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

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July 16, 2020

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 a specific corner of the full typological landscape. When we focus on manual signs, 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 the phenomena can be explained in relation to the discourse referents that they make available. The use of space in sign language also invites iconic inferences about the referents introduced in discourse. We show that these iconic inferences coincide with the meaning of distributive concord but contradict the meaning of negative concord. The sign language typology is thus explained based on what is easy and hard to represent in space.[*]

1. INTRODUCTION

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 & 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 on iconicity has focused on descriptive meaning, often appearing on open-class items like nouns, verbs, or adjectives (Bellugi & 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 (although this iconicity is neither transparent nor predictable).

In this article, I examine the role of iconicity on abstract functional morphology, focusing on the case of QUANTIFICATION. I propose that iconic biases can explain a typological tendency 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, as in 1.

(1)   a.   Mari **nem** látott **semmit**.
          Mary not   saw   nothing
          'Mary didn't see anything.'   (Hungarian; Szabolcsi 2018)
      b.   **Minden**   gyerek hozott **egy-egy** könyvet.
          Every(DIST) child   brought one-DIST book.
          'Every child brought one book.'   (Hungarian; Farkas 1997)

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 a specific corner of the full typological landscape. I will show that the typological picture in sign language shows a division of labor between manual and nonmanual signs. Manual signs are signs that are articulated with the hands in the signing space in front of the signer. Nonmanual signs are facial expressions that perform a variety of linguistic functions, such as question-formation, topicalization, and negative marking. Notably, while manual signs are made in space, nonmanual marking cannot have a spatial component, allowing for the possibility of differential pressures. Indeed, when we consider the sign stream as a whole, including both manual and nonmanual signs, the typology of quantification of sign languages looks similar to that of spoken language. On the other hand, when we focus exclusively on manual signs, 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 on the use of space: what is easy to represent in the visuospatial modality, and what is hard.

Specifically, I will claim that both distributive concord and negative concord involve inferences about what discourse referents are available outside of the local context. I will show that the use of space in sign language similarly invites inferences about the discourse referents of the global context. These iconic inferences coincide with the meaning of distributive concord but contradict the meaning of negative concord. Iconicity thus imposes a pressure in favor of manual distributive concord, but against manual negative concord.

2.   THE TYPOLOGY OF QUANTIFICATION

2.1.   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 2 communicate that the 'read a book' property holds of some, all, or none of the individuals in the domain.

(2) a. **Somebody** read a book. $\exists x\,[P\,x]$

b. **Everybody** read a book. $\forall x\,[P\,x]$

c. **Nobody** 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 3 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 4. In the company of sentential negation, however, the sentences nevertheless contribute a single negative meaning, as seen in the translations in 3. 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 5.

(3) 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)

(4) 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)

(5) a. % Mary did**n't** see **nothing**.

b.   Mary did**n'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 3 become ungrammatical when negation is removed.

(6) 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 7 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 7. This is in contrast to English, in which multiple embedded distributive markers result in either degraded grammaticality or doubly distributive meanings, as in 9. The distributive equivalent of two negatives 'canceling out' is thus two distributives multiplying their meaning, as in 9b.

(7) 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)

(8) a. A   gyerekek hoztak **egy-egy** köyvet.
        The children brought one-DIST book.'
        'The children brought a book each'   (Hungarian)

     b. Xeqatij **ox-ox**   wäy.
        we-eat three-DIST tortilla
        'We each ate three tortillas.'   (Kaqchikel)

(9) a. ?? **Every** child read one book **each**.

     b. **Every** professor nominated one student **per** professor.
        ⇝ 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 7 become ungrammatical when all arguments are singular.

(10) 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.

(11) 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.

(12)   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.

Note that these definitions provide a characterization of linguistic items, not of languages, reflecting the fact that a single language may have multiple paradigms that behave in different ways. For example, in many cases, a negative concord item or distributive concord item can be replaced by a plain indefinite without changing the meaning. In 7a, for example, the distributive numeral can be replaced with the plain numeral *egy* 'one' which can appear in both distributive and non-distributive contexts. In contrast, the reduplicated form *egy-egy* needs a distributive or plural licensor, thus qualifying it as a distributive concord item. Thus, in order to generate a typology of languages, we can categorize a given language as ±NC/DC depending on whether it has negative concord and/or distributive concord as a potential strategy of quantification.

