim   bi-zhirut
             I.picked ACC all   the-flowers with-care

             'I picked all the flowers carefully'

        b.   Katafti   ʔet   ha-praxim   **kul-am**   bi-zhirut
             I.picked ACC the-flowers all-3MPL   with-care

   '(same as 33a)' (Hebrew, Shlonsky 1991: p. 160)

Shlonsky proposes that QP in (33b) is derived from (33a) by Comp-to-Spec XP-movement, where the DP occurs in [Spec, QP], triggering Spec-Head agreement on Q:

(34)
```
                        QP
                      /    \
                 DP_i        Q'
                /   \       /  \
          ha-praxim   Q      t_i
                    kul-am
```

The DP in [Spec, QP] can then move to higher positions in the clause, facilitating the stranding analysis of quantifier float proposed by Sportiche (1988), discussed below.

There is another way of understanding the alternation in (33), informed by the Northern Sotho example in (26), which is clearly a DP adjunct. Like Hebrew *kul-am*, Northern Sotho *ka moka* can float. Hence, (33b) could also be analyzed as a DP with a right-adjoined QP:[6]

---

[6] From a compositional perspective the label of the node dominating DP and QP does not bear on which expression takes the other as its argument. In other words, there is no reason to think that a quantifier must take a DP as its complement to compose with it as its restriction; all that is required is a sisterhood relationship between some projection of DP and the QP.

(35)

```
              DP
          ┌────┴────┐
         DP         QP
         ╱╲         ╱╲
     ha-praxim    kul-am
```
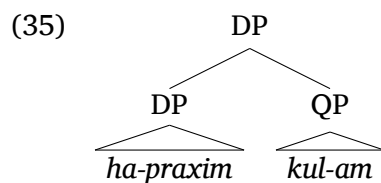
First, adjunction is often on the right in Hebrew, seen for example in the sentence-final position o the adverb *bi-zhirut* 'with care' the examples above. Second, the fact that the adjoined QP is an independent phrasal category, likely containing a null anaphor, is significant inasmuch as adjoined D-quantifiers very often have anaphoric distributions as well, meaning something like *all of them*. More recent analyses adopt adjunction, including Benmamoun (1999); Ott (2012) and Al Khalaf (2019), all of which argue that agreeing, postnominal quantifiers, are full anaphoric QPs which are adjoined to the host DP. This proposal also accounts for the behavior of Basque *oro* in examples such as (22b), which can freely attach to the right of the DP without interrupting the normal DP syntax, whereas the quantifier *guzti*, arguably a Q head taking a DP complement, attracts the definite article.

The final syntactic pattern for D-quantifiers is the partitive (30d), typically taken to have the following structure, in which the quantifier directly takes a PP complement:

(36)

```
         QP
       ┌──┴──┐
       Q     PP
       │   ┌──┴──┐
      all  P     DP
           │     ╱╲
           of  the children
```
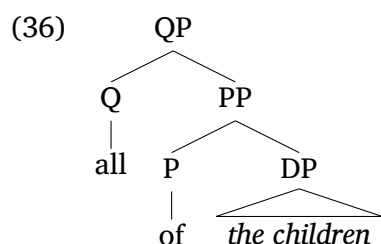
Partitives structures are often subject by the Partitive Constraint, which Barker (1998) argues should take the following form, first articulated in Ladusaw (1982):

(37) The Partitive Constraint can be stated … by requiring that the NP in a partitive phrase always denotes an individual (Ladusaw 1982, p. 238).

This constraint captures the observation that definite DPs and demonstratives can serve as the complement to partitive *of* while ruling out indefinite partitive complements and nested quantifiers:

(38) a. most of the children
      b. most of those children
      c. *most of children
      d. *most of all children

The most widely accepted analysis of the partitive constraint is semantic: *of* in partitive structures is semantically contentful, and it derives a predicate by abstracting over the subparts of its definite or referential plural DP complement. This 'of' predicate can then directly serve as a complement to a quantifier (see Ladusaw 1982; Barker 1998; Ionin et al. 2006, a.o.). Typological work has been conducted confirming that partitives are a crosslinguistically robust phenomenon (Seržant 2021); they are productive in languages without overt definiteness or partitive markers, such as Mandarin (Liao & Wang 2011).

The common thread between the various structures for D-quantifiers above is that the quantifier is the highest head or constituent in the noun phrase; this highest position is a crosslinguistically robust pattern. The semantics of quantification described in Section 2

provides an explanation for this generalization: quantifiers take two arguments, first their nominal restriction, then their scope VP. Hence, they typically occur at the periphery of the DP because they must take the entire DP as their semantic argument, enabling them to compose with the rest of the sentence as their scope argument.

3.2 The syntax of cardinal quantifiers

Cardinal quantifiers, adopting the terminology of Keenan (2012), are a class of nominal modifiers which include numerals (*one, two*, etc.) as well as value judgment quantifiers (*few, many, enough*). Both numerals and value judgments cardinals have modified counterparts (*more than two, quite a few, not many*).

(39) a. Three/Few/Enough young children are outside.
      b. More than three/quite a few/not many young children are outside.

Cardinal quantifiers alternate between two kinds of meanings, one quantificational, and another essentially predicative. In their quantificational uses, both simple and modified cardinal quantifiers have existential meanings. For example, the numeral in *three young children are outside* claims that the intersection of the set of young children (the restriction) and the set of entities that are outside (the scope) contains three members. 'Few' claims that the intersection is small in number, 'enough' claims that the number of individuals in this set meets some contextually specified standard.

Cardinal quantifiers are commonly found in one of four positions across languages: as main predicates, as nominal modifiers, as determiners, and in partitive structures; in the latter two uses, cardinal quantifiers seem to function as a D-quantifier and have existential semantics. Modified cardinal quantifiers seem to exclusively function as existential D-quantifiers, though they do not look at all like D heads.

First, cardinal quantifiers in many languages can function as main predicates of the clause. Basque once again provides a clear illustration: cardinal quantifiers can occur as predicates (40):

(40) Gonbidatuak [asko/gutxi/bost/bost baino gehiago] ziren.
      guest.D.PL   [many/few/five/more than   five]   be.PAST
      'The guests were many/few/five/more than five. '(Basque Etxeberria 2012: p. 144)

In contrast, the existential D-quantifier in Basque and universal quantifiers cannot be syntactic predicates (see Etxeberria 2012: p. 145), presumably because their semantics is inherently quantificational.

In some languages the predicative use of some cardinal quantifiers serves an existential or presentational function, as we see in the following examples of predicative value-judgement quantifiers in Moro (Kordofanian:Sudan):

(41) a. ðamala ð-ən:əŋ
          camel   CLð-INDEF
          'There's a camel.'
      b. jamala j-ə́m:ə́n
          camels CLj-some
          'There are some camels.'

  c. jamala j-oaɲá
   camels CLj-many

   'There are a lot of camels.' (Moro, Jenks et al. submitted: p. 236-237)

In Moro, predicative numerals pattern differently from the value judgment quantifiers and existential quantifiers above, in that numerals require the copula typically associated with predicate nominals to introduce them:

(42) a. ɲerá ɲ-a-d-ó   ɲ-əgətʃaŋ
    CLɲ.girls CLg-RTC-be-PFV CLɲ-two

    'The girls are two.' (= 'There are two girls.')

  b. ɲerá ɲ-a-d-ó   marlon
    CLɲ.girls CLg-RTC-be-PFV four

    'The girls are four.' (= 'There are four girls.') (Jenks et al. submitted: p. 254-255)

The pattern in (41) look like adjectival predicates in Moro, while the numerals in (42) are essentially patterning as predicate nouns (Jenks 2020), illustrating that not all cardinal numerals in Moro pattern as a single syntactic category.

 The second position for cardinal quantifiers, found in nearly every language, is internal to the DP. When they occur there, quantifiers can combine with other determiners, including in noun phrases which lack existential quantification, for example when they occur with definite articles, demonstratives, or other quantifiers:

(43) a. All/the/those three children are outside.labelcard3

  b. The/those few children still at school are playing outside.

