

Hyperdetermination in German Sign Language plurals

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1 Introduction: Under- and overdetermined plurals in spoken language¹

→ Morphological under- and overdetermination is attested in many languages. Consider, for example, plural formation in German and English. On the one hand, the plural form can be expressed by zero marking as in (1). On the other hand, pluralization may also involve double marking (i.e. stem change in combination with affixation) as in (2).

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|-----|----|----------|---|------------------|--|----|----------|---|---------------|
| (1) | a. | Segel | → | Segel | | b. | Fahr-er | → | Fahrer |
| | | sail | | sail:PL | | | drive-DS | | drive-DS:PL |
| | | ‘sail’ | | ‘sails’ | | | ‘driver’ | | ‘drivers’ |
| | c. | sheep | → | sheep | | | | | |
| (2) | a. | Haus | → | Häus-er | | b. | Bank | → | Bänk-e |
| | | house | | house-PL | | | bench | | bench-PL |
| | | ‘house’ | | ‘houses’ | | | ‘bench’ | | ‘benches’ |
| | c. | child | → | child-ren | | | | | |
| | | [tʃaɪld] | | [tʃɪldrən] | | | | | |

→ Zero marking in (1) is an instance of underdetermination, while double marking as in (2) overdetermines the plural form since it is very well possible to express the plural form by one marker only (simple determination) – be it a stem-internal change (3ac) or an affix (3bd) (for pluralization strategies see Köpcke 1993; Neef 1998; Corbett 2000).

- | | | | | | | | | | |
|-----|----|----------|---|--------------|--|----|--------|---|----------------|
| (3) | a. | Vater | → | Väter | | b. | Bank | → | Bank-en |
| | | father | | father:PL | | | bank | | bank-PL |
| | | ‘father’ | | ‘fathers’ | | | ‘bank’ | | ‘banks’ |
| | c. | foot | → | feet | | d. | car | → | car-s |

→ In this talk, we will discuss various degrees of determination in German Sign Language (DGS) plurals. Interestingly, DGS makes use of different plural marking strategies, the application of which is determined by phonological properties of nouns.

→ Just as in German and English, we find cases of under- and overdetermination. What is particular about DGS is that overdetermination comes in two types and does not involve a combination of affixation and stem change.

→ We are also going to speculate about in how far the observed patterns might be related to modality differences, in particular, processing requirements.

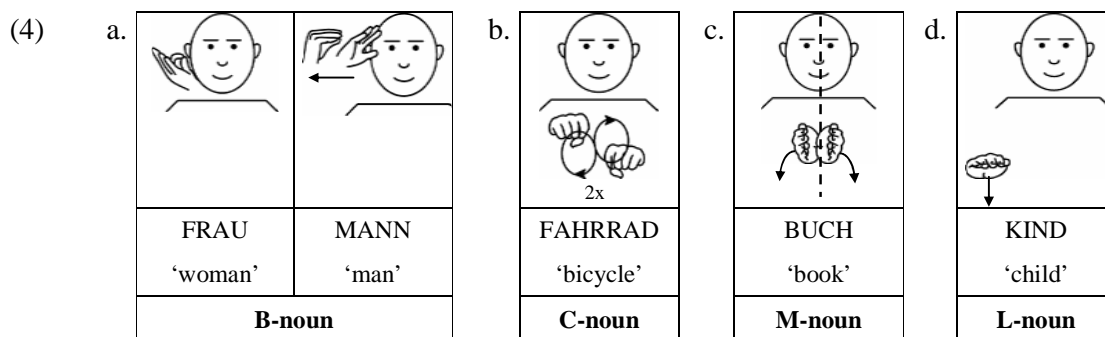
¹ We are indebted to Michael Geist, Andrea Kaiser, Elke Steinbach, and Jutta Warmers. Without their help, this research would not been possible.