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 13 presents a sample of languages in the four possible categories. (For the typology of negative concord, see Zeijlstra 2004 and Giannakidou & Zeijlstra 2017; for distributive concord, see Oh 2006, Henderson 2014, and Farkas 2015). In the table, ±NC indicates presence or absence of negative concord items, and ±DC indicates presence or absence of distributive concord items.

(13)

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

Standard dialects of English, as we saw in 5 and 9, show neither negative concord nor distributive concord; German and Dutch are two other such languages. Italian, French, Hebrew, and Farsi are negative concord languages, as illustrated in 3b, but not distributive concord languages. Kaqchikel Mayan has distributive concord, as in 7b, but not negative concord. Languages with both negative concord and distributive concord include Hungarian, Russian, Korean, and Turkish, as exemplified in 1. 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 licensor. On the other hand, we have seen that other environments, such as fragment answers to questions, as in 4, may allow a negative concord item to appear without an overt licensor (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 6b), we classify these languages as +NC languages.

Second, as observed by Haspelmath (1997), the boundary between negative concord items and 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 11: *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 licensor 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), as illustrated in 14.

(14) Raamu renDu renDu kootu-lu-ni   cuus-ee-Du
      Ram   two-DIST   monkey-Pl-Acc see-Past-3PSg
      'Ram saw two monkeys in each time interval.'   (Telugu; Balusu 2005)

In such cases, the distributive numeral indicates distribution across time, instead of distribution across another plural individual (as we saw in 7 and 8); as a consequence, it is not clear that they meet the definition in 12, since they do not require an overt distributive or plural licensor. 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.

2.2. 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 rather different. When we consider the sign stream as a whole, including both manual and nonmanual signs, the typology of sign languages arguably looks similar to that of spoken languages, with a preference for both negative and distributive concord. On the other hand, when we restrict our view to manual signs, 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 & 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. (For most sign languages that exist, we just don't yet have the empirical data.) In the American Sign Language sentence in 15, both the quantifier EACH and the distributive numeral ONE-arc express distributivity, but only a single distributive meaning is interpreted. Similarly, in many sign languages, verbs may be reduplicated over an area of space to express a distributive meaning; the Russian Sign Language sentence in 16 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.)

(15)   EACH-a PROFESSOR NOMINATE ONE-arc-a STUDENT
       'Each professor nominated one(-DIST) student.'   (ASL; Kuhn 2017)

                     brow raise
(16)   ‾E‾V‾E‾R‾Y‾ ‾B‾O‾Y‾ IX-pl GIVE.PRESENT-1-dist
       '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 nonmanual 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, nonmanual signs can participate in negative concord. We also occasionally see emphatic negation via syntactic 'doubling.' 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. These generalizations are illustrated with examples below.

In most sign languages, negative meanings are associated with particular nonmanual 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 nonmanual dominant strategies for negation (Pfau, 2016). For languages with manual dominant negation, negative nonmanuals may only occur in the presence of a negative manual sign. One such language is Russian Sign Language; the sentence in 17a is ungrammatical without the manual negation that appears in 17b. For languages with nonmanual dominant negation, on the other hand, the negative nonmanual may appear alone, itself contributing negative force, like the example in 18a from ASL. From the present perspective, nonmanuals in languages like RSL clearly exemply our definition of negative concord: negative nonmanuals 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 18b.)

(17)   a.   * BOY $\overline{\text{LATE}}^{\text{neg}}$

        b.   BOY $\overline{\text{LATE NOT}}^{\text{neg}}$
            'The boy is not late.'   (RSL; Kimmelman 2017)

(18)   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 19. Importantly, in 19 the negative word NOTHING is not acting like a negative indefinite (such as English *nothing* or Italian *niente*), because it is not an independent thematic argument of the verb. Specifically, the sentence means that the speaker was not told how many times something happens; the internal argument of the verb is thus the left-dislocated topicalized clause HOW MANY TIMES, and the word NOTHING is neither the subject nor the object of the verb. Similar behavior has been reported for a number of languages, including New Zealand Sign Language (NZSL: McKee 2006), Chinese Sign Language (CSL: Yang & 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 20 and the ASL sentence in 21.

