

Logical meaning in space: Iconic biases on quantification in sign languages*

Jeremy Kuhn

Institut Jean Nicod, Département d'études cognitives,
ENS, EHESS, CNRS, PSL Research University

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Abstract

Typologically, the world's languages vary in how they express universal quantification and negative quantification. In patterns of concord, a single distributive or negative meaning is expressed redundantly on multiple morphological items. Sign languages, too, show semantic variation, but, surprisingly, this variation populates only a small corner of the full typological landscape. Sign languages systematically have distributive concord but tend to not have negative concord in its canonical form. Here, I explain these typological facts as the reflection of an abstract, iconic bias. Recent work on distributive concord and negative concord has proposed that these phenomena can be explained in relation to the discourse referents that they make available. I argue that discourse reference is also uniquely important to the iconic use of space in sign languages. The quirky sign language typology is thus explained based on what is easy and hard to represent in space.

Since Stokoe (1960), linguists have known that sign languages are natural languages, with independent histories and fully formed grammars. In subsequent years, much work on the phonology, morphology, syntax, and semantics of sign language has confirmed that sign languages share an abstract combinatorial system with spoken languages, and fit into known typologies (for overviews, see Quer et al. (2017) as well as Sandler (2012) on phonology, Sandler and Lillo-Martin (2006) on syntax, and Schlenker (2018) on semantics). Concurrently, a large body of work has emphasized the iconic properties of sign language (Cuxac, 2001; Taub, 2001; Liddell, 2003, *i.a.*). The prevalence of iconic phenomena in sign language may be driven by a number of pressures, including the ease at which pictorial meaning is expressed in the visual modality. Most of this work

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on iconicity has focused on descriptive meaning, often appearing on open-class items like nouns, verbs, or adjectives (Bellugi and Klima, 1979; Emmorey, 2014; Meir et al., 2013). This is perhaps unsurprising: in many sign languages, the sign for ‘tree’ looks like a tree and the sign for ‘eat’ looks like eating.

In this article, I examine the role of iconicity on abstract functional morphology, focusing on the case of *quantification*. I show that iconic biases stochastically influence typological patterns regarding how sign languages express universal quantification and negative quantification. By now, typological work on spoken languages has shown that there is a rich variety of strategies to express quantificational meanings. In particular, many of the world’s languages show patterns of *concord*, in which a single distributive or negative meaning is expressed redundantly on multiple morphological items. The availability of concord varies language to language; for example, Hungarian has both distributive and negative concord, but (a common superstrate dialect of) English has neither.

Sign languages, too, show semantic variation, but, surprisingly, this variation populates only a small corner of the full typological landscape. Sign languages systematically *have* distributive concord but tend to *not* have negative concord in its canonical form. I argue that this is not due to randomness, but in fact reflects iconic pressures: what is easy to represent in the visuospatial modality, and what is hard. We will see that this connects directly to the *dynamic potential* of quantificational structures—that is, what kinds of discourse referents they introduce.

1 The typology of quantification

1.1 Semantic typology in spoken language

In English, quantificational meanings are typically expressed using generalized quantifiers: DPs that indicate that a predicate holds of some quantity of the individuals in its restrictor. The sentences in (1) communicate that the ‘read a book’ property holds of some, all, or none of the individuals in the domain.

- | | | | |
|-----|----|-------------------------------|------------------------|
| (1) | a. | <u>Somebody</u> read a book. | $\exists x [P x]$ |
| | b. | <u>Everybody</u> read a book. | $\forall x [P x]$ |
| | c. | <u>Nobody</u> read a book. | $\neg \exists x [P x]$ |

The English system, however, is neither the only nor even the most common strategy of quantification that is attested in human language. Notably, in patterns of concord, the quantificational force of a DP is morphologically spread out over the entire sentence, appearing redundantly on multiple lexical items, and notably on indefinite DPs that appear in the quantificational scope.

The most canonical example of concord is that of negative concord, in which negative force is syntactically expressed on multiple lexical items (Giannakidou, 2000; Zeijlstra, 2004). The sentences in (2) provide examples from Russian and Italian, in which the negative indefinite pronoun *nichego/niente* (‘nothing’) appears in the scope of sentential negation. These negative indefinites may themselves contribute negation, as seen in fragment answers to questions, as in (3). In the company of sentential negation, however, the sentences nevertheless contribute a single negative meaning, as seen in the translations in (2). This is in contrast to a standard variety of English, in

which multiple negative expressions are either ungrammatical or, with appropriate prosody, give rise to double negation—i.e., positive meanings, as in (4).

- (2) a. Marija ne videla nichego.
 Mary not saw nothing
 ‘Mary didn’t see anything.’ (Russian)
- b. Maria non ha visto niente.
 Mary not has seen nothing
 ‘Mary didn’t see anything.’ (Italian)
- (3) a. Chto Marija videla? Nichego.
 What Mary saw? Nothing.
 ‘What did Mary see? Nothing.’ (Russian)
- b. Cosa ha visto Maria? Niente.
 What has seen Mary? Nothing.
 ‘What did Mary see? Nothing.’ (Italian)
- (4) a. ?? Mary didn’t see nothing.
 b. Mary didn’t see NOTHING.
 ‘Mary *did* see something.’ (English)

The flip-side of this pattern is that, in most syntactic environments, negative concord items *require* a negative operator in a higher position. In both Russian and Italian, post-verbal negative concord items are dependent on sentential negation: the sentences in (2) become ungrammatical when negation is removed.

- (5) a. * Marija videla nichego.
 Mary saw nothing (Russian)
- b. * Maria ha visto niente.
 Mary has seen nothing (Italian)

Many languages also show patterns of distributive concord, in which distributive force is expressed on multiple lexical items (Gil, 1982; Farkas, 1997). The sentences in (6) provide examples from Hungarian (Farkas, 1997) and Kaqchikel (Henderson, 2014), in which the distributive numeral *egy-egy/ju-jun* (‘one each’) appears in the scope of the distributive quantifier *each*. Distributive numerals may themselves contribute distributive meaning, as seen in sentences with a definite plural subject. In the company of a distributive quantifier, however, the sentences nevertheless contribute a single distributive meaning, as seen in the translations in (6). This is in contrast to English, in which multiple embedded distributive markers result in either degraded grammaticality or doubly distributive meanings, as in (8). The distributive equivalent of two negatives ‘canceling out’ is thus two distributives multiplying their meaning, as in (8b).

