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This is a contribution from *Sign Language & Linguistics* 18:2
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Weak hand holds in two sign languages and two genres

Anna Sáfár and Vadim Kimmelman

Centre for Language Studies, Radboud University Nijmegen /
University of Amsterdam

In this paper, we provide a quantitative analysis of weak hand holds based on corpus data. We include both a cross-linguistic analysis of these holds in narrative data from Russian Sign Language (RSL) and Sign Language of the Netherlands (NGT), and a language-internal, cross-genre analysis comparing NGT narrative and conversational data. We classified the functions of all holds found in two corpora of RSL and NGT, and analyzed their formal characteristics. We found that holds in RSL and NGT have similar functions. However, holds are significantly more frequent in RSL than in NGT. In addition, we found that the distribution of holds across different functions varies between different genres in NGT. The similarities between RSL and NGT in the domain of holds may be attributed to modality effects. The differences in frequency of holds ask for a language-specific explanation, and we discuss several possible scenarios.

Keywords: weak hand holds, corpus data, Russian Sign Language, Sign Language of the Netherlands, cross-linguistic comparison, cross-genre comparison

1. Introduction

Sign languages differ from spoken languages in using the two hands as the main articulators, that is to say, the two hands are the channel through which most lexical content is communicated. The fact that the hands (and arms) are visible, symmetrical, and independently movable gives rise to more possibilities for simultaneous expression compared to the vocal tract used to articulate spoken languages.¹

Although possible in principle, the fully simultaneous articulation of several signs is for the most part restricted to poetry and word play (see Crasborn 2006).

1. In addition, sign languages show other types of simultaneity (for instance, non-manual expressions are simultaneous with manual expressions), but these are not addressed in this paper.

However, another type of manual simultaneity is common in casual signing in most sign languages described so far. In weak hand holds, the movement of the two hands is not simultaneous, but rather a sign is articulated first (by one or both hands) and then one (the strong) hand continues signing while the other (weak²) hand maintains the end state of the first sign.³ In this paper, we will use the expression ‘weak hand hold’ to refer to this phenomenon, in order to capture its manual and simultaneous nature.

While the types and functions of weak hand holds have been investigated in several sign languages (Vermeerbergen, Leeson & Crasborn 2007), there is almost no quantitative research on the use of weak hand holds in different types of discourse. We provide a first quantitative analysis of weak hand holds, comparing two sign languages, Russian Sign Language (RSL) and Sign Language of the Netherlands (NGT), as well as two types of NGT data, namely narratives and discussions. We will argue that such a comparison can also shed light on the role of modality in the emergence of weak hand holds.

The paper is structured as follows. In Section 2, we discuss previous research on weak hand holds, and argue for the necessity to do quantitative and comparative research. In Section 3, we outline the methodology we used. Section 4 is a brief description of our classification of weak hand holds in RSL and NGT. In Section 5, we present the quantitative results. Finally, in Section 6, we discuss the implications of our study.

2. Previous research

2.1 Different perspectives on weak hand holds

Weak hand holds, and more generally simultaneous constructions in sign languages, have received considerable attention from researchers over the last two decades (for a review, see Vermeerbergen et al. 2007). However, different researchers paid attention to different aspects of this phenomenon, and sometimes used different terms to refer to it. In what follows, we briefly review the existing literature concerning weak hand holds in terms of their functions in the domains of prosody, morphosyntax, and discourse.

Some researchers have looked at the spreading of the weak hand in terms of prosodic domains. For instance, Nespor & Sandler (1999) argued that, in Israeli

2. Some researchers also use the term ‘non-dominant hand’ for the same notion.

3. Sometimes weak hand holds are regressive, that is, the weak hand is held before articulating a sign (see example (1) below).

Sign Language (ISL), the weak hand spreads leftwards or rightwards from the lexical sign until it reaches the boundary of a phonological phrase. Consider example (1), where the weak hand of the sign two-handed BAKE spreads leftwards across the sign IX-1 within the phonological phrase (Nespor & Sandler 1999: 162f). They also mention that sometimes when a classifier is held, the hold can spread across all types of prosodic boundaries.

- (1) h1: CAKE THERE [IX-1 BAKE]_{PP} TASTY VERY [ISL]
 h2: [-----BAKE]_{PP}
 'The cake that I baked is very tasty'

Brentari & Crossley (2002) looked at the prosodic properties of holds (which they call H2-spreads, similar to Nespor & Sandler 1999) in American Sign Language (ASL). They found that holds in ASL can occur in a variety of prosodic contexts; most often, the hold occurs within a prosodic word (a compound), or a phonological phrase, similar to what happens in ISL. However, they also found some holds that spread across larger prosodic units, namely parenthetical and forward-referencing holds. Forward-referencing holds have a function of connecting two semantically-related intonational phrases (IPs), so that the last sign in the first IP spreads across the first sign in the second IP, as in (2) (adapted from Brentari & Crossley 2002: 122), where the sign DISTRIBUTE-ALL-OVER spreads from the first IP onto the first sign of the second IP to signify a semantic relation between the two. A parenthetical hold can also cross IP boundaries ('b' = eye blink).

- (2) h1: [IX-3 DISTRIBUTE-ALL-OVER]_{IP} ^b[IX-1 DARN]_{IP} [ASL]
 h2: DISTRIBUTE-ALL-OVER-----
 'She distributed (the advertisement) all-over. (There I was,) "Darn!"'

Both Nespor & Sandler (1999) and Brentari & Crossley (2002) noticed that some holds have morphosyntactic or semantic functions, but in their own research, they focused on the prosodic aspects of holds. However, other researchers looked at the role of holds in morphosyntax. For instance, Padden (1983) argued that sometimes a hold in ASL is obligatory, which is a clear sign of the grammatical status of such holds. Consider example (3) from Padden (1983), cited by Brentari & Crossley (2002: 109): without the hold of the sign CL: 'flat surface', the sentence becomes ungrammatical (3b). Zimmer & Patschke (1990) also argued that pointing signs in ASL are sometimes held when a noun is signed and the pointing functions as a determiner.

- (3) a. h1: TABLE MONKEY CL: 'small animal'+JUMP [ASL]
 h2: TABLE CL: 'flat surface' -----
 'The monkey jumped on the table'

- b. h1: *TABLE MONKEY CL: 'small animal'+JUMP [ASL]
 h2: *TABLE CL: 'flat surface'
 'The monkey jumped on the table'

Miller (1994a,b) and Engberg-Pedersen (1994) discuss the morphosyntactic roles of weak hand holds. Miller (1994a) came to the conclusion that the main function of weak hand holds is to background information: the central piece of information is presented with the strong hand, while the peripheral piece is held on the weak hand. He also argued that some complex predicates (namely classifier constructions) have parts expressed by the weak hand that can be held and used as morphemes in the following signs (Miller 1994b). This led him to conclude that the boundary between morphology and syntax in sign languages is not rigid. Engberg-Pedersen (1994) noted several functions of weak hand holds, including expressing spatial relations between referents, backgrounding of information, and expressing morphological relations.

Perhaps the most widely known work on weak hand holds is the analysis of Liddell (2003), who emphasized the role of holds in the structuring of discourse. He introduced the now commonly used notion of "buoys": formally defined weak hand holds which have discourse-related functional properties. He suggested the following types of buoys: pointer buoys, list buoys, theme buoys, and fragment buoys.⁴

Pointer buoys are holds of pointing signs used to emphasize important referents. List buoys occur when the fingers of the weak hand are associated with referents and the hand is used for enumeration. For instance, in (4), the sign FOUR-LIST is held to refer to four children. Note also that the pointing sign IX-a is directed towards the index finger, and IX-b towards the little finger (Liddell, Vogt-Svendsen & Bergman 2007: 193).

- (4) h1: IX-a GIRL BOY BOY GIRL IX-b [ASL]
 h2: FOUR-LIST -----
 'The oldest of four is a girl, the next a boy, another boy, and the youngest, a girl.'

