

Reduplication as intensification. Evidence from French Sign Language*

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Like most sign languages, French Sign Language (LSF) makes a productive use of reduplication, which can appear on various syntactic categories (nouns, verbs, adjectives). Most of the existing literature on reduplication argues that it is best analyzed as a plural marker, denoting either pluralities of individuals (Pfau and Steinbach, 2006; van Boven et al., 2023) i.a., or events (Kuhn and Aristodemo, 2017). We present novel data from LSF that argue that reduplication is best analyzed as an intensifier, similar to English *many/very*. Main evidence for our claim comes from the infelicity of sentences in which a reduplicated noun appears in the scope of numerals denoting small quantities (paucals), as well as the observation of an abundance inference in contexts in which reduplication is licensed (Tsoulas, 2009; Renans et al., 2018).

1 Introduction

Like most sign languages, French Sign Language (LSF, *Langue des Signes Française*) makes a productive use of reduplication, (1a)-(1b):¹

- (1) a. HAVE MANY CHILD>+>+ [7/7]
 ‘I have many children-red.’
- b. TREE_a PI_a LEAF+_a MANY [7/6]
 ‘This tree has many leaves-red.’

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¹ Here is a list of the glossing conventions used in this paper: IX₁: first-person pronoun, IX₂: second-person pronoun, IX_a: third person pronoun in locus *a*, +: reduplication of the sign, >+: reduplication of the sign with sideward movement. The lines above the glosses indicate facial non-manual markers scoping over manual signs: WOE: wide open eyes, SE: squinted eyes.

Unless indicated, all the LSF data has been elicited with the help of two native LSF signers (one deaf adult, one coda) using the playback method (Schlenker et al., 2013; Schlenker, 2014): sentences were graded using a 7-point likert scale and then resubmitted on different occasions to the same signers and re-graded, ensuring relative additional stability across judgments.

In (1a), the noun CHILD is rapidly repeated two times sideways, going from the front of the signer outwards to the ipsilateral region (i.e., to the dominant hand side), indicating a plurality of children; in (1b), reduplication of the sign LEAF occurs without sideward movement. As a morphological operation, reduplication is observed quite pervasively across the world’s languages (Hurch, 2005; Inkelas and Downing, 2015; Downing and Inkelas, 2015), and encompasses a wide range of functions, including (but not limited to) plurality, distributivity, intensity, tense, aspect, reciprocity and transitivity alterations, depending on the syntactic category the reduplicative morpheme attaches to (Rubino, 2005).

Similar heterogeneous functions of reduplication have been attested for sign languages (Fischer, 1973; Klima and Bellugi, 1979; Sandler, 2011; Wilbur, 2005; Pfau and Steinbach, 2003, 2006). In spite of this variety of functions and meanings, most of the existing analyses treat sign language reduplication as uniformly expressing grammatical plural number (Pizzuto and Corazza, 1996; Pfau and Steinbach, 2006; Steinbach, 2012; van Boven et al., 2023; van Boven, 2024). In what follows, we present novel data from LSF that challenges the number analysis. On the basis of these examples, the goal of this paper is to argue for an alternative analysis for red in LSF as an intensifier, akin to English *very/many* (Kennedy and McNally, 2005; Solt, 2009, 2015; Rett, 2008, 2014). The rest of this article is structured as follows. In §2, we start by exposing the various morphophonological constraints that regulate the distribution of red in LSF; in §3, we review the analysis of red as a grammatical plural marker, and go on to present novel data from LSF that, we argue, are not straightforwardly predicted by the number analysis; in §4, we expose our analysis of red as a cross-categorical intensifier. §5 considers additional puzzles about the interpretation of red that neither proposals can straightforwardly account for; §6 concludes.

2 Distribution of red

To the extent that reduplication is conceived as a morphological process, such as affixation (Marantz, 1982), we expect it to be sensitive to the phonology of the stem it attaches to. In sign languages indeed, just as in spoken languages, reduplication is morphophonologically constrained: the form of the reduplicative morpheme, which we gloss red, will vary depending on the phonological base of the sign it affixes to (Pizzuto and Corazza 1996 for LIS; Sutton-Spence and Woll 1999 for BSL; Pfau and Steinbach 2006 for DGS; van Boven 2021, 2024 for NGT).