- (6) a. Minden gyerek hozott egy-egy könyvet.
 Every(DIST) child brought one-DIST book.
 ‘Every child brought one book.’ (Hungarian)

- b. Chikijujunal ri tijoxela' xkiq'etej ju-jun tz'i'.
 each(DIST) the students hugged one-DIST dog
 'Each of the students hugged one dog.' (Kaqchikel)
- (7) a. A gyerekek hoztak egy-egy köyvet.
 The children brought one-DIST book.
 'The children brought a book each' (Hungarian)
- b. Xe'qatij ox-ox wäy.
 we-eat three-DIST tortilla
 'We each ate three tortillas.' (Kaqchikel)
- (8) a. ?? Every child read one book each.
 b. Every professor nominated one student per professor.
 $\sim n$ professors means $n \times n$ nominations. (English)

Once again, the flip-side of the pattern is that distributive concord items are *dependent* on a plural or distributive operator elsewhere in the sentence or context. In both Hungarian and Kaqchikel, the sentences in (6) become ungrammatical when all arguments are singular.

- (9) a. * A gyerek hozott egy-egy könyvet.
 The child brought one-DIST book. (Hungarian)
- b. * Xe'inchäp ox-ox wäy.
 I-handle three-three tortilla (Kaqchikel)

We use these positive and negative properties to provide definitions for negative concord and distributive concord.

(10) *Negative concord*

In most syntactic environments, negative concord items require a negative licensor in order to be grammatical. When they occur under a negative operator, they do not contribute any additional negative meaning.

(11) *Distributive concord*

Distributive concord items require a distributive or plural licensor. When they appear under a distributive operator, they do not contribute any additional distributive meaning.

A large body of existing cross-linguistic semantic work allows us to get a sense of the typological landscape, categorizing the world's languages with respect to whether or not they have negative concord and/or distributive concord items. The table in (12) presents a sample of languages in the four possible categories. (For the typology of negative concord, see Zeijlstra (2004) and Giannakidou and Zeijlstra (2017); for distributive concord, see Oh (2006), Henderson (2014), and Farkas (2015)). In the table, \pm NC indicates presence or absence of negative concord, and \pm DC indicates presence or absence of distributive concord.

(12)

	–NC	+NC
–DC	English German Dutch	Italian French (European) Hebrew Farsi English (some dialects)
+DC	Kaqchikel Nahuatl Latin	Hungarian Russian Korean Turkish French (Côte d’Ivoire)

Standard dialects of English, as we have seen, show neither negative concord nor distributive concord; German and Dutch are two other such languages. Italian, French, Hebrew, and Farsi are negative concord languages but not distributive concord languages. Kaqchikel Mayan has distributive concord but not negative concord. Languages with both negative concord and distributive concord include Hungarian, Russian, Korean, and Turkish. There may be dialectal variation; for example, many varieties of English are known to show negative concord (Labov, 1972), and French as spoken in the Côte d’Ivoire shows distributive concord (p.c. Paloma Jeretic).

The online *World Atlas of Language Structures* allows us to make rough quantitative generalizations. Gil (2013) shows that the large majority of languages have distributive concord: out of 251 languages surveyed, only 62 do not have distributive numerals (i.e. indefinites that participate in distributive concord). Haspelmath (2013) shows that negative concord, too, is by far the typologically more common strategy: in 170 languages, negative indefinites (e.g. *nobody*) co-occur with sentential negation versus only 11 in which negative indefinites preclude sentential negation and 13 which show mixed behavior.¹ On both fronts, English is in the minority.

The above definitions of negative and distributive concord have been designed to make language classification as clear as possible. Nevertheless, further cross-linguistic variation within these categories complicates the picture somewhat. Our definition of negative concord, for example, specifies that negative concord items are often ungrammatical without a negative licenser. On the other hand, we have seen that other environments, such as fragment answers to questions, as in (3), may allow a negative concord item to appear without an overt licenser (but with a negative meaning). In some languages, there are specific structural positions that also allow negative concord items to appear without sentential negation. In particular, Italian and Spanish are examples of ‘non-strict’ negative concord languages, in which negative indefinites may appear without negation in preverbal position (Giannakidou, 1997). Nevertheless, because postverbal negative indefinites do require sentential negation (as seen in (5b)), we classify these languages as +NC languages.

Second, as observed by Haspelmath (1997), the boundary between negative concord items and

¹ Among the spoken languages that preclude sentential negation, Haspelmath (2013) also notes close familial connections: these languages tend to be the Germanic languages of northwestern Europe and languages from Mesoamerica. When we cross the typology with the presence or absence of distributive concord, the language families become even more segregated: –NC/–DC languages are almost exclusively Germanic, and –NC/+DC languages are almost exclusively Mesoamerican.

negative polarity items (NPIs) like English *anything* is not always clear cut. Note, for example, that English *anything* can arguably be classified as a negative concord item by the definition in (10): *anything* is ungrammatical in upward entailing environments, and does not contribute an additional negative meaning under negation. Canonical NPIs like English *anything* nevertheless have features that distinguish them from canonical negative concord items like Russian *nichego*: notably, they are grammatical in a variety of downward entailing but non-negative environments, such as *if*-clauses and questions. On the other hand, the diversity of the world's languages provides a number of intermediate cases, leading Haspelmath (1997, 2013) to collapse the categories for the purposes of large-scale typological work. This has the potential to inflate the number of languages considered to be +NC languages. For example, Mandarin Chinese and Hindi have been argued neither to have negative quantifiers like English *nobody* nor to have negative concord items like Russian *nichego*, relying instead on sentential negation and a system of NPIs (Lin, 1996; Lahiri, 1998). If we consider these to be negative concord languages, then Mandarin would join the Romance languages in +NC/–DC quadrant. Although I think it is useful to make these distinctions when possible, the boundary between negative concord and negative polarity will not play a large role for our purposes below.

Distributive concord items also show cross-linguistic variation. Notably, in some languages, the plural licenser of a distributive concord item may be an implicit variable, inferred from context (Henderson, 2014; Farkas, 2015). In Telegu and Tlingit, for example, a distributive numeral may be used to convey that a particular event happened on multiple occasions (Balusu, 2005; Cable, 2014). In such cases, the distributive numeral indicates distribution across time, instead of distribution across another plural individual (as we saw in (6) and (7)). We nevertheless categorize these as distributive concord items because (a) the resulting sentential meaning in all cases is distributive and (b) they may be redundant with an overt distributivity operator, whether this operator quantifies over individuals or times.

1.2 Semantic typology in sign language

There has by now been enough semantic work on sign language that we can perform a similar game with the sign languages of the world. Here, however, the picture looks strikingly different. Unlike spoken languages, which cover all four logical possibilities (with a preference for both negative and distributive concord), sign languages turn out to cluster in one corner of the typological landscape. By a large margin, sign languages tend to *have* distributive concord, and to *not* have negative concord in the form it typically appears in spoken language.

