Exploring sign-writing contact and multilingualism in the Norwegian deaf community

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Abstract: In this chapter, we detail the on-going work related to the Norwegian Sign Language Corpus and lexical database (Norwegian Signbank). In particular, we highlight the corpus' interactional focus and discuss its implications for a description of Norwegian Sign Language grammar and lexicon. We then present an initial study that engages the corpus to map out the different types of fingerspelling, one type of sign-writing contact, observed, focusing on non-lexicalized forms. Two analyses were performed to investigate whether fingerspelling is affected by sociolinguistic factors and principles of Audience Design (Bell 1984). Basing this descriptive work on data from the corpus facilitates a better understanding of how these language contact forms contribute to expressions of social identity and illustrates one way that Norwegian signers leverage their multilingualism for meaning-making in conversation.

Keywords: Norwegian Sign Language, fingerspelling, multilingualism, corpus linguistics, language contact, sign-writing contact

Introduction

Norway is a Scandinavian country in northern Europe, home to a little over five million people. Just under a million people living in Norway are first- or second-generation immigrants, who come from all over the world. While these people bring with them a diverse repertoire of languages, Norway also recognizes indigenous languages, for example the many Sami languages, Kvensk, Romani and Rodi. Norway also officially recognizes Norwegian Sign Language (norsk tegnspråk) as the language of the Norwegian deaf community (Språklova 2022). While there are no official census statistics of deaf people or Norwegian Sign Language users in Norway, unofficial reports suggest that there are approximately 4,000 profoundly deaf people, and an estimated 15,000 people who use Norwegian Sign Language (Bergh 2004).

Linguistic study of Norwegian Sign Language began in the 1980s, and further research continued sporadically over the next few decades (e.g., Erlenkamp 2011; Halvorsen 2012; Vogt-Svendsen 1983). However, to date it remains largely under-described. Recently though, there has been renewed momentum, resulting in an emerging body of work on linguistic aspects of Norwegian Sign Language (e.g., Ferrara 2019, 2020; Ferrara & Halvorsen 2017; Ferrara & Ringsø 2019; Ferrara et al. forthcoming; Skedsmo 2020a, 2020b). This new momentum has come with an interest in documenting Norwegian Sign Language through corpus work, and it is this work that is the

focus of the next section. Thereafter, a small study using the corpus is presented. The study considers the multilingual repertoires of deaf signers in Norway. In particular, we examine how fingerspelling practices are engaged across the community to borrow words from Norwegian, and in some cases, English. Descriptions of the different fingerspelling practices observed in the corpus are followed by two preliminary analyses that examine whether fingerspelling is affected by sociolinguistic factors and principles of audience design. By basing this study on naturalistic Norwegian Sign Language interactions from the corpus, we argue that we are better able to examine how language contact forms contribute to expressions of social identity (Zenner et al. 2019), and we illustrate one way that Norwegian signers leverage their multilingualism for meaning-making in conversation.

The (current and future) Norwegian Sign Language Corpus

Efforts to create a Norwegian Sign Language Corpus have been underway since 2014. The corpus has followed in the footsteps of previous corpus projects, and has benefited from all the groundwork these projects have accomplished, especially with regard to the development of a Signbank, which is a lexical database that functions as a dictionary of signs, and how to create a corpus that is as openly accessible as possible.

The Norwegian Sign Language Corpus is a collection of several datasets, collected at different times and for different projects. [1] An initial pilot project, conducted in Oslo from 2014 to 2015, involved filming seven elderly signers from Oslo, Trondheim, and Bergen (Ferrara & Bø 2015). Despite attempts to balance the participants for gender, in the end more women were recruited. The signers are known members of the signing deaf community and all reported learning Norwegian Sign Language either from birth or from when they started school (which at that time in Norway was around 8 or 9 years old). The main aim of this project was to collect conversational Norwegian Sign Language an document the experiences of this generation of signers.

The signers were filmed in dyad, triad, and multi-party interactions over two consecutive days, as they participated in various language-based activities, including conversations about issues relevant to the deaf community, retellings of the picture book *Frog, Where Are You?* (Mayer 1969), and an illustration called "The Cookie Theft" (Goodglass et al. 2001). Signers also engaged in conversations with the other signers from their area of Norway. At the end of the two-day session, an additional conversation with all participants and deaf colleagues was also filmed (a total of nine signers). From this project, about 5.5 hours of signing was recorded. This video data was cut into clips corresponding

[1] All of these previous projects, along with the current ongoing project, have been approved by the Norwegian centre for research data (#182324).

to the activities, and ELAN files were created for each participant in each activity. Background information about the participants was also logged. Currently, only the group conversations with signers from the same city and the retellings of *Frog, Where Are You?* are being annotated, as they relate to ongoing studies.

In 2017, a new project was initiated as a follow-up to a previous project on the second language acquisition of a signed language by hearing adults (Ferrara 2019; Ferrara & Nilsson 2017). This new project investigated how Norwegian signers establish and maintain different visual perspectives (Ferrara & Ringsø, 2019, 2021). Data collection was carried out in three Norwegian cities (Oslo, Bergen, and Trondheim). In total, 21 young and middle-aged deaf signers participated in (dyad or tryad) conversations. Each conversation involved one interlocutor (a hearing or deaf native signer) from the project team. Keeping the conversations as natural as possible, the project team member leveraged any opportunities that arose to talk about spatially relevant topics (e.g., what their summer cabins look like, summer holiday trips, how to get from one place to another). Each conversation lasted approximately 30 to 40 minutes. Depending on the number of participants and the space available, one and two cameras were used. In total, 13 conversations totaling 7.5 hours were video recorded. Currently, all conversations are being annotated (with initial focus on the deaf interlocutors).