In the case of theme buoys, an index finger extended upwards is held to signify the importance of a part of discourse. Fragment buoys occur when other types of signs are held; "fragment" refers to the fact that not the sign as a whole but only its location and handshape are preserved. This type of hold can be meaningless, but it can also be used to establish an important concept in discourse.

4. Other types of buoys were proposed in later papers (see, for instance, Vogt-Svendsen & Bergman 2007).

To sum up, different researchers focused on different aspects of weak hand holds. Some described the prosodic properties of holds, and usually use the term *spreading*. Others looked at morphosyntactic properties. Finally, some investigated the discourse-related functions of holds, and use the term *buoys*. It is certainly justifiable to analyze the prosodic properties of holds exclusively, or to focus on their semantic and morphosyntactic properties. However, since our aim in this project was to provide a quantitative, corpus-based account of holds, we wanted to include all instances of weak hand holds. Therefore, we decided to define weak hand holds in very broad terms: “A weak hand hold occurs when the location and handshape of a sign are maintained on one hand while the other hand articulates at least one full sign.”⁵ Based on this definition, a hold can spread across prosodic constituents, but it can also have a morphosyntactic function, or be used to structure discourse. In Section 4, we will discuss how we classified holds based on their functions. In the next section, we describe how the novel approach taken in this paper can shed new light on the nature and origin of weak hand holds.

2.2 A quantitative and comparative approach to weak hand holds

As detailed above, previous research has focused on specific aspects and functions of weak hand holds. Little attention was given to the frequency of holds (but see Nilsson 2007) and the factors that influence the use of weak hand holds. For example, planned and spontaneous discourse may differ in the frequency of holds, due to the articulatory complexity involved (e.g., planning may be required to ensure that the hold is produced by the signer’s non-dominant hand). Furthermore, there may be differences between types of discourse that make extensive use of the iconic possibilities inherent to sign languages, for example in the use of space to describe space (e.g. Emmorey, Tversky & Taylor 2000) or demonstrating the actions of characters in a narrative (e.g. Dudis 2004), and types of discourse that rely less on classifier constructions and constructed action. To our knowledge, there is no previous research testing these hypotheses.

The frequency of weak hand holds is also a relevant dimension for cross-linguistic comparisons. Previous descriptions of individual sign languages, as well as the only direct cross-linguistic comparison of weak hand holds (Liddell, Vogt-Svendsen & Bergman 2007), suggest that most sign languages use similar types of holds in similar ways. However, we do not know whether these similarities between languages also extend to the frequency of holds.

5. Please note that this definition includes holds that originate in one- as well as two-handed signs, and also “anticipatory” holds or regressive spreading as in example (1).

This question is theoretically important for the enterprise of identifying and characterizing modality-effects that distinguish signed and spoken languages (Sandler & Lillo-Martin 2006). Sandler & Lillo-Martin discuss modality effects such as the high degree of iconicity, simultaneity, and the use of space in sign languages. These modality effects can be explained through the cognitive and physiological properties of production and perception of sign languages.

Weak hand holds are a modality-specific phenomenon⁶ (and can thus be considered an aspect of the major simultaneity effect discussed in Sandler & Lillo-Martin (2006)), and the similarities across sign languages may be due to the fact that their use is a function of the affordances of the visual-spatial modality and restricted by general cognitive and motoric constraints on the use of the two hands. If this is the case, we expect cross-linguistic similarities in the frequency of holds. On the other hand, if sign languages differ in the frequency of weak hand holds, this would suggest that not only modality- but also language-specific processes are at play.

Another advantage of frequency data based on corpora is that we can quantify phonetic characteristics of holds, such as their length or whether they originate in one- or two-handed signs. These characteristics can also inform cross-linguistic or cross-genre comparisons by allowing us to detect more fine-grained differences between languages, genres, and types of holds.

Therefore, we argue that information on frequency is crucial for a comprehensive analysis of weak hand holds. The research question we address in this paper is: How does the frequency of weak hand holds vary cross-linguistically and across genres? There are also two follow-up questions: (i) If there are some differences, how can they be explained? (ii) What is the role of modality in the presence and properties of weak hand holds in different sign languages?

To answer these questions, we analyze corpus data from two sign languages that have not previously been studied in this respect, namely RSL and NGT. In another paper on weak hand holds (Kimmelman, Sáfár & Crasborn, under revision), and in Kimmelman (2014), we have described our approach to classifying weak hand holds based on the functional relationship between the sign being held and the sign(s) articulated by the other hand. That approach and the resulting categories of weak hand holds are briefly summarized in Section 4. In the present paper, we provide a quantitative analysis of weak hand holds, comparing RSL and NGT as well as two types of NGT data, namely narratives and discussions. In addition, we will describe phonetic characteristics of holds and compare these between different hold types.

6. As Vermeerbergen & Demey (2007) point out, manual simultaneity is present in co-speech gesture. However, in our view, this type of simultaneity is qualitatively different from what we see in sign languages where lexical content is articulated by the hands and not by the mouth.

3. Methodology

3.1 Data

The data analyzed for this study come from recordings that were initially collected and annotated for different purposes. In this section, we describe the process of data selection, the resulting data sets, and the annotation procedure, both for RSL and NGT.

Sign Language of the Netherlands is a language used by deaf and hard-of-hearing people in the Netherlands. According to Crasborn's (2001) estimation, it is used by approximately 16,000 people. Russian Sign Language is a language used by deaf and hard-of-hearing people in Russia and some other former Soviet countries, such as Ukraine and Belorussia. According to the latest census organized in 2010, it is used by 120,000 people in the Russian Federation alone. Despite the differences in the number of speakers, the languages have some similarities: they both are approximately 200 years old, and since they are both used in Europe, they also share some common history concerning educational policies: manual methods were used in the first half of the 19th century, then a gradual change to the oralist approach occurred, and strict oralism was the policy for most of the 20th century. For both languages, a connection to French Sign Language has been reported, but this connection is not certain (especially so for RSL, see Bickford 2005). RSL and NGT have not been in active contact at any time. At least at the lexical level, the languages do not show much similarity. Therefore, it is informative to compare them with respect to weak hand holds.

3.1.1 *Sign Language of the Netherlands (Nederlandse Gebarentaal, NGT)*

The NGT data used in this study comprised selected sessions from the Corpus NGT (Crasborn et al. 2008; Crasborn & Zwitserlood 2008). The sessions included in this study were selected in two phases. A set of cartoon descriptions and narratives were selected for a project on information structure (Kimmelman 2014). A second set of recordings containing conversational data was selected from the same signers specifically for this study. As a result, the NGT dataset amounts to a total of 1 hour and 32 minutes of recordings from 15 signers, as summarized in Table 1. While data from narratives is available for all 15 signers, conversational data is available for 12 signers only.

For the Corpus NGT, signers were recorded in pairs, interacting based on various prompts (one or two assistants were also present in the room to facilitate the recording). As mentioned above, three types of narrative tasks were selected from the corpus. In the cartoon retelling task, one of the signers watched a short cartoon clip from *Canary Row* (Freleng 1950), a cartoon for children with a cat and a bird

Table 1. Overview of the data set. Number of signs is an approximation based on preferred hand glosses (see Section 3.3.1 below).

Language	Genre	Duration	Number of signers	Number of sessions	Number of glosses	Number of signs
NGT	Discussion	31 min.	12	13	4226	3085
NGT	Narrative	61 min.	15	41	7736	5248
RSL	Narrative	51 min.	6	38	8361	5513

as the main protagonists, which has been widely used in sign language and gesture studies. Afterwards, their task was to describe the events in the clip to the other signer, who had not seen the clip. In the fable task, signers watched a story recounted in NGT and had to retell the story to their partner. In the personal stories task, signers told each other stories based on their personal experiences; the topics were not specified beforehand. In the dataset used in this study, Canary Row narratives were available from 10 signers, personal stories were available from eight signers, and fables from three signers.⁷ Thus, narratives were available from each of the 15 signers, from one or two of these tasks. Our data also included a selection of discussion sessions, in which signers were asked questions related to deafness (for example, “Do you think deafness is a handicap?”) that served as discussion starters. In this paper, we refer to this type of data as “conversational”.