(19) $\overline{\text{HOW-MANY TIMES}}^{\text{topic}}$ / $\overline{\text{NOT SAY NOTHING}}^{\text{neg}}$
       'They did not tell me how many times!' (VGT; van Herreweghe & Vermeerbergen 2006)

(20)   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)

(21)   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 are there negative indefinites that 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 22. Analogously, the ASL sentence in 23 provides minimal pairs to 21 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 §2.1, which requires a linguistic item to be dependent on a negative licensor.

(22)　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 & Vermeerbergen 2006)

(23)　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 & Lillo-Martin (1997) show that similar doubling also occurs for wh-words, modals, quantifiers, and verbs, as illustrated in 24 for ASL. These parallels suggest that the examples of negative doubling in 19–21 are an instances of a grammatical phenomenon independent of negation.

(24)　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 & 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 25, for example, both *personne* 'nobody' and *rien* 'nothing' are negative indefinites, but may appear together in a sentence with a single negative meaning.

(25)　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 26 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.

(26) 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 27. Once again, though, the pattern displays several properties that distinguish it from canonical negative concord. First, the construction is syntactically highly restricted; as in the case of doubling, one of the two negative words must appear in clause-final position, as seen in the ungrammaticality of 28. (On the other hand, canonical patterns of negative concord of course also show syntactic constraints.) 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.

(27) JOHN NEVER EAT FISH NOTHING
      'John has never eaten any fish.'

(28) * 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 & Pasalskaya (2019) show that, in RSL, in situ negative indefinites are only grammatical when they appear under negation, as illustrated in 29 and 30. Furthermore, as in languages like French or Russian, multiple thematically independent negative indefinites may co-occur with a single negative meaning, as seen in 31. RSL is thus a negative concord language.

(29) a. NOBODY 3-CALL-1 NOT
          'Nobody called me.'

      b. * NOBODY 3-CALL-1

(30) a. IX-1 NOTHING BUY NOT
          'I bought nothing.'

      b. * IX-1 NOTHING BUY

(31) NOBODY NOTHING GIVE-1 NOT
      'Nobody gave me anything.'   (RSL; Kuhn & Pasalskaya 2019)

All together, this suggests a situation in which: (a) nonmanual 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 surveyed seem to allow a negative particle plus a nonmanual negative marker; sometimes a negative particle may be repeated; but combining two different manual negatives (e.g. sentential negation and a negative indefinite) is very uncommon.

If we want to redraw the typological table that we saw for spoken languages, we thus have a choice about what we want to represent, leading to very different-looking distributions. If we

choose to count both manual and nonmanual signs that participate in negative concord, we end up with the table in 32; this table looks highly similar to the typology observed for spoken language, in which both negative and distributive concord are strongly preferred.

(32) Typology with nonmanual signs

	−NC	+NC
−DC		
+DC		American Sign Language French Sign Language Italian Sign Language Russian Sign Language German Sign Language

On the other hand, if we restrict our view to only negative indefinites expressed using manual signs, we end up with the table in 33. 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 33 should thus ideally be tested by further linguistic work on sign languages from across the world.

(33) Typology without nonmanual signs

	−NC	+NC
−DC		
+DC	American Sign Language French Sign Language Italian Sign Language German Sign Language	Russian Sign Language

Our goal here is to explain these typological tendencies. When we look at the sign stream as a whole (including nonmanual signs), the pattern in 32 mirrors the tendency of spoken languages to be +NC and +DC, suggesting that the two modalities share similar communicative pressures. On the other hand, sign language shows an asymmetry in the way that these morphological features are spelled out. The question that we would like to answer is thus the following: When we restrict our view to manual components of the sign stream, why do sign languages tend to cluster in that bottom-left corner? Why do sign languages like manually-expressed distributive concord but not manually-expressed 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 manual forms in the sign language modality. The patterns that we see can also not be explained via contact with an ambient spoken language. We observe, for example, that

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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].

