
Quantifiers in RSL: distributivity and compositionality

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9.1 Introduction

9.1.1 *Quantification and sign languages*

In her 1995 article, Partee discussed various questions concerning the nature of quantifiers based on cross-linguistic data. An important part of the argument is based on the analysis of data from American Sign Language (ASL).

In particular, Partee (1995) discussed the distinction between D-quantifiers (quantifiers which are typically determiners and which quantify over entities) and A-quantifiers, which are not determiners, and which in general constitute a more heterogeneous class. Thus, adverbs are A-quantifiers, and they quantify over events, and also unselectively bind variables in their scope. However, ASL (as well as some spoken languages) has another means of expressing quantification, which can also be called A-quantifiers, but which has different properties.

In particular, verb inflection in ASL can express quantification, but only over certain arguments of the verb, not over event and all argument variables in the clause. Partee called this type of quantifiers Argument Structure Adjusters. They are different from D-quantifiers because they are not determiners, but they are also different from quantifiers like *always* because they are not unselective binders, and they quantify only over particular arguments of the verb. Partee further referred to A-quantifiers as non-NP means of expressing quantification. One might argue that Argument Structure Adjusters are a

middle case between clear D-quantifiers like *every* and clear adverbial quantifiers like *always*, because they share some properties with both classes. Thus two follow-up questions can be asked: (1) Do non-NP quantifiers constitute one class of markers? (2) Is there a clear boundary between NP and non-NP quantifiers? In this paper I will try to show that sign language data can be relevant for answering these questions, especially the latter.

Another case where Partee (1995) used ASL is the question of compositionality of quantificational structure. Semantically, quantification involves three parts: the operator, the restrictor, and the nuclear scope. However, there is cross-linguistic and language-internal variation in compositionality, in other words, in the question whether these three entities are also syntactically distinguished. ASL is an interesting language in this respect because it uses the topic-comment structure as the basis for the quantification structure: the marked topic constitutes the restrictor, the quantifier is a separate sign not included in the topic, and the nuclear scope (the comment) is prosodically separated as well. Quer (2012) also argued that sign languages (in particular ASL and Catalan Sign Language) have the tendency to overtly express the tri-partite semantic structure of quantification. But how universal is this tendency?

In this paper I discuss these issues from Partee 1995 based on the data from yet another sign language, namely Russian Sign Language (RSL). I will show that RSL distributivity marking is interesting for the discussion of the status of D-quantifiers vs. A-quantifiers (section 9.2), and I will discuss how RSL realizes the tri-partite semantic structure of quantification (section 9.3).

9.1.2 Russian Sign Language

RSL is a natural language used by deaf and hard-of-hearing people in Russia and some other former Soviet countries. In Russia, it is used by at least 120,000 people, according to the census organized in 2010. It emerged in the beginning of the 19th century, when the first school for the deaf children was founded.

One important property that RSL shares with many other sign languages, including ASL, is using space to localize referents, to refer back to them through pointing sign (pronouns) and for verbal agreement. For first and second person, the pointing to the signer (INDEX₁) and the addressee (INDEX₂) are used, as in (1); other referents are assigned arbitrary locations in the signing space, which we will gloss as *a*, *b* etc., as in (2).

- (1) INDEX₁ INDEX₂ SEE₂ SELDOM [RSL]
'I seldom see you.'
- (2) INDEX_a INDEX_b _aSEE_b [RSL]
'He sees him.'
- (3) INDEX₁ INDEX_b LOVE [RSL]
'I love him.'

Examples (1) and (2) also demonstrate that verbs can agree with these locations, which phonologically means that the verbal sign either moves from the location of the subject to the location of the object, or it is oriented towards the object. However, not all verbs are agreeing: plain verbs, such as the RSL sign LOVE, do not change the form depending on the locations associated with their arguments (3).

The RSL data discussed in this paper comes from elicitation sessions conducted for a project on quantification in RSL (see [Kimmelman to appear](#), also for further details of the methodology). Four signers (working in pairs) have been consulted, mainly with the help of a written questionnaire.

9.2 Distributivity marking in RSL

[Partee \(1995\)](#), based on [Petronio's \(1995\)](#) data, discussed verbal quantification in ASL. In this language some verbs can be modified to express aspect (iterative, durative, etc.), but also to quantify over arguments. The following example is adapted¹ from [Partee \(1995: 548\)](#). In this example distributive quantification over women is expressed through the spatial modification of the verb GIVE (figures illustrating this type of modification in RSL are provided below).

- (4) $\overline{\text{WOMAN}}^{\text{top}}$ BOOK ₁GIVE_{DISTR} [ASL]
'I gave each woman a book.'