3.1.2 Russian Sign Language

The Russian Sign Language data was collected in 2011. The corpus contains approximately two hours of signing by 12 deaf signers. However, for the present project only half of the corpus (data from 6 signers) was selected. Participants were filmed in pairs, engaging in semi-spontaneous storytelling based on memorable experiences, as well as describing short films to each other. The tasks used in the collection of the corpus, namely the Canary Row cartoon retelling task and the personal story task, were identical to the tasks used in the Corpus NGT. Thus the RSL corpus is comparable to the NGT corpus both in terms of content and the fact that signers were recorded in pairs, with the exception that conversational data, similar to the discussions in the Corpus NGT, was not available for RSL.

3.2 Participants

For both sign languages, participants are all deaf signers, who use NGT or RSL as their primary language. Six RSL signers were included in this study, two men and

7. Only three fable narratives were included in this study, so we have grouped these together with the personal narratives in the analyses that follow.

four women. All signers are from the same geographical area (Moscow). The age of signers ranged from 29 to 58 at the time of recording ($M = 43.83$, $SD = 12.51$). Five of the six signers reported having at least one deaf parent and having been exposed to RSL from birth. The remaining one signer started learning RSL at the age of 5 when he entered kindergarten.

The NGT signers constitute a larger and, in some respects, more varied group. As mentioned above, 15 participants were included from the Corpus NGT, four men and eleven women. All signers are from Amsterdam and its surroundings. Signers' age at the time of recording ranged between 17 and 81 years ($M = 52.73$, $SD = 18.87$). Seven participants reported having at least one deaf parent, resulting in early exposure to NGT. Four signers were exposed to sign language before the age of 3, three signers between 3–6 years of age. One NGT signer reported late exposure to sign language (at 14 years of age).

3.3 Annotation

3.3.1 *Pre-existing annotations*

The RSL data had been annotated by the second author (with the help of RSL signers) prior to the project reported here, including gloss and sentence level translations. The identification of clauses was based on semantics (a clause consists of a predicate with all its arguments and adjuncts) and prosody (clauses usually form one prosodic unit).⁸ NGT narratives had been glossed in part by the Corpus NGT team and in part by the second author (again with the help of fluent NGT signers), while clause-level translations were completed by the second author in the same manner as with the RSL data. The conversational part of the dataset, consisting of discussion sessions from the Corpus NGT, included gloss annotations from the Corpus NGT, but no clause-level annotations.

Gloss annotations were similar for both sign languages. Annotations were created for each sign on two gloss tiers, representing the right and left hand, respectively. The content of the annotations reflected the meaning of the sign. One-handed signs were annotated on the tier corresponding to the hand articulating the sign, while two-handed signs received an annotation on each of the two hand-tiers (fully or partially overlapping, depending on the level of synchronization between the two hands). As a result of this two-tiered approach, the number of glosses does not correspond to the number of signs, since two-handed signs are represented by two glosses. The number of signs can be approximated by taking the number of glosses on the tier corresponding to the preferred hand of the signer.

8. We define prosodic units through pauses and abrupt changes in non-manual behavior.

3.3.2 *Annotations created for the present study*

The procedure of coding of the weak hand holds involved the addition of annotations on multiple tiers. First, all holds were identified using the simple definition that we formulated in Section 2.1, repeated here:

The location and handshape of a sign are maintained on one hand while the other hand articulates at least one full sign.

Note that this definition applies to holds of both one-handed and two-handed signs. On one tier, the handedness of the source sign was annotated (whether it was one-handed, two-handed symmetric or two-handed asymmetric; cf. Battison 1978). On another tier, we marked whether the right boundary of the hold coincided with a new sign, that is, whether the hold was followed by the articulation of a sign by the same hand.

Finally, on the last tier, we listed the functions of holds in terms of categories we developed for Kimmelman (2014) and Kimmelman, Sáfár & Crasborn (under revision), and the present study. An initial set of categories was established based on the literature. However, in the end, holds were classified by examining the functional relationship between the held sign and the signs articulated by the other hand coinciding with the duration of the hold. The resulting categories are discussed in detail in Kimmelman (2014) and Kimmelman, Sáfár & Crasborn (under revision). Some of the analyses in the present paper make use of a more coarse classification of holds into phonetic, syntactic, discourse, and iconic types, which are discussed and illustrated in Section 4.

The weak hand holds in the RSL corpus were annotated by the second author, and the holds in the NGT corpus by the first author. In order to ensure agreement, all annotations of each author were checked by the other author. The final dataset included only holds which both authors agreed on, which constitutes the majority (74%) of all annotated holds.

4. Types of holds

In Kimmelman (2014) and Kimmelman, Sáfár & Crasborn (under revision), we discuss in detail how weak hand holds can be classified into categories according to the functions of the hold in relation to the signs articulated by the other hand. Here we only discuss the classification of holds into four major classes: phonetic holds (holds for the ease of articulation), syntactic holds (holds marking a syntactic domain), iconic holds (holds used to express iconic relations), and discourse-related holds (holds used to connect sentences or emphasize important information). This classification is inspired by the literature discussed in Section 2:

previous research has shown that holds can happen for prosodic reasons, and also that some holds have iconic motivation and/or discourse-level functions.

Let us illustrate the four categories with some examples. Sometimes holds appear for phonetic reasons, in particular, ease of articulation. For instance, a hand can be held because it is reused as a part of the following sign; in (5), for instance, the base hand of the sign SEVEN is immediately reused in the following sign EIGHT.

(5)

[RSL:s2:s20]



h1: APPROXIMATELY SEVEN -----

h2: APPROXIMATELY SEVEN EIGHT YEAR

‘[He was] approximately seven or eight years old.’

A hold can also occur in a situation in which a sign is doubled; that is, it appears twice in the utterance (with one or more other signs intervening between the occurrences), and one hand is held from the first occurrence until the second one. The anticipation of doubling, we reasoned, can also be a phonetic motivation for a hold. In addition, we classified brief holds with unclear functions as being phonetic as well, under the assumption that a hold without other functional motivation is produced to enhance articulatory ease. Note that the types of holds that we classify as phonetic are usually not considered in the literature, as researchers are usually interested in prosodic, morphosyntactic, or discourse functions of holds.

Another group of holds fulfill a syntactic function. A common type of weak hand hold is when a head or a dependent in a syntactic constituent is held across the whole constituent. The function of the hold is then to mark the corresponding syntactic domain. Within noun phrases, a noun can be held across its dependents, or an adjective can spread across the head noun. For instance, in (6) the weak hand of the noun CAT spreads across the following pointing sign IX.

(6)

[NGT19:s03]



h1: CAT

IX

h2: CAT -----

'the cat'

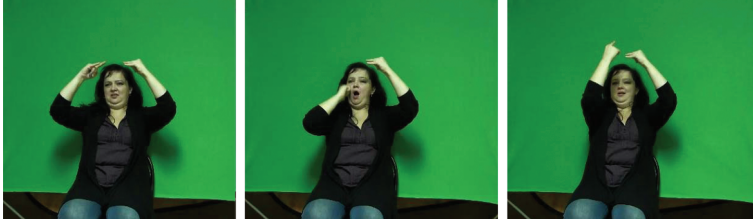
At the clause level, the verb can be held across its arguments and adjuncts, but also the subject, the object or an adverb can be held while the verb is signed. Furthermore, sometimes a verb is held across one or more verbs following it in a serial verb construction. Most of these holds can be also described in prosodic terms (see Section 2.1), as syntactic constituents are usually isomorphic with prosodic constituents. Whether the primary function of such holds is to mark a prosodic domain (as suggested for these types of holds by Nespor & Sandler 1999) or to signal syntactic boundaries (as suggested for some of these holds by Zimmer & Patschke 1990) is discussed in more detail in Kimmelman (2014) and Kimmelman, Sáfár & Crasborn (under revision). In the rest of the paper, we call this type of hold “syntactic”; it is irrelevant for the quantitative comparison whether they are in fact prosodically motivated.