In a comparative study, Pfau and Steinbach (2006) list two phonological parameters that constrain the realization of red on nouns in German Sign Language (DGS): the location of the sign, as well as the type of movement encoded in the stem (simple vs. complex) (Figure 1). Although there is variation across languages, reduplication is generally not available for body-anchored (B) or complex movement (C) signs in DGS, as well as in Sign Language of the Netherlands (NGT; van Boven 2024). LSF patterns with DGS and NGT in this respect: it seems that reduplication is only a possibility for signs involving a simple movement, either in front of the signer (M-noun) or on the side (S-noun), such as BOOK, CHILD, LEAF, EVENT or PERSON, but not possible with B- (e.g. MOM) or C-nouns (FISH, WATER). Beyond nouns, red can attach to verbs (2a), as well as adjectives (2b), although it is overall less attested within this category:

- (2) a. IX₁ SEND++ MESSAGE
 ‘I sent-red messages.’ [7/7]
- b. PI WALL $\overline{\text{HARD}}^{SE}++$
 ‘This wall is hard-red.’ [5/5]

non-body-anchored		body-anchored	
simple movement		complex movement	(with or without movement)
lateral noun (L-noun)	midsagittal noun (M-noun)	(C-noun)	(B-noun)
sideward reduplication (hyperf determination)	simple reduplication (overdetermination)	zero marking (underdetermination)	

Figure 1: Reduplication strategies in DGS (Pfau and Steinbach, 2006, 159)

3 Is red a number marker?

One of the most widespread functions of nominal reduplication across languages is that of pluralization (Rubino, 2005; Downing and Inkelas, 2015). This generalization extends to sign languages: according to Pfau and Steinbach (2006), reduplication is the main form by which sign languages express grammatical plural number, the other being zero marking. Under this analysis, red is thus conceived as an optional number marker. Its optionality is confirmed by the fact that in sign languages (which are languages without determiners), bare nouns can range over atomic individuals as well as pluralities. This is illustrated in the following examples: while (3a) is compatible with both a singular and a plural interpretation, only the latter is available for (3b), as illustrated by the infelicity of (3c).

- (3) a. PI_a SHOP_a CHILD_b LIKE_b . [6/6]
 ‘Some child/children like this shop.’
- b. PI_a SHOP_a CHILD>+>+>+_b LIKE_b . [7/7]
 ‘Children-red like this shop.’
- c. *Context: there is just one child in the school.*
 TEACHER_a WELCOME CHILD>+_a SCHOOL . [1/1]
 ‘The teachers welcomed the children-red at school.’

However, this analysis runs into a number of problems. The first concerns the degradedness of red nouns with some numerals which otherwise have a plural semantics. This is exemplified in (4): while red nouns are compatible with numerals such as 10 or greater, they are degraded with numerals such as 2 or 3, indicating that pluralities alone seem insufficient to license red:

- (4) a. #IX₁ HAVE 2 CHILD>+>+ [2/2]
 ‘I have two children-red.’
- b. #IX₁ HAVE 3 CHILD>+>+ [2/3]
 ‘I have three children-red.’
- c. IX₁ HAVE 10 CHILD>+>+ [5/6]
 ‘I have ten children-red.’

Of importance here is the fact that numerals in LSF are compatible with plural marking overall; hence, sentences such as (4a) and (4b) are not ungrammatical, but perceived as odd. In other words, LSF is distinct from languages such as Turkish or Hungarian, in which plural marking and numerals are in complementary distribution (Farkas and de Swart, 2010; Martí, 2020; Scontras, 2022):

- (5) a. Bir çocuk-*lar Iki çocuk-*lar
 one boy.SG-PL two boy.SG-PL
 ‘One boy’ ‘Two boys’
 [Turkish, Martí 2020, (3)-(4)]

Rather, the generalization here seems to be that LSF red-nouns cannot be used with paucals (Harbour, 2014).

Another problem is related to the observation of a so-called *abundance inference* in contexts in which red nouns are licensed. For instance, the main difference between (6a) et (6b), aside from the fact that only the former can be used to denote a single book, is that the latter triggers the inference that the books were many:

- (6) a. STUDENT_a READ_a BOOK [7/7]
 ‘A student/students read a book/books.’
- b. STUDENT_a READ_a BOOK>+>+_a [7/7]
 ‘A student/students read books-red.’
 ~ *The books were many.*

This inference is robust and seems obligatory: while in contexts in which the described entities are in relatively small number, red forms in sentences such as (8) are slightly degraded, the pattern reverses in contexts with a large number of entities, in which the bare, unreduplicated noun in sentences such as (7) is perceived as odd.

- (7) *Context: describe the picture.*
 PICTURE THERE_a CHILD_a SMILE
 ‘In the picture, children smile.’