Again we can see a representative example from Basque, where numerals occurs before the noun and can co-occur with the definite article:

(44) Zazpi lagun-ek bost oilasko-ak jan zituzten.
   seven fellow-D.plERG five chicken-D.plERG eat aux.pl

   'The seven fellows ate the five chickens.' (Basque Etxeberria 2012: p. 91)

In Moro, value judgment quantifiers pattern as adjectives in that they agree with the head noun:

(45) jamala j-oaɲ-á j-a-w-ó   n-ajén
   camels CLj-many-ADJ CLj-RTC-be.loc-PFV ADESS-mountains

   'Lots of camels are in the mountains.'

The 'weak concord' agreement pattern on weak quantifiers and adjectives is distinct from a 'strong concord' pattern which is found on demonstratives, possessors, and definite relative clauses (Jenks et al. submitted: ch. 8). Numerals again pattern somewhat differently in Moro, as only the numbers 1-3 show agreement, while higher numerals do not. Bantu languages show a similar pattern to Moro, as cardinal quantifiers generally show the inflectional and syntactic properties of adjectives, while universal quantifiers are distinct (Zerbian & Krifka 2008).

 As modifiers, cardinal quantifiers—and in particular numerals—occupy a position in the DP where they occur above intersective adjectives and below determiners, as has been shown in extensive typological work invstigating the relative typological order of demonstrative-numeral-adjective-noun (e.g. Cinque 2005). Even in this position, though,

it is possible to analyze cardinal quantifiers as intersective adjectives which retain a basic predicative semantics. So just as *friendly children* denotes the set of entities which are both friendly and children, *three children* can be interpreted as the set of pluralities consisting of which have three parts which are children.[7]

Third, cardinal quantifiers often function as existential D-quantifiers. For example, St'át'imcets allows quantifiers such as *cw7ít* many to occur in one of two positions, DP-internally, after the determiner (46), or in the initial position occupied by strong quantifiers (47).

(46) ít'-em   [i   cw7ít-a   smúlhats]
      sing-INTR PL.DET many-DET woman

      'A lot of women sang.' (Matthewson 1996: p. 302)

(47) [cw7ít i   ucwalmífew-a] ats'x-en-táli   [ta šqáx7-a]
      many   PL.DET person-DET   see-TRERG.EXTR DET dog-EXIS

      'Many people saw the dog.' (Matthewson 1996: p. 305)

The D-quantifier position for weak quantifiers in Salish is only possible in arguments which appear preverbally; this restriction is striking, as St'at'imcets, like most Salishan languages, is generally verb-initial. This restriction suggest they have undergone A′-extraction of some sort, and these preverbal quantifiers may obligatorily be subject to quantifier movement, as is the case for quantifiers in languages such as Hungarian (Kiss 1991).

It is not always clear whether cardinal quantifiers are occupying an adjectival position or a determiner position. In some cases, cardinal quantifiers cannot co-occur with definite articles or demonstratives, suggesting they are determiners themselves. This is true of the Moro quantifiers in (41). We see the same pattern below for cardinal quantifiers in Basque. Like most nominal modifiers, these quantifiers occur after the noun, though unlike adjectives, many cardinal quantifiers can also occur before the noun.

(48) a. Asko haur   etorri zen.
         many child-ABS come AUX.SG

         'Many children came.'

      b. Haur asko   etorri zen.
         child many-ABS come AUX.SG

         'Many children came.' (Etxeberria 2012: p. 97)

Artiagoitia (2006) argues that the prenominal position for such quantifiers is a specifier position, distinct from adjectives. The prenominal position is also the position occupied by numerals, with the exception of 'one' and 'two', which can also occur postnominally.

However, unlike adjectives and strong quantifiers, postnominal cardinal quantifiers cannot co-occur with a definite article:[8]

(49) Nerabe   asko(*-ak)   berandu iritsi ziren.
      teenager many(-D.PL) late   arrive AUX.PL

      'The many teenagers arrive late.' (intended) (Etxeberria 2012: p. 101)

---

[7] See Krifka 1999 or Landman 2004, for example, for semantic analyses of numerals and other weak quantifiers along these lines.

[8] See Etxeberria (2005: ch. 3) for discussion and an analysis of this fact in terms of domain restriction on the relevant quantifiers.

Recall that strong D-quantifiers, in contrast, required definite articles in Basque. The postnominal position for the weak quantifier could be analyzed as D, where it is functioning as an existential quantifier.[9]

The Basque data is representative of the larger pattern for cardinal quantifiers: they occur as predicates in many languages, but have a distribution in the noun phrase which is sometimes adjective-like, sometimes numeral-like (in that they share the same structural position as numerals), and sometimes determiner-like. This distinction is reflected in cartographic approaches to quantification, such as Zamparelli (2000), who propose that existential quantifiers generally occupy a lower head position than universal quantifiers do; this could simply be D in Basque, for example.

Finally, cardinal quantifiers, like D-quantifiers more generally, are very often available in partitive constructions. This was illustrated above in Basque (29), and below for a weak (value judgment or proportional) quantifier in St'át'imcets:

(50)   [**cw7it** i-lhél-ki   n-snek'wnúk'w7-a]   ats'x-en-an   i
        many   from-PL.DET 1SG.POSS-friends-DET see-TR-1SG.CONJ when
        nátxcw-as
        day-3SG.CONJ

        'I saw many of/most of my friends yesterday.' (St'át'imcets, Matthewson 1996: p. 50)

When cardinal quantifiers occur in partitive constructions, their interpretation is always as existential quantifiers. Additionally, partitives are often only structures which allow cardinal quantifiers to combine with definite restrictions.

The fact that cardinal quantifiers function essentially as D-quantifiers when they are associated with existential meanings is unsurprising for the reasons described at the end of the previous section: quantifiers must combine with an NP or DP restriction before they semantically compose with the rest of the clause.

3.3   The syntax of A-quantifiers

A-quantifiers are far less syntactically homogenous than D-quantifiers, and include quantificational adverbs and particles, verbal affixes, and quantificational auxiliaries. This term is sometimes applied to temporal or event-oriented adverbs such as 'always' or 'often', but this section will focus on nominally-restricted A-quantifiers.

A recurring theme in work on A-quantifiers is the claim that they are not true generalized quantifiers (see section 2), but should instead be analyzed as maximizing, distributive, or focus operators of some kind. This point will be flagged for the relevant A-quantifiers as they are discussed below. Systematic typological on A-quantification has not been conducted to my knowledge, and it is unclear the extent to which the heterogenous syntactic categories of A-quantifiers might correlate with the heterogenous semantic analyses which have been proposed for them. Still, a basic descriptive typology for different syntactic classes of A-quantifiers will be offered below.

Looking across languages, at least the following four classes of A-quantifiers are found; some terminology is novel and will be discussed below:

(51)   Morphosyntactic classes of (nominally restricted) A-quantifiers

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[9] In fact two cardinal quantifiers in Basque do occur with the definite article, unlike the majority which do not, in particular *franko* 'many' and *gutxi* 'few' (Etxeberria 2012: p. 101-102). One possibility is that these two quantifiers are proportional quantifiers when they occur with the definite article, as 'many' and 'few' often alternate between proportional and value-judgment meanings.

    a. Independent quantifiers (e.g. Passamaquoddy *psi(te)/psiw*))

    b. Quantificational adverbs (e.g. Mandarin *dou*)

    c. Quantificational affixes (e.g. Mayali *djarrk-*, Blackfoot *ohkana-*)

    d. Quantifier particles (e.g. Japanese *mo* and *ka*)

These labels are intended to be theory-neutral, as it is likely that these broad labels conceal finer-grained syntactic and semantic differences.