Holds with iconic functions appear both in intra-clausal and inter-clausal contexts. In these holds, the relationship between the held sign and the signs articulated by the other hand can be characterized by spatial or temporal contiguity. We decided to call this category iconic, because this contiguity is represented iconically by maintaining the held sign. One example of an iconic hold is a hold expressing *background in locative construction*, where the weak hand represents an entity that is localized in space (the background), and is held while the other hand signs the figure and/or the locative relation between the two. For instance, in (7) the GRANNY is located with respect to the open window, which is expressed through the hold of the verb WINDOW.OPEN. In such cases, the function of the weak hand is clear because there is a topographic relation created between the two hands, which is interpreted as the locative relation between the referents they represent. According to Liddell (2003), such holds would either be classified as fragment buoys (if a lexical sign is being held), or as point buoys (if a pointing sign is being

held). However, we argue that irrespective of the lexical source, the function of this type of hold is to iconically represent background in a locative construction.

(7)

[RSL:cr5:s20]



h1: WINDOW.OPEN

GRANNY

IX.

h2: WINDOW.OPEN -----

‘The window opens. The granny is there.’

Another reason for an iconic hold is to express *simultaneity*. In such cases, a sign, typically a verb (usually under role shift), is held while the other hand signs the following sentence. There is no structural relation between the verb on the weak hand and the following sentence, rather what links the hold and the signs articulated by the other hand is the simultaneity of events described. Thus the temporal simultaneity of two events is expressed iconically by the (partially) simultaneous use of the two hands.

Some holds are discourse-related. The type illustrated here is *noun as topic*, which means that a noun that is prominent within a stretch of discourse is held across several sentences. One should also note that most often, the noun is actually realized as a pronoun, which is to be expected because topics are often pronominalized. Example (8) shows that the pronoun IX can have different syntactic functions in different sentences: it can be subject or object, but in all sentences following the first, it is the topic of the sentence. Thus the function of this type of holds is to mark a discourse topic. Again, in Liddell’s (2003) terminology, such holds would either be fragment buoys or pointers, but we argue that they have a common function of marking a discourse topic and thus should be grouped together. Other discourse-related types of holds, such as parenthetical and forward-referencing holds (Brentari & Crossley 2002), are also included in this group in our analysis.

(8) [RSL:cr4:s10]



h1: THINK-- MONKEY. LOOK. NICE.
h2: IX-----
'She thinks it is a monkey. She looks at it. It is nice!'

Finally, we have to mention that our current classification does not include list buoys (Liddell 2003) and weak hand holds originating in palm-up gestures (McKee & Wallingford 2011), because our data contained too few tokens to allow a thorough analysis and categorization of the holds originating in these multifunctional signs/gestures. These tokens were excluded from the analyses reported in this paper (but note that the cross-linguistic differences reported below are present even when these tokens are included).

A detailed comparison of these categories of holds to categories proposed in the existing literature is presented in Kimmelman (2014). Our classification is not borrowed directly from any of the previous researchers because we wanted to account for all holds found in the data. One important decision in our approach was that the categories we use are not mutually exclusive, and as a result, each token of weak hand hold may be assigned more than one functional category. This strategy is necessary if we want to look at all holds in a corpus without restricting ourselves to specific domains of analysis.

We have found no differences between RSL and NGT in terms of the types of holds used. The two languages make us of very similar holds with the same functions (see Kimmelman (2014) for a discussion of every subtype of the general types of holds). However, differences between the two languages might be quantitative, not qualitative, and therefore in what follows, we focus on the frequency and formal characteristics of holds in these languages. In the next section, we look at the characteristics of weak hand holds and compare RSL to NGT and narratives to conversations.

5. Results

In this section, we describe the overall frequency of holds in the two languages, and the distribution of holds across the four major types (Section 5.1). Next, we compare the two languages to each other (Section 5.1.1) and present a cross-genre comparison for holds in NGT (Section 5.1.2). In addition, we analyze formal characteristics of holds, such as length and handedness, and compare different types of holds to each other with respect to these characteristics (Section 5.2). The results are summarized in Section 5.3.

5.1 Overall frequency of weak hand holds

Altogether, we have collected 621 cases of weak hand holds in the complete dataset of nearly 2.5 hours of signing from the two sign languages. Table 2 shows for each language and genre the number of holds included in the analysis.

As mentioned above, in the annotation phase, we assigned multiple functions to the same token where appropriate. While the majority of holds (75%, 468 holds) was assigned a single type, 23% (143 holds) of the tokens belonged to two types, and 2% (10 holds) belonged to three or four types. There was no difference between the two languages in the frequency of mixed type holds (24.7% in NGT, 24.6% in RSL; $N = 621$, $\chi^2(4) = 4.28$, $p = .369$). In the analyses regarding functional categories in the following sections, we will focus on holds that belonged to the single type only ($n = 468$). While this means eliminating 25% of the tokens from some of the analyses, this approach allows us to focus on the characteristics and distribution of each type in isolation.

In order to be able to quantitatively compare the use of weak hand holds across languages and genres, we calculated a holds rate separately for each participant and genre. The holds rate is the average number of weak hand holds per 100 glosses, calculated by dividing the number of holds by the number of glosses (for each participant and genre separately) and multiplying the resulting figure by 100. By using this measure, we control for differing sample sizes across participants and genres.

Table 2. Number of weak hand holds across genres

Language	Genre	Number of glosses	Holds
RSL	Narrative	8361	350
NGT	Narrative	7736	171
	Conversation	4226	100
Total		20323	621

5.1.1 Cross-linguistic differences

First, we were interested in whether there are any differences between RSL and NGT in the rate of weak hand holds or the types of holds used. We hypothesized that we would not find differences between the two languages, because we assumed that the use of the modality-specific articulatory resource of the two hands would be governed mainly by general motoric and cognitive constraints rather than language-specific principles. Furthermore, previous research on different sign languages (both descriptions of individual languages and cross-linguistic comparisons) suggested the existence of similar types of simultaneous constructions.

Since we did not have access to conversational data from RSL, we restricted the comparison of the two languages to the narrative subsets of our data. We first consider the weak hand hold rate in NGT and RSL narratives (see Table 3).

Table 3. Rate of weak hand holds (average number of holds per 100 glosses) in narratives: number of participants, mean hold rate, standard deviation, minimum, maximum.

Language	Genre	N	Mean	SD	Min.	Max.
RSL	Narrative	6	4.69	1.66	3.24	6.94
NGT	Narrative	15	2.37	1.59	0.22	5.38

As mentioned above, we expected to find similar rates of weak hand holds in the two languages. Contrary to this hypothesis, we found that RSL signers produced twice as many holds ($M=4.69$, $SD=1.66$) than NGT signers ($M=2.37$, $SD=1.59$), as shown in Figure 1. This difference between the two languages was significant ($t(19)=2.98$, $p=.008$).

As this finding was unexpected, we looked for variables that could explain this difference between the two languages. As described above, the sample of RSL signers was smaller (6 participants) than that of NGT signers (15 participants). In addition, the group of NGT signers was more varied in terms of age and language background. We first considered the effect of age, by selecting NGT signers matched in age to RSL signers. The difference between the two groups remained significant ($t(10)=3.26$, $p=.009$), age-matched NGT signers produced a lower rate of holds ($N=6$, $M=1.95$, $SD=1.21$) than RSL signers ($M=4.69$, $SD=1.66$).

The NGT group showed more variation in terms of language background as well, with more participants having hearing parents and as a result not being exposed to NGT from birth. In order to test whether this difference between the samples can be held responsible for the results, we compared hold rates between RSL and NGT signers who reported having at least one deaf parent. We still found a significant difference ($t(10)=2.33$, $p=.042$) between NGT signers ($N=7$, $M=2.26$, $SD=1.48$) and RSL signers ($N=5$, $M=4.31$, $SD=1.55$).