In 2019, funding was granted for a four-year project to investigate the systematic and constantly evolving communication practices within various Norwegian Sign Language interactions (Research Council of Norway, project number 287067). For this project, a large sample of Norwegian Sign Language interaction needs to be collected and annotated. The project will incorporate the datasets described above into the new, larger corpus. In addition, data from a previous doctoral research project (Halvorsen 2012) have also been incorporated. This data included two female and two male signers of different ages retelling *Frog, Where Are You*? (Mayer 1969), and also retelling their memories of the 9/11 attacks on the United States, rendering a total of 18 minutes of signing (this data is now published as Ferrara & Halvorsen 2021).

Along with the re-purposed datasets, the current corpus project involves the collection of new data from a variety of sources. First, 60 deaf, near-native signers from Oslo, Bergen, and Trondheim and their surrounds, that is, 20 signers from each city, balanced for gender and age, are being recruited to participate in structured data collection sessions, lasting in total approximately 2.5 hours. To increase possibilities for future cross-linguistic research, the planned activities are based on those engaged by other corpus projects. In addition, some activities were chosen with the goal of doing second language acquisition research in future. The activities include asking participants to 1) tell a warm-up anecdote, 2) retell either *Frog, Where Are You?* (Mayer 1969) or

The Snowman (Briggs 1978), 3) engage in free conversation, 4) re-tell several "Herr Jakob" comics (Press 1992), and 5) engage in a discussion on topics relevant to the deaf community. A second source of data for the project comes in the form of more open, interactive settings, such as dinner among friends, game nights, or instances of signers cooking together. A selection of public activities, such as academic and popular science lectures, as well as open meetings (e.g., in the deaf associations), are also being video-recorded.

The video-recorded Norwegian Sign Language data is being annotated in ELAN (Wittenburg et al. 2006).[2] The identification of manual sign tokens and subsequent ID glossing follows closely the guidelines for the Auslan Corpus (Johnston 2019), with modifications to accommodate the multilingual Norwegian Signbank. The Norwegian Signbank is one of the datasets contained within Global Signbank, which is now being developed at Radboud University (Crasborn et al. 2020). Currently, the Norwegian Signbank consists of just over 1,300 signs, with new signs being added as manual sign annotation of the corpus progresses. Other types of annotations (e.g., translations, composite utterances, mouthing, constructed action), created as part of primary, secondary, and tertiary processing of the corpus data, are outlined further in the Norwegian Sign Language Corpus annotation guidelines. Many of these annotations also

[2] Visit http://www.lat-mpi.eu/tools/elan for more information regarding this free annotation software, which was developed by Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands.

closely align with those for the Auslan Corpus. Details on the annotation work and demographic information about the participants relevant to the current study are provided in the Methods section below.

Fingerspelling in Norwegian Sign Language

To our knowledge, this is the first empirical study on the use of fingerspelling by signers in the Norwegian deaf community. General folk knowledge about the language suggests that signers seldom fingerspell, and that there are varying levels of competence with producing and understanding fingerspelling in the community. Instead, signers prefer to use mouthing (and perhaps loan translations) as a strategy for borrowing Norwegian words. In their introductory book about Norwegian Sign Language, Mosand and Malmquist (1996) explain that there exists both a one-handed and a two-handed fingerspelling system in Norway.[3] The one-handed alphabet is associated with the advent of deaf education in Norway in 1815. Andreas Christian Møller, the first teacher of the deaf in Norway and a deaf person himself, used a one-handed alphabet in teaching that he had learned during his time and training in Denmark (Mosand & Malmquist 1996). Over time, this alphabet evolved within the Norwegian context, with some variation in the forms of certain letters, reflecting contact with other one-handed alphabets such as the American Sign Language (ASL)

[3] Illustrations of the Norwegian one- and two-handed manual alphabets are provided in at https://osf.io/dkv4p/.

fingerspelling system (Språkrådet n.d.). According to Mosand & Malmquist (1996), less is known about the adoption of the two-handed fingerspelling system. It is possible that deaf people may have learned this system from hearing individuals. The two-handed system was used at deaf schools in the eastern and southern parts of Norway, and also for a time in Bergen. Nowadays, the two-handed alphabet is anecdotally reported to be used primarily by elderly signers in the Oslo area, and by signers in the deaf-blind community. One goal of the present study is to detail who uses this two-handed alphabet and in what contexts.

Fingerspelling in different signed language communities

As mentioned above, fingerspelling is one way deaf signers borrow words from spoken languages, and it constitutes a form of sign-writing language contact (Quinto-Pozos & Adam 2013). Previous research in other signed language contexts suggests that fingerspelling is a varied practice. Some fingerspelled items may also become lexicalized into a signed language, forming part of a non-native component of a signed language lexicon (Brentari & Padden 2001; Padden 1998). In this study, we distinguish between (presumed) lexicalized and non-lexicalized forms, with a primary focus on non-lexicalized fingerspelling. It has been observed that signers use non-lexicalized fingerspelling to borrow words from spoken languages, such as the names of people and places, and for

vocabulary for which no signs are available. However, people can also fingerspell words that do have sign equivalents, and they may also fingerspell to emphasize or to demonstrate knowledge of a language (see Battison 1978; Brentari & Padden 2001; Johnston 1989; Schembri & Johnston 2007; Sutton-Spence et al. 1990). We note that the current study is not investigating nativization of fingerspelled forms (see Brown & Cormier 2017; Cormier et al. 2008), but instead aims to document which hand alphabets are used by signers, the grammatical class of the fingerspelled words, and whether signers fingerspell whole words or only a selection of letters.