To begin, independent quantifiers are quantificational elements which freely attach to either DPs or clauses. The syntactic freedom of this class often corresponds with the ability to take either nominal or verbal restrictions. Consider the case of Passamaquoddy, which has two independent universal quantifiers *psi(te)~msi(te)* 'all' and *psiw~msiw* 'all,' both of which can occur in the following positions (Bruening 2008):[10] 1) directly modifying the DP (52), 2) discontinuous from the DP, for example clause initially (53), and 3) as adverbs, where they takes a verbal restriction with an exhaustifying meaning that could be paraphrased as 'completely' (54):

(52) Wespasahkiwik **msiw** skitapi-yik kotunka-htu-wok
      in.morning   all   man-3P   hunt-Plural-3P

      'In the morning, all the men go hunting' (Passamaquoddy, Bruening 2008: p. 77, citing Mitchell 1921/1976e, 17)

(53) **msite**=he 't-iy-ulti-ni-ya   naksqi-yik
      all=FUT   3-be.located-Plural-Sub-3P young.woman-3P

      'All the young girls will be there.' (Passamaquoddy, Bruening 2008: p. 88, citing Mitchell 1921/1976e, 5)

(54) Pahtoliyas **psiw** wap-sewe
      priest   all   white-dress.3
      'The priest is all (=completely) dressed in white.' (Passamaquoddy, Bruening 2008: p. 96)

Bruening demonstrates that elements are bona fide quantifiers in argument position by virtue of their ability to show variable scope with negation, for example.

In many of the languages which have been explicitly claimed to lack D-quantification, including Straits Salish (Jelenik 1995; Davis 2013) and Mohawk (Baker 1995), there is an independent quantifier. This early work assumed that by virtue of their ability to scope over verbal material and occur in adverbial positions, such quantifiers were necessarily adverbs. However, as discussed by Davis & Matthewson (2019), it is likely that in most cases where the independent quantifier is attached to DP it is interpreted as a generalized quantifier. Discontinuous noun phrases, particularly with determiners, are common in such languages as well (e.g. Bliss 2012), and so the flexible position of independent quantifiers does not constitute evidence that they are never generalized quantifiers. In other words, it is unclear whether independent quantifiers should be analyzed as ambiguous between an A-quantifier and a generalized D-quantifier, represent very free cases of quantifier float, or whether a general syntax and semantics can be given to quantifiers in both positions. We will return to this question in section 4.2, as one of the analyses proposed for adverbial floating quantifiers seems well-suited to independent quantifiers, once we see that the two classes of elements are difficult to distinguish.

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[10] The /m/ initial forms were used earlier in the 20th century, /p/ initial forms were in current use as of Bruening's writing.

The second category of A-quantifiers is quantificational adverbs, a term which I use only to describe quantifiers which are restricted to adverbial positions but which nevertheless take nominal restrictions. Here, the best studied case by far is Mandarin *dou* (Lin 1998; Xiang 2008; Liu 2018: a.o.), although we will see in section 4.3 that some floated quantifiers have been analyzed this way as well. *Dou* is required alongside strong quantifiers in subject position (55b), but also contributes universal quantification to regular plural subjects (56b):

(55)   a. Meige ren *(**dou**) mai-le   shu
           every man all   buy-Asp book
           'Everyone bought a book.'

         b. Suoyou-de ren *(**dou**) mai-le   shu
           all   man all   buy-Asp book
           'All the people bought a book' (Mandarin, Lin 1998: p. 219)

(56)   a. Tamen mai-le   yi-bu chezi
           they   buy-Asp one-Cl car
           'They bought a car.'

         b. Tamen **dou** mai-le   yi-bu chezi
           they   all   buy-Asp one-Cl car
           'They all bought a car' (Mandarin, Lin 1998: p. 201)

The preverbal position of *dou* is often described as adverbial (e.g. Liu 2018), but it has sometimes been analyzed as a head (Lin 1998: see, e.g.).

Mandarin *dou* is subject to the *leftness condition*, i.e., the requirement that the nominal restriction of *dou* must precede it within the same clause (Lin 1998). While subjects precede *dou* in their base position (55b-56b), objects must be fronted, for example to a topic position (57b), when they are associated with *dou*:

(57)   a. * Wo dou kan-guo naxie shu
             I   all   read-Asp those book
           'I read all of those books.'

         b. Naxie shu, who **dou** kan-guo
           those book I   all   read-Asp
           'I read all of those books.' (Mandarin, Lin 1998: p. 206)

A first-pass analysis of *dou* is as a universal A-quantifier. However, additional facts about *dou* suggest that this analysis is too simple. First, *dou* is only compatible with distributive readings (Lin 1998; Xiang 2008):

(58)   Tamen **dou** chi-le   yi-ge pingguo pai
       They   dou eat-Perf one-Cl apple   pie

      a. 'They each ate an apple pie.'
      b. *'They ate an apple pie (together)' (Mandarin, Xiang 2008: p. 228)

Additionally, *dou* has purely scalar uses, reminiscent of English *already* or *even*:

(59)   Yizhuanyan, haizi **dou** da   le.
       in.a.blink,   child dou grown Perf

      '(time flies!) In a blink of time, the child/children has/have already grown up.'
      (Mandarin, Xiang 2008: p. 228)

(60) Yuehan **dou** mai-le   yi   liang chezi.
     John   dou buy-Perf one cl   car
     'Even John bought a car.' (Mandarin, Liu 2017: p. 62)

Because of these facts, most analyses of *dou* analyze it not as a generalized universal quantifier but instead take another function as basic and derive the quantificational meaning as essentially epiphenomenal. There are several analyses along these lines: earlier analyses take *dou* to be a distributive operator (Lin 1998; Xiang 2008) or a maximality operator (Giannakidou & Cheng 2006; Cheng & Giannakidou 2009; Xiang 2008), while more recent analyses center on its role in managing alternatives, either as a likelihood-based scalar particle roughly equivalent to English *even* (Liao 2011; Liu 2017; 2018), or as a pre-exhaustification exhasutifier operating on subalternatives of its associated noun phrase (Xiang 2020). Collectively, this work is significant because the consensus is that the best-studied case of a quantificational adverb is not a quantifier at all, but rather a focus operator.[11]

  Third, some A-quantifiers are *quantifier particles*, a term used by Szabolcsi (2015) for functional morphemes such as Japanese *ka* and *mo*, which produce existential and universal quantificational interpretations, respectively, when they occur in construction with indeterminate pronouns such as *nani* 'what' and *dare* 'who':

(61) Dare-**mo**-ni/-ni-**mo** denwa-o   kaketa.
     who-MO-to/-to-MO phone-ACC rang

     '(I) called everyone.'

(62) Dare-**ka**-kara/-kara-**ka** denwa-ga   atta.
     who-KA-from/from-KA phone-NOM existed

     'There was a call from someone.' (Japanese, Shimoyama 2008: p. 374)

The examples above involve cases where the quantifier particles can be separated from the indeterminate pronoun by an adposition, illustrating that they cannot be analyzed as a single lexical item.

  While the existential interpretation for (62) is only available when it is local to the indeterminate pronoun—clause-associated uses of *ka* trigger interrogative readings—*mo* can supply universal force to an indeterminate pronoun embedded inside of a noun phrase or relative clause:

(63) [Dare-no hahaoya]-**mo** naita.
     who-GEN mother-MO   cried

     'For everyone x, the mother of x cried.'

(64) [Dare-ga katta   ie]-**mo**   takakatta.
     who-NOM bought house-MO was.expensive

     'For everyone x, a/the house(s) that x bought was/were expensive.' (Japanese, Shimoyama 2008: p. 375)

An influential syntactic account of these constructions is provided by Nishigauchi (1986; 1990) which is largely parallel to accounts of *wh*-in-situ based on covert movement: the entire phrase c-commanded by *mo* moves at LF to [Spec, CP], at which point the indeterminate

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[11] This work mostly does not address the leftness restriction on *dou,* and as alternatives are calculated on a propositional level, focus-based accounts (e.g. Liu 2017; 2018) require *dou* to take sentential scope. It seems that it is implicit in this work that focus particles in Mandarin must be preceded by the constituent that alternatives are generated on, accounting for the leftness condition, but an interesting syntactic question for future work might be why the leftness condition must hold on the surface in Mandarin.

pronoun sub-extracts from the moved phrase, where it gains its quantificational force. Nishigauchi observes that long-distance quantification with *mo* is blocked by *wh*-islands in support of this proposal.