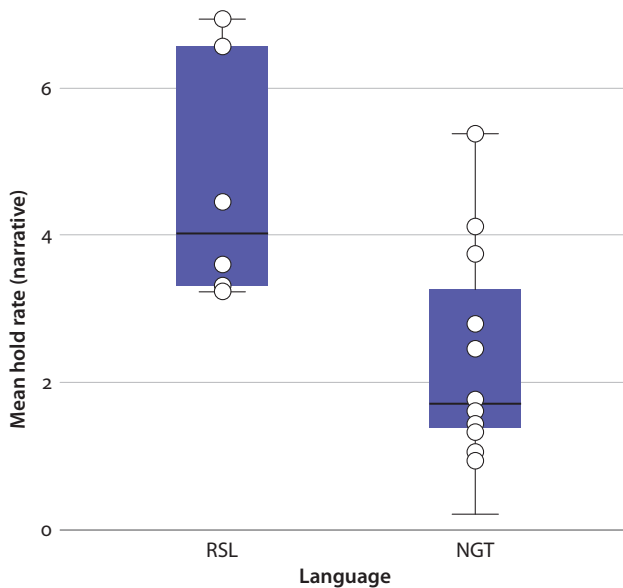


Figure 1. Mean weak hand holds rate for RSL and NGT narratives. Boxplots show the minimum, first quartile, median, third quartile, and maximum. Individual participants' values are indicated by dots.

Finally, we also tested the difference between the two groups of signers in the Canary Row narratives only. As we described above, the narrative data used in this study included retellings of cartoons and personal narratives. While personal narratives varied in content, the retellings of cartoon clips can be expected to be highly similar, because the same clips were used as stimuli for the task for both languages. Looking at holds rates in cartoon retellings only, we again found a significant difference ($t(14) = 3.86$, $p = .002$) between NGT signers ($N = 10$,⁹ $M = 2.97$, $SD = 1.76$) and RSL signers ($N = 6$, $M = 6.51$, $SD = 1.80$). To sum up, we have found a robust difference in overall frequency of holds between RSL and NGT, even in subsets of the data that were closely matched for sociolinguistic and task-related variables.

Table 4. Distribution of holds in narratives (only holds belonging to a single type were included in this analysis).

		N	Phonetic	Iconic	Discourse	Syntactic
NGT	Narrative	123	7%	59%	9%	26%
RSL	Narrative	264	12%	45%	11%	33%

9. Canary Row narratives were available from ten NGT signers only.

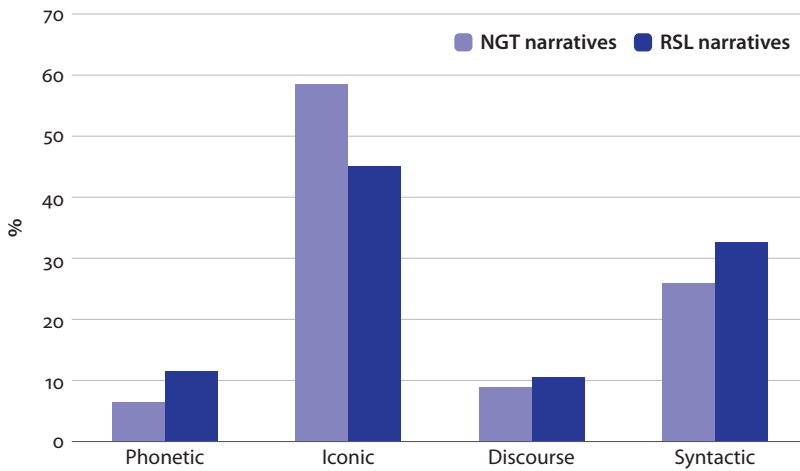


Figure 2. Distribution of weak hand holds in RSL and NGT narratives (only holds belonging to a single type were included in the analysis).

Having found a robust difference between the two languages in terms of hold rate, we proceeded to look at the distribution of the types of holds in the two languages. As mentioned above, in this analysis, we only included holds that occurred in narratives and that belonged to a single type. We found no significant difference in the frequency of hold types between NGT and RSL narratives ($N=387$, $\chi^2(3)=6.78$, $p=.079$; Table 5, Figure 2). In both languages, iconic holds occur most often (around 50% of holds belong to this category), followed by syntactic holds (around 30%). Phonetic and discourse holds each comprise around 10% of all single-type holds. Thus, although the two languages differ in the frequency of weak hand holds, they use the same types of holds (as already noted above in Section 4) in similar proportions. This suggests that the frequency difference we described earlier is not driven by a single type of hold that would be more frequent in RSL; rather, there is a frequency difference between RSL and NGT across all hold types.

5.1.2 Genre differences in NGT

As described in Section 2, our NGT dataset included two types of language production: narratives and conversation. The conversational data involved signers discussing issues related to deafness and sign language. We expected to find a higher rate of holds in narrative signing, due to the higher number of iconic constructions in this type of signing (Sáfár et al. 2015). In addition, we expected to find a difference in the distribution of the different types of holds in the two genres, again due to the frequency of iconic structures in narratives.

Table 5. Descriptive statistics of NGT signers' weak hand hold in narratives and conversation

Language	Genre	N	Mean	SD	Min.	Max.
NGT	Narrative	12	2.51	1.59	0.94	5.38
	Conversation	12	2.04	1.62	0.37	6.56

Although the whole NGT dataset involved 15 participants, conversational data was only available for 12 signers. In the comparison of the two genres, only these signers were included. Descriptives for this subset of the data are presented in Table 5.

Contrary to our expectations, the rate of weak hand hold use was only slightly higher in narratives ($M=2.51$, $SD=1.59$) than in conversations ($M=2.04$, $SD=1.62$), and this difference was not significant ($t(11)=0.61$, $p=.56$).

We did, however, find significant differences between the two genres in terms of the distribution of the types of holds ($N=204$, $\chi^2(3)=66.71$, $p<.001$). There was a higher percentage of syntactic holds in conversations (61%) than in narratives (26%), and iconic holds were used more frequently in narratives (59%) than in conversations (3%). The differences in these two categories drive the effect, but there were also differences in the distribution of phonetic and discourse holds, both of which occurred more often in conversations than in narratives (Table 6, Figure 3).

Thus it appears that genre differences in the distribution of holds are restricted to the frequency of different types of holds, while the overall frequency of holds is similar across the two genres.

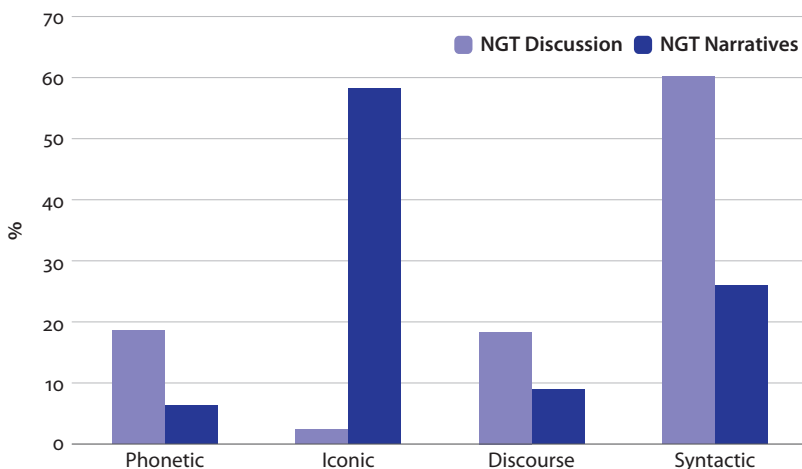
**Figure 3.** Distribution of weak hand holds in NGT narratives and conversations.

Table 6. Distribution of weak hand holds in narratives and discussions in NGT (only holds belonging to a single type were included in this analysis).