An analysis of the above tendencies must therefore explain a three-way interaction between modality, meaning, and manner of articulation. Within sign language, the analysis must explain why distributive concord and negative concord pattern differently, but also why, within negative concord, nonmanuals behave differently from manual signs. Comparing spoken and sign language, we would like to understand what functional pressures are shared between the two, and what pressures are unique to a specific modality. This is what we do in the rest of the paper.

3. 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 Lin 1996, 1998, Giannakidou 1998, 2011, and Alonso-Ovalle & Guerzoni 2004 for negative concord; Henderson 2014, Kuhn & Aristodemo 2017, and Kuhn 2017 for distributive concord; also Bumford 2017 and Charlow 2018). 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 34.

(34)   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 35 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 34.

(35)   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 students nominated by a professor.

In doing so, the compositional system also establishes a function that relates the two pluralities. In 35, 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 36, the pronoun may covary with the professors, returning the student that each given professor nominated.

(36)   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 37, the distributive numeral *egy-egy* introduces a discourse referent, and flags the fact that, later in evaluation, the discourse referent will be a plurality.

(37) **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 be evaluated at different structural positions (i.e., they take split scope). The existential meaning is interpreted in the local context generated by the plural licensor. The plurality presupposition is interpreted at a higher level; in 37, it is evaluated in the global context after interpretation of the sentence as a whole. 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 35 is anaphoric to the discourse referent introduced in the first sentence in 35.

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 38. When unembedded, indefinites like *a student* introduce a discourse referent (as in 34), but in 38a, 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.

(38) 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.

Lin (1996, 1998) and Giannakidou (1998, 2011) propose that the interaction of negation with discourse referents underlies the distribution of some polarity sensitive items, a proposal further developed by Alonso-Ovalle & 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 39, the negative indefinite *nessuno* introduces a discourse referent, and flags the fact that, later in evaluation, the discourse referent will have an empty extension.

(39) a. **Non** ho visto **nessuno**.
not have.1 seen nobody
'I didn't see anybody.'

b. Ci sono andato **sensa** **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 again be evaluated at different structural positions.[3] The existential meaning is interpreted in the local context generated by the negative licensor. The emptiness presupposition is interpreted at a higher level; in the examples in 39, it is evaluated in the global context after interpretation of the sentence as a whole. 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 concord (cf. Barker, 2018)? Functionally speaking, it may be useful to provide a redundant signal for the presence of a logical operator. On the other hand, it is not possible to repeat the semantic operation itself, as this would change the meaning of the sentence (as in the case of double negation). Kuhn (2019)'s solution is the following: across both negative and distributive concord, 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.[4] Concord items do so via a component of meaning that is interpreted higher than the local context, representing a property of the discourse representation after the operator has been evaluated. In this way, concord items ensure that the semantic representation of the larger discourse is robust.

As we will see in the next section, the use of space in sign language has a highly similar effect: it invites an iconic inference regarding what discourse referents exist in the global context. But I will show that this inference interacts in different ways with distributive and negative operators, imposing a pressure in favor of manual distributive concord, but against manual negative concord.

**4.** SIGN LANGUAGE

4.1. 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, following Schlenker et al. 2013 and Emmorey 2014, we define iconicity as a mapping that preserves certain structural or geometric properties of a sign in its interpretation. The presence of 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 & 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 40 makes available a discourse referent consisting of the subset of my students who did not come

to class (i.e, those that stayed home). These inferences are exactly parallel to the iconic interpretation of the set diagram in 41. 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'.

(40) 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.'

<div align="right">(ASL; Schlenker et al. 2013)</div>

(41)
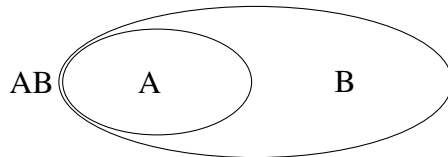
Singular individuals can also be established in space. Famously, noun phrases be indexed at points in space; subsequent pronouns may then refer back to these individuals by pointing to the location at which their antecedent was established (Lillo-Martin & Klima, 1990, i.a.). Sentence 42 presents a simple 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.