This type of quantification is interesting because it does not strictly speaking fall under D- or A-quantification. It is definitely not D-quantification, because there is no adnominal quantifier present; instead, the verb is marked. On the other hand, adverbial A-quantifiers (*always, often*) typically quantify over events, not arguments. [Partee \(1995\)](#) uses the term Argument-Structure Adjusters to refer to this type of quantifiers.

¹ All examples are adapted to conform to a notation more commonly used nowadays ([Pfau, Steinbach & Woll 2012](#)).



Figure 9.1: Stills for example (5). Movement from the signer towards several (four) locations.

Similar marking clearly also exists in RSL. The verbal sign moves towards the locations of the objects distributed over (*the distributive key*). Interestingly, distributive agreement can apply both to objects and subjects: see (5) and figure 9.1, and (6) and figure 9.2. In addition, similar to other sign languages, RSL also has the form of non-distributive plural agreement, when the hand follows an arc shape to denote a plurality of objects.

- (5) ${}_1\text{GIVE-PRESENT}_{\text{DISTR}}$ [RSL]
 'I gave everyone a present.'
- (6) $_{\text{DISTR}}\text{GIVE-PRESENT}_1$ [RSL]
 'Everyone gave me a present.'

Partee (1995: 564) claimed that distributive marking on the verb “indicat[es] both distributive key and distributed share”. However, note that in RSL² the distributive morphology itself indicates the distributive key only: in (5), it is the people who I gave presents to, as these people are associated with the spatial location with which the verb agrees. The distributed share (the present) is in principle also marked morphologically by the handshape of the verb, but it is not marked in any specifically distributed way: the same handshape would be used in the non-distributive form of the verb GIVE-PRESENT, as in (7).

- (7) ${}_1\text{GIVE-PRESENT}_2$ [RSL]
 'I gave you a present.'

² The same is probably true for ASL as well.



Figure 9.2: Stills for example (6). Movement from several (four) locations towards the signer.



Figure 9.3: Stills for example (9). Sign FLOWER-DISTR.

However, distributed share can be marked in RSL as well, and the marking is again the same spatial strategy, but this time the noun is modified. Example (8) shows that the sign ONE-DISTR is repeated in several locations thereby producing the distributive interpretation 'one each'. However, it is not correct to say that RSL has a special morphological class of distributive numerals similar to some spoken languages (Balusu 2006), as nouns can be forced distributive interpretation through the same spatial strategy: see (9) and figure 9.3.



Figure 9.4: $EVERY_{DISTR}$. The sign $EVERY$ is repeated in several locations.

(8) MAN BUY BEER ONE_{DISTR} [RSL]
 ‘Every man bought a beer.’

(9) $FLOWER_{DISTR}$ [RSL]
 ‘a flower each’

Finally, distributive quantification can also be expressed by a D-quantifier $EVERY$ (10), which accompanies the distributive key NP. Note that in this example the quantifier is combined with distributive marking on the verb, but this is not always the case.

(10) $\overline{EVERY\ BOY\ INDEX_{PL}^{top}\ DISTR\ GIVE-PRESENT_1}$ [RSL]
 ‘Every boy gave me a present.’

Interestingly, the sign $EVERY$ can also be realized in several spatial locations, which we gloss as $EVERY_{DISTR}$ (figure 9.4), but there seems to be no additional meaning associated with this inflection.

The facts discussed above seem to show that distribution in general can be expressed by spatial distribution in RSL. However, different constituents make use of this spatial strategy. First, the verb can agree with distributed spatial locations to express distributive key. Second, the nouns expressing distributive share can be localized in the same manner. Finally, the distributive D-quantifier $EVERY$ itself can be localized as well. This means that spatial distribution in RSL can be analysed as a general marker of distributivity (see also Quer 2012 for a similar claim for Catalan Sign Language).

Is distributive marking in RSL and other sign languages different from dis-

tributive markers in spoken languages? In fact, several parallels can be found between distributivity in RSL and distributivity in some spoken languages. One parallel is that in some spoken languages reduplication of the numeral is used to express distributive share. For instance, in Hungarian reduplication of the numeral *két* ‘two’ is used in this way (Szabolcsi 2010: 138).

- (11) A gyerekek két-két majmot láttak. [Hungarian]
 the children two-two monkey.ACC saw.3PL
 ‘The children saw two monkeys each.’

However, this parallel is superficial, because it is not the reduplication which creates distributive reading in RSL and other sign languages, but the distributive localization. Simple reduplication without localization is used to express verbal and nominal plurality in general, including both collective and distributive readings.