Language	Genre	N	Phonetic	Iconic	Discourse	Syntactic
NGT	Conversation	81	19%	3%	19%	61%
	Narrative	123	7%	59%	9%	26%

5.2 Phonetic characteristics

As a corpus-based investigation, our study can describe some of the phonetic aspects of weak hand holds in a quantitative manner for the first time. This data is interesting in itself because it informs the characterization of weak hand holds. For example, it can tell us how long holds are typically maintained, or whether one- or two-handed signs are more likely to be held. Moreover, phonetic characteristics allow us to further explore the differences and similarities between the two languages in our study, as well as the four types of weak hand holds we identified.

Due to their modality-specific nature and in light of previous research showing similarities between holds in different sign languages (e.g. Liddell et al. 2007), our original hypothesis regarding the cross-linguistic comparison of weak hand holds was that we would find more similarities than differences between NGT and RSL in terms of the types and frequency of holds. We expected this general hypothesis to apply to phonetic characteristics as well. On the other hand, we expected to find differences in the phonetic characteristics of different types of holds.

The first question we consider in this respect is how long holds are maintained (Section 5.2.1), followed by whether the source sign is one- or two-handed (Section 5.2.2), and finally whether the right boundary of a hold coincides with the articulation of a new sign or not (Section 5.2.3).

5.2.1 *Length*

As mentioned above, our hypothesis was that we would find similarities between the two languages in terms of the phonetic characteristics of holds. In terms of length, we expected weak hand holds to be maintained for similar durations in the two languages.

We characterized hold duration in terms of the number of overlapping gloss and clause level annotations. Whereas these indices are somewhat superficial, at this stage we do not have more detailed data available concerning the syntactic and prosodic domains spanned by weak hand holds. However, we believe that even though the measures we present here are crude, they do allow a basic comparison of holds in NGT and RSL as well as different types of holds.

Number of overlapping gloss annotations

After exporting the annotations, we calculated the number of glosses overlapping with each hold. The mean length of holds (Table 7) was similar for RSL (3.47) and NGT (3.61). Overall, 80% of holds overlapped with four or fewer signs on the other hand. Another 18% spanned 5–10 signs, with a little less than 2% being held for the duration of more than ten signs (up to 29).

Table 7. Number of overlapping glosses in weak hand holds in NGT and RSL

Language	N	Mean	SD	Min.	Max.
NGT	271	3.61	2.80	1	29
RSL	350	3.47	1.79	1	13

While there was no significant difference between the two languages in the mean length of holds overall ($t(435) = -0.75$, $p = .452$) or within any single type, an ANOVA showed significant differences between different types of holds ($N = 468$,¹⁰ $F(3) = 15.70$, $p < .001$). The longest holds fulfilled discourse-related functions (mean length 4.63 overlapping glosses), and iconic holds were similar in length (mean length 3.91 signs, not a significant difference). Phonetic and syntactic holds were significantly shorter than iconic and discourse holds (overlapping with 3.00 and 2.68 signs on average, not a significant difference) (Table 8).

Table 8. Length of different types of weak hand holds, RSL and NGT data combined (only holds belonging to a single type were included in this analysis)

Type	N	Mean	SD	Min.	Max.
Discourse	54	4.63	4.15	1	29
Iconic	193	3.91	2.37	1	20
Phonetic	54	3.00	0.91	1	6
Syntactic	167	2.68	1.05	1	7

Clauses

In narratives, clause-level annotations were available. On average, holds spanned two clauses (Table 9), and again there was no difference between the languages overall ($t(519) = -0.44$, $p = .658$) or within any single type.

A little more than one third (36%) of all narrative holds were intra-clausal, that is, they were simultaneous with one clause-level annotation only. Slightly more, 38% of holds, crossed one clause boundary, being simultaneous with two

10. Taking into account only those holds which belong to a single type.

Table 9. Number of weak hand holds across clauses in RSL and NGT narratives

Language	N	Mean	SD	Min.	Max.
NGT Narratives	171	2.11	1.27	1	10
RSL Narratives	350	2.06	1.12	1	8

clause annotations; 16% of holds were maintained over two clause boundaries, and 10% overlapped with four or more clauses (see Figure 4).

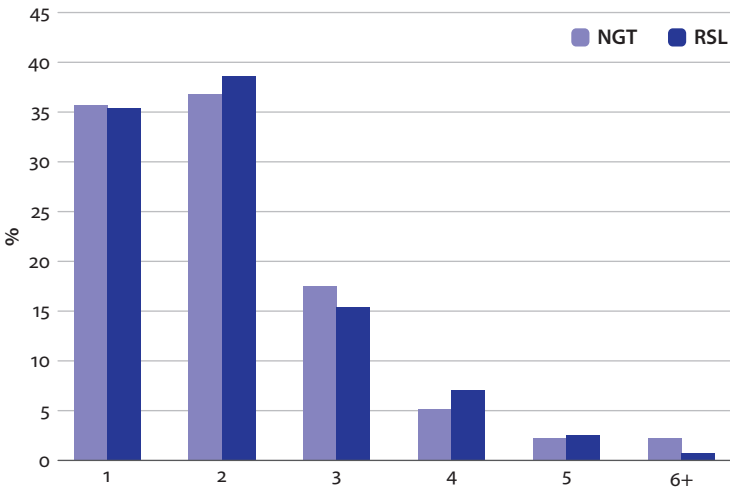


Figure 4. Number of clauses spanned by holds in both languages combined. Bars show percentage of holds (within each language) overlapping with a given number of clauses.

Similar to the number of overlapping gloss annotations, we again found that different types of holds differed in the average number of overlapping clauses ($N = 387$, $F(3) = 28.29$ $p < .001$). The pattern was similar to what we described above, in that discourse holds and iconic holds were longest (with no significant difference between these two types), followed by phonetic and finally syntactic holds (Table 10).

Table 10. Length of different types of weak hand holds in terms of overlapping clauses (only holds belonging to a single type were included in this analysis).

Type	N	Mean	SD	Min.	Max.
Discourse	39	2.38	0.75	1	4
Iconic	191	2.43	1.25	1	8
Phonetic	39	1.92	0.81	1	4
Syntactic	118	1.38	0.60	1	4

5.2.2 *Handedness of the source sign*

The second phonetic characteristic we discuss is the handedness of the source sign. This aspect of weak hand holds is interesting because there is a difference between one- and two-handed signs in terms of how “easily” they can be maintained. When a two-handed sign is followed by a series of one-handed signs, then the non-dominant hand may maintain the location and handshape of the two-handed sign without extra articulatory effort; this is what we observe in (7). In contrast, the maintenance of a one-handed sign always necessitates dominance reversal, either because the hand that was dominant up to that point is now maintained and the hitherto non-dominant hand has to take over, or because the so far non-dominant hand is used to produce a sign that is then maintained. For instance, in example (8), the one-handed INDEX (IX) is produced with the left hand which thus is dominant at this point; after that, the signer switches back to the right hand and produces a sequence of signs while holding the INDEX on the left hand. Therefore, we expected to find differences between different types of holds in terms of the handedness of the source sign, namely we expected iconic and discourse holds (as having more non-phonetic motivation) to originate in one-handed signs more frequently than phonetic and syntactic holds.

Looking at our whole dataset, we found that most holds originated in two-handed signs, with 52% of the source signs being symmetric and 22% asymmetric.¹¹ Nonetheless, 26% of holds had a one-handed sign as its source. These proportions represent a reversed pattern compared to the overall frequency of one- and two-handed signs in conversational NGT (see Figure 5). In NGT discourse, nearly 70% of the signs are one-handed (Crasborn & Sáfár, in press). Thus, two-handed signs constitute only about 30% of the signs articulated in casual discourse, yet they give rise to 75% of all holds.