(7): [7/7], (8): [5/4]

- (8) *Context: same.*
 PICTURE THERE_a CHILD>+>+_a
 SMILE
 ‘In the picture, children-red smile.’



(7): [3/3], (8): [7/7]

Similarly, Putri (2019) reports that reduplication of both nouns and verbs in the village sign language Kata Kolok (Indonesia) can productively be used to convey intensification. Last, Aonuki (2019) reports that adjectives tend to be reduplicated under intensification in ASL. These observations raise the following question: if red is a grammatical plural marker, how exactly does the intensificational component of red relate to its semantics? In what follows, we propose a solution to this problem and argue that, in fact, treating red as an intensifier rather than a plural marker allows us to provide a unified account that is able to compositionally deliver both. In what follows, we briefly introduce the semantic framework put to use and then go on to show how it can account for the LSF patterns observed in §3.

4.1 Intensification and degrees

A way to capture the intensive reading of red in LSF while accounting for the fact that it systematically ranges over plural entities is to analyze it as a quantifier over degrees (Klein 1982; Schwarzschild 2002, 2005; Rett 2008, Rett 2014 i.a.). It has long been observed that natural language has many expressions that range over degrees or intervals (Cresswell, 1976): adjectives such as e.g. *tall* or *heavy* are degree-dependent to some extent, (12):²

$$(12) \quad \llbracket \text{tall} \rrbracket = \lambda d. \lambda x. \text{tall}(x).$$

Adjectives are not the only degree-dependent category: NPs also have degree readings (Rett 2014, (20)-(22)):

(13) Numerals

- | | | |
|----|---|-------------------|
| a. | Four pizzas are vegetarian/were eaten by the senators. | <i>individual</i> |
| b. | Four pizzas is enough/is more than what Bill asked for. | <i>degree</i> |

(14) Quantity words

- | | | |
|----|---|-------------------|
| a. | Many guest are drunk/were arrested after the party. | <i>individual</i> |
| b. | Many guest is more than Bill had anticipated. | <i>degree</i> |

(15) Anaphoric dependencies

- | | | |
|----|---|-------------------|
| a. | John bought four pizzas. They were delicious. | <i>individual</i> |
| b. | John bought four pizzas. It was more than we needed. | <i>degree</i> |

In order to allow nouns to compose with degrees or measure phrase, we assume a null type-shifter from individuals to their corresponding degrees (Bartsch and Vennemann 1972; Cresswell 1976; Nerbonne 1995; Villalba 2003; Schwarzschild 2002, 2005 i.a.). Following Rett 2008, 2014, we call this operator MEAS, for ‘measure’:

² Type *d* is a shorthand for a triple $\langle D, >_o, \psi \rangle$, where *D* is a set of points, $>_o$ a total ordering on *D*, and ψ a dimension of measurement (Bartsch and Vennemann 1972; Bierwisch and Lang 1989).

(16) **The individual measurement operator MEAS**

$$\llbracket \text{MEAS} \rrbracket = \lambda P_{\langle e,t \rangle} . \lambda d . \lambda x . P(x) \wedge \mu(x) = d$$

MEAS applies to plural individuals and returns a degree that corresponds to the quantity (cardinality) of individuals in the set ($=_{EC}$ indicates that existential closure has taken place):

(17) a. Ten votes have been counted.

b. $\llbracket \text{MEAS} \rrbracket (\llbracket \text{votes} \rrbracket) = \lambda d \lambda x . [P(x) \wedge \mu(x) = d] (\lambda x . \text{vote}(x)) = \lambda d \lambda x . \text{vote}(x) \wedge \mu(x) = d$

c. $\llbracket \text{ten} \rrbracket (\llbracket \text{MEAS votes} \rrbracket) = [\lambda d \lambda x . \text{vote}(x) \wedge \mu(x) = d] (10) = \lambda x . \text{vote}(x) \wedge \mu(x) = 10$

d. $\llbracket \text{ten MEAS votes have been counted} \rrbracket =_{EC} \exists x . \text{vote}(x) \wedge \text{count}(x) \wedge \mu(x) = 10$

Application of MEAS derives the individual readings of the NPs in (13)-(15). Deriving the degree readings requires another operator, D-MEAS, which is a degree modifier: D-MEAS quantifies over an interval/set of degrees D , with μ_d the measure of D (Rett 2014, 2018; Solt 2015).