Fingerspelling is used more or less frequently across individuals and signing communities. For ASL, it is estimated that between 7 and 10% of all signing is fingerspelling (Brentari & Padden 2001; Padden 1998), although it is unclear whether this figure refers to lexicalized or non-lexicalized fingerspelling, or both. In her study of variation in the use of fingerspelling, Mulrooney (2002) found a rate of 12 fingerspelled items per two minutes (the total number of signs was not reported). In a small corpus study conducted by Morford and Macfarlane (2003), 6.4% of a total of 4,111 signs were found to be fingerspelling. In another study on ASL, Padden and Gunsauls (2003) reported frequencies of fingerspelling ranging from 10% to 35%, with high levels of inter-signer variability. Proportions are different for other signed languages. A lexical frequency study of Auslan revealed 5% fingerspelling out of 63,436

manual sign tokens (Johnston 2012). For New Zealand Sign Language, McKee and Kennedy (2006) report that 2.5% of 100,000 signs and compound signs in the Wellington Corpus of NZSL are fingerspelled. A corpus study of Swedish Sign Language found that fingerspelling made up 4% of 44,786 tokens (Börstell et al. 2016). A recent corpus study of British Sign Language (BSL) reported 6.3% fingerspelling out of 14,700 sign tokens (Brown & Cormier 2017), and a small preliminary study of fingerspelling in Iranian Sign Language (ZEI) found 4% fingerspelling out of 9,255 tokens (Sanjabi et al. 2016).

Several studies have considered fingerspelling from a sociolinguistic perspective. For example, an early study on BSL found that signers over 45 years old fingerspelled more than other age groups (Sutton-Spence et al. 1990). They also found significant regional differences, while gender did not seem to be a factor (see also Sutton-Spence & Woll 1993). However, gender differences have been observed in ASL, namely that men favored non-citation (i.e., marked, non-standard pronunciation) fingerspelling forms (Mulrooney 2002). She also found that word class was a significant linguistic variable. Proper nouns favored citation-form fingerspelling (i.e., unmarked standard pronunciation), while verbs and nouns slightly disfavored citation forms. Investigating fingerspelling in Auslan, Schembri and Johnston (2007) found both age and region to be significant sociolinguistic variables. Specifically, older signers (71+) most strongly preferred fingerspelling, and signers aged

between 51 and 70 slightly preferred fingerspelling. By contrast, younger signers, aged between 31 and 50 slightly disfavored fingerspelling. Findings also showed that signers from Sydney and Adelaide slightly disfavored fingerspelling compared to signers in other areas, who slightly preferred fingerspelling. An examination into the word class of fingerspelled words revealed common nouns (35.2%) and proper nouns (32.1%) to be the most frequent. Signers also fingerspelled words from other word classes such as conjunctions, prepositions, pronouns, adjectives, and adverbs. Similar findings related to the word class of fingerspelled words has been also reported for ASL (Padden & Gunsauls 2003),

That fingerspelling is a varied practice partly relates to how much of a word is fingerspelled. Signers may sometimes fingerspell a word fully, or they might only produce a selection of letters. In some communities, it is common to fingerspell only the initial letter of a word (Sutton-Spence & Woll 1993; Sutton-Spence et al. 1990). These ‘single manual letter signs’ (SMLS) have been observed mostly in signed languages like BSL with two-handed alphabets. Composed of handshapes from the manual alphabet they exhibit very limited location and movement parameters. SMLS are regarded as lexicalized signs, although signers may also produce initial letters of words idiosyncratically to express a word. These nonce forms are often accompanied by mouthings and are used after the full word has already been introduced.

We distinguish SMLS from 'initialized signs,' i.e., signs where the handshape is a fingerspelled letter integrated with different types of location and movement patterns, e.g., the ASL sign WATER. It has been suggested that initialized signs are more productive in languages like ASL that use one-handed manual alphabets, compared to languages that use two-handed manual alphabets (Padden 1998; Sutton-Spence & Woll 1993). In some cases, initialized signs form groups within a particular semantic domain, such as kinship terms or colors (Padden 1998).

In other cases, signers sequentially combine signs with fingerspelling, usually to express complex words such as compounds. This type of variation has been observed for ASL and BSL (Brentari & Padden 2001; Brown & Cormier 2017; Padden 1998; Sutton-Spence et al. 1990), although these studies mainly focused on lexicalized forms. In the present study, such variation was also observed during non-lexicalized fingerspelling and is discussed further below.

Multilingual repertoires, language contact, and Audience Design

Deaf signers in Norway are multilingual. The signers in the Norwegian Sign Language corpus reported knowing a variety of signed and spoken/written languages, e.g., Norwegian, English, ASL, BSL, Swedish, Swedish Sign Language, and German. This multilingualism characterizes each signer's

diverse multimodal, semiotic repertoire (De Meulder et al. 2019; Kusters et al. 2017). From this perspective, fingerspelling represents just one of the ways that deaf signers have adapted spoken language to their sensorial access. In the current study, most fingerspelling was used to express Norwegian words. However, there were several instances of signers fingerspelling English words (e.g., one signer described a particular vacation destination in southern Europe as "eye candy"). Further research will reveal the extent to which English and other spoken languages are incorporated into Norwegian signed interactions. However, even the fingerspelling of Norwegian words gives insight into how ambient spoken languages are used by signers in everyday signed interactions. Fingerspelling reflects the contact of a signed language with a spoken language(s), – or rather, the close contact signers have with ambient spoken languages and speakers in those language communities. In other contexts of language contact, code-switching and borrowing practices have been framed as social acts expressing the "self, social identity and language regard" (Zenner et al. 2019: 2). In the Norwegian context, fingerspelling Norwegian words might be considered one way signers index their Norwegian identities.

Fingerspelling might also be subject to Audience Design principles (Bell 1984; Coupland 2007). These principles outline how interlocutors modify their choice of linguistic expression to accommodate perceived "interspeaker" norms related to social identity, as well as "intraspeaker" stylistic norms that

vary according to setting, topic, and degree of familiarity with the topic. For example, when interlocutors do not know each other well, they prefer styles codified within writing conventions, avoiding available forms of reduction (Armstrong 2002). Both social and linguistic factors come into play in investigating language contact phenomena. Ideally, any description of fingerspelling use should account for both types of factors. Only by assessing these factors can we understand why, when, and how signers choose to avail themselves of this complex articulatory behavior. For example, the factors which influence fingerspelling might differ across the different sub-groups of that community, or in different settings. Speakers and signers construct and adapt their discourse by attending to specific characteristics of their audience. Such behaviors are well-attested across languages and may also relate to context-shaped and context-renewing nature of interaction (Depperman 2013; Heritage 1984).