There is no difference between RSL and NGT in terms of source sign handedness ($N = 621$, $\chi^2(2) = 4.76$, $p = .093$). However, different types of holds show different patterns ($N = 468$, $\chi^2(6) = 27.91$, $p < .001$), see Table 11 and Figure 6. In particular, discourse holds and iconic holds are more likely to originate in one-handed signs (44% and 37%, respectively) than phonetic and syntactic holds (13% and 22%). Over 80% of phonetic holds stem from two-handed signs. This difference might also be connected to the types of signs that are likely to participate in discourse holds and iconic holds, namely pointing signs and classifier predicates, respectively.

11. Handedness was always determined as the handedness of the surface form realized in each token. Thus, if a sign that is generally realized as two-handed was produced with one hand only, it was categorized as a one-handed sign.

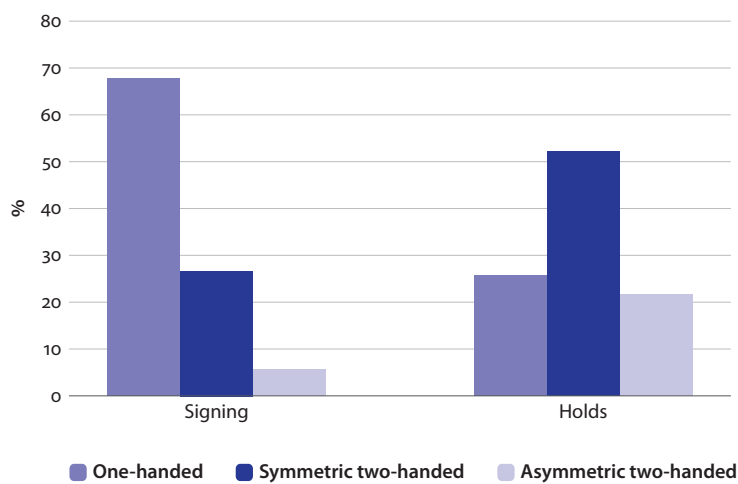


Figure 5. Handedness in conversational NGT and in weak hand holds in NGT and RSL.

This finding indirectly supports the categories that we proposed. In particular, it appears that one-handed signs are usually held for discourse or iconic purposes, while two-handed signs are likely to be held for phonetic and probably prosodic reasons. On the other hand, contrary to the claims of some researchers (Nespor & Sandler 1999), we have seen that all types of holds can originate in both one-handed and two-handed signs.

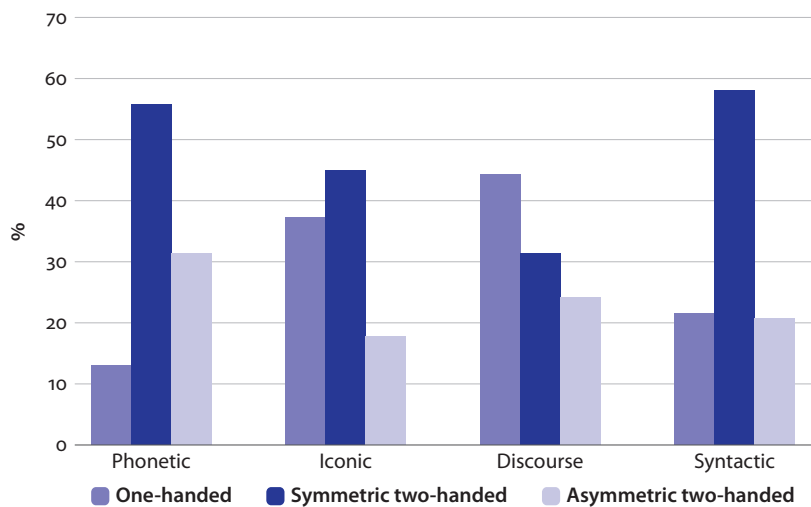


Figure 6. Handedness of different types of weak hand holds (only holds belonging to a single type were included in this analysis).

Table 11. Handedness of different types of weak hand holds (NGT and RSL data combined; only holds belonging to a single type were included in this analysis)

Type	Count	One-handed	Symmetric two-handed	Asymmetric two-handed
Phonetic	54	13%	56%	32%
Iconic	193	37%	45%	18%
Discourse	54	44%	32%	24%
Syntactic	167	22%	58%	20%

5.2.3 *Right boundary*

The annotations include information about whether the right boundary of a hold is followed by the articulation of a new sign that involves the (previously) held hand. If the hand that was previously being held participates in a new sign, the articulatory requirements of the new sign overrule the motivation for the hold. Therefore, we expected that the right boundary of phonetic holds would more often coincide with a new sign than in the case of other types of holds. Furthermore, the fact that some holds end without the involvement of the held hand in an immediately following sign would suggest that the motivation for weak hand holds is not purely phonetic.

We have found that overall 19% of the holds were not followed by a new sign on the same hand, while 81% did. There was no significant difference between the two languages in this respect: in RSL 18% and in NGT 21% of holds ended without an adjacent sign ($N = 621$, $\chi^2(1) = 0.90$, $p = .342$). Contrary to our expectations, we found no significant difference between types of holds: holds with a right boundary coinciding with a new sign constituted 17% of discourse, 19% of iconic, 20% of syntactic, and 22% of phonetic holds ($N = 468$, $\chi^2(3) = 0.61$, $p = .894$). Further inspection of the data revealed that in cases where the right boundary of a hold did not coincide with a new sign, there was no consistent relationship to other constituent boundaries. In some cases, the end of a hold coincides with a prosodic or syntactic boundary, but in other cases it does not.

5.3 Summary of the quantitative data

From the data presented in the previous sections three important observations can be made: (i) RSL and NGT differ in the overall frequency of holds; (ii) Narratives and conversations in NGT differ in the distribution of hold types, in other words, the distribution of types varies according to the genre in this language; (iii) Different types of holds differ in phonetic characteristics. The first two observations will be further discussed in Sections 6.2 and 6.3.

Observation (iii) regarding the different phonetic properties of different types of holds is a further justification of the classification of holds applied in this study. In particular, we have found that iconic and discourse-related holds are significantly longer than syntactic and phonetic holds; we also found that they are significantly more likely to originate in one-handed signs. As described in Section 3, the classification was based on the functions of holds. It is therefore a non-trivial finding that these types of holds are also different in their phonetic characteristics.

6. Discussion

6.1 Implications for research on weak hand holds

In this paper, we have focused on a topic that has not been investigated previously, namely frequency and phonetic properties of weak hand holds. In Section 6.2, we zoom in on the implications of the frequency and phonetic analyses; however, first in this section, we discuss how our results relate to previous research on weak hand holds.

As we discussed in Section 2, previous research usually focused on particular functions of holds. For instance, Nespor & Sandler (1999) and Brentari & Crossley (2002) described the prosodic behavior of holds; Zimmer & Patschke (1990) and Miller (1994a,b) focused primarily on syntactic functions; Liddell (2003) emphasized the discourse functions of holds. Focusing on a particular domain is certainly beneficial, but it does not allow for generalizations concerning how holds are used. For instance, Nespor & Sandler (1999) mentioned that holds of classifier predicates can cross any prosodic boundaries, but this fact is not considered relevant for their analysis of prosodic holds. Moreover, most researchers ignore holds which we classify as phonetic in this paper. When looking at corpus data, however, it becomes clear that holds can have all of the previously described functions, and sometimes one hold combines several of these functions. Our results thus have some practical implications for future research. Firstly, a researcher interested in describing the whole variety of functions of holds should not focus on one domain only (prosody, syntax, or discourse). Secondly, phonetic holds should not be overlooked. Thirdly, one should be aware of the possibility of multiple functions of holds.

On the other hand, our research confirmed that the general categories of holds proposed in previous research are valid, in that holds can have phonetic, syntactic, iconic, and discourse functions. This is also demonstrated by phonetic properties of different types of holds (Section 5.3), which support at least two broader hold types (phonetic-syntactic and discourse-iconic). Thus, RSL and NGT also

show alignment of holds with syntactic/prosodic domains (as Nespor & Sandler (1999) argued for ISL), and they use holds in locative constructions as well as to express discourse relations (as discussed by Liddell (2003) and Brentari & Crossley (2002)). One very interesting question that we do not explore in this paper is whether the holds that we classify as syntactic are better described in syntactic or prosodic terms, but see Kimmelman (2014) for a discussion.