(18) **The degree measurement operator D-MEAS**

$$\llbracket \text{D-MEAS}_{\langle \langle d,t \rangle, \langle d,t \rangle \rangle} \rrbracket = \lambda D_{\langle d,t \rangle} . \lambda d . \mu_d(D) = d$$

(19) a. Ten votes is enough to win.

b. $\llbracket \text{MEAS votes} \rrbracket = \lambda d . \lambda x . \text{vote}(x) \wedge \mu(x) = d$

c. $=_{EC} \lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d$

d. $\llbracket \text{D-MEAS} \rrbracket (\llbracket \text{MEAS votes} \rrbracket) = [\lambda D_{\langle d,t \rangle} . \lambda d . \mu_d(D) = d] (\lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d) = \lambda d' . \mu_d(\lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d) = d'$

e. $\llbracket \text{is enough to win} \rrbracket = \lambda d . \text{enough-win}(d)$

f. $\llbracket \text{is enough to win} \rrbracket (\llbracket \text{D-MEAS MEAS votes} \rrbracket) = [\lambda d . \text{enough-win}(d)] (\lambda d' . \mu_d(\lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d) = d') = \lambda d' . \mu_d(\lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d) = d' \wedge \text{enough}(d')$

g. $\llbracket \text{ten} \rrbracket (\llbracket \text{D-MEAS MEAS votes is enough to win} \rrbracket) = [10] (\lambda d' . \mu_d(\lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d) = d') = \mu_d(\lambda d . \exists x . \text{vote}(x) \wedge \mu(x) = d) = 10 \wedge \text{enough}(10)$

Looking at natural language, it has been proposed that Q(uality)-words such as *many*, *much*, *few* are not quantifiers, as traditionally assumed in the GQ tradition (Barwise and Cooper, 1981), but overt realizations of the D-MEAS operator (Cresswell 1976; Klein 1982; Schwarzschild 2005; Rett 2008, 2014, 2018; Brasoveanu 2008; Solt 2015 i.a.). Following Klein (1982) and Rett (2014, 2018), we assume that a word such as *many* lexicalizes D-MEAS, augmented with an additional specification that the measure value ranges high with respect to a contextual standard s_c :

(20) $\llbracket \text{many} \rrbracket = \lambda D . \lambda d . \mu_d(D) = d \wedge d > s_c$

Many thus denotes a degree modifier, a function from sets of degrees D to their measures μ_d , with the additional specification that this measure exceeds a contextual standard s_c .

- (21) a. Many children came.
- b. $\llbracket \text{MEAS} \rrbracket(\llbracket \text{children} \rrbracket) = \lambda d \lambda x. [P(x) \wedge \mu(x) = d](\lambda x. \text{children}(x)) = \lambda d \lambda x. \text{children}(x) \wedge \mu(x) = d$
- c. $=_{EC} \lambda d. \exists x[\text{children}(x) \wedge \text{came}(x) \wedge \mu(x) = d]$
- d. $\llbracket \text{many} \rrbracket(\llbracket \text{MEAS children came} \rrbracket) = [\lambda D. \lambda d. \mu_d(D) = d \wedge d > s_c](\lambda d. \exists x[\text{children}(x) \wedge \text{came}(x) \wedge \mu(x) = d]) = \lambda d' [\mu_d(\lambda d. \exists x[\text{children}(x) \wedge \text{came}(x) \wedge \mu(x) = d]) = d' \wedge d' > s_c]$
- e. $=_{EC} \exists d' [\mu_d(\lambda d. \exists x[\text{children}(x) \wedge \text{came}(x) \wedge \mu(x) = d]) = d' \wedge d' > s_c]$

4.2 red as a cross-categorial degree affix

Following this thread, we would like to propose that the morpheme *red* in LSF is essentially a degree modifier that encodes a contextual argument $> s_c$ just like *many* and *much*:

(22) **The LSF red morpheme (degree modifier)**

$$\llbracket \text{red} \rrbracket = \lambda D_{\langle d, t \rangle}. \lambda d. \mu_d(D) = d \wedge d > s_c$$

red therefore has the type of a degree modifier $\langle \langle d, t \rangle, \langle d, t \rangle \rangle$ and denotes a relation between an interval (set of degrees) D and the size of that interval d , provided through a variable μ over dimensions of measurement (quantity, height, weight, density, etc.).

An immediate consequence of this proposal is that, as a modifier, *red* can affix to various lexical categories. Assuming for instance that nouns are provided a degree argument through application of the *MEAS* operator, *red* can subsequently apply and derive a reading corresponding to *many N*. *MEAS* takes the denotation of a noun (a set of individuals) and delivers their degree of measurement μ alongside some salient dimension (here, cardinality). Additionally, *red* takes this measure d and identifies it with d' while additionally specifying that d' is high with respect to some contextual standard. This will restrict the denotation to pluralities (sets which cardinality is high), as desired.