Distributive constructions have been studied in detail for a number of sign languages, including American Sign Language (ASL: Kuhn 2017), French Sign Language (LSF: Kuhn and Aristodemo 2017), Russian Sign Language (RSL: Kimmelman 2017), and Czech Sign Language (CSL: Dočekal et al. 2018), as well as investigated informally for German Sign Language (DGS) and Italian Sign Language (LIS). Each of these languages have distributive numerals that participate in concord phenomena. Conversely, I know of no sign languages that have been shown *not* to have distributive numerals, although strong generalizations are difficult to make without further typological work. In the American Sign Language sentence in (13), both the quantifier EACH and the distributive numeral ONE-arc express distributivity, but only a single distributive meaning is

interpreted. Similarly, in most sign languages, verbs may be reduplicated over an area of space to express a distributive meaning; the Russian Sign Language sentence in (14) presents an example in which distributive marking on the verb is redundant with the distributive subject. (Kimmelman 2017 describes EVERY as expressing universal distributive quantification.)

- (13) EACH-a PROFESSOR NOMINATE ONE-arc-a STUDENT
 ‘Each professor nominated one(-DIST) student.’ (ASL; Kuhn 2017)
- (14) $\overline{\text{EVERY BOY IX-pl}}^{\text{brow raise}} \text{ GIVE.PRESENT-1-distr}$
 ‘Every boy gave me a present.’ (RSL; Kimmelman 2017)

Similarly, a growing body of literature on negation in sign languages allows us to describe the wide variety of strategies for expressing negative meanings in the sign language modality, including both manual signs and non-manual negation markers. Typologically, sign languages show a range of different behavior, including patterns in some languages in which multiple markers of negation express a single negative meaning—that is to say, negative concord. However, when negative concord occurs in sign languages, it is generally restricted to a certain set of forms. Across many sign languages, it has been observed that negative non-manual markers (implicated as markers of negation by their distribution or their stand-alone interpretation) can appear alongside manual signs of negation without generating double negation. We also occasionally see cases of syntactic ‘doubling,’ in which multiple negative morphemes are semantically associated with the same variable, perhaps with an emphatic interpretation. What seems to be rare in sign languages, however, are negative indefinites (words like *nobody*, *nothing*, and *never*) that are obligatorily restricted to negative environments. As far as such phenomena have been investigated, we likewise rarely see concord between multiple negative indefinites that are associated with separate discourse referents. These generalizations are illustrated with examples below.

In most sign languages, negative meanings are associated with particular non-manual signs, often a head-shake or head-tilt (Zeshan, 2006). One typological split that has been described for sign languages is that of having *manual* dominant or *non-manual* dominant strategies for negation (Pfau, 2016). For languages with manual dominant negation, negative non-manuals may only occur in the presence of a negative manual sign. One such language is Russian Sign Language; the sentence in (15a) is ungrammatical without the manual negation that appears in (15b). For languages with non-manual dominant negation, on the other hand, the negative non-manual may appear alone, itself contributing negative force, like the example in (16a) from ASL. From the present perspective, non-manuals in languages like RSL clearly exemplify our definition of negative concord: negative non-manuals may only appear when they are licensed by a negative manual sign; in such environments, they do not contribute any additional negative meaning. (Precisely how to characterize languages like ASL depends on which element is taken to carry negative force in (16b).)

- (15) a. * BOY $\overline{\text{LATE}}^{\text{neg}}$
 b. BOY $\overline{\text{LATE NOT}}^{\text{neg}}$
 ‘The boy is not late.’ (RSL; Kimmelman 2017)

- (16) a. IX-1 $\overline{\text{UNDERSTAND}}^{\text{neg}}$
 ‘I don’t understand.’
 b. IX-1 $\overline{\text{NOT UNDERSTAND}}^{\text{neg}}$
 ‘I don’t understand.’ (ASL; cf. Neidle et al. 2000)

A number sign languages also allow the use of multiple manual negative markers to generate emphatic negation. In Flemish Sign Language (VGT), for example, the word glossed NOTHING (in Flemish, NEITS) may reinforce the meaning of a manual negation elsewhere in the sentence, as in (17). Note that in (17), the negative word NOTHING is not a negative indefinite (unlike English *nothing* or Italian *niente*), since it is not associated to an independent thematic argument of the verb—the argument of the verb is the left-dislocated topicalized clause ‘HOW MANY TIMES.’ Similar behavior has been reported for a number of languages, including New Zealand Sign Language (NZSL: McKee 2006), Chinese Sign Language (CSL: Yang and Fischer, 2002), and ASL (Wood, 1999). These emphatic uses of negative markers often appear clause-finally, and may be a syntactic double of another negative word in the sentence, as in the NZSL sentence in (18) and the ASL sentence in (19).

- (17) $\overline{\text{HOW-MANY TIMES}}^{\text{topic}} / \overline{\text{NOT SAY NOTHING}}^{\text{neg}}$
 ‘They did not tell me how many times!’ (VGT; van Herreweghe and Vermeerbergen 2006)
 (18) IX-1 GROW-UP BOARDING SCHOOL NOTHING COOK SEW NOTHING
 ‘I went to boarding school and we didn’t learn to cook and sew.’ (NZSL; McKee 2006)
 (19) JOHN NOTHING FIND PAPER NOTHING
 ‘John did not find any paper.’ (ASL; Wood 1999)

Critically, though, these patterns show different characteristics from those of negative concord. Of particular note, in none of these languages do negative indefinites *require* negation. In Flemish Sign Language, the negative indefinites NOBODY and NEVER may appear in various syntactic positions as the only negative manual sign, as seen in (20). Analogously, the ASL sentence in (21) provides minimal pairs to (19) that show that removing either negative indefinite results in a grammatical sentence. These patterns thus do not adhere to the definition of negative concord provided in §1.1, which requires dependence on a negative licenser.

- (20) a. $\overline{\text{YESTERDAY TO MEETING}}^{\text{topic}} / \overline{\text{NOBODY PRESENT}}^{\text{neg}}$
 ‘Yesterday I went to a meeting at which there wasn’t anyone present.’
 b. $\overline{\text{MY MOTHER NERVOUS NEVER}}^{\text{neg}}$
 ‘My mother is never nervous.’ (VGT; van Herreweghe and Vermeerbergen 2006)
 (21) a. JOHN NOTHING FIND PAPER
 b. JOHN FIND PAPER NOTHING
 ‘John did not find any paper.’ (ASL; Wood 1999)

Moreover, patterns of emphatic doubling are not restricted to negative items. Petronio (1993) and Petronio and Lillo-Martin (1997) show that similar doubling also occurs for *wh*-words, modals, quantifiers, and verbs, as illustrated in (22) for ASL. These parallels suggest that the examples of negative doubling in (17)–(19) are an instances of a grammatical phenomenon independent of negation.