In sum, we predict that fingerspelling frequency should be affected by sociolinguistic factors, as in other signed language communities, and that the form fingerspelling takes should be affected by pressures for efficient Audience Design.

Method

Data and participants

The data for this study comes from two of the datasets within the Norwegian Sign Language corpus, namely Ferrara & Bø (2015) and Ferrara & Ringsø (2021). These datasets include semi-naturalistic (dyad, triad, and multiparty) conversations, lasting approximately 30-45 minutes each.[4] The conversations from Ferrara & Bø (2015) are segmented into manual signs (and thus fingerspelling), whereas the conversations from Ferrara & Ringsø (2021) are only partially segmented for manual signs. The data has been produced by 19 women and 11 men, who live in Oslo (n=14), Trondheim (n=9), and Bergen (n=7). Except for two participants (CJV and TR), each signer produced between 500 and 1,500 sign tokens (including fingerspelling). CJV and TR each produced over 2,000 signs. Most participants reported acquiring Norwegian Sign Language very early, before 7 years old (n=22). The remaining eight participants reported learning Norwegian Sign Language between 8 and 12 years old. Six of these eight signers are over 60 years old and their age of acquisition (AoA) reflects when these signers began school. The analysis conducted for this study is based on 12,070 (composite) utterances comprised of 31,807 manual sign tokens. The demographic characteristics of the

[4] At the time of this study, only the conversations from Ferrara & Bø (2015) have been annotated and so were the only data from this dataset included here.

participants and their distribution of sign and utterance tokens are presented in Table 1.

Table 1. Demographic characteristics of the signers and general information about the annotated data

Participant	Dataset	Gender	Age	Region	AoA	Number of manual signs	Number of utterances
ANJ	DPNTS	Female	49	Trondheim	0-7	537	243
BHS	DPNTS	Female	27	Trondheim	0-7	618	211
BS	DPNTS	Female	26	Oslo	0-7	685	250
CJV	DPNTS	Female	25	Trondheim	0-7	2779	885
EB	PILOT	Female	74	Bergen	8-12	1026	391
EL	DPNTS	Male	40	Trondheim	0-7	891	318
EMN	DPNTS	Female	57	Trondheim	0-7	953	397
EMT	DPNTS	Female	68	Trondheim	0-7	1235	616
ER	DPNTS	Female	43	Oslo	8-12	844	331
ES	PILOT	Female	70	Oslo	0-7	1715	765
HKO	DPNTS	Female	50	Trondheim	0-7	1011	375
IGB	DPNTS	Female	24	Trondheim	0-7	695	258
IMH	DPNTS	Female	27	Bergen	0-7	818	227
KFV	DPNTS	Female	52	Bergen	0-7	1111	456
KOK	PILOT	Male	65	Trondheim	8-12	1472	682
LMN	PILOT	Female	61	Oslo	8-12	1374	621
LPL	DPNTS	Male	27	Oslo	0-7	792	792
MF	DPNTS	Male	23	Trondheim	0-7	626	156
MO	PILOT	Female	68	Trondheim	8-12	783	340
MS	DPNTS	Male	43	Bergen	0-7	605	200
OIS	PILOT	Male	68	Oslo	0-7	1379	627

ØSR	DPNTS	Male	33	Bergen	0-7	652	207
PN	DPNTS	Male	27	Oslo	0-7	899	291
PS	DPNTS	Female	36	Oslo	0-7	646	203
TH	DPNTS	Female	22	Bergen	0-7	597	143
TJ	DPNTS	Male	29	Trondheim	0-7	681	275
TJ2	DPNTS	Male	54	Trondheim	8-12	1371	446
TR	PILOT	Male	73	Bergen	8-12	2133	751
TVG	DPNTS	Female	25	Trondheim	0-7	1404	374
ULA	PILOT	Female	73	Oslo	8-12	1475	860

Data annotation and analysis

As mentioned above, the data in the study corpus had been previously segmented into manual signs, including fingerspelling. Annotations tagged as fingerspelling are presumed to be non-lexicalized. Lexicalized fingerspellings are not annotated as fingerspelling in the corpus. Instead, they are assigned ID-glosses and are entered into the Norwegian Signbank (i.e., they are treated as lexical signs). Fingerspelling annotations are made to correspond to the Norwegian word fingerspelled, not for each letter produced. For example, one annotation is created for the fingerspelled word ‘Tyholt’ (an area in Trondheim), not six annotations. These annotations on the right- and left-hand ID gloss tiers were used to identify instances of fingerspelling. All fingerspelling tokens are produced as parts of (composite) utterances. Some utterances consisted of a single fingerspelled word, while other utterances included signing and fingerspelling. Within these contexts, fingerspelling

tokens were further characterized on four additional tiers created for the purposes of this study. These tiers and their related tags are summarized in Table 2.

First, the fingerspelled token was tagged for which fingerspelling system was used. As explained previously, both one-handed and two-handed manual alphabets have been developed and used in Norway. In addition, sometimes signers would switch between these two systems during the fingerspelling of a single word. Occasionally, a signer even produced ad-hoc signs representing letters. All these cases were tagged on the BKS:system tier.

On the BKS:form1 tier, the fingerspelling was characterized in relation to the target word. Signers could fingerspell full words, or they could produce only a few letters of the word.[5] Signers often fingerspelled only the first letter of the word. The data also contains many instances of fingerspelling in conjunction with signs to produce compound words from Norwegian. These instances were characterized as 'mixed'.

Next, on the BKS:form2 tier, the actual manual letters produced were recorded, along with any relevant signs (as parts of compounds). For example, a signer fingerspelled the word 'Charlottenlund' by producing the letters C-H. In other instances, signers produced the manual letter H combined with the sign

[5] These reduced forms do not entail the assimilation documented for fluent fingerspelling. Here, it was the case that signers would produce two or three letters of a word, e.g., C-H to mean 'Charlottenlund'.

DAL, meaning ‘valley’, to express the name of the town Heimdal. Words were often expressed using only the first letter, e.g., R to mean ‘rabarbra’ (‘rhubarb’).