2 Various degrees of determination in DGS plurals

- In DGS, reduplication and zero marking are the two basic strategies of pluralization. Although some typological variation can be found, these are also the basic strategies for plural marking in other sign languages (for an overview see Pfau & Steinbach 2005b).²
- Reduplication is a very common morphological process in the grammar of sign languages (SLs). In DGS, reduplication is used for plural marking, aspectual marking, and reciprocal marking (cf. Pfau & Steinbach 2003, 2005a).
- Plural reduplication comes in two forms: (i) simple and (ii) sideward reduplication. Moreover, reduplication in SLs usually does not only involve one repetition but two.
- The choice of a particular plural marking strategy is determined by phonological properties of the underlying noun. Hence, we are dealing with phonologically triggered allomorphy.

2.1 Differentiation of noun types

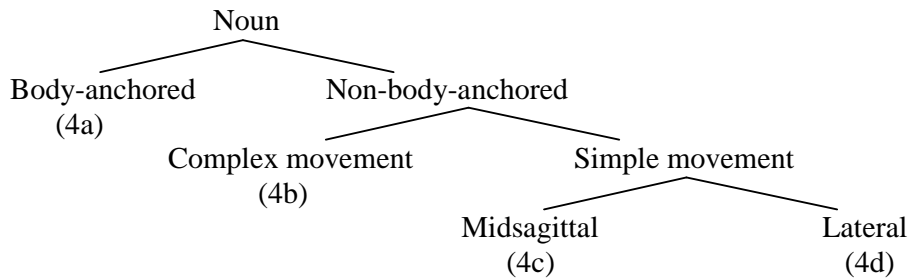
- Four different kinds of nouns need to be distinguished: (i) nouns that are body-anchored (B-nouns), (ii) nouns involving complex movement (C-nouns), (iii) nouns signed on the midsagittal plane (M-nouns), and (iv) nouns signed in the lateral signing space (L-nouns).
- Examples for each noun type are given in (4a) to (4d).



- **B-nouns** (4a) are related to a certain body part. 'Body-anchored' does not necessarily imply contact with a body part, as is illustrated by the contrast between FRAU ('woman') and MANN ('man') where only the former makes contact with a body part.
- **C-nouns** (4b) are inherently specified for complex movement, where complex may mean circulating, alternating, or repeated. The noun FAHRRAD ('bicycle') is specified for all three of these features. Most C-nouns are two-handed signs.
- The **M-noun** BUCH ('book') in (4c) is signed in neutral signing space and is specified for a particular relation to the midsagittal plane (indicated by the dotted line). Most M-nouns are two-handed signs. They are signed symmetrically to or on the midsagittal plane.
- **L-nouns** (4d) are signed on the lateral side of the signing space, which is dependent on the handedness of the signer. As opposed to M-nouns, all L-nouns are one-handed signs.
- The figure in (5) gives an overview of the noun types that are relevant for the following discussion of pluralization in DGS.

² See Wilbur (1987:124) and Valli & Lucas (1992:118) for ASL, Sutton-Spence & Woll (1999) for British SL, Skant et al. (2002:39f) for Austrian SL, Pizzuto & Corazza (1996) for Italian SL, Stavans (1996) for Israeli SL, Nijhof & Zwitserlood (1999) for SL of the Netherlands, and Zeshan (2000) for Indo-Pakistani SL.

(5) The relevant noun types for plural formation in DGS



- The three noun-specific options for plural marking in DGS that we are going to describe are (i) zero marking with B- and C-nouns, (b) simple reduplication with M-nouns, and (c) sideward reduplication with L-nouns.
- We will argue that zero marking in DGS, just as in spoken languages, is a case of underdetermination. By contrast, simple reduplication can be described as overdetermination. Sideward reduplication, we are going to argue, constitutes an instance of hyperdetermination.

2.2 Underdetermination with C- and B-nouns

- In DGS, the plural form of B- and C-nouns is underdetermined. For these nouns, the only possible plural form is the one which involves zero marking; cf. (6) for a B-noun.³

(6)

a.	b.	c.
FRAU 'women'	* FRAU>+>+ 'women'	* FRAU++ 'women'

- With C-nouns, too, both kinds of reduplication are ungrammatical, as is illustrated in (7). Note that the repetition in (7a) does not express the plural feature. Like many other signs, the C-noun FAHRRAD ('bike') is inherently specified for one repetition.