- (22) a. $\overline{\text{WHAT JOHN BUY YESTERDAY WHAT?}}^{\text{whq}}$
 ‘What did John buy yesterday?’
 b. MY HIGH SCHOOL FIVE DEAF KID FIVE
 ‘My high school had (only) five deaf kids.’ (ASL; Petronio and Lillo-Martin 1997)

When negative indefinites participate in negative concord, they show redundant marking not only with sentential negation, but also with each other. Multiple negative indefinites may appear in a sentence without generating a double negation reading. In the French example in (23), for example, both *personne*, ‘nobody,’ and *rien*, ‘nothing,’ are negative indefinites, but may appear together in a sentence with a single negative meaning.

- (23) *Personne ne fait rien.*
 Nobody NE do nothing.
 ‘Nobody does anything.’ (French)

Sentences with multiple negative indefinites have not been systematically studied across sign languages. Nevertheless, in at least French Sign Language and Italian Sign Language, such examples are not possible. Example (24) provides an minimal paradigm from LSF. Geraci (2005) provides analogous examples for LIS.² This shows a significant departure from the behavior of negative concord in spoken languages, in which multiple, thematically independent negative indefinites can appear in the same sentence without problem.

- (24) a. MY BIRTHDAY, NONE OFFER GIFT
 ‘On my birthday, nobody offered me gifts.’
 b. MY BIRTHDAY, CL-pl FRIEND MINE OFFER NOTHING
 ‘On my birthday, my friends offered me nothing.’
 c. * MY BIRTHDAY, NONE OFFER NOTHING (LSF)

Wood (1999) reports a slightly different state of affairs for ASL. In ASL, two thematically independent negative indefinites may appear in the same sentence with a single negative meaning, as shown in (25). Once again, though, the pattern displays several properties that distinguish it from canonical negative concord. First, there are syntactic constraints on the construction; as in the case of doubling, one of the two negative words must appear in clause-final position, as seen in

²Geraci (2005) explains the LIS data by postulating that sentential negation and negative indefinites like *nobody* must move to the specifier of NegP. On his analysis, competition for the same structural position explains why only one negative item may appear in a sentence. Here, we take a different approach, outlining in §2 a semantic analysis of negative concord. Shifting from a syntactic to a semantic explanation will provide us a foothold into the functional pressures that may influence typology.

the ungrammaticality of (26). More importantly, there is never dependence on a negative licensor: either negative indefinite can appear as the only marker of negation in the sentence. By the present definition, we thus classify ASL as a –NC language because there are no manual items that *require* a negative licensor.

(25) JOHN NEVER EAT FISH NOTHING
 ‘John has never eaten any fish.’

(26) * JOHN NEVER NOTHING EAT FISH (ASL; Wood 1999)

There are nevertheless some exceptions to the tendency for sign languages not to have negative concord. Notably, Kuhn and Pasalskaya (2019) show that, in RSL, *in situ* negative indefinites are only grammatical when they appear under negation, as illustrated in (27) and (28). Furthermore, as in languages like French or Russian, multiple thematically independent negative indefinites may co-occur with a single negative meaning, as seen in (29). RSL is thus a negative concord language.

(27) a. NOBODY 3-CALL-1 NOT
 ‘Nobody called me.’

b. * NOBODY 3-CALL-1

(28) a. IX-1 NOTHING BUY NOT
 ‘I bought nothing.’

b. * IX-1 NOTHING BUY

(29) NOBODY NOTHING GIVE-1 NOT
 ‘Nobody gave me anything.’

(RSL; Kuhn and Pasalskaya 2019)

All together, this suggests a situation in which: (a) non-manual signs can participate in concord and (b) emphatic repetitions or minimizers may redundantly mark negation but (c) despite some exceptions, negative indefinites that depend on the presence of a negative licensor are relatively rare. Zeshan (2004), following a typological survey of 38 sign languages, comes to a similar generalization: “All sign languages seem to allow [a negative particle plus a nonmanual negative marker], and in many cases it is the most common way of expressing negation. Sometimes the negative particle itself is repeated [...], while the combination of two different manual negatives, such as a clause negator and a negative quantifier, is very uncommon.”

We represent (part of) this typological picture in the table in (30). Here, the classification of a language as +DC reflects the fact that it has distributive numerals; the classification of a language as –NC reflects the fact that negative indefinites are not restricted to negative environments. We note that a number of the languages discussed above do not appear in the table because there exists documentation regarding distributive indefinites or negative indefinites but not both. Indeed, the clearest linguistic documentation clusters around not only a relatively small set of languages but around an even smaller set of language families (such as the one containing ASL, LSF, and LIS). The robustness of the generalizations reflected in (30) should thus ideally be tested by further linguistic work on sign languages from across the world.

(30)		-NC	+NC
	-DC		
	+DC	American Sign Language French Sign Language Italian Sign Language German Sign Language	Russian Sign Language


The question that we would like to answer is thus the following: Why do sign languages tend to cluster in that bottom-left corner? Why do sign languages like distributive concord but not negative concord? Several interesting non-answers already present themselves. Note, for example, that the fact that distributive concord and negative concord pattern in opposite ways rules out the possibility of language-level syntactic pressures that prefer or disprefer redundant forms in the sign language modality. The patterns that we see can also not be explained via contact with a superstrate spoken language. We observe, for example, that English and German are [-NC, -DC], but ASL and DGS are both [-NC, +DC]; French and Italian are [+NC, -DC], but LSF and LIS are again both [-NC, +DC].

Finally, we have seen that many sign languages *do* have negative concord items, but these are restricted to certain constructions—notably, they include non-manual signs, but not negative indefinites. Ideally, an analysis of the facts above will explain the differences between the two modalities (sign vs. spoken), but also, *within* sign languages, why some parts of the grammar are more conducive to negative concord than others. This is what we do in the rest of the paper.