(42) JOHN-a TELL BILL-b IX-{a / b} WILL WIN.
    'John^i 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 42, a case of iconicity? Unlike 40, there is no evident geometric inference for a sentence like 42: 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 43, corresponding to the use of space in 42, similarly provides no structural information, besides perhaps the fact that there are at least two individuals, an inference entailed by the words of sentence 42 itself. Thus, the fact that no iconic inferences are observable in 42 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.

(43)

Indeed, an iconic inference for singular discourse referents does emerge when we examine their interaction with plurals. In 44, 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 44b, are once again analogous to the iconic inferences of the set diagrams in 45.

(44) 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.'

<div align="center">15</div>

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)

(45) a.   b.

AB (A   b ●)   AB (A   a ●)
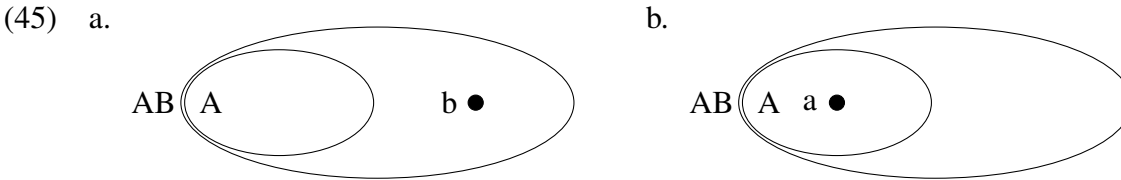
But let us return once more to 42 (or to an even simpler sentence, in which only a single discourse referent is established in space). I will propose that even this use of space invites an iconic inference: namely, that the individuals exist. Schlenker (2011) provides evidence for such an inference based on examples involving pronouns with disjunctive antecedents, which we replicate below in LSF. 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 LSF sentence in 46, in which all nouns are signed at the same neutral location, the pronoun may refer to the individual who wins, just as in the English translation. In LSF, however, the two disjuncts may be indexed at separate locations; in such a case, it is impossible to retrieve the disjunctive referent by pointing to either of the established locations. 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. To the extent that 47 is possible, associating a pronoun with 'b' generates the inference that IF the individual at 'b' wins, then they will establish the relevant law. In this local context, akin to modal subordination, a discourse referent exists.

(46) NEXT-YEAR ELECTION PRESIDENT, GOING-TO WIN WHO? PERSON-neutral BLACK OR
PERSON-neutral ASIAN. THEN IX-neutral NEW LAW THEME EQUALITY CITIZEN.
'In next year's presidential election, who is going to win? A black person or an Asian person. They will then establish a new law on citizen equality.'

(47) NEXT-YEAR PRESIDENT ELECTION, WHO GOING-TO WIN? PERSON-a BLACK OR
PERSON-b ASIAN. THEN IX-b ESTABLISH NEW LAW THEME CITIZEN EQUALITY.
'In next year's presidential election, who is going to win? A black person or an Asian person. The Asian person would then establish a new law on citizen equality.'

(LSF)

Thus, while the existential inference may be redundant with the sentential meaning in examples like 42, 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 42, 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.

4.2. DISTRIBUTIVITY 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 licensor. This can be seen in 48, repeated in part from 15: the distributive numeral ONE-arc must move in space over the area at which the professors were established. The two distinct sets—the professors and the students—are thus localized at a shared area of space. Figure 1 provides an illustration.

(48)   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)
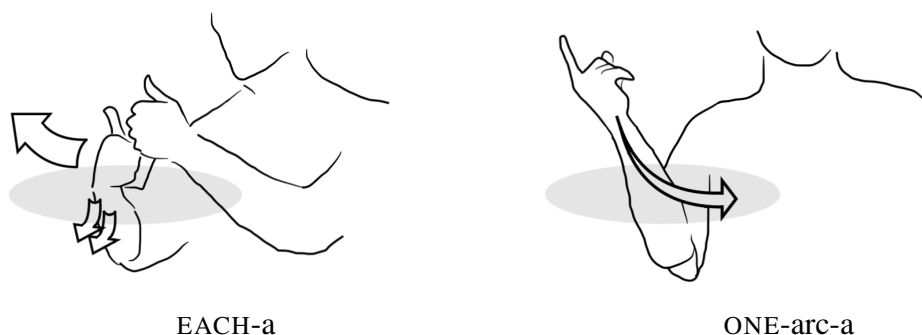

EACH-a   ONE-arc-a

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 licensor). 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 49.