(7)

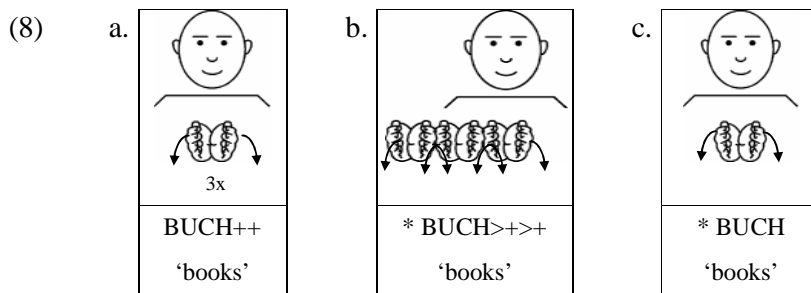
a.	b.	c.
FAHRRAD 'bicycles'	* FAHRRAD>+>+ 'bicycles'	* FAHRRAD++ 'bicycles'

³ **Notational conventions:** '++' indicates simple plural reduplication; every + represents one repetition of the base form, i.e. a sign like BUCH++ is performed three times all together. '>+>+' indicates sideward plural reduplication. The sideward movement proceeds rightwards with right-handed signers, but leftwards with left-handed signers. Please note that inherent repetitions, as in FAHRRAD 'bicycle', are not indicated in the glosses.

- Note that reduplication is not excluded in principle for B-signs and C-signs. Aspectually modified verbs, for instance, permit reduplication even if they are body anchored (e.g. VERGESSEN ‘to forget’) or contain complex movement (e.g. ERZÄHLEN ‘to tell’).
- Besides, with respect to B-nouns we find some typological variation. For instance, SL of the Netherlands, unlike DGS, permits simple reduplication of at least some B-nouns (Nijhof & Zwitserlood 1999; Harder 2003).

2.3 Overdetermination with M-nouns

- The plural form of M-nouns is derived by means of simple reduplication, as is illustrated for the symmetrical M-noun BUCH (‘book’) in (8a). As opposed to L-nouns (see below), sideward reduplication is not an option for M-nouns (8b).



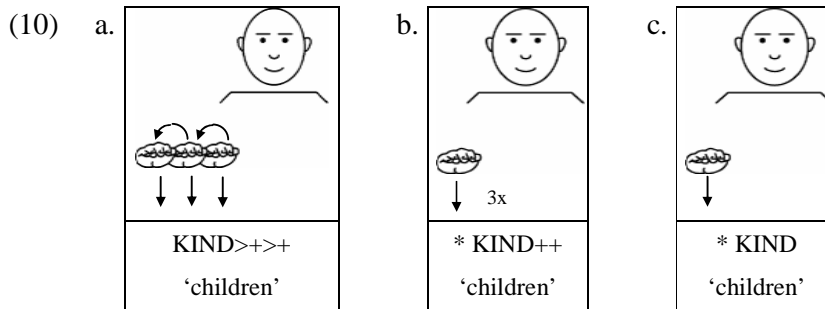
- At first sight, the plural form in (8a) does not seem to be a case of overdetermination. The plural feature is only expressed once by means of reduplication, no stem change occurs.
- However, in pluralization, the base is not only repeated once but twice. That is, strictly speaking, pluralization in DGS does not involve reduplication but rather triplication (two repetitions was the most common pattern in our data).
- Actually, a simply determined plural form would only involve one repetition. Since we do not find any semantic difference between reduplication and triplication in plural marking, we treat triplication as an instance of overdetermination.
- Triplication is also found as a productive morphological process in some spoken languages. The Austronesian languages Mokilese (9a) (cf. Harrison 1973:426) and Thao (9b) (cf. Blust 2001:331) use triplication to express certain aspectual distinctions.
- Another instance of complete triplication has been described for Chinese, which permits reduplication and triplication of adjectives (9c) (cf. Zhang 1987:379). Again, the form involving triplication differs semantically from the reduplicated form.