2 Dynamic semantics

One hypothesis that has been pursued in recent work is that concord is fundamentally linked to *discourse reference* (see in particular Kuhn (2018, 2019), building on Giannakidou (1998, 2011) and Alonso-Ovalle and Guerzoni (2004) for negative concord; Henderson (2014), Kuhn and Aristodemo (2017), and Kuhn (2017) for distributive concord; also Bumford (2017) and Charlow (to appear)). Within the framework of *dynamic semantics*, sentence meanings are modeled as objects that change the discourse context. In addition to providing information about the world, they may also introduce discourse referents—individuals that can be referred to later in conversation. Indefinite DPs introduce discourse referents, and pronouns retrieve them, as seen in (31).

(31) I saw a man in the road. He was whistling.



The contribution of indefinites may interact with other operators in the sentence, resulting in semantic effects on the discourse referents that they introduce. Sentence (32) provides an example in which an indefinite is embedded under the distributive quantifier *each*. What is surprising in this sentence is the mismatch between the pronoun and its antecedent: the singular indefinite introduces an atomic individual, but the plural pronoun retrieves a plurality. This behavior is not possible for an unembedded indefinite like the one in (31).

(32) Each professor nominated a student. Any of them could now win a \$100 prize.



The dynamic semantic answer to this puzzle is, of course, that the plurality emerges from the interaction of the indefinite with the distributive quantifier (van den Berg, 1996; Nouwen, 2003; Brasoveanu, 2006). In a nutshell, the distributive quantifier evaluates its complement for each atom of its restrictor, then collapses this information by summing the discourse referents introduced by any indefinites in its scope. A plural discourse referent is created by summing all the atomic boys nominated by a professor.

In doing so, the compositional system also establishes a *function* that relates the two pluralities. In (32), for example, each professor is associated with the student that he or she nominated. Heim (1990) observes that this function can be retrieved by a pronoun, in cases she calls ‘quantificational subordination.’ In (33), the pronoun may covary with the professors, returning the student that each given professor nominated.

(33) Each professor nominated a student, but none of them think that he or she will win.



Henderson (2014) and Kuhn (2017) argue that this interaction provides the key to distributive concord; distributive numerals are licensed in exactly those environments that generate a plural discourse referent in this manner. In (34), the distributive numeral *egy-egy* introduces a discourse referent, and flags the fact that, later in evaluation, the discourse referent will be a plurality.

(34) Minden gyerek hozott egy-egy könyvet.

Every(DIST) child brought one-DIST book.

‘Every child brought one book.’

(Hungarian)

Distributive numerals thus have two components of meaning: (i) the introduction of a discourse referent, like an existential, and (ii) a presupposition that the discourse referent is a dependent plurality. In order to avoid contradiction (and thus, ungrammaticality), these two components of meaning must take split scope around the plural licenser. On this analysis, there is an anaphoricity built into the meaning of a distributive numeral itself: the second component of the meaning is anaphoric to the discourse referent introduced in the first component of meaning, not unlike the way that the second sentence in (32) is anaphoric to the discourse referent introduced in the first sentence in (32).

Similarly, there are operators that *block* the introduction of discourse referents by indefinites in their scope. Two such environments are sentential negation and the preposition *without*, as seen in (35). When unembedded, indefinites like *a student* introduce a discourse referent (as in (31)), but in (35a), it is impossible to use a pronoun to refer to the students that I saw in the room, since the sentence entails that there is no such student.

(35) a. I didn’t see a student in the room. ??He was studying hard.

b. I went to the party without a date. ??He was wearing a tuxedo.

Giannakidou (1998, 2011) proposes that the interaction of negation with discourse referents underlies the distribution of some polarity sensitive items, a proposal further developed by Alonso-Ovalle and Guerzoni (2004) and Kuhn (2018) for negative concord. Specifically, Kuhn (2018) argues that negative concord items are licensed in exactly those environments that block the introduction of discourse referents. In (36), the negative indefinite *nessuno* introduces a discourse referent, and flags the fact that, later in evaluation, the discourse referent will have an empty extension.

- (36) a. Non ho visto nessuno.
 not have.1 seen nobody
 ‘I didn’t see anybody.’
- b. Ci sono andato senza nessuno.
 there am gone without nobody
 ‘I went there without anybody.’ (Italian)

Negative concord items thus also have two components of meaning: (i) the introduction of a discourse referent, like an existential, and (ii) a presupposition that the extension of the discourse referent is empty. In order to avoid contradiction (and thus, ungrammaticality), these two components of meaning must take split scope around the negative licenser.³ Once again, anaphoricity is built into the meaning of a negative concord item: the second component of the meaning is anaphoric to the discourse referent introduced in the first component of meaning, with the twist that the set of values taken by the discourse referent must be empty.

The parallel between distributive concord and negative concord, previously discussed in the syntactic literature (e.g. Oh, 2006), can thus be provided a highly parallel semantic analysis. This semantic perspective, in turn, allows us a window into the functional motivation for patterns of concord that may feed into semantic typology. What is the communicative value of negative concord (cf. Barker, 2018)? Kuhn (2019)’s answer is the following: across both phenomena, the use of concord items is a way to provide redundancy of meaning by signaling how the quantificational force—distributive or negative—affects discourse referents that are introduced in its scope.

3 Sign language

3.1 Spatialization as iconicity

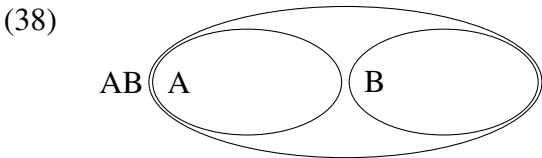
Cross-linguistically, sign languages have been shown to have a robust tendency to represent discourse reference in a visible, iconic manner, through the use of space.

Intuitively, iconicity describes a phenomena in which form of a sign resembles the meaning of the sign. Here, we adopt Schlenker et al. (2013)’s definition of iconicity as a mapping that preserves certain structural or geometric properties of a sign in its interpretation. The presence of

³Precisely how split scope is obtained varies between the theories: Alonso-Ovalle and Guerzoni (2004) use a conventional implicature; Henderson (2014) employs the post-suppositions of Brasoveanu (2013); Kuhn (2017, 2018) uses quantifier raising, using insights from Charlow (to appear).

iconicity can be deduced from the observation that structural inferences are generated by manipulating the form of a linguistic item. A simple example of structural iconicity can be seen with plural pronouns. Across many sign languages, pluralities are associated with areas of space. Areas of space can be established in a variety of ways, by reduplicating a noun over an area of space, by a plural pronoun (IX-arc) that moves over the area, or by inflecting a quantifier, such as ALL or EACH, over the area (Pfau and Steinbach, 2006). The positioning of these areas of space with respect to each other gives rise to iconic inferences. In particular, Schlenker et al. (2013) show that geometric properties of the form of a plural map onto mereological properties of the denotation of the plural. For example, the use of space in the ASL discourse in (37) presupposes that the individuals who came and the ones who stayed home are two non-overlapping subsets of the students in my class. These inferences are exactly parallel to the iconic interpretation of the set diagram in (38). Below, ‘IX’ glosses a pronoun, signed with an extended index finger; ‘-arc’ indicates inflection of a sign across an area of space; lowercase ‘ab’ indicates an area subsuming non-overlapping areas ‘a’ and ‘b’.