Another problem with this parallel is that reduplication for distributive readings seems to be used to mark distributed share only in spoken languages. For instance, Balusu (2006) analyzed numeral reduplication in Telugu, and showed that it is used to mark distributed share only. In this language, according to Balusu, the distribution can be over spatial or temporal subevents, not only over participants. In (12) both the subject and the object are marked with numeral reduplication, so they are both distributed shares, while the distributive key is either temporal or spatial. The sentence can mean that two kids in each time interval saw four monkeys in each time interval, or two kids in each time interval saw four monkeys in each location, but neither the set of monkeys nor the set of children has to be exhaustively used up (so there is not reading like ‘two kids saw four monkeys each’).

- (12) iddaru iddaru pilla-lu naalugu naalugu kootu-lu-ni cuuseeru [Telugu]
 two two kid-PL four four monkey-PL-ACC saw
 ‘Two kids saw four monkeys.’

In RSL, in contrast, the same strategy is used for both the distributive key and the distributed share. Distributive localization can attach either to the verb, or to the noun phrase, thus marking the distributive key in the former case and the distributed share in the latter.

It seems that English *each* provides a better parallel to the spatial strategy of marking distributivity in RSL. *Each* can be used as the distributive key marker (*Each boy was happy*), or it can attach to the distributed share (*The boys have eaten one apple each*). The obvious difference between *each* and the

distributive markers in RSL is the morphological status. The question that arises (for both *each* and RSL localization) is whether a unified analysis is possible for both distributive key and distributed share markers.

Zimmermann (2002) proposed an analysis for the binominal *each* as a regular quantifier. Informally, he suggested that the binominal *each* is a quantifier head that has an NP complement with a proform co-indexed with the distributive key. Thus, both in *each boy has eaten one apple* and *the boys have eaten one apple each*, *each* combines with the NP denoting *boys*. Intuitively this analysis is not very attractive for the RSL distributive marker, because the RSL marker combines both with verbs and with nouns, so it can hardly be a head of a quantifier phrase.

Beghelli & Stowell (1997) and Szabolcsi (1997), based on the analysis of *every* and *each* in English, argue that distributivity is not expressed by these D-quantifiers. Instead it is expressed by a syntactic functional head *Dist*, while *every* and *each* are agreement markers, having the feature [*dist*], but not marking distributivity per se. This type of analysis can be applied to RSL data: the functional head *Dist* in RSL would then be not empty, but it would actually contain the spatial distributive morpheme. This morpheme can then be fused or agree with the verb, or with the distributed share NP, or even with the quantifier *EVERY*. The exact details of such a syntactic analysis need to be worked out, but it has an advantage of separating the distributivity from a particular host.

To return to the questions discussed in Partee 1995, the distributive localization in RSL seems not to be a D-quantifier, or an A-quantifier, nor is it specifically an argument-structure adjuster. It is a very general marker of distributivity with broad applicability. This marker can better be analyzed in the spirit of modern analyses of quantification where the quantification is often not expressed by the (lexical) quantifiers themselves (Szabolcsi 2010). This also means that the boundary between NP and non-NP quantification is not always rigid.

9.3 Compositionality in RSL

Partee (1995) used ASL to illustrate how a language can use the topic-comment structure to overtly express the tri-partite semantic structure of quantification. In (13) (adapted from Partee 1995: 551), the restrictor *STUDENT GROUP* is topicalized and also non-manually marked; it is followed by the operator – the quantifier *ALL*, and then comes the nuclear scope, which is separated from

the quantifier by a prosodic break. Partee suggested that this type of overt marking is to be expected due to the functions of topic and focus. Quer (2012) claimed that the same tendency of separating the quantifier from the NP and placing the restrictor NP into a left-preipheral position also existed in Catalan Sign Language.

- (13) $\overline{\text{STUDENT GROUP}}^{\text{top}} \text{ ALL, INDEX}_1 \text{ LIKE}$ [ASL]
 ‘I like all (of the) students.’

At first sight, RSL often uses the same strategy. Consider example (14): the restrictor NP *BOY* is topicalized and marked non-manually, and the quantifier does not form a constituent with this NP. This is even more obvious in (15), where the quantifier is not even adjacent to the NP. Note however, that in both examples the quantifier is not separated from the nuclear scope by a prosodic break. Quer (2012) also does not report any special prosodic marking separating the quantifier in Catalan Sign Language. This fact itself should not be considered surprising: since the sentences contain a lexical quantifier, any overt syntactic marking of the quantifier seems redundant, because it is easily identifiable.