- (23) a. $\text{STUDENT}_a \text{ READ}_a \text{ BOOK}_{>+>+}_a$
‘A student/students read books-*red*.’
- b. $\llbracket \text{MEAS} \rrbracket(\llbracket \text{BOOK} \rrbracket) = \lambda P_{\langle e, t \rangle}. \lambda d. \lambda x. [P(x) \wedge \mu(x) = d](\lambda y. \text{book}(y)) = \lambda d. \lambda x. \text{book}(x) \wedge \mu_{|}(x) = d$
- c. $=_{EC} \lambda d. \exists x. [\text{book}(x) \wedge \mu_{|}(x) = d]$
- d. $\llbracket \text{red} \rrbracket(\llbracket \text{MEAS BOOK} \rrbracket) = \lambda D_{\langle d, t \rangle}. \lambda d. \mu_d(D) = d \wedge d > s_c (\lambda d. \exists x. [\text{book}(x) \wedge \mu_{|}(x) = d]) = \lambda d' . \mu_d(\lambda d \exists x. [\text{book}(x) \wedge \mu_{|}(x) = d]) = d' \wedge d' > s_c$
- e. $\llbracket \text{STUDENT READ BOOK-red} \rrbracket = \lambda d' . \mu_d(\lambda d \exists x \exists y. [\text{book}(x) \wedge \mu_{|}(x) = d \wedge \text{student}(y) \wedge \text{read}(y, x)]) = d' \wedge d' > s_c$
- f. $=_{EC} \exists d' [\mu_d(\lambda d \exists x \exists y. [\text{book}(x) \wedge \mu_{|}(x) = d \wedge \text{student}(y) \wedge \text{read}(y, x)]) = d' \wedge d' > s_c]$
- g. ‘There is a plurality of books of cardinality d s.t. some student read d and the measure of d is high relative to some contextually-valued standard.’

Similarly, red can affix to gradable adjectives like *hard* of type $\langle d, \langle e, t, \rangle \rangle$, if we assume that red can type-shift to denote a degree-predicate modifier of type $\langle \langle d, \langle e, t, \rangle \rangle, \langle d, \langle e, t, \rangle \rangle \rangle$:

(24) **The LSF red morpheme (degree-predicate modifier)**

$$\llbracket \text{red}_A \rrbracket = \lambda G_{\langle d, \langle e, t, \rangle \rangle} . \lambda d . \lambda x . G(d, x) \wedge d > s_c$$

This version of red is similar to the entry for *very* assumed e.g. in [Kennedy and McNally \(2005\)](#): applying it to another predicate of the same type will deliver the contextually-high value d of that predicate - that is, the intensive reading.

- (25) a. $\text{PI}_a \text{ WALL}_a \text{ HARD}++$
‘This wall is hard-red.’
- b. $\llbracket \text{HARD} \rrbracket = \lambda d \lambda x . \text{hard}(x, d)$
- c. $\llbracket \text{red}_A \rrbracket (\llbracket \text{HARD} \rrbracket) = \lambda G_{\langle d, \langle e, t, \rangle \rangle} . \lambda d . \lambda x . G(d, x) \wedge d > s_c (\lambda d \lambda x . \text{hard}(x, d)) = \lambda d \lambda x . [\text{hard}(x, d) \wedge d > s_c]$
- d. $\llbracket \text{PI WALL HARD-RED} \rrbracket = \exists x \exists d [\text{wall}(x) \wedge \text{hard}(d, x) \wedge d > s_c]$
- e. ‘This wall x is d -hard and d is above the contextual standard.’

Last, red can affix to verbs, provided that some version of MEAS can also apply to events to deliver their corresponding degrees alongside some dimension of measurement μ :³

(26) **The event measurement operator MEAS_ϵ**

$$\llbracket \text{MEAS}_\epsilon \rrbracket = \lambda P_{\langle v, t \rangle} . \lambda d . \lambda e . P(e) \wedge \mu(e) = d$$