- (37) POSS-1 STUDENT IX-arc-ab MOST IX-arc-a CAME CLASS. IX-arc-b STAY HOME.
 ‘Most of my students came to class. They [=the ones who didn’t come] stayed home.’
 (ASL; Schlenker et al. 2013)



Singular individuals can also be established in space. Famously, noun phrases be indexed at points in space; subsequent pronouns may then refer back to these individuals by pointing to the location at which their antecedent was established (Lillo-Martin and Klima, 1990, *i.a.*). Sentence (39) presents a simple example in which spatial indexing can disambiguate a singular pronoun with two possible antecedents. Below, lower-case letters ‘a’ and ‘b’ (without ‘arc’) indicate that the singular pronoun is directed towards a specific point in the horizontal plane.

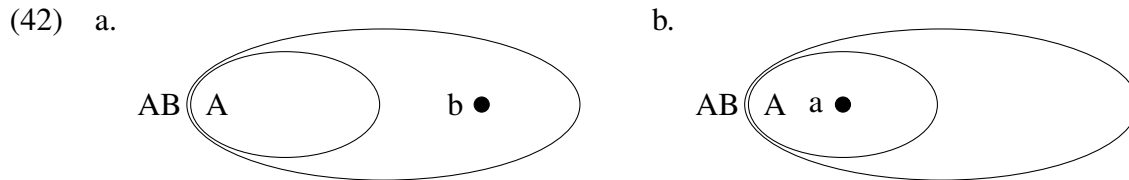
- (39) JOHN-a TELL BILL-b IX- $\{a / b\}$ WILL WIN.
 ‘Johnⁱ told Bill^j that he_{i/j} would win.’
 (ASL, Kuhn 2016)

On our definition of iconicity, is the spatialization of discourse referents, as seen in (39), a case of iconicity? Unlike (37), there is no evident geometric inference for a sentence like (39): the sentence does not indicate that John has any structural properties that Bill does not, or vice versa. On the other hand, this does not necessarily mean that space is not used iconically. After all, the boringly simple set diagram in (40), corresponding to the use of space in (39), similarly provides no structural information, besides perhaps the fact that there are at least two individuals, an inference entailed by the words of sentence (39) itself. Thus, the fact that no iconic inferences are observable in (39) does not show that the use of space is not iconic, but just that any iconic inferences are logically weaker than the at-issue meaning of the sentence.

- (40) a ● b ●

Indeed, an iconic inference for singular discourse referents does emerge when we examine their interaction with plurals. In (41), a structural inference of set membership is generated depending on the placement of the singular noun within or outside of the area established by the plural. The inferences (generating a contradiction in the case of (41b)), are once again analogous to the iconic inferences of the set diagrams in (42).

- (41) a. MY CLASS IX-arc-ab SO-SO. SOME STUDENTS IX-arc-a FINISH ALL HOMEWORK.
 BUT SOMEONE IX-b FINISHED NONE.
 ‘My class is so-so. Some students finished all the homework. But someone [among those that didn’t finish it all] finished none.’
- b. * MY CLASS IX-arc-ab SO-SO. SOME STUDENTS IX-arc-a FINISH ALL HOMEWORK.
 BUT SOMEONE IX-a FINISHED NONE.
 ‘My class is so-so. Some students finished all the homework. But someone [among those that finished it all] finished none.’ (ASL)



But let us return once more to (39) (or to an even simpler sentence, in which only a single discourse referent is established in space). I will propose that even this use of space invites an iconic inference: namely, that the individuals exist. Schlenker (2011) provides evidence for such an inference based on examples involving pronouns with disjunctive antecedents. In general, when a verb is predicated of a disjunctive argument, it is possible to use a pronoun to pick out *whichever* individual has the relevant property; in the ASL sentence in (43a) as well as its English translation, the pronoun may refer to the individual who wins. In ASL, however, the two disjuncts may be indexed at separate locations; Schlenker (2011) observes that such indexation blocks the relevant anaphoric indexing. Schlenker (2011) explains this observation by proposing that activating a location in space generates a presupposition that, in the local context, a discourse referent associated with that location exists. In (43b), associating a pronoun with the disjunctive antecedent generates the infelicitous presupposition that there exist two individuals who will win.

- (43) BLACK-m OR ASIA-m WILL WIN NEXT PRES. ELECTION. IX-m WILL WIN AHEAD
 ‘An African-American man or an Asian-American will win the next presidential election. He will win by a large margin.’
- (44) * BLACK-a OR ASIA-b WILL WIN NEXT PRESIDENT ELECTION. IX-m WILL WIN AHEAD
 (ASL; Schlenker 2011)

Thus, while the existential inference may be redundant with the sentential meaning in examples like (39), a non-trivial effect may emerge in sentences with quantification.

Finally, we observe that the degree to which a sentence gives rise to iconic inferences is highly dependent on pragmatic factors. In some cases, the spatial arrangement of singular noun phrases

may reflect the 3D topographic arrangement of the denoted individuals. To give an extreme example, Schlenker (2014) shows that, in LSF and ASL, locating pronouns high or low in the signing space can indicate gradient information regarding the relative locations of astronauts of varying heights, floating freely in space. In other cases, such as (39), iconic structure is highly schematic, to the point of triviality, or suppressed entirely. How much iconic structure is interpreted in general will depend on a number of factors, including the manner and the context in which a sentence is uttered.

3.2 Distributive concord in sign language

Returning to distributivity, it turns out that sign languages are typologically similar not only in the fact that they *have* distributive concord, but also in the morphological manner in which it is expressed. In particular, Kuhn (2017) shows that, in ASL, distributive numerals are generated by adding plural inflection to a numeral, moving it over an area of space. Moreover, the plural inflection on the distributive numeral must obligatorily agree with location of its plural licenser. This can be seen in (45), repeated in part from (13): the distributive numeral ONE-arc must move in space over the area at which the professors were established. Figure 1 provides an illustration.