The final step in the annotation process involved tagging the fingerspelled word for its grammatical class within the context of the composite utterance. To do this, a controlled vocabulary was adopted from the Auslan Corpus ELAN template (see §3.1.2.2. in Johnston 2019). An additional tag for proper nouns was added to quantify the large number of fingerspelled items expressing proper names of places and people. The word class tags are presented in Table 2.

Table 2. Fingerspelling annotations in the study corpus

Tier	Tag	Description
BKS:system	The fingerspelling system used	
	1	The 1-handed fingerspelling system
	2	The 2-handed fingerspelling system.
	B1-2	A mix of the 1-and 2-handed fingerspelling system.
	ah	ad-hoc forms.
	bah	The 1-and/or two-handed fingerspelling system plus ad-hoc forms.
BKS:form1	Identifies how much of a word is fingerspelled	
	FULL	The full word.
	RED	Only some of the word (more than one letter).
	INIT	Only the first letter of the word.
	MIX	The word is expressed with fingerspelling and signing.
	?	Unclear how much of a word is fingerspelled.
BKS:form2	The actual fingerspelled letters (and signs) produced are tagged.	

	e.g., h(dal)	The letter h is produced followed by the sign for ‘dal’ to express ‘heimdal’.
	e.g., bs	The letters b and s are produced to express ‘Bogstad’
BKS:ordklasse	The word class of the fingerspelled word is tagged.	
	NLoc	A (common) noun, which can be located in space
	NProp	A proper noun
	Adj	An adjective
	Prep	A preposition.
	Conj	A conjunction.
	INT	Interactive.
	NorV	No information to decide if a noun or a verb.
	Unsure	Word class cannot be determined.

Figure 1 illustrates The annotation scheme in ELAN (for the utterance shown in Figure 4).

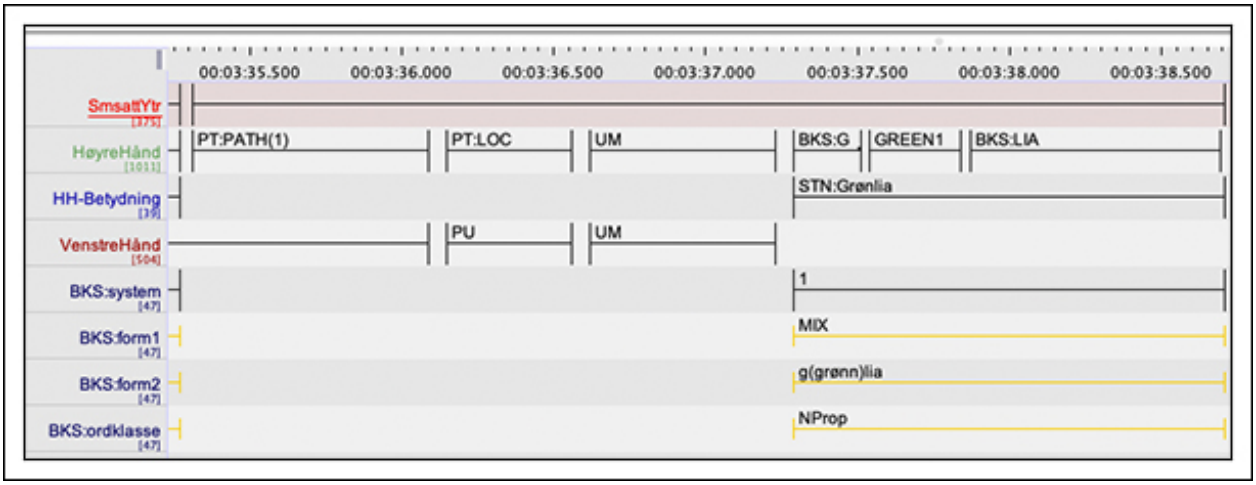

Figure 1. Example of the fingerspelling annotation scheme in ELAN

Findings

Fingerspelling distribution

We first sought to examine the distribution of non-lexicalized fingerspelling. A total of 944 instances of non-lexicalized fingerspelling were identified. This means that fingerspelling makes up 2.96% of all manual signs in the study corpus. Table 3 provides an overview of how these tokens were tagged with respect to which manual alphabet system was used, the form of the word, as well as the word class of the word.

Table 3. Distribution of fingerspelling tokens in the study corpus according to system, form, and word class.

Tier & Tag	**# of tokens**		**Tier & Tags**	**# of tokens**
BKS:system			*BKS:ordklasse*	
1	898		NLoc	224
2	38		NProp	679
b1-2	1		Adj	8
ah	4		Prep	3
bah	3		Conj	1
			INT	1
BKS:form1			NorV	1
FULL	360		Unsure	27
RED	70			
INIT	270			
MIX	231			
Unsure	13			

Upon examination of the raw counts provided in Table 3, we immediately see that the two-handed alphabet was rarely used. Only 4% of all fingerspelling tokens were produced with the two-handed alphabet. These tokens were produced by only four signers. Instead, overwhelmingly, signers fingerspelled using variations of the one-handed alphabet (95%). In Figures 2 and 3, two utterances that contain tokens of one- and two-handed fingerspelling are presented. In Figure 2, the signer is telling about her experience as a child learning how to pronounce different sounds. In this utterance, she is talking about the sound 'r', and first fingerspells 'r' with the one-handed alphabet, then repeats herself by fingerspelling 'r' with the two-handed alphabet. This utterance illustrates that signers who used the two-handed alphabet also used the one-handed alphabet.