- (27) a. C-A-M-I-L-L-E BUY++ DRESS .
‘Camille bought-red dresses.’
- b. $\llbracket \text{MEAS} \rrbracket (\llbracket \text{BUY} \rrbracket) = \lambda P_{\langle v, t \rangle} . \lambda d . \lambda e . [P(e) \wedge \mu(e) = d] (\lambda e . \text{buy}(e)) = \lambda d . \lambda e . \text{buy}(e) \wedge \mu_{| |}(e) = d$
- c. $=_{EC} \lambda d . \exists e . [\text{buy}(e) \wedge \mu_{| |}(e) = d]$
- d. $\llbracket \text{red} \rrbracket (\llbracket \text{MEAS BUY} \rrbracket) = \lambda D_{\langle d, t \rangle} . \lambda d . \mu_d(D) = d \wedge d > s_c (\lambda d . \exists e . [\text{buy}(e) \wedge \mu_{| |}(e) = d]) = \lambda d' . \mu_d (\lambda d \exists e . [\text{buy}(e) \wedge \mu_{| |}(e) = d]) = d' \wedge d' > s_c$
- e. $\llbracket \text{CAMILLE BUY-red DRESS} \rrbracket = \lambda d' . \mu_d (\lambda d \exists e . [\text{buy}(e) \wedge \text{AGENT}(C, e) \wedge \text{THEME}(dr, e) \wedge \mu_{| |}(e) = d]) = d' \wedge d' > s_c$
- f. $=_{EC} \exists d' [\mu_d (\lambda d \exists e . [\text{buy}(e) \wedge \text{AGENT}(C, e) \wedge \text{THEME}(dr, e) \wedge \mu_{| |}(e) = d]) = d' \wedge d' > s_c]$
- g. ‘There is a degree d' of dress-buying events e by Camille, the cardinality of which is above the contextual standard.’

We now have a principled explanation for why red nouns cannot combine with numerals such as 2 or 3, but are fine with greater numerals such as 10, (4): if the cardinality denoted by the numeral is perceived as not being part of the greater end of the contextually-specified range of s_c , the sentence will be perceived as odd, which is just

³ An adequate treatment of red in verbs might actually need to be more complex, for reasons discussed in [Kuhn and Aristodemo \(2017\)](#). See also §5.

what we observe - in normal contexts, two or three children are considered standard, while ten children is perceived as high.

- (4) a. #IX₁ HAVE 2 CHILD>+>+ [6/6]
 ‘I have two children-red.’
- b. #IX₁ HAVE 3 CHILD>+>+ [6/6]
 ‘I have three children-red.’
- c. IX₁ HAVE 10 CHILD>+>+ [6/6]
 ‘I have ten children-red.’

Similarly, under the present analysis, the abundance inference is directly expected, given the semantics of red: since it requires the measure value of its argument to be high relative to a contextual standard, we expect that it will be degraded in cases in which its argument is a plurality containing a number of individuals perceived as contextually not important enough. This, we believe, is the source of the degradedness observed when a sentence such as (8) is used to describe the context of the first picture, that is, when a red-noun is used to describe a context in which the contextual threshold s_c of μ_d is perceived as not important enough:

- (7) *Context: describe the picture.*
 PICTURE THERE_a CHILD_a SMILE
 ‘In the picture, children smile.’



(7): [7/7], (8): [5/4]

- (8) *Context: same.*
 PICTURE THERE_a CHILD>+>+_a
 SMILE
 ‘In the picture, children-red smile.’



(7): [3/3], (8): [7/7]

On the opposite, the degradedness of (7) in a context in which the contextual standard s_c is perceived as high could be due to the competition of the bare form with the red-affixed form (Spector, 2007; Ivlieva, 2013; Zweig, 2009).

5 Open issues

5.1 Is the denotation of red restricted to plural entities?

The LSF and ASL data from the above sections suggested that red is restricted to strictly plural arguments:

- (3c) *Context: there is just one child in the school.*
 #TEACHER_a WELCOME CHILD>+_a SCHOOL . [2/3]
Intended: ‘The teachers welcomed the child-red at school.’

- (28) *Context: only one message was sent.*
 #IX₁ MESSAGE SEND>+>+ . [2/3]
Intended: 'I sent messages-red.'