This purely syntactic approach has been largely overturned due to the work of Shimoyama (2001; 2006; 2008), also Kratzer & Shimoyama (2002) (republished as Kratzer & Shimoyama 2017), which provides a semantic account for how indeterminate pronouns can be interpreted *in situ* as sets of alternatives, directly arriving at an appropriate denotation for their interogative uses via pointwise-functional application up the tree with each member of the set of alternatives. In the case of universal or existential interpretations, then, the alternative-based denotation provided by the indeterminate pronoun is closed by an operator with the appropriate quantificational force, opererating not over a predicate but a set of alternatives.[12] The main payoff of the Kratzer/Shimoyama approach to indeterminates is that it derives the *wh*-island observations without further stipulation, based on similar logic that has applied in other cases of focus intervention effects; see Shimoyama (2008) for further overview and discussion.

One central difference between quantifier particles versus other cases of A-quantification is that quantifier particles must be associated with indeterminate pronouns. However, similar mechanisms may actually be at play in other cases of A-quantification. In Passamoquoddy, for example, Bruening shows that independent quantifiers can associate with *wh*-items, reminiscent of Japanese:

(65) Tokee olu **msite keq** '-kiwacehtu-n
       now   TOP all   what 3-make.lonely-INAN.OBJ

       'But now, he makes everything feel lonely.' (Passamaquoddy, Bruening 2008: p. 78, citing Mitchell 1921/1976e, 7)

On the other hand, independent quantifiers in Passomoquoddy and quantificational adverbs in Mandarin are not particularly picky about which DPs they take as their restriction, whereas quantifier particles of course are. Assuming the alternative-based analyses of *dou* are on the right track, there is good support that these three cases of A-quantification in fact involve three distinct semantic mechanisms for generating apparent universal quantificational force.

Finally, some A-quantifiers are affixal. For example, Evans (1995) describes three verbal affixes which function as nominal universal quantifiers in Mayali, an Austronesian language. The first, *djarrk-* 'all together', marks collective universal quantification over agents (66). The second, *-rr* 'all' is a reflexive marker that also functions as a universal quantifier over agentive and non-agentive intransitive subjects (67). The third, *bebbeh-* 'each', is distributive, and can take any argument as its restriction (68).

(66) Garri-**djarrk**-dulubom   duruk.
       we.plu-together-shootPP dog

       'We all shot the dog(s).' (Mayali, Evans 1995: p. 218)

(67) Barri-dowie-**rr**-inj.
       they.plu-die-RR-PP

       'They all died.' (Mayali, Evans 1995: p. 219)

(68) Gunj   barri-**bebbe**-yame-ng.
       kangaroo 3A.P-DISTR-spear-PP

       'They each killed a Kangaroo.' (Mayali, Evans 1995: p. 221)

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[12] Szabolcsi (2015) provides a different interpretation of a similar intuition, proposing essentially that quantifier particles are always operating on sets of propositional alternatives.

In Mayali, these affixal quantifiers exist alongside D-quantifiers with roughly the same meaning; at least in the case of the distributive quantifier *bebbe,* the two can co-occur as well (Evans 1995: p. 221), meaning that at least the distributive affix could be analyzed as a distributive operator.

Affixal quantifiers are also found in Algoquian languages, where they show the same general properties as independent quantifiers in that they can take either subject, object, or the event as their restriction. These include the Blackfoot prefixes *ohkan(a)-~kan(a)* 'all' and *wayák-* 'both/two', both of which can take subjects or objects as their restriction—event restrictions are not mentioned—(Frantz 2017: p. 182-183), and Passamaquoddy *nokka-~'kihka* 'all,' which can take arguments or events as its restriction (Bruening 2008: p. 98). Bruening shows that *nokka-~'kihka* is a quantifier inasmuch as it can take scope below negation and indefinites, but it is not clear whether it shows scopal variability, the signature semantic property of quantifiers.

In general, while less is known about the semantics of affixal quantifiers than the other cases, they do show behavior which suggests they are not semantically homogenous. Mayali affixal quantifiers resemble Mandarin *dou* in that they are restricted to certain syntactic positions, while Algonquian affixal quantifiers more closely resemble independent quantifiers. In fact, Japanese quantifier particles *mo* and *ka* are in fact themselves affixes or clitics, highlighting the conclusion that 'affixes' are unlikely to form a coherent semantic or syntactic class; some languages just have more affixes than others. Yet it is important to recognize that affixal quantifiers show a range of properties which we can now see constitute typical characteristics of A-quantifiers: 1) they can take VPs as their restriction in addition to DPs, 2) they tend to mark distributivity, and 3) they can associate with different arguments in the clause in their adverbial use.

It is clear from this survey that the syntactic elements which have been described under the rubric of A-quantifiers constitute an unruly collection of interpretive phenomena which are quantificational in their final effect but often via quite different syntactic and semantic mechanisms. While the definition in (1b) and the rough grouping into morphosyntactic distributions in 51 are useful starting points, they do not provide much theoretical insight. It is likely that independent quantifiers are adjuncts which attach freely to different clausal constituents; it is not fully clear how they associate with their nominal restriction when they do so at a distance, whether by semantic means or syntactic movement. Quantificational adverbs could be adjuncts or heads, but at least Mandarin *dou* sits firmly at the left edge of VP, while the syntactic distribution of quantifier particles is much freer. Affixal quantifiers are likely heads in the extended projection of the VP, but whether their position is fixes, and where they occur across languages, is not clear. In short, there is much work left to do in understanding the distribution of A-quantifiers across languages and the way these relate to the interpretive differences between them.

3.4   *Revisiting syntactic universals of quantification*

With this broad survey of quantificational structures completed, we are now in a better position to return to Barwise and Cooper's NP-Quantifier Universal (12) and Determiner Universals (13), as well as Partee's strengthened form of the former (14). Some of the most prominent counterexamples to these universals come from work on Northern Straits Salish (Jelenik 1995), Navajo (Faltz 1995; Speas & Parsons Yazzie), and Mohawk (Baker 1995). The claim that these some languages lacked D-quantification was part of Jelenik's Pronominal Argument Hypothesis, from which Baker derived many aspects of his Polysynthesis Parameter. Both theories maintained that in languages with rich subject

and object agreement, DPs do not occupy A-positions, which are occupied by null pronouns controlling agreement. Instead, DPs are adjuncts which bind these null pronouns, accounting for their free word order. It follows from such a claim that apparent quantificational DPs must be adjuncts as well, quantifying over their associated argument positions via unselective binding.

The universal in (14) has sometimes been taken to be disproven on the basis of this work. Von Fintel & Matthewson (2008), for example, conclude that "recent cross-linguistic research has produced many counter-examples to the NP-Quantifier Universal."

However, Davis & Matthewson (2019) suggest that (14) may still hold, at least for the vast majority of languages. For one, later research on Salish languages has provided robust evidence for D-quantification (Matthewson 1999; 2001) including in Northern Straits Salish (Davis 2013).[13] Similarly, Passamaquoddy (Algoquian) has been shown to have clearly configurational syntax (**??**), and Passamaquoddy independent quantifiers can arguably be analyzed as D-quantifiers when they occur adjacent to the noun (Bruening 2008). Configurational analyses have been provided for Athapaskan languages (Gelderen & Willie 2012), other Algonquian languages including Mi'gMak (Hamilton 2015), Blackfoot (Bliss 2012; 2013), and Meskwaki (Morris 2018), as well as Tlingit (Na-Dene) (Crippen 2019), and Nez Perce (Sahaptian) (Deal 2010), among many others. In his critical discussion, Crippen defends the growing consensus that 'polysynthesis' is, as Déchaine (1999) put it, "at best a descriptive term for a constellation of surface properties which reflect the convergence of independent factors, some syntactic and some prosodic, whose net effect is to derive complex 'words'." If polysynthesis is epiphenomenal and ill-defined, then there is no compelling reason to expect that any particular polysynthetic languages would restrict the ability of D-quantifiers to occur in argument positions.