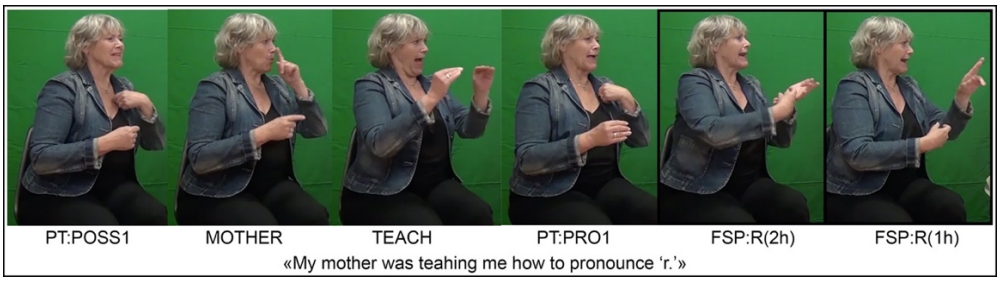

Figure 2. A signer producing a letter with the 1- and 2-handed fingerspelling systems (Ferrara & Bø, 2015, P-OO1_ES.eaf, 31:22.3-31:25.3).[6]

[6] This video clip is available for viewing at https://osf.io/as2dv/.

Figure 3. A signer producing a word with the 1-handed fingerspelling system (Ferrara & Ringsø, 2017-2018, DPNTS_O_LPL.eaf, 10:10.7-10:12.82).[7]

Figure 3 depicts a signer fingerspelling the name of a lake, Mjøsa, using the one-handed alphabet, followed by an interactional point towards his interlocutor, which is interpreted as a request for the interlocutor to indicate her knowledge of this place. This utterance follows a first attempt where the signer produced a sign for 'Mjøsa,' which the interlocutor did not understand. He then produced a false-start where he began to sign the name again, but then abandoned this to fingerspell the name.

The findings summarized in Table 3 also indicate that signers do not always fingerspell full words. They may produce only a few letters of a word (e.g., B-S for 'Bogstad') or just the initial letter, sometimes with repeated movement (e.g., G for 'Gimse'). In many cases, they also will produce

[7] This video clip is available for viewing at https://osf.io/as2dv/.

fingerspelling in conjunction with signs to express a (Norwegian) word. One such example is presented in Figure 4 and involves a signer naming a place, Grønlia. To do this, she first fingerspells G, then produces the sign GRØNN (meaning 'green'), and then fingerspells L-I-A. Together, we can understand this sequence of signs to express 'Grønlia.'

Figure 4. A signer expressing the name of a place with fingerspelling and signs (Ferrara & Ringsø, 2017-2018, DPNTS_Tr_HKO.eaf, 03:35.3-03:38.7).[8]

In addition to signers primarily using the one-handed manual alphabet to fingerspell words fully, partially, or in conjunction with signs, the findings also indicate that fingerspelling is overwhelmingly used to express nouns. In total, 72% of the fingerspelled words in the data are proper nouns and 24% are common nouns.[9] These figures support observations from other signed

[8] This video clip is available for viewing at https://osf.io/as2dv/.

[9] The data analyzed for this study were informal conversations. We may find fingerspelling used for other types of words in other text-types, e.g., technical vocabulary in scientific lectures.

languages that signers prefer to fingerspell nouns (Mulrooney 2002; Schembri & Johnston 2007).

Fingerspelling demographics

For the next part of the analysis, we used a generalized linear model to explore whether the demographic factors of age (M = 44.9, SD = 12.89), gender (female = 19, male = 11) and region (Bergen = 7, Oslo = 9, Trondheim = 14) affect the frequency of fingerspelling. The analysis was conducted with R (R Core Team 2019) using the "tidyverse" (Wickham et al. 2019), "lme4" (Kuznetsova et al. 2013), "MASS", and "pscl" (Jackman 2020) packages. Plots were created using "ggplot2" (Wickham 2009). All code, data, and figures are available on the following publicly accessible OSF repository: https://osf.io/dkv4p/.

For the analysis, we excluded fingerspelling tokens that were not either common or proper nouns, given how few observations there were. We also excluded uncertainly annotated fingerspelling tokens. We did not have specific hypotheses about the interaction of our demographic variables, and do not include such interactions in our model. While anecdotal evidence suggests there may be differences in fingerspelling based on age, gender and/or region, the absence of prior investigations of sociolinguistic variation in Norwegian Sign Language and lack of a balanced dataset at this early stage of corpus building prevented us from testing for different amounts of fingerspelling between

combinations of these variables (e.g., comparing younger women in Oslo to older men in Trondheim). Since the frequency of fingerspelling can nevertheless easily vary between individual signers, we included the number of signs per participant as an offset to the fingerspelling token count. A likelihood ratio test of a negative binomial model against a Poisson model revealed significant difference χ^2 (1) = 169.85, $p < .0001$ and so the more conservative (negative bimodal) model was selected. The resulting analysis revealed slightly less fingerspelling from older signers than expected by chance (0.49, $p < 0.001$) (see Figure 5). There were no main effects of gender or region, indicating that fingerspelling frequency in Norwegian sign language is probably not affected by these variables.