However, it has been observed in many languages that the plural interpretation of definite and indefinite plurals alike disappears in downward-entailing (DE)-contexts, suggesting that the 'more than one' meaning associated to plural number might be the result of an inference:

- (29) a. The homework contains difficult problems.
 ~> *The homework contains more than one problem.*
 b. The homework does not contain difficult problems.
 ~> *The homework does not contain any problem.* [Spector 2007, (1)]
 c. If the homework contains difficult problems, I will help.
 ~> *I will help even if the homework contains a single difficult problem.*

When it comes to sign language, things are actually more intricate. For instance, Schlenker and Lamberton (2019) and Koulidobrova (2021) argue that in ASL, red is lexically restricted to plural entities, based on the following examples:

- (30) *Context: the speaker will be renting the addressee's apartment.*
 POSS₂ APT IF BOOK>+>+_{HORIZONTAL} IX₁ ADD 20 DOLLAR
 'If your apartment has at least two or three books in a row, I will add \$ 20.'
 [ASL; Schlenker and Lamberton 2019, (16)]

- (31) A: $\overline{\text{HAVE TREE} + > + > + > \text{HERE}}^{\text{Y/N}}$.
 'Do you have trees / Are there trees there?'
 B: #YES, HAVE ONE PINE . / NO, ONLY ONE .
 'Yes, I have one pine.' / 'No, only one.' [ASL, Koulidobrova 2021, (31)]

It seems that in LSF, the plural restriction on predicates is also lifted in DE-contexts, although more research is needed: in both (32a) and (32b), both red-nouns receive an inclusive interpretation.

- (32) a. PI_a TREE_a LEAF+ NONE [6/7]
 'This tree has no leaves-red.'
 ~> *The tree has no leaves at all.*
 b. IF ALL STUDENT_a READ BOOK>+>+_a, TEACHER_b HAPPY [6/6]
 'If all the students read books-red, the teacher will be happy.'
 ~> *The teacher will be happy even if most of the students read only one book.*

Assuming for now that the LSF data above can be taken at face value, they raise a number of problems. The first one can be stated as follows: given that bare nouns are apparently numberless in LSF (and ASL), how is the plurality inference expected to arise in the absence of a singular competitor? Most of the implicature accounts of the plurality

inference for both definites and indefinites crucially rely on the availability of a singular alternative that can be negated in order to yield the ‘more than one’ interpretation of plurals in upward-entailing contexts (Sauerland, 2003; Spector, 2007; Zweig, 2009; Ivlieva, 2013; Mayr, 2015; Ahn et al., 2020; Sudo, 2023). However, in LSF, no such competitor seems available, since the singular has no exponent in the language. In that, LSF would not be an isolated case, as it has been claimed that bare nouns languages such as Turkish and Buryat also display plurality inferences in similar environments while lacking singular number exponents altogether (Bylinina and Podobryaev, 2020; Saĝ, 2022; Yatsushiro et al., 2023).

A possible way out this conundrum would be to assume a morphosyntactically active alternative in the language with no overt exponent, allowing the implicature-computing algorithm to negate it to yield the exclusive plural interpretation: such a solution is assumed, for instance, by Bylinina and Podobryaev (2020) for Buryat. While whether such a solution could be applicable to LSF has ultimately to be left for future research, we would like to observe that just as in Turkish (Saĝ, 2022), LSF bare nouns lose their ability to refer to pluralities when they are preceded with the pointing gesture PI:

- (33) a. PI_a CHILD PLAY . [7 / 7]
 ‘This child plays.’
 *‘These children play.’
- b. YOU.PL_a PI_a BOOK READ? . [7 / 6]
 ‘Have you read this book?’
 *‘Have you read these books?’

Although the status of PI in LSF is far from clear, a reasonable assumption in that context is that it functions as a definite. Following Martí (2020), one could therefore argue that the ability for a form to host a definite requires a syntactic head Num^o, which would be absent in structures without definites, thereby supplying the language with the required alternative in order to feed the implicature-computing algorithm.⁴

5.2 red and iconicity

Another problem raised by the data in (32a)-(32b) concerns cross-linguistic variation: how can the plural be exclusive in ASL (as evidenced in (30)-(31)), but inclusive in LSF? Although more research is clearly needed on this issue, we tentatively would like to suggest that it might be due to the existence of a confound - another form of sign repetition with iconic properties, distinct from red. Previous studies have shown that reduplication (at least in LSF and ASL) has an iconic component (Kuhn and Aristodemo, 2017; Schlenker and Lamberton, 2019, 2022), both with verbs and nouns. For instance, Kuhn and Aristodemo (2017) provide evidence that verbal reduplication in LSF and ASL has an at-issue iconic component, which contributes information about the speed of the event being described:

⁴ Another solution would be not to adopt the implicature account of the plurality inference, and treat it as homogeneity instead (Križ, 2017). However, various experimental results tend to favor the implicature account, at least for English (Augurzky et al., 2023; Jiang and Sudo, 2023).