- (9)
- | | | | | | | |
|----|------------------|---|-------------------------------------|---|--------------------------|------------|
| a. | roar | → | roarroar | → | roarroarroar | (Mokilese) |
| | ‘give a shudder’ | | ‘to be shuddering’ | | ‘to continue to shudder’ | |
| | soang | → | soangsoang | → | soangsoangsoang | |
| | ‘tight’ | | ‘being tight’ | | ‘still tight’ | |
| b. | shkash | → | makit-shka-shka-shkash | | | (Thao) |
| | ‘to fear’ | | ‘gradually be overcome with fear’ | | | |
| | m-untal | → | m-unta-ta-tal | | | |
| | ‘to follow’ | | ‘to follow incessantly, everywhere’ | | | |
| c. | ang | → | angang | → | angangang | (Chinese) |
| | ‘red’ | | ‘reddish’ | | ‘extremely red’ | |

→ As opposed to DGS, however, the spoken languages in (9) draw a clear functional distinction between reduplication and triplication; the triplicated cases are therefore not overdetermined.

2.4 Hyperdetermination with L-nouns

→ The plural form of L-nouns is also derived by means of triplication. However, as opposed to M-nouns, pluralization of L-nouns involves an additional sideward movement, as is illustrated in (10a) for the sign KIND ('child'). Output forms with simple triplication or zero marking are ungrammatical (10bc).

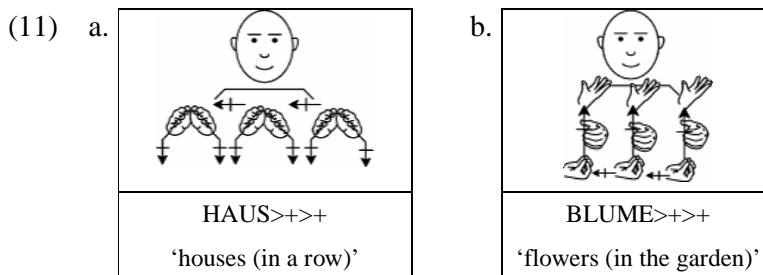


→ Again, since we do not find any semantic difference between reduplication and triplication, the simply determined plural form would involve just one repetition (and no spatial displacement).

→ Hence, pluralization of L-nouns combines two types of overdetermination: triplication and sideward movement. In the following, we will refer to this type of double overdetermination as “hyperdetermination”.

2.5 Apparent hyperdetermination with M-nouns and C-nouns

→ Recall from section 2.3, that M-nouns do not permit sideward triplication. Nevertheless, under certain circumstances, sideward triplication can also be found with M-nouns like HAUS ('house') in (11a) or BLUME ('flower') in (11b).

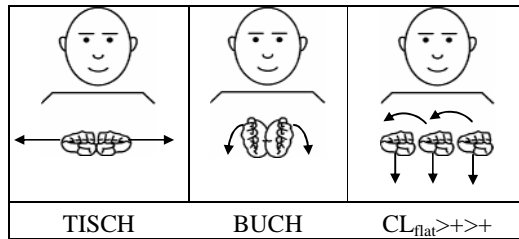


→ Both examples in (11) look like hyperdetermination. However, these cases crucially differ from sideward triplication of L-nouns (10a).

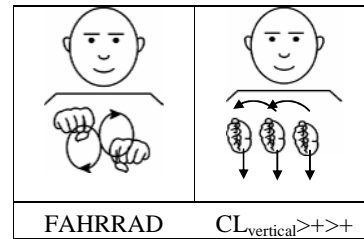
→ While with L-nouns, sideward movement is part of the simple plural form, the sideward movement in (11) does not express the simple plural form of a noun but also induces the additional semantic effect of a particular spatial localization or arrangement of the referents the nouns refer to.

- Such an effect cannot be found with sideward reduplication of L-nouns. In other words: for L-nouns, sideward triplication is the unmarked plural form. By contrast, M-nouns have a different unmarked plural form, i.e. simple triplication (8a).
- Consequently, the additional semantic effect observed with M-nouns might be related to a pragmatic principle which states that marked expressions receive marked meanings (i.e. M-implicature).
- Hence, sideward triplication with M-nouns is not an instance of hyperdetermination. It can be compared to triplication in Mokilese, Thao, and Chinese discussed in (9) above.
- A similar effect can be observed with nouns that allow for spatial localization by means of a classifier handshape. Just like other sign languages, DGS makes extensive use of so-called classifier handshapes (CL), the choice of which is determined by physical characteristics of the nominal referent (Supalla 1986; Emmorey 2003; Zwitserlood 2003).
- For some M-nouns and C-nouns, it is possible to express plurality by means of sideward repetition (e.g. triplication) of the corresponding CL, as is illustrated for the M-noun BUCH ('book') and the C-noun FAHRRAD ('bike') in (12).