There is a positive argument for the universality of D-quantification as well: Keenan & Paperno (2017) report that of the 36 languages for which a detailed description of quantification is given in their two-volume series, all 36 languages have cardinal and value-judgement D-quantifiers as well as at least one D-quantifier meaning 'all,' suggesting that the overwhelming majority of languages do in fact have quantificational NPs, as Barwise & Cooper (1981) predicted.

In a much more narrow, sense, however, Davis & Matthewson (2019) argue that both of Barwise and Cooper's universals are in fact falsified in Salish languages. First, the NP-Quantifier universal (12) has been called into question by Davis (2013), who argues that the quantificational DPs in St'át'imcets fail to show the scopal interactions that would be expected if they were generalized quantifiers, and suggests that instead the relevant quantfifiers may always be interpreted non-quantificationally. St'át'imcets is the only language for which this claim has been made, and replication or further verification of the relevant findings by additional researchers would be needed to be certain of this conclusion, however. As for the Determiner Universal (13), Davis & Matthewson (2019) observes that many Salish languages lack true quantificational determiners, because D-quantifiers in these languages always occur with the indefinite article (20). So it may be true that all languages have D-quantifiers in the broad sense used here, but not all languages have quantificational D-heads.

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[13] It is unclear, however, whether the relevant determiners are in fact generalized quantifiers, as Davis (2011) argues that their content is presuppositional and do not contribute truth conditional meaning. Nevertheless, it is unclear whether or not a quantifier is presuppositional is crucial to qualifying it as a quantifier, as the presuppositional meaning itself may be quantificational.

4 Quantifier float

Quantifier float is a term which is used to describe the ability of some quantifiers to alternate between a position where they form a constituent with their nominal restriction and a position where they appears discontinuously from it, typically in a position normally occupied by adverbs. In these examples, the quantifier will be bolded and the nominal restriction will be underlined.

(69) a. **All** the children are going home.
b. The children are **all** going home.

(70) a. **Both** the children are going home.
b. The children are **both** going home.

Quantifier float is common; some well-studied languages include English (Dowty & Brodie 1984; Sportiche 1988; Bobaljik 1995), German (Merchant 1996; Ott 2012), French (Kayne 1975; 1981; Sportiche 1988; Doetjes 1997; De Cat 2000), Hebrew (Shlonsky 1991), Arabic (Benmamoun 1999), Japanese (Miyagawa 1989; Kobuchi-Philip 2006; 2007; Nakanishi 2007a; b), Korean (O'Grady 1999; Ko 2005; 2007), Thai (Jenks 2011; 2013; Simpson 2011; Chaiphet 2017), and Janitzio P'urhepecha (Zyman 2018). Most languages seem to have quantifier float: of the 36 languages surveyed in Keenan & Paperno (2012) and Paperno & Keenan (2017), 26 were clearly shown to possess quantifier float; only 4 decisively lacked it.

The clearest typology of quantifier float is proposed in Fitzpatrick (2006), whose work reconciles two competing analyses of it, the stranding analysis and the adverbial analysis, by proposing that both analyses are appropriate for different instances of quantifier float. Some floating quantifiers are left behind by the movement of their DP restriction, and hence are stranded D-quantifiers, while other floating quantifiers do not seem to have a derivational relationship with their nominal restriction, and hence base generated as adverbs. We will see that adverbial floating quantifiers themselves seem to fall into a few different categories, some as quantificational adverbs, including arguably the English examples above, and in other cases as independent A-quantifiers.

This section provides an overview of the syntax of quantifier float across languages. Section 4.1 presents the stranding analysis and the arguments that have been provided for it, as well as the problems it encounters when applied to languages such as English. Section 4.2 shows that these problems are overcome if floating quantifiers are base-generated in an adverbial position, while section 4.3 reconciles adverbial floated quantifiers with the typology of A-quantifiers described above.

4.1 *Quantifier float as quantifier stranding*

Two main analyses of quantifier float have been the topic of some debate. Reviewing the facts of quantifier float through the lens of these analyses helps illustrate some of the most important empirical observations about them. Earlier overviews of the debate in different languages include Doetjes (1997), Bobaljik (2003), Fitzpatrick (2006), Ko (2005), and Nakanishi (2008).

The first analysis of quantifier float we examine is the *stranding* analysis Sportiche (1988); Miyagawa (1989); Shlonsky (1991); Merchant (1996); Benmamoun (1999); Boškovìc (2004); Zyman (2018), a cover term for a few different theories where the quantifier *all* forms a constituent with some lower copy of the subject. The intuitive appeal of the stranding analysis is obvious: as long as the subject reconstructs to the position

of the stranded quantifier it can function as its normal restriction, naturally capturing the intuitive synonymy between the floated and non-floated alternants and providing a unified analysis of stranded and non-stranded quantifiers, the stated motivation for the stranding analysis as proposed in Sportiche (1988). This section will first identify some of the issues with the stranding analysis as applied to English, and then will show that stranding analysis in languages such as Japanese or Korean does not seem to face these problems and hence, these languages arguaby allow a stranding-based derivation of quantifier float.

The theoretical development that precipitated the stranding analysis was the emergence of the *v*P-internal subject hypothesis in the late 1980s (e.g. Koopman & Sportiche 1991; Chomsky 1995; McCloskey 1997). Quantifier float was taken as transparent evidence for the VP-internal origin of the subject (Sportiche 1988), and is still regularly recited in syntax textbooks as such. However, the evidence that English quantifier float is derived by stranding is relatively weak. Consensus in the theoretical literature instead tilts towards the adverbial analysis, for reasons discussed below. We will see, however, that the stranding analysis does seem correct for other languages.

One argument for the stranding analysis was the observation that floated quantifiers can precede verbal auxiliaries, whose specifiers were taken to provide intermediate landing sites for A-movement:

(71)   a. **All** <u>the children</u> will have been eating ice cream.
        b. <u>The children</u> **all** will have been eating ice cream.
        c. <u>The children</u> will **all** have been eating ice cream.
        d. <u>The children</u> will have **all** been eating ice cream.
        e. *<u>The children</u> will have been **all** eating ice cream.

Because X′-theory predicted that every head should project a specifier, it was a welcome finding that subjects in fact seemed to move through each available specifier between VP and the surface subject position in [Spec, TP]—and in fact quantifier float was the crucial evidence for that idea. In the context of Minimalism, however, in particular the context of probe-driven movement (Chomsky 2000; 2001) and bare phrase structure (Chomsky 1995), there is no compelling reason to adopt the idea that there are intermediate landing sites corresponding to the position of floated quantifiers. In fact, given the idea that subjects move directly from [Spec, *v*P] to [Spec, TP] (e.g. Pesetsky & Torrego 2007), exactly the opposite pattern is expected: a floated quantifier should be possible before the verb, contrary to fact (71e), and is unexpected in the positions where it does occur. As such, the stranding analysis of quantifier float for English raises more theoretical issues than it resolves. The story is different in other languages, as we will see below.

An independent problem for the stranding analysis is the quantifier inversion structure (71b), where the quantifier immediately follows the subject. The DP and Q do not obviously form a constituent—objects do not allow DP-Q order, for example—and this order is somehow facilitated by the availability of quantifier float. This order is readily explained if the quantifier is simply adjoined to the predicate, in this case the T′ projection, i.e. below the subject.