- (14) $\overline{\text{BOY}}^{\text{top}} \text{ ALL LATE}$ [RSL]
 ‘All boys were late.’
- (15) $\overline{\text{BOY}}^{\text{top}} \text{ LATE ALL}$ [RSL]
- (16) $\overline{\text{BOY LATE}}^{\text{top}} \text{ ALL}$ [RSL]
- (17) ALL BOY LATE [RSL]

However, RSL data is more complicated. Sometimes the nuclear scope and the restrictor are topicalized together (16), and sometimes the quantifier is pre-nominal and no topicalization occurs (17); thus the tri-partite structure is not always overtly marked. Of course, one could not expect that a language would obligatorily mark the quantifier structure, as Partee (1995) also discussed for ASL.

More importantly, it seems that the construction with a topicalized restrictor is semantically different from the construction with a pre-nominal quantifier, and the latter seems to be basic. There are a number of facts that can demonstrate it.

Firstly, partitives are expressed by the post-nominal placement of quantifi-

ers: in (18) the NP *GIRL INDEX PLURALITY* ‘the girls’ are topicalized.

- (18) $\overline{\text{GIRL INDEX PLURALITY}}^{\text{top}} \text{ HALF BEAUTIFUL}$ [RSL]
 ‘Half of the girls are beautiful.’

In addition, some asymmetry between post- and pre-nominal quantifiers emerges when we look at the number on the noun. Number is not marked obligatorily on nouns in RSL, so the sign *APPLE* can be interpreted either as ‘apple’ or as ‘apples’. The exception is some body-anchored signs such as *RIB* which have to be marked with repetitions to express plural. Some quantifiers can only combine with (semantically) plural nouns. One such quantifier is *SOME*, so it cannot be combined with a singular form of the sign *RIB* (19). However, if the restrictor is topicalized, this constraint can be violated (20).

If the noun is marked with plural, it can only be interpreted as plural, so some restrictions also apply. In particular, the numeral *ONE* cannot combine with the plural noun *CHILDREN*³ (21). Nevertheless, with the topicalization of the restrictor this numeral can be used, yielding the partitive interpretation (22). Finally, there are mass nouns in RSL, such as *WATER*. Such nouns can be combined with numerals, but the topicalization is preferred (23)⁴.

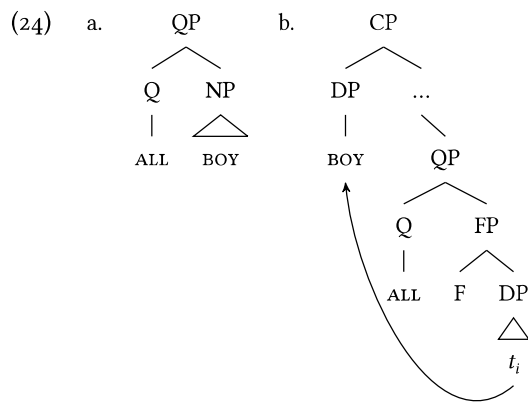
- (19) **SOME RIB* [RSL]
 (20) $\overline{\text{RIB}}^{\text{top}} \text{ SOME}$ [RSL]
 ‘some ribs’
 (21) **ONE CHILDREN* [RSL]
 (22) $\overline{\text{CHILDREN}}^{\text{top}} \text{ ONE SICK}$ [RSL]
 ‘One of the children is sick.’
 (23) *WATER TWO* [RSL]
 ‘two glasses/bottles of water’

The facts above suggest that the structure where the restrictor is topicalized is not basic, but a more complex one derived from the structure with a pre-nominal determiner. In particular, for the prenominal determiner the structure

³ We gloss this sign as *CHILDREN* because it is not morphologically related to the singular noun *CHILD*.

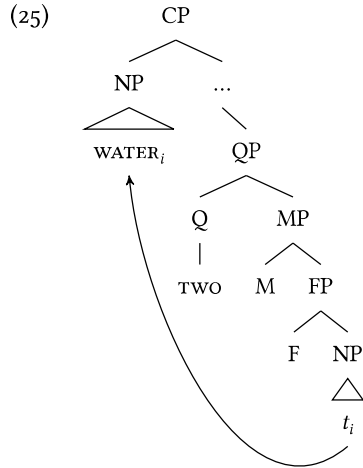
⁴ Note that the noun is not marked non-manually in this example. In general, in some of my data nouns that are in the sentence-initial position and followed by a quantifier are not marked non-manually. Further research is needed to find out the exact conditions on the use of the non-manual marking.

in (24a) can be proposed, while for the topicalization construction the structure in (24b). Examples like (18) would be explained by the fact that pre-nominal quantifiers can only combine with NPs, not DPs. If a DP has to be quantified over, a partitive construction (with a silent partitive marker) is employed, but it is also accompanied with topicalization of the DP. Semantically the F head would be responsible for shifting the type of the DP to a type that can be compositionally combined with the quantifier.