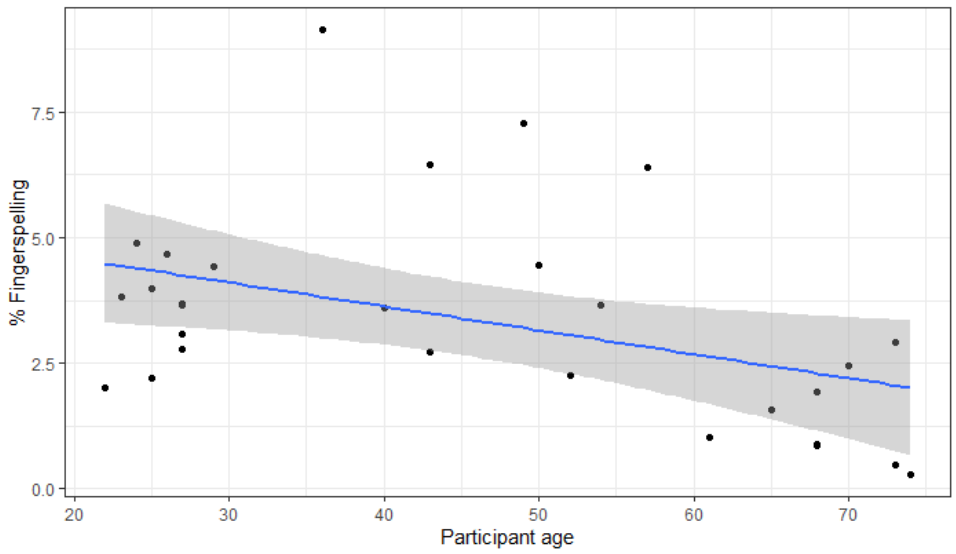

Figure 5. Effect of age on fingerspelling frequency

Fingerspelling reduction styles

To explore whether signers' use of fingerspelling might be affected by the people they were signing with and by the discourse context (Audience Design), we predicted that the degree of fingerspelling reduction would be affected by conversational participants' shared geographical knowledge (considering that many of the fingerspelled tokens were place names). We tagged each fingerspelling token for whether all interlocutors in the conversation came from the same geographical region or from different regions, and assessed the number of tokens produced for each level of the BKS:form1 tier coding (full, initial, mixed, or reduced). We then controlled for the type of noun, since there was a higher observed proportion of fingerspelling for proper nouns in conversations between participants that shared regional knowledge (79%, n = 508/646), than in conversations where participants were not from the same region (65%, n = 166/254). We also controlled for individual signer variability in amount of fingerspelling, this time using random effects in a mixed-effects generalized linear regression.

Our model included the interaction of the fixed effects of fingerspelling type (full, initial, mixed, or reduced) by shared region (different or same) on token count, controlling for noun class (common or proper), with the interaction of fingerspelling type by participant as varying intercepts and slopes. The full

model predicted 78% of the variability of the data (pseudo R-squared), with fixed effects accounting for 41%, and individual variability (ICC) accounting for 26%, suggesting that our results would generalize well to subsequently collected data (but see §Discussion for important caveats). Holding region and noun class constant, participants varied most in their type of strategy for mixed fingerspelling (SD = 1.00), followed by initialized (SD = 0.82), full (SD = 0.59), and reduced (SD = 0.37) fingerspelling. Proper nouns were fingerspelled more than common nouns (***b*** = 0.79, **S.E**. = 0.09, **z** = 9.21, **p** > .001). Initializations were more frequent when regional knowledge was shared (***b*** = 0.98, **S.E**. = 0.36, **z** = 2.70, **p** > .01). Mixings (***b*** = 0.83, **S.E**. = 0.43, **z** = 1.92, **p** = .06) and reductions (***b*** = 0.60, **S.E**. = 0.36, **z** = 1.62, **p** = .10) were also more common with shared knowledge, but not at a statistically significant level. Figure 6 helps interpret these results. Contrasting the two windows shows that common nouns were fingerspelled less than proper nouns. Within the common noun category, full fingerspelling was more frequent than other strategies. For proper nouns, reduced fingerspelling was the least frequent strategy. There were mostly equal rates of full fingerspelling of proper nouns by shared region, but initializations, mixing, and reduced fingerspelling were more frequent when geographic knowledge was shared. Initializations, specifically, were used much more for proper nouns when participants shared common knowledge about a region.

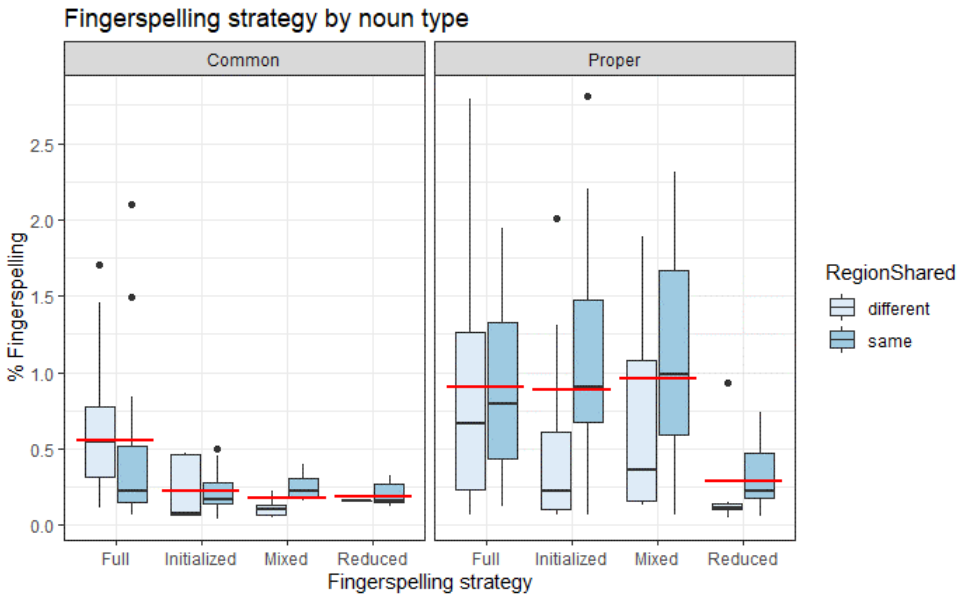

Figure 6. Box and whisker plot showing frequency of fingerspelling type for noun type by level of shared geographic knowledge.[10]

Discussion

The findings from the above analyses begin to describe and account for fingerspelling in Norwegian Sign Language. First, the study found that these Norwegian signers fingerspelled relatively rarely. Across the study corpus, fingerspelling made up a total 2.96% of all manual sign tokens. This is one of the lowest rates reported cross-linguistically, based on corpus studies (see Table 4).

[10] Red lines show fingerspelling type averages; dots show condition outliers; black intra-box bars show condition means and box height shows two standard deviations from the mean.