One well-known account of the DP-Q inversion in the context of the stranding analysis was proposed by Shlonsky (1991), who proposed that quantifier stranding proceeds through [Spec, QP], triggering agreement (cf. 33-3.1). Sportiche was correct in his empirical observation: the cross-linguistic correlation between quantifier float and agreement on quantifiers is robust, and possibly universally available when the syntax of a language permits. For example, agreement is obligatory on floated quantifiers in French (Sportiche

1988),[14] German (Merchant 1996), and Janitzio P'urhepecha (Zyman 2018). However, given the issues that Shlonsky's analysis faces in light of modern theories of agreement (see section 3.1), most contemporary analyses assume that floated quantifiers are right-adjoined to the DP when they form a constituent with it as in (33b), either by late adjunction to a lower copy of the DP (Boškoviĉ 2004), or in a symmetrical XP-YP configuration which then must be broken by movement (Ott 2012). The appearance of agreement, then, is often attributed to the claim that agreeing quantifiers are free-standing anaphoric QPs rather than Q or D heads (Doetjes 1997; De Cat 2000; Benmamoun 1999; Ott 2012), a point we will return to below.

Setting aside these significant theoretical worries, the central empirical problem for the stranding analyses of English is the unavailability of floated quantifiers in positions which are well-known to be A-traces (Bobaljik 1995; Fitzpatrick 2006). This includes the unavailability of the preverbal position for *all* illustrated in (71e), along with the inability of floated quantifiers to follow a passivized or unaccusative verb such as *(69)*-(70). In all three cases, the floated quantifier is able to occur in the expected preverbal position (examples from Fitzpatrick 2006: 99-100).

(72) Passive

    a. *The suspects have been arrested **all**.

    b. The suspects have **all** been arrested.

(73) Unaccusative

    a. *The students have arrived **all**.

    b. The suspects have **all** arrived.

Facts like this have motivated the *adverbial* analysis of quantifier float, (Dowty & Brodie 1984; Ueda 1986; O'Grady 1999; Bobaljik 1995; Benmamoun 1999; Nakanishi 2007a; b), which adopts the idea that the floated quantifier is an A-quantifier—though not typically using that term—never forming a constituent with its restriction. We will return to the details of this account in the following section.

One version of the stranding account of quantifier float which explicitly accounts for the unavailability of floated quantifiers in θ-positions is Boškoviĉ (2004), who argues that this pattern arises due to a general ban on quantifier float to θ-positions, a restriction that also accounts for the ungrammaticality of the immediately preverbal floated quantifier in (71e), as this is the thematic position of the external argument. Boskovic derives this ban first by analyzing quantifier float as late adjunction to any copy of DP, and second by adopting the proposal that adjunction to θ-positions is impossible due to its interference with θ-role assignment (citing Chomsky 1986 a.o.). However, Boskovic's analysis still relies on the idea that subjects leave copies in the specifier of every projection above vP in English. But the only evidence for this claim is the floated quantifiers themselves.

Another problem with Boskovic's proposal is that it does not explain the contrast between English on one hand and languages where floated quantifiers freely occupy θ-positions on the other (e.g. Fitzpatrick 2006). For example, in Japanese, floated quantifiers can occur following VP-internal adverbs for passives and unaccusatives but not unergatives, tracking the θ-position of the subject DP (Miyagawa 1989).

(74)   a. Gakusei-ga   ano otoko-ni **huta-ri** korosareta.
        [student-NOM] that man-by 2-CL   were.killed

        'Two students were killed by that man.' (Passive)

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[14] One exception is Canadian French, which has an non-agreeing A-quantifier *tutte*, discussed in De Cat (2000).

    b. Gakusei-ga   ofisu-ni **huta-ri** kita.
       [student-NOM] office-to 2-CL   came

       'Two students came to the office.' (Unaccusative)

    c. *Gakusei-ga   geragerato **huta-ri** waratta.
       [student-NOM] loudly   2-CL   laughed

       Intended: 'Two students laughed loudly.' (Unergative)

Miyagawa (1989) argued that such examples provide evidence that the subject and quantifier are in a "mutual c-command configuration" in their base positions with the quantifier functioning as a secondary predicate to the underlying theme DP before it moves to subject position. This paradigm is controversial: in other sentences (e.g. 86 below), unergative subjects are in fact able to host stranded quantifiers across adverbs; a number of factors facilitate grammaticality, including stress and intonation, as summarized in (Nakanishi 2008), who advocates a generalized adverbial analysis (Nakanishi 2007a; b). Miyagawa & Arikawa (2007) defends the original characterization of the data, and argues that the stranding analysis is viable.

  Another argument for the stranding analysis of quantifier float comes an asymmetry first noted by Miyagawa (1989) for Japanese, illustrated below for Korean, where the facts are largely similar (Ko 2005; 2007): while objects can strand quantifiers over subjects, subjects cannot strand their quantifiers over objects (Ko 2005: p. 32):

(75) a. John-i   maykcwu-lul **sey-pyeng** masi-ess-ta
         John-NOM beer-ACC   3-CL$_{bottle}$ drink-PAST-DECL

       'John drank three bottles of beer.'

    b. Maykcwu-lul John-i   **sey-pyeng** masi-ess-ta
       beer-ACC   John-NOM 3-CL$_{bottle}$ drink-PAST-DECL

       'John drank three bottles of beer'

(76) a. Haksayng-tul-i **sey-myeng** maykcwu-lul masi-ess-ta
         student-Pl-NOM 3-CL$_{person}$ beer-ACC   drink-PAST-DECL

       'Three students drank beer.'

    b. *Haksayng-tul-i maykcwu-lul **sey-myeng** masi-ess-ta
       student-PI-NOM beer-ACC   3-CL$_{person}$ drink-PAST-DECL

       'Three students drank beer.'

If we suppose that the base order of the subject and object in Korean is SOV, then it follows from a stranding analysis that the quantifier associated with the subject cannot be stranded after the object, as the subject never occupied this position to begin with. In contrast, the object can scramble over the subject, stranding its quantifier in its base position.

  While appealing in its simplicity, this proposal faces the problem that arguments and adjuncts all freely scramble to their left in Korean and Japanese, raising the question of why objects cannot first scramble to the left of the subject followed by a step of quantifier-stranding subject-scrambling. With this concern in mind, Ko (2005; 2007) argues that, supplemented with the phase-based linearization algorothm of Fox & Pesetsky (2005), the intuition of the simple analysis is in fact essentially correct: object scrambling can occur internal to the vP phase, permitting a novel ordering statement between the scrambled object N and the subject. In contrast, subject scrambling necessarily crosses the vP phase boundary, meaning that its order is fixed before the object once the vP is complete.

Table 23.1: Two types of quantifier float (Fitzpatrick 2006: p. 28).

	Type 1 (Adverbial)	Type 2 (A′-stranding)
Trace indicator	No	Yes
Movement correlation	A-movement	A′-movement
Extraction restrictions	No	Yes
Semantics	Exhaustive	Non-exhaustive

It seems there is a reasonably strong case for the conclusion that there is a basic difference between languages like English, where quantifier float cannot target θ-positions, and languages like Korean and Japanese, where it can. Fitzpatrick (2006) argues on the basis of this observation among many others that quantifier float in languages such as Japanese, Korean, and Russian, are in fact derived by stranding, a process he characterizes as resulting from A′-movement rather than A-movement. (Fitzpatrick 2006) partitions floated quantifiers into two distinct types, summarized in Table 23.1. Type 1 quantifier float, which includes the English examples in (69-73) along with the French, Hebrew, and Arabic cases discussed above, are analyzed with the adverbial analysis. Type 1 floated quantifiers can occur in positions not associated with DP-traces, occur in the same finite clause as their associated nominal, do not show extraction restrictions, and generally have exhaustive semantics, such as English *all*, *both*, or *each*. Type 2 floated quantifiers, on the other hand, are derived by A′-movement of their nominal associate, stranding the quantifier in its base position. As a result, Type 2 floated quantifiers can be linked to A′-movement of the nominal associate, show DP extraction restrictions, and show few restrictions on which quantifiers can float, as in the case of the floating numeral-classifier constituents in Japanese and Korean above. These correlations are summarized in Table 23.1. While we will see below that the simple two-way dichotomy likely conceals greater complexity, it is an important set of generalizations that are only compatible with the conclusion that quantifier float is not syntacically uniform across languages.