In a similar way, the numeral *ONE* can only combine with a singular NP, and the quantifier *SOME* only with a plural NP; however, they can also participate in partitive constructions ('one of the children') followed by a topicalization of the DP. Again, the functional head *F* would be responsible for shifting the type of the NP to match the semantic requirements of the quantifier.

Similarly, in (23) the mass noun *WATER* cannot directly combine with a numeral quantifier, but it can combine with it through a (pseudo-)partitive construction as in 'two [glasses of] water'. In this case an additional layer of Measure Phrase is necessary, as in (25) (Stickney 2007). Another difference would be that *WATER* is not a DP but an NP in this case, so *TWO* cannot directly combine with it not because of its syntactic category, but because numerals only combines with count nouns.



Further evidence for this structure of topicalized restrictors comes from numeral incorporation. In RSL, some signs can incorporate numerals (for more detail see [Kimmelman to appear](#)). One of such signs means PIECE (in Russian *штука*), and it is used as a numeral classifier⁵ (TWO+PIECE, THREE+PIECE). Interestingly, it can only be used in the construction with topicalization of the restrictor as well. It is possible to account for that if one can claim that PIECE is the Measure Phrase head in the structure in (25). When the quantifier TWO is combined with an MP [piece apple] headed by PIECE, the numeral and the classifier fuse, while the DP obligatorily undergoes topicalization (28). Note that we have independent evidence that the sign PIECE occurs in the same position as measure nouns: as (29) shows, it is ungrammatical to use a measure noun GLASS in combination with the sign TWO+PIECE.

(26) $\frac{\text{top}}{\text{APPLE TWO+PIECE}}$ [RSL]
 ‘two apples’

(27) *TWO+PIECE APPLE [RSL]

(28) [APPLE_i]_{NP} ... [TWO+PIECE_j [t_j [∅_{of} [t_i]_{NP}]_{FP}]_{MP}]_{QP}

⁵ It is indeed a numeral classifier and not a measure noun because it does not have a lexical meaning like ‘glass’ or ‘bottle’, but instead just means ‘a unit of N’.

- (29) *FLOUR GLASS TWO+PIECE [RSL]
 (30) ^{OK}FLOUR TWO GLASS [RSL]
 'two glasses of flour'

Further details of the syntactic analysis have to be worked out; for instance, it should be explained why the DPs in the partitive and pseudo-partitive constructions undergo topicalization. However, it is clear that the topicalization of the restrictor in RSL has a complex structure, and, more importantly for the questions raised in [Partee 1995](#), this position comes with a particular semantics, which can be characterized as partitive. Thus the generalization can be that the topic-comment structure in RSL is not used to overtly express the tri-partite quantifier structure per se, but rather some special cases when the restrictor is definite or otherwise semantically not directly compatible with the quantifier (i.e. in the case of number mismatch).

9.4 Conclusions

[Partee \(1995\)](#) showed among other things the importance of using sign language data (in that case, from ASL) within the typological approach to theoretical linguistics, in particular, to the study of quantification. In this paper I used the data from a different sign language, RSL, in order to further discuss Partee's findings.

I have found that RSL also uses spatial distributive modification of verbal signs to express distributive quantification over an argument of such a verb. However, the same spatial modification can apply to nominal signs. In the former case the distributive key is marked, while in the latter it is the distributed share that is marked. Thus this strategy is similar to the English *each* which can mark both as well; however, the RSL distributive marker is interesting as it can attach morphologically both to verbs and to nouns. The RSL facts show thus that the boundary between D-quantifiers and A-quantifiers may not be rigid. Furthermore, RSL data can be used as an argument in favor of analyzing distributive quantification as a clause-level phenomenon separate from lexical D-quantifiers, which has been also suggested for spoken languages ([Szabolcsi 2010](#)).

I have also discussed the question of overt expression of the tri-partite semantic structure of quantification, which according to [Partee \(1995\)](#) can manifest itself in the topic-comment structure. I found that RSL also uses the topic-comment structure in quantificational contexts; however, this structure

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is marked syntactically and it is semantically different from the unmarked pre-nominal use of quantifiers. I would therefore not classify RSL as a language that overtly marks the tri-partite quantificational structure, at least not in the simplest case. It would be interesting to know if ASL in fact has similar syntactic and semantic arguments in favor of the derived status of the topic-comment structure used in quantificational contexts.

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