- (45) a. EACH-a PROFESSOR NOMINATE ONE-arc-a STUDENT.
 ‘Each professor nominated one student.’
 b. *EACH-a PROFESSOR NOMINATE ONE-arc-b STUDENT.
 ‘Each professor nominated one student.’ (ASL; Kuhn 2017)



Figure 1: Spatial agreement of EACH and ONE-arc in ASL

Cross-linguistically, these facts seem to form a general morphological strategy for communicating distributive meaning in sign languages; see, for example, Kimmelman (2017) on Russian Sign Language and Dočekal et al. (2018) on Czech Sign Language.

Why is this precise morphological strategy so common? The hypothesis pursued here is that these representations, like the representations of singular and plurals, are fundamentally *iconically motivated*. Of particular note, we see a direct connection to the dynamic analysis of distributive numerals. On a dynamic analysis, recall that distributive numerals signal the fact that (i) a plurality is

introduced, and that (ii) this plurality is placed in a functional correspondence with a second plurality (the licenser). It is precisely this information that is expressed iconically in the morphological marking of distributive numerals.

First, like plural nouns and pronouns, distributive numerals move across an area of space. In the case of distributive numerals, this reflects the fact that a discourse plurality will be available upon evaluation of the sentence as a whole. That this movement establishes a plural discourse referent can be seen by the availability of a later plural pronoun, which must move over the same area as the distributive numeral, as in (46).

(46) EACH-a PROFESSOR SAID ONE-arc-a STUDENT WILL RECEIVE A. IX-arc-a STUDENT WILL HAPPY.

‘Each professor said one student will receive an A. Those students will be happy.’ (ASL)

Second, this plurality is spatially associated with its plural licenser, thus iconically representing the functional relation between the two. In mathematical terms, a function is the association with one set with another set. In iconic terms, where sets and plurals are represented as areas of space, a function is iconically represented as the spatial association of two areas of space. This, as we saw in (45), is exactly what we see in sign languages.

Indeed, this appears to be a general iconic strategy for representing functional reference beyond distributive numerals. In particular, Kuhn (2017) shows that the morphological pattern that appears on distributive numerals in ASL also appears for the adjectives *same* and *different*, implicated elsewhere as involving functional reference. In particular, it has been shown that the adjectives *same* and *different* cannot be analyzed as generalized quantifiers over individual variables (Keenan, 1992). On the other hand, the compositional analyses of Barker (2007) and Bumford (2015) for the two adjectives highlight the connection to functional reference. In informal terms, notice that the meaning of (47) can be stated in terms of a function: ‘The function from boys to the book they read is a constant function.’

(47) All the students read the same book.

In ASL, Kuhn (2017) shows that these adjectives display the same iconic representation of functions seen above. The adjectives SAME and DIFFERENT may be signed neutrally, or may move over an area of space at which a plural was previously established. With movement of the adjectives over an area of space, the sentences in (48) only receive an ‘internal’ reading, in which boys are compared to each other.

(48) a. ALL-a BOY READ SAME-arc-a BOOK.

‘All the boys read the same book (as each other).’

b. ALL-a BOY READ DIFFERENT-arc-a BOOK.

‘All the boys read different books (from each other).’ (ASL, Kuhn 2017)

This use of space is only available when a functional discourse referent is introduced. Recall from the example of quantificational subordination in (33) that the introduction of a functional discourse referent can be diagnosed by the behavior of a subsequent pronoun. The English sentences in (49) show that the quantifier *all* allows such discourse referents to be introduced, but *none* blocks them. (Observe that the two sentences, up to the conjunct, are truth-conditionally equivalent.)

- (49) a. All of the students read a different book, and all of them liked it.
 b. * None of the students read the same book, and all of them liked it.

In ASL, like other languages with distributive concord, distributive numerals are not licensed under NONE, as is expected if distributive numerals require the introduction of a functional discourse referent. Moreover, the behavior of SAME in ASL generates a minimal paradigm that tracks the precise contribution of space. When SAME is signed neutrally, it may appear under NONE, receiving an interpretation in which each student read a different book, like its English translation. In this context, however, movement is not permitted, as shown in (50). This follows directly from the hypothesis that this use of space requires a functional discourse referent, together with the observation, in (49), that *none* blocks such discourse referents.

- (50) a. THAT CLASS IX-arc-a, NONE STUDENT READ SAME-neutral BOOK.
 'In that class, none of the students read the same book.'
 b. * THAT CLASS IX-arc-a, NONE STUDENT READ SAME-arc-a BOOK. (ASL)

To summarize: sign languages are typologically united not only in the fact that they have distributive concord, but also in the morphological strategy in which it appears. This is argued to be the iconic representation of a functional discourse referent, a claim supported by fine-grained semantic contrasts within one sign language (ASL). For spoken language, we proposed that the preference for distributive concord arises from the communicative pressure to redundantly signal distributive quantification by indicating its effect on discourse referents in its scope. In sign language, this pressure dovetails with the iconic pressure to interpret space iconically: space provides an immediately accessible tool to indicate the relevant logical properties of these discourse referents. The broader typological tendencies of sign language thus arise from a general pressure to iconically represent abstract information about discourse reference.

3.3 Negative concord in sign language

When we turn to negative concord, the same iconic pressure generates a conflict. According to the analysis in §2, negative concord items are fundamentally dynamic in nature, signaling the fact that the set of discourse referents is empty. But, unlike what we have seen for plurality, iconic, pictorial representations are fundamentally unable to express this kind of negative proposition; one cannot demonstrate the non-existence of an entity by pointing at something (Sober, 1976). The use of space thus does not provide an easily accessible morphological strategy to communicate the relevant discourse information in the way that it does for distributive concord. Indeed, the situation is even worse than this: any manual sign must be placed *somewhere* in space; in this act, we have seen that the sign invites an iconic inference that a discourse referent exists. This inference directly contradicts the use conditions of negative concord items, which are only grammatical in environments that ensure that no discourse referents are introduced.

From a typological perspective, we can see the observed differences between the spoken language and sign language as arising via three competing pressures. First, I assume that there is a basic pressure to avoid ineffability: there should be some way to say everything. Such a pressure

means that there should be at least one strategy to express negative quantification in any given language, spoken or sign. Second, following Kuhn (2019), we have proposed that there is a pressure to express quantificational meaning redundantly, possibly by indicating its effect on discourse referents. Finally, we have argued for a pressure to interpret space iconically whenever possible.

This final pressure will be violated in almost any case in which space is used on a DP under negation: this includes negative quantifiers themselves, as well as the pronouns that they bind, and any indefinites in the scope of negation. On the other hand, the constraint against ineffability states that some violation of this pressure is unavoidable, as there must be some way to express negative existential meanings. Thus, the pressure to interpret space iconically is perhaps most likely to be found in cases in which there is competition between alternative formulations of the same meaning—in such cases, we expect the more iconically congruent alternative to be preferred.