(12) a. TISCH BUCH CL_{flat}>+>+
 table book CL:PL
 'Books are lying next to each other on the table.'

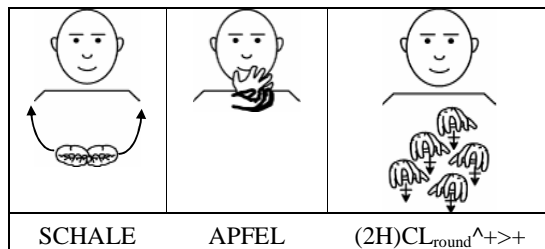


b. FAHRRAD CL_{vertical}>+>+
 bicycle CL:PL
 'Bicycles are standing next to each other.'



- Again, sideward triplication of the CL is not part of the formal expression of the plural feature. Rather, just as with M-nouns (11), however, it always induces the additional semantic effect of a particular spatial localization or arrangement of the referents.
- Crucially, the sideward repetition of M-nouns and classifiers is not restricted to triplication, to the lateral signing space, or to one hand, as is illustrated in (13) where '^+>+' indicates a combination of upwards and sidwards movement of the hands.

(13) SCHALE APFEL (2H)CL_{round}^+>+
 bowl apple CL:PL
 'There are (lots of) apples in the bowl.'



- See Pfau & Steinbach (2005b) for further typological and syntactic arguments against treating these constructions as involving numeral classifiers.

2.6 Summary and speculations on modality effects

→ In sum, we have seen that plural formation in DGS depends on phonological properties of the underlying noun. That is, in contrast to German, we are dealing with phonologically triggered allomorphy. Table 1 summarizes our main findings.

Non-body anchored		Body-anchored	
Simple movement		Complex movement (C-nouns)	(with or without movement) (B-nouns)
Lateral nouns (L-nouns)	Midsagittal nouns (M-nouns)		
Sideward triplication	Simple triplication	Zero marking	
Hyperdetermination	Overdetermination	Underdetermination	

Table 1. Noun types and plural marking strategies in DGS

- Basically, the patterns can be compared to those attested in German and other spoken languages in that we find over- and underdetermination within one paradigm.
- Underdetermination (zero marking) is attested with C-nouns and B-nouns, while overdetermination (triplication) is found with L-nouns and M-nouns.
- In contrast to e.g. German plurals, there is no case of simple determination. Moreover, overdetermination does not involve the combination of stem change with affixation.
- Overdetermination is particularly dramatic with L-nouns where in addition to triplication we observe sideward movement (i.e. the reduplicant is not faithful to the base with respect to location features). We call this “hyperdetermination”.
- In Pfau & Steinbach (2005a, in press), we propose an optimality-theoretic account for the above data. We assume that [+plural] triggers sideward movement and triplication but that either the former or both is blocked by phonological features of the noun.
- We speculate that the fact that the basic plural marking strategy in DGS involves hyperdetermination is due to modality differences: hyperdetermination (in particular sideward movement) increases visual salience of signs in neutral signing space.
- While communicating, signers do not focus on each other’s hands but rather on the face where essential grammatical information is encoded non-manually (Siple 1978). Hence, much of the manual signing is perceived in peripheral vision (Neville & Lawson 1987).
- Clearly, triplication as well as spatial displacement enhances phonological contrast. In pluralization, nouns exploit as many of these options as they can.
- This assumption is corroborated by diachronic data (Frishberg 1975): signs which are articulated in an area of low visual acuity tend to undergo phonological changes to facilitate visual discrimination (e.g. become two-handed).
- Besides, movements in sign language are functionally very similar to sonorous sounds in spoken language. Sign language syllables can be defined as consisting of one sequential movement and therefore triplication increases the phonological weight of the inflected sign (for syllables in sign language see Perlmutter 1992; Brentari 1998).
- Another determining factor might be that a fair number of signs involves inherent repetition. Triplication therefore distinguishes lexical repetition from morphosyntactic modification (see Poizner (1983) on lexical vs. inflectional movement).