(49)   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 licensor, 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 48, 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 50 can be stated in terms of a function: 'The function from boys to the book they read is a constant function.'

(50)   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 51 only receive an 'internal' reading, in which boys are compared to each other.

(51)   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 36 that the introduction of a functional discourse referent can be diagnosed by the behavior of a subsequent pronoun. The English sentences in 52 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.)

(52)   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 53. This follows directly from the hypothesis that this use of space requires a functional discourse referent, together with the observation, in 52, that *none* blocks such discourse referents.

(53)   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.

4.3.   NEGATION IN SIGN LANGUAGE

When we turn to negative concord, the same iconic pressure generates a conflict. According to the analysis in §3, 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 & Abner (2012), who report that the negative quantifier NO in ASL cannot act as the antecedent of an overt bound pronoun, as seen 54a. 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 & Wilbur (2017) show that the target meaning can be communicated by replacing the overt pointing pronoun with a null pronoun, as in 54b.

(54)   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 & Wilbur 2017)

Graf & 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. One possible interpretation is to take these examples to show that the overt pronoun IX does not allow quantificational binding. This implementation is likely too strong: Kuhn (2021) 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 54a, 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, 54b 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 §2.1, certain intonations and contexts allow double negation to produce a positive meaning, as in 55. 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 55.

(55)   Nobody gave me NOTHing.   (English)
       'Everybody gave me something.'

(56)   * 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: nonmanual signs. In this respect, nonmanual signs are fundamentally different from manual signs: manual signs must have a location in space, but nonmanual signs cannot. The iconic pressures on manual signs will not transfer over to nonmanual signs.

Nonmanuals 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 nonmanuals, which do not. Redundantly expressing negative meaning via nonmanual signs is the more iconically congruent alternative. As we saw in §2.2, this is indeed a highly frequent strategy in sign language: patterns of negative concord involving nonmanual expressions is extremely pervasive across sign languages. If we reclassify sign languages as $+/-$NC based on the behavior of both manual AND nonmanual 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 nonmanual signs. Adopting a redundant nonmanual marking of negation consequently also reduces the relative utility of manual negative concord on this front, as well.

4.4. 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 & 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 & 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 & 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.

5. CONCLUSION

Iconic biases contribute to the typological patterns of quantification in sign languages. Here, I have claimed that both distributive concord and negative concord involve inferences about the discourse referents that become available outside of the local context. I have argued that the use of space in sign language similarly gives rise to inferences about the discourse referents of the

global context. These two inferences coincide in the case of distributive concord but contradict in the case of negative concord. 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. Nonmanual 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 sign language typology is thus explained based on what is easy and hard to represent in space.

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NOTES

[1]Among the spoken languages in which negative indefinites 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.

[2]Geraci (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 §3 a semantic analysis of negative concord. The two analyses are not mutually exclusive, but shifting from a syntactic to a semantic explanation will provide us a foothold into the functional pressures that may influence typology.

[3]Precisely how split scope is obtained varies between the theories: Alonso-Ovalle & Guerzoni (2004) use a conventional implicature; Henderson (2014) employs the postsuppositions of

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Brasoveanu (2013); Kuhn (2017, 2018) uses quantifier raising, using insights from Charlow (2018).

[4]Note that semantic redundancy does not necessarily imply phonetic redundancy or increased articulatory effort, since patterns of concord often involve choosing one series of words instead of another. In Italian, the negative concord item *nessuno* is no longer or harder to articulate than the plain indefinite *qualcuno*. This observation is relevant, given the difference in speed of articulation between the sign and spoken modalities (Bellugi & Fischer, 1972).