6.2 Cross-linguistic and cross-genre differences

In Section 5.1, we have demonstrated that there is a statistically significant difference in the overall frequency of holds in RSL and NGT narratives. In particular, signers of RSL seem to use weak hand holds nearly twice as often as NGT signers. This difference between the two languages was significant even when comparing only Canary Row narratives, the subset of data that was as closely matched in terms of content and context as possible. Furthermore, the difference in frequency is not due to a difference in hold length: it is not the case that RSL signers produce more but shorter holds. Interestingly, we also did not find differences between RSL and NGT with respect to other phonetic characteristics of holds, such as handedness of the source sign and the characteristics of the right boundary. Finally, we did not find significant differences between RSL and NGT with regard to hold types. In both languages, holds have similar functions. In addition, the distribution of holds across these functions is similar in narratives, that is, the cross-linguistic difference in hold frequency is not due to a higher frequency of certain types of holds in RSL.

In our comparison of two genres in NGT, contrary to our expectations, we found no difference in terms of the frequency of holds. This similarity in the frequency of holds is all the more striking given that the genres did differ in terms of the distribution of the different types of holds. In narratives, iconic holds were used more often than in discussions, while syntactic holds showed the opposite pattern.

This cross-genre finding seems to reinforce the cross-linguistic difference: although the types of holds differ, overall frequency is constant in the two types of NGT data. On the other hand, RSL and NGT differ in the frequency of holds despite the similar distribution of types. This pattern seems to suggest that the frequency of holds is a language-specific feature, independent of the semantic or functional characteristics of holds.

Why would RSL and NGT differ in the frequency of holds? Firstly, it is possible that the two languages differ in terms of contact with the surrounding spoken language. Sign languages that are strongly influenced by a spoken language may use fewer modality-specific constructions (such as weak hand holds). However,

at this stage, we have no data that would allow a comparison of NGT and RSL in this respect.

Secondly, NGT is characterized by a considerable amount of regional lexical variation: there are five major dialects attributed to the five schools for deaf children (Schermer 2004). Lexical variation in RSL is less well understood, but it seems that the degree of variation is lower. Burkova & Varinova (2012) show that variation is low, is restricted to only some lexical domains, and occurs mainly among young adult signers, despite the large number of schools for deaf children in Russia. There is no reliable data on regional variation in the domain of grammar for either sign language, but if lexical variation is correlated with grammatical variation, we also expect to find differences in this domain. The alleged higher variation in NGT might lead to a lower degree of grammaticalization of different constructions, including weak hand holds. Again, more research is needed to test this hypothesis.

Thirdly, as Vermeerbergen & Demey (2007) argued, the co-speech gestures produced by hearing people also contain constructions which can be characterized as holds. These gestural holds might be a source of the holds in sign languages, because signers are naturally exposed to gestures of hearing people, and gestures can lexicalize and grammaticalize, as discussed, for instance, in Pfau & Steinbach (2011). It might be the case that gestural holds are less common in Dutch than in Russian co-speech gestures, which might explain the difference between the sign languages as well.¹² However, gestural holds have not been studied for Russian or Dutch speakers so far.

Finally, another possible explanation involves an interaction between prosodic/phonetic properties of a language and possible functions of holds. Recall that in NGT, the frequency of holds is similar across genres while the distribution of types of holds differs. It might be the case that the frequency of holds is primarily determined by some overarching prosodic property: for instance, the prosody of NGT is such that holds occur less often than in RSL. In other words, NGT disfavors manual simultaneity for prosodic reasons. These phonetic/prosodic reasons may concern the interplay between articulatory strategies: when the passive hand is not used, it can be relaxed and lowered (= no hold), or it can be held in the configuration and location of the previous sign for some time (= hold); both actions are somewhat costly in terms of articulatory effort, so different languages might differ in the ranking of these articulatory constraints.

Even if the primary motivation of holds is prosodic or phonotactic, this does not mean that they are not used functionally, for instance, to express discourse-related, semantic, or syntactic functions. Holds are not arbitrary with respect to

12. We would like to thank Onno Crasborn for this suggestion.

the context in which they are used. Similarly, pauses in spoken language are necessary for breathing, but they also fulfil a variety of linguistic functions, such as delimiting words and phrases.

One possible problem for this account lies in our observation that RSL and NGT are not different with respect to the phonetic characteristics of holds, such as length and handedness. If the overall frequency of holds was determined by the phonetic/prosodic component of the language, we would expect such differences. For instance, if NGT allowed for fewer holds due to phonetic reasons, it would be likely that a larger proportion of holds would originate in two-handed signs, as those holds are the least demanding with respect to articulation, since they do not have to involve dominance reversal (Sáfár & Crasborn 2013). In addition, we would then also expect NGT holds to be shorter, as phonetic constraints prohibiting holds would likely influence not only frequency, but also duration. But again, this is not what we found.

It is clear that further research is needed to confirm and explore the cross-linguistic and cross-genre differences we identified. In order to test these theories, it would be necessary to analyze larger databases both for RSL and for NGT, comparing the frequency of holds in different genres. We think that this line of inquiry is a very promising one.

6.3 Modality effects

In Section 2, we posed the question to what extent modality is responsible for the presence and properties of weak hand holds. The most straightforward approach to our results is to attribute all similarities between RSL and NGT to the modality, while all differences should be independently motivated. Therefore, the presence of weak hand holds, as well as the functions that weak hand holds fulfil, might be said to result from the visual modality, while the frequency of holds is defined by some other factors.

The fact that weak hand holds exist in sign languages is clearly a modality effect, in particular, it results from the constraints on production in spoken vs. sign languages. Since two partially independent articulators are available, they can form weak hand holds. Moreover, ease of articulation probably motivates the presence of at least some weak hand holds in most sign languages. However, although available and motivated by articulatory ease, this construction does not have to be realized, as in the case of Adamorobe Sign Language, a village sign language from Ghana (Nyst 2007).

Furthermore, the availability of two articulators and the visual-spatial nature of sign languages seem to predict many of the functions that weak hand holds have. First, phonetic holds may be present for articulatory reasons, which

influence any formal features of natural languages. Second, holds are convenient and natural boundary markers, as the hold visually emphasizes a constituent by being aligned with it; therefore, they may be used to mark syntactic constituents. Thirdly, holds are used in iconic contexts because they represent spatial arrangements and simultaneity in a very transparent manner: the spatial arrangement of referents is mirrored in the spatial arrangement of hands, and the simultaneity of events is mirrored in the (partial) simultaneity of the produced signs. Finally, the importance of a discourse referent can be emphasized by the maintenance of the referring sign. In other words, all the functions of holds (with the exception of phonetic holds) are non-arbitrary and motivated by the natural interpretations that can be related to the act of holding a hand as a part of a sign. Taken together, the fact that sign languages, including RSL and NGT, are similar to each other in the functions of holds becomes less surprising.

On the other hand, the frequency of weak hand holds obviously depends on some factors external to the modality. The present study is the first one to show such a difference between sign languages. As for possible factors, we hypothesized that the degree of variation and the influence of the spoken language might play a role, or differences in phonetic/prosodic restrictions of the languages. However, future research is needed to substantiate one or more of these hypotheses.

Acknowledgements

The work of Anna Sáfár was funded by ERC Starting Grant 210373, awarded to Onno Crasborn. The work of Vadim Kimmelman was funded by the Dutch Science Organization (NWO) and by the Russian Foundation for Basic Research (12-06-00231-a). We would like to thank Diane Brentari, Onno Crasborn, and Roland Pfau for their useful comments on this manuscript.

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Authors' contact information

Anna Sáfár

annasafar@gmail.com

Vadim Kimmelman

V.Kimmelman@uva.nl