→ Note finally that triplication – while being rare across spoken languages – is a common feature in the morphosyntax of sign languages. Various types of aspectual modification, for instance, also involve triplication (or even more repetitions).

3 Underdetermination within DP

→ Another instance of underdetermination concerns plural marking within DP. In many languages, plural can be realized more than once within DP. In the German example in (14b) plurality is expressed on both the head noun and the numeral/quantifier.

- (14) a. Schiff → Schiff-e
 ship ship-PL
 ‘ship’ ‘ships’
- b. fünf/viele Schiff-e
 five/many ship-PL
 ‘five/many ships’
- c. * fünf/viele Schiff
 five/many ship

→ In some languages, however, the head noun can only be marked for plural if the DP does not contain a numeral/quantifier. Hence, plurality is only indicated once within DP, as e.g. in the Hungarian example in (15b) (see Ortmann (2000, 2004) for details and an optimality-theoretic analysis).

- (15) a. hajó → hajó-k
 ship ship-PL
 ‘ship’ ‘ships’
- b. öt/sok hajó
 five/many ship
 ‘five/many ships’
- c. * öt/sok hajó-k
 five/many ship

→ Similarly, in DGS overt plural marking on L- and M-nouns is blocked whenever a numeral or quantifier appears within the DP. This is illustrated by the examples in (16).

- (16) a. * FÜNF BUCH++
 five book:PL
 ‘five books’
- b. FÜNF BUCH
 five book
 ‘five books’
- c. * VIEL KIND>+>+
 many child:PL
 ‘many children’
- d. VIEL KIND
 many child
 ‘many children’

→ Obviously, DGS does not permit the overt realization of the plural feature on the noun (i.e. triplication) when plurality is indicated by a numeral or quantifier. Hence, DGS – just like Hungarian – lacks DP-internal number agreement.

→ A similar observation is made for Israeli Sign Language by Stavans (1996). Note that for other sign languages it has been claimed that they do permit DP-internal numeral concord; e.g. Hausa SL (Schmaling 2000) and Austrian SL (Skant et al. 2002).

→ Since there is zero marking on the noun, we refer to the cases in (15bd) as “underdetermination”. It might also be argued, however, that number marking on nouns in the presence of a numeral/quantifier is a case of overdetermination.

→ Table 2 shows that underdetermination is actually the normal case for plural marking in DGS. Overdetermination is as rare as hyperdetermination.

	B-nouns	C-nouns	M-nouns	L-nouns
with numeral/quantifier	zero marking	zero marking	Zero marking	zero marking
Without numeral/quantifier	zero marking	zero marking	simple triplication	sideward triplication

Table 2. Distribution of plural marking strategies in DGS

4 Conclusion

- Depending on phonological properties of the underlying noun (location and movement features), we find three different types of plural marking in DGS.
- Only nouns with simple movement in neutral signing space can be triplicated; of these, only lateral nouns allow for additional sideward movement. With body-anchored nouns and nouns involving complex movement, we find zero marking.
- Clearly, just as in spoken languages, the zero marking strategy is an instance of underdetermination. Overdetermination, however, is qualitatively different from what has been described for spoken languages.
- First, with L- and M-nouns, overdetermination does not involve the combination of an affix with a stem-internal modification (or a combination of two affixes) but rather triplication (where reduplication would be sufficient to realize the plural feature).
- Secondly, for L-nouns we find sideward movement of the reduplicant in addition to triplication. This phenomenon we have labeled “hyperdetermination“.
- Consequently, within one paradigm, we find under-, over- and hyperdetermination.
- We assume that the existence of hyperdetermination is a modality effect. Additional marking (triplication and spatial displacement) increases the visual salience of signs articulated in neutral signing space and facilitates visual processing.
- Note finally that in DGS, morphological under- and/or overdetermination is also observed with aspectual marking (triplication) and in the agreement paradigm (zero marking, double marking).

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