A first such example is provided by Graf and Abner (2012), who report that the negative quantifier NO in ASL cannot act as the antecedent of an overt bound pronoun, as seen (51a). Kuhn (2016) reports variation on analogous sentences: one consultant does allow binding by NO, but two others assign degraded judgments. Importantly, the ungrammaticality is not because NO is unable to induce co-variation, since Abner and Wilbur (2017) show that the target meaning can be communicated by replacing the overt pointing pronoun with a null pronoun, as in (51b).

- (51) a. % [NO POLITICS PERSON]-a TELL-STORY IX-a WANT WIN.
Intended: ‘No politician_i said he_i wants to win.’
- b. [NO POLITICS PERSON]-a TELL-STORY WANT WIN.
 ‘No politician_i said he_i wants to win.’ (ASL, Abner and Wilbur 2017)

Graf and Abner (2012) share the same fundamental intuition proposed here: it is impossible to point to something that does not exist. The precise implementation of this intuition is somewhat more subtle. Graf and Abner (2012) argue that these examples show that the overt pronoun IX does not allow quantificational binding. This implementation is likely too strong: Kuhn (to appear) provides systematic evidence that pointing pronouns can receive bound readings in all documented sign languages, generating, for example, sloppy readings of ellipsis and co-variation in the focus alternatives of *only*. Schlenker (2011) provides an alternative direction of analysis, proposing that pronouns generate a presupposition of existence in their local context. However, relativization to local contexts make this analysis too weak to explain the degraded judgement of (51a), since the existence presupposition is satisfied in the pronoun’s local context, below negation. I would thus advocate for an intermediate position; pronouns can be bound, but placing items in space generates an iconic inference of existence that is *often and easily* interpreted relative to the global context. Thus, comparing the two alternatives, (51b) is the more iconically congruent option.

A second example can be found in cases in which two negative quantifiers are used in a sentence. In English, as we saw in §1.1, certain intonations and contexts allow double negation to produce a positive meaning, as in (52). On the other hand, in LSF, LIS, and ASL (claimed, like English, to be –NC languages), multiple negative quantifiers generally give rise to ungrammaticality, not to positive meanings (Wood 1999; Geraci 2005; though see Schlenker 2011). This difference between the two modalities can be better understood on the present perspective. Notably, these positive meanings have a more iconically congruent alternative in sign language: a sentence with no negative words whatsoever, equivalent to the paraphrase of sentence (52).

- (52) Nobody gave me NOTHing. (English)
 ‘Everybody gave me something.’
- (53) * MY BIRTHDAY, NONE OFFER NOTHING (LSF)

These examples provide evidence of a general pressure to avoid the use of space in negative constructions. This pressure is expected to influence the form of language in other ways, too: when negative signs do occur, there would be a pressure against localizing them in a marked way in space. Indeed, we have seen one syntactic strategy that doesn’t use space at all: non-manual signs. In this respect, non-manual signs are fundamentally different from manual signs: manual signs must have a location in space, but non-manual signs cannot. The iconic pressures on manual signs will not transfer over to non-manual signs.

Non-manuals thus provide a potential strategy to escape from the conflicting pressures operating on the form of the sign language grammar. In particular, since the pressure to express quantificational meaning redundantly is not modality-specific, we expect it to be just as active in the sign language modality. In the sign modality, though, languages provide two ways to address this pressure: through manual NC items, which invite spurious iconic inferences, or through negative non-manuals, which do not. Redundantly expressing negative meaning via non-manual signs is the more iconically congruent alternative. As we saw in §1.2, this is indeed a highly frequent strategy in sign language: patterns of negative concord involving non-manual expressions is extremely pervasive across sign languages. If we reclassify sign languages as +/–NC based on the behavior of both manual *and* non-manual signs, +NC languages become strongly dominant in sign language, mirroring the typology of spoken language.

To summarize, for patterns of distributive concord, we see a dovetailing of two communicative pressures: the iconic use of space provides an easily accessible strategy to indicate distributive force redundantly. For negative concord, the use of space is not helpful, and may even be counterproductive, introducing the spurious iconic inference that an individual exists in the global context. On the other hand, the pressure to have redundancy of negative meaning can also be satisfied in sign language by non-manual signs. Adopting a redundant non-manual marking of negation consequently also reduces the relative utility of manual negative concord on this front, as well.

3.4 Beyond quantification

Above, we have focused on universal and negative quantification, but similar techniques can of course be applied to other areas of language in which functional syntactic categories carry abstract meanings. One such domain revolves around modal meaning. In spoken language, literature on *epistemic indefinites* has established a landscape of typological variation displayed by indefinites that are restricted to modal environments (Alonso-Ovalle and Menéndez-Benito, 2013). Similar typological work has been conducted in related domains in sign language, including on modal meaning (Herrmann, 2013), free choice (Nicola, 2008) and impersonal reference (Barberà and Cabredo Hofherr, 2018). Another such domain involves possessive constructions, which similarly have been the subject of a large amount of typological work in sign language (Zeshan and Perniss, 2008), and which have been shown to use space in meaningful ways in many sign languages. As

above, we expect comparison across modalities to give insight into which linguistic tendencies are modality-independent, and which arise from modality-specific biases.

4 Conclusion

Iconic biases contribute to the typological patterns of quantification in sign languages. Sign languages, I have argued, have a general pressure to represent information about discourse reference iconically in space. With respect to distributive meanings, this explains not only the presence of distributive concord in sign language (which is also typologically common in spoken languages), but also the particular morphological form in which it appears. With respect to negative meanings, this explains where negative concord appears, and where it does not. Non-manual signs, which do not use space, are free to participate in concord, but manually-signed negative indefinites, which must be placed somewhere in the signing space, do not participate in concord (thus going against the typological tendency of spoken languages).

These patterns are best seen as *biases*, not absolutes. Indeed, the case of RSL shows an exception to the tendency not to have negative concord with manual signs. In general, sign languages, as linguistic systems, are certainly able to express logical meanings such as negation. In any particular conversation, it is perfectly conceivable for iconic inferences to be suspended when irrelevant. When addressing typology, though, it is often useful to talk in terms of *pressures*. What is it easy for a given language to do? What is it hard for this language to do? Typological generalizations emerge not based on what is possible at the level of a given conversation, but based on what is easiest at the level of a linguistic community. Here, I have claimed that discourse reference is central to both distributive concord and negative concord. I have suggested that discourse reference is also uniquely important to the iconic use of space in sign languages. The quirky sign language typology is thus explained based on what is easy and hard to represent in space.

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