- (34) a. MIRKO CHILD BOOK GAVE -rep accelerating.
 ‘Mirko gave the child a book at an accelerating pace.’
- b. MIRKO CHILD BOOK GAVE -rep deceleration.
 ‘Mirko gave the child a book at an decelerating pace.’
- c. MIRKO BOOK GIVE -rep-speeding-up NOT. IX BOOK GIVE -rep-slowng-down.
 ‘Mirko didn’t give books at an accelerating rate. He gave books at a decelerating rate.’ [LSF, [Kuhn and Aristodemo 2017](#), (76a,b), (78)]

The last example illustrates that the iconic component (the speed of the event described) can felicitously be targeted by various operators such as negation, and similarly creates entailments that survive embedding under other DE-operators such as antecedents of conditionals, suggesting overall that the plural interpretation analogously survives in such environments alongside its iconic component. Similarly, [Schlenker and Lamberton \(2019\)](#) show that in ASL, reduplicated nouns contribute to an iconic plural interpretation about their location in space:

- (35) MUSEUM HAVE 7 TROPHY>+>+>+_{HORIZONTAL}
 ‘The museum has 7 trophies arranged in a row.’

- (30) *Context: the speaker will be renting the addressee’s apartment.*
 POSS₂ APT IF BOOK>+>+_{HORIZONTAL} IX₁ ADD 20 DOLLAR
 ‘If your apartment has at least two or three books in a row, I will add \$ 20.’
 [ASL; [Schlenker and Lamberton 2019](#), (18),(16)]

Again, the gloss in example (30) suggests that the plural meaning is preserved alongside the iconic component about the spatial arrangement of the books under negation. However, [Schlenker and Lamberton \(2019\)](#) also report marginal examples such as (36), which they remark is acceptable with a plural meaning if reduplication is effectuated on the same location, but without any iconic import (either about the number of trophies or their spatial arrangement):

- (36) GROW-UP IX₁ WIN TROPHY>+>+
 ‘I won many trophies growing up.’ [ASL; [Schlenker and Lamberton 2019](#), 57]

[Schlenker and Lamberton \(2019\)](#) remark that such reduplication is otherwise banned from other iconic uses of reduplication they observe. Although further research is obviously needed, what the difference between examples (35) and (36) suggests is that, in ASL, we are confronted with not one, but two different uses of reduplication: the first one, observed in (35), leads to iconic inferences, whereas the second, observed in (36), is more constrained and has no iconic import. What we would like to suggest is that only the second example (36) actually involves what we have been calling red in this article, i.e., grammatical reduplication, while the other involves a different form of repetition with iconic properties. This distinction can be further motivated by the fact that, in LSF, the morpho-phonological restrictions for reduplication outlined in §2 are lifted if signs are i) repeated at a slower pace and ii) make significant use of the signing space for iconic purposes, just like in the examples that [Schlenker and Lamberton \(2019\)](#) discuss. For instance, the noun TROPHY in LSF cannot undergo red-uplication for morpho-phonological

reasons, (37b): however, it can be iconically reduplicated n times at a slower pace, leading to an iconic inference about the number of trophies on the wall (alongside their spatial arrangement), what Schlenker and Lamberton (2019) call *punctuated repetitions*, (37a):

- (37) a. #HOUSE IX_{pos} TROPHY>+>+ THERE WALL [1/2]
Intended: ‘At home, I have trophies on a wall.’
- b. HOUSE IX_{pos} TROPHY TROPHY TROPHY THERE WALL [7/7]
‘At home, I have three trophies (aligned) on a wall.’

These meaning distinctions suggest that we might actually be facing two apparently similar instantiations of repetition-based plurals, with very different linguistic profiles: one would be the non-iconic, highly grammatically constrained red, while the other would be a form of iconic repetition, with an apparently much freer lexical distribution. Whether such a distinction is legitimate and warranted by further cross-linguistic data is a topic of upcoming research.

6 Conclusion

In this article, we have tried to make a case for an analysis of LSF reduplication in terms of degree modification, proposing that the red affix semantically behaves as an intensifier. We showed that this analysis explains a number of puzzles that the standard analysis of red in terms of grammatical plural number faces, namely the fact that i) red cannot appear in the scope of quantifiers such as *few* which are otherwise compatible with pluralities, ii) red cannot combine with numerals denoting small numbers such as two or three, and iii) red triggers an abundance inference that the denotation of the predicate it affixes to is high relative to a contextual standard. We concluded by mentioning problematic data for both analyses involving inclusive plural readings in downward-entailing environments, which are attested in LSF but not in ASL, suggesting that this cross-linguistic difference could actually be explained by the existence of two forms of reduplication, with distinct grammatical and iconic profiles.

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