Whether a language has Type 2 quantifier float, i.e., quantifier stranding, depends on whether a language has an A′-movement operation that can strand quantifiers. This might be scrambling, as in Korean and Japanese Ko (2005; 2007), topicalization and scrambling in German Ott (2012: ch. 4), or *wh*-movement in the well-known case of West Ulster English described in McCloskey (2000):

(77)   a.   What **all** did he say that he wanted?
       b.   What did he say that he wanted **all**? [*other dialects]
       c.   What did he say **all** that he wanted? [*other dialects]

Quantifier float here again is available in θ-positions. Note that *all* in these examples is not an exhaustive quantifier, a point argued at length by Fitzpatrick (2006), but rather a modifier that introduces a anti-uniqueness presupposition in the answer to the question.

Work since Fitzpatrick (2006) has argued that A-movement in some languages may be able to strand quantifiers as well. See Ott (2012) for German, Al Khalaf (2019) for Arabic, and Zyman (2018) for Janitzio P'urhepecha. In these languages, floated quantifiers occupy theta positions, including in passive and unaccusative sentences, where they are necessarily stranded by A-movement. Additionally, quantifier float in these languages can be associated with subjects or objects. Furthermore, in Janitzio P'urhepecha, subjects are freely ordered with auxiliaries, meaning there is good evidence for subject traces in the positions equivalent to (71) where floated quantifiers occur.

To summarize, there is good evidence that quantifiers are stranded by movement in some languages, but there are compelling reasons not to extend such an account to all cases of quantifier float. The following section will expand on the reasons to conclude that at least some floated quantifiers are base-generated in adverbial positions, and will furthermore show that adverbial floated quantifiers are arguably freely available given (potentially universal) mechanisms of binding and secondary predication, and hence also widely available across languages, possibly coexisting with stranded floated quantifiers in many languages.

4.2   *Adverbial floated quantifiers*

The alternative to the stranding analysis of quantifier float is the adverbial analysis, which takes floated quantifiers to be base generated in an adverbial position, that is, adjoined to VP or as a member of its extended projection. The adverbial analysis of floated quantifiers was first proposed by Dowty & Brodie (1984), and was defended at length in later work (Bobaljik 1995; 2003; Doetjes 1997; De Cat 2000). Compelling arguments for the adverbial analysis of quantifier float have also been presented for Korean (O'Grady 1999) and Japanese ((e.g. Nakanishi 2007a; b); see Nakanishi 2008 for additional citations and dicussion). Given that there is also evidence for stranding in Japanese and Korean in slightly different contexts, both stranding and the adverbial instances of quantifier float may be in effect for different instances of the phenomenon in these languages (Ishii 1998; Kang 2002; Ko 2005). This section will first outline the arguments that some floated quantifiers are adverbs, and then will sketch two main variants of this analysis.

The central argument for the adverbial analysis of floated quantifiers is the unavailability of floated quantifiers in obvious A-trace positions in English (Bobaljik (1995; 2003); see e.g. 72-73). Fitzpatrick (2006: p. 42-45) further observes that the distribution of *all* relative to auxiliaries generally mirrors the distribution of modal adverbs such as *easily* and *mostly* as well as subject-oriented adverbs such as *intentionally*, a point which is also made by Sportiche (1988: p. 430-431).

The correct characterization of English floating quantifiers is that they must adjoin to the left of a predicate. This generalization accounts for their ability to directly precede nonverbal predicates (78), in what would seem to be a θ-position, as well as secondary predicates (79), often assumed to involve a PRO subject:

(78)   a.   <u>The children</u> were **all** happy.

      b.   <u>The children</u> were **all** outside.

(79)   a.   <u>The three friends</u> came to the cafe **all** very drunk.

      b.   <u>The three friends</u> came to the cafe **all** wearing red hats.   (Bobaljik 1995: p. 215)

It is relevant that adverbs can also occur in these positions, i.e., *all* above can freely be replaced with *already*.

In French, object-oriented quantifiers can float to the object's left, but only if the object is realized as a preverbal clitic:

(80)   Elle a   tous voulu   les   lire.
      she has all   wanted them to-read

      'She wanted to read them all.'   (Kayne 1975: p. 4)

Such cases cannot possibly be derived by stranding, as the quantifier precedes its DP restriction, itself in a derived position. Because *tous* can also be associated with plural

subjects, it actually resembles certain adverbial quantifiers as described in section 3.3—recall, for example, that Mandarin *dou* required object shift before the verb in order to associate with it.

  Another compelling argument for the adverbial analysis of floating quantifiers in English and French comes from what Bobaljik (2003) dubs the "underlying constituents problem", where floating quantifiers can associate with a subject DP for which there is no non-floated counterpart:

(81) a. Larry, Darryl and Darryl have all come into the café.
       b. ?*All (of) Larry, Darryl and Darryl have come into the café. (Bobaljik 2003: p. 124)

(82) a. Some (of the) students might all have left in one car.
       b. *All (of) some (of the) students might have left in one car. (Bobaljik 2003: p. 124)

Similar observations have been made for French, for example, with expressions such as *tous le trois*, which lack an adnominal counterpart:

(83) a. Les enfants sont **tous les trois** allés à la   plage
          the children are   all   the three gone to the beach

          'All three of the children went to the beach'
       b. ***Tous les trois** (**les**) **enfants** sont allés à la   plage
          all   the three (the) children are   gone to the beach

                                                              (Doetjes 1997: p. 210)

  Finally, Bobaljik highlights semantic contrasts between quantifiers in subject position and floated quantifiers which cannot be accounted for under the stranding analysis (Bobaljik 2003: p. 129, attributed to Heidi Harley, p.c.):

(84) a. All lions, tigers and bears are scary.
       b. Lions, tigers and bears are all scary.

(85) a. All students, professors and clowns have come to the meeting.
       b. Students, professors and clowns have all come to the meeting.

In the first sentence, where *all* precedes the coordinated nouns, it exhaustively quantifiers over all members of the relevant sets. In the second sentence with a floated quantifier, however, *all* merely requires that the predicate hold for some members of the relevant set; i.e., *all* in the latter case is applying to the conjunction itself.

  Nakanishi (2007a; b; 2008) surveys a number of arguments that at least some floated quantifiers in Japanese must be adverbial as well. For example, there are counterexamples to the claim that unergatives do not allow quantifier float across adverbs; compare the following example to the ungrammatical (74c):

(86) Kodomo-ga butai-de zyuu-nin odot-ta.
      childNOM   stage-at ten-CL   dance-PAST

      'Ten children danced on the stage.' (Takami 2001: p. 129)

One caveat about this counterexample to Miyagawa's generalization is that it is not clear that the PP *butai-de* must be VP-internal, meaning *zyuu-nin* could be in its surface subject position.

  In addition, the ban on subjects stranding quantifiers over objects discussed in the previous section can be voided if there is focus on the quantifier:

(87) Gakusei-ga repooto-o san-nin-dake teisyutusi-ta.
      studentNOM reportACC three-CL-only hand   in-PAST
      'Only three students handed in a report.' (Takami 2001: p. 125-126)

Nakanishi (2008) additionally observes that semantic contrasts between floated and non-floated quantifiers in Japanese provide yet another argument that (some) floated quantifiers must be adverbia. The semantic contrasts generally take the form of a distributivity requirement in the case of a floated numeral quantifier which is absent when the numeral forms a constituent with the noun (Nakanishi 2007a; b).

Korean provides an even way of determining whether quantifier float is adverbial or derived by stranding, based on the fact that floated quantifiers in Korean optionally double the case suffix on the associated DP, an option that is not allowed in Japanese. Strikingly, the subject-over-object restriction in (76) disappears if the floated quantifier bears a matching case suffix (88a), suggesting that case-doubled floating quantifiers are always adverbial. Focus-marked floating quantifiers parallel to (??) show the same pattern (88b)

(88) a. Haksayng-tul-i sakwa-lul **twu-myeng-i**
          Student-Pl-Nom apple-Acc 2-Cl-Nom   mek-ess-ta eat-Past-Dec
          'Two students ate apples'
      b. Haksayng-tul-i sakwa-lul **sey-myeng-man** mek-ess-ta
          Student-Pl-Nom apple-Acc 3-Cl-only eat-Past-Dec
          'Only three students ate apples'

Ko concludes that case-marked or focused floated quantifiers must be adverbial, an conclusion which is also reached by O'Grady (1999) and Kang (2002), who offer several other arguments for this conclusion, including cases of case mismatch along with semantic contrasts between floated and non-floated quantifiers.

In summary, then, there is quite strong evidence that floated quantifiers in many languages can be base generated in an adverbial position. From the perspective of the typology of A-quantifiers in section 3.3, this conclusion is absolutely unsurprising, a point also made by Bobaljik (2003). The more interesting question then becomes what kind of A-quantifier such floated quantifiers might be.

4.3   *Adverbial floated quantifiers as A-quantifiers*

This section reviews the two analyses which have been proposed for adverbial floated quantifiers, and connects them with two of the types of A-quantifiers discussed in section 3.3. First, English and French floated exhaustive floating quantifiers can be analyzed as adverbial quantifiers, that is, as quantificational adverbs proper, analogous to Mandarin *dou*, as proposed by Dowty & Brodie (1984) and adopted by Bobaljik (1995; 2003); Junker (1995) and Fitzpatrick (2006). Floated quantifiers with an adverbial distribution, on the other hand, closely resemble independent A-quantifiers, analogous to the Passamaquoddy cases described above. Following similar suggestions in the literature (e.g. Miyagawa 1989; De Cat 2000; Kobuchi-Philip 2006; 2007; Ott 2012), such quantifiers could be analyzed as a quantificational secondary predicate, one which contains a null anaphor which permits these predicates to take various arguments as their restriction with the simple mechanics of variable binding.

Analyses of floated quantifiers as genuine adverbs, that is, syntactic elements which directly modify the meaning of the VP, have been proposed for English, French, and

Japanese; Fitzpatrick (2006) suggests this analysis provides a general account of adverbial floating quantifiers. For example, Dowty and Brodie observe that as English floating quantifiers are universal, they semantically maximalize the open argument position in the predicate.

(89) $[[all]] = \lambda P_{<e,t>}.\lambda x.P(max(x))$

This analysis provides an elegant account for the subject orientation of English floated quantifiers, their fixed scope relative to other logical operators, and the fact that floated quantifiers in English and other languages are necessarily exhaustive (see Bobaljik 2003; Fitzpatrick 2006 for discussion). This analysis also extends naturally to the use of floated quantifiers before non-verbal predicates (78) and secondary predicates (79).

   For languages such as Japanese or Korean, on the other hand, Nakanishi (2007a; b) shows it is possible to analyze the floated quantifier as a direct quantifier over events (recall the discussion in section 2.1). Nakanishi implements this idea by proposing that floated quantifiers derive distributive quantification over the subject secondarily by via event-agent homomorphisms which are entailed by the distributive predicate itself. In an example such as (87), for example, the quantifier produces three events of report-submission which in turn entail three separate students were involved. Dowty and Brodie's analysis of English and Nakanishi's analysis of Japanese, then, represent a case of potential convergence between the literature on dedicated quantificational adverbs such as Mandarin *dou* and some instances of quantifier float.

   However, is not clear that every instance of adverbial floating quantifiers should be analyzed as proper quantificational adverbs in this sense. In French, for example, floated quantifiers can range over the subject or object with no consistent semantic effect, and certain restrictions on the possible noun phrases that can be associated with the floated quantifier receive no explanation under an adverbial analysis. For example, object-associated floating quantifiers, generally called L-*tous* in the literature, must associate with a pronominal object, rather than a definite description (De Cat 2000: p. 6-7; coindices are from the source and indicate quantifier-restriction associations):

(90)   a.   * Elles ont **tous**$_i$ voulu manger les escargots$_i$.
              they-F have all-M Pl wanted (to) eat the snails
              'They wanted to eat all the snails.' (intended)

        b.   Elles ont **tous**$_i$ voulu les$_i$ manger.
              they-F have all-M Pl wanted them-(to) eat
              'They wanted to eat them all.'

As long as the pronoun is an object and of the same gender and number as the subject, then, we find cases of ambiguity:

(91)   Elles$_j$ ont **toutes**$_{j/k}$ voulu les$_k$ caresser.
        they-F have all-F.Pl   wanted them stroke.INF

        i. 'They all wanted to stroked them.'
        ii. 'They wanted to stroke all of them.' (De Cat 2000: p. 21, translations mine)

This example also demonstrates that *tous* need not be c-commanded by its pronominal restriction, as the pronoun is cliticized to a lower verb in this example.

   The agreeing floated quantifier *tous* is distinct from a invariant pronominal form *tout*, which can appear with a null argument, unlike the true floated quantifier *tous*:

(92)   Il a   tout$_i$ lu ec_i
        he has all read

'He has read it all'   (Doetjes 1997: p. 204)

(93)   Il faut   tous$_i$ voir ec_i
       it must all   see
       'It is necessary to see them all' (intended)   (Doetjes 1997: p. 205)

This observation lays the groundwork for the analysis of adverbial floating quantifiers that Doetjes calls the 'generalized L-*tous* analysis. Doetjes proposes that while the pronominal *tout* in (92) is a quantifier which binds an empty category in argument position, the floated quantifier *tous* in (93) is a QP which contains a null NP—which must be licensed by associating with an argumental DP.

Doetjes proposes that the floated quantifier is a QP which contains a null pronominal element, which we will take to be a null DP:

(94) $[_{QP}$ tous $[_{DP}$ e $]$

This floated quantifier is proposed to associate with either a subject trace or the trace of a cliticized pronoun via binding; the null DP itself is what triggers agreement on the quantifier.

The French pattern is similar to the pattern of independent A-quantifiers described in section 3.3: both can associate with either subjects or objects, but the central distinction is that floating quantifiers in French in can only associated with object pronouns, which obligatorily move, unlike in English, or subjects, which always move to their surface position.

If the association with moved DPs is crucial, it is interesting to observe that so many of the languages which were originally observed to have A-quantifiers, such as Mohawk or North Straits Salish, were languages where DPs are quite mobile, and scramble freely. It may be possible, then, that independent A-quantifiers in such languages always contain a null DP. While Doetjes does not provide an explicit semantics for her analysis, we can extrapolate somewhat to assume that the movement of a DP over a stranded quantifier, or perhaps the movement of a DP in general, creates an operator variable relationship which can capture the null DP, itself interpreted as a variable, inside the QP. This semantic binding relationship could then permit the moved DP to reconstruct to the QP-internal position, where it could be interpreted as the restriction of the quantifier. Further research is needed to determine if this approach is on the right track, or if some other connection between independent quantifiers and generalized floating quantifiers might be possible. In either case, the purpose of this discussion has been to highlight the ways in which the study of floating quantifiers and A-quantifiers should be seen as a part of a more general enterprise of understanding adverb-like positions of nominal quantification.

5   Conclusion

The main theme of this chapter has been the observation that nominal quantifiers are regularly realized either high in the extended periphery of the DP or in the extended projection of VP. One question which could be asked about this observation, but has not been adequately answered in the literature, is whether there are any syntactic property of quantifiers which allows them this particular distribution.

One possibility is that at least some quantifiers are syntactically ambiguous between a Q category—a functional projection of the noun—and a proper adverbial category. English *all* may be a good candidate for this analysis, for example, based on the discussion

above. However, this proposal is unsatisfying for cases where the morphological resemblance between D-quantifiers and adverbial floated quantifiers is absolute and there is good evidence for stranding, particularly in examples where there are agreement or case-doubling effects; here, analysis such as Ott (2012) and Al Khalaf (2019), where the quantifiers are independent QPs which are able to adjoin to the DP or its copies, seem to hold the most promise.

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