Table 4. Comparing the distribution of fingerspelling cross-linguistically

Study	Language	Participants	Total sign tokens	Fingerspelling tokens	% FSP
Brown & Cormier 2017	BSL	147	14,700	510	3.4%
Schembri & Johnston 2007	Auslan	205	8,032	807*	10%*
Johnston 2012	Auslan	109	63,436	--	5%
Morford & Macfarlane 2003	ASL	27	4,111	--	6.4%*
McKee & Kennedy 2006	NZSL	80	100,000	2,554*	2.5%*
Sanjabi et al. 2016	ZEI	3	9,295	343*	4%*
Börstell et al. 2016	SSL	42	44,786	--	4%*
The current study	Norwegian Sign Language	30	31,807	944	2.97%

*may include lexicalized fingerspelling

In addition, the signers overwhelmingly fingerspelled with the one-handed manual alphabet (95% of the time), with the two-handed alphabet only used in very limited settings (with additional remnants visible in some lexicalized signs). The signers who fingerspelled with the two-handed alphabet also fingerspelled with the one-handed alphabet. This further suggests that competency with the two-handed alphabet within the community is decreasing or is fairly low. An informal conversation with a prominent member of the deaf

community revealed that the two-handed alphabet was used by a few particular deaf schools up until the 1970s (Rune Anda, personal communication, December 2020; see also Greftegreft et al. 2015: 664). Students then switched to using the one-handed alphabet when they moved on to different schools. This accounts for why the signers who produced two-handed fingerspelling also produced one-handed fingerspelling, and also why younger signers do not use the two-handed alphabet.

Although the findings suggest that fingerspelling is infrequent in Norwegian Sign Language, they reveal a range of fingerspelling practices. Signers do not only fully fingerspell words (38%), but may choose to produce only a few select letters (7%) or even just the initial letter of a word (29%). They also produce combinations of fingerspelling and signs (24%). These figures indicate that Norwegian signers fingerspell words in similar ways to signers using other signed languages (Cormier et al. 2008; Brentari & Padden 2001; Padden 1998; Schembri & Johnston 2007; Sutton-Spence et al. 1990). However, we note that the distributions of these fingerspelling types in other signed languages have not been reported quantitatively (however, see Brown & Cormier 2017 for some type distinctions in BSL). Moreover, in this study, we did not examine for levels of nativization (Brown & Cormier 2017). Comparing findings here to other studies, the relatively high frequency of fingerspelling only the initial letter of a word is interesting. These forms appear

to resemble the SMLS described in the BSL literature, although in BSL they are mostly described as lexical signs and only anecdotally mentioned as potentially nonce forms (Sutton-Spence & Woll 1993; Sutton-Spence et al. 1990). Although a number of lexicalized SMLS have been identified in the corpus, e.g., OSLO, YES, and RENT, the analysis presented here shows that signers often produce SMLS forms as non-lexicalized fingerspelling in order to borrow Norwegian words. Interestingly, the BSL studies suggest that the two-handed manual alphabet preferences SMLS (Sutton-Spence & Woll 1993), possibly because BSL manual letters are more sign-like than one-handed letters (Brennan 2001). This claim is supported by the lack of such signs in ASL, a language with a one-handed alphabet. However, in this study we observe Norwegian signers regularly producing SMLS (non-lexicalized and lexicalized) with the one-handed manual alphabet. Therefore, it does not seem that the type of manual alphabet *per se* encourages or discourages this strategy.

The analysis of fingerspelling by demographics revealed that the frequency of fingerspelling was not affected by region or gender variables. However, we found that age was a significant social variable, in that older signers fingerspell less than younger signers. These results contrast findings for BSL (Sutton-Spence et al. 1990) and Auslan (Schembri & Johnston 2007) where it is the older signers who fingerspell the most. These two studies also documented significant regional variation, which was not attested in the

Norwegian data analyzed here. Gender has yet to be found a significant variable affecting the frequency of fingerspelling in Auslan (Schembri & Johnston 2007), BSL (Sutton-Spence et al. 1990), or Norwegian Sign Language (current study).

We suggest that, by fingerspelling the names of places and people, signers demonstrate their socio-cultural knowledge of Norway and their membership in the larger Norwegian society. However, they still consider the specific knowledge of their interlocutors. In the mixed-effects regression presented above, it was found that if an interlocutor was from a different part of Norway, signers tended to produce less reduced fingerspelling (single letters and mixed forms). This finding underscores how signers are responsive to their interlocutors and adjust their signing accordingly, while at the same time indexing their own semiotic repertoires and identity.

Conclusion

In this chapter, we provided information about the Norwegian Sign Language corpus that is currently being developed. This corpus will be the foundation for future empirical studies, leading to better documentation and description of this under-described Norwegian language. In this way, the corpus and related studies can help to confirm or adapt folk understandings of the language and, among other things, contribute to improved teaching and learning practices in

the community. For example, folk intuitions suggest that fingerspelling is rarely used in Norwegian Sign Language. The empirical study presented in this chapter indicates that this is true—fingerspelling made up less than 3% of all signs. However, findings also added nuance to this folk knowledge by showing that the words signers fingerspell are often proper nouns. We suggest that while fingerspelling might be rare, it is still very important to meaning-making and reference in Norwegian Sign Language. In addition, it is often thought that some elderly signers from around Oslo are the main users of the two-handed manual alphabet (see Greftegreff et al. 2015). The data analysis conducted for this study revealed that while some elderly signers from Oslo produced two-handed fingerspelling, this was not a categorical finding, as some Oslo signers only produced one-handed fingerspelling. In addition, those that did produce two-handed fingerspelling also produced one-handed fingerspelling. Again, by investigating language in use, we demonstrated the issue to be more complex than previously thought.

We argue that such nuance and range are the advantages of quantitative, corpus-based linguistic studies, as it is through quantitative analysis that we are able to discover larger-scale patterns across the variation and idiosyncrasies presented by individual signers. In addition, we contend that the findings uncovered by the study presented here were also facilitated by the focus on conversational data. An on-going parallel project investigating reference in

narrative retellings of *Frog, Where Are You*? (Mayer 1969) suggests that Norwegian signers do not fingerspell, and that it is not a strategy used for referencing (Ferrara et al. forthcoming). The findings presented here however reveal that signers do in fact use fingerspelling for reference. These contrasting findings remind us of the need to investigate and consider a wide range of language interactions if we are to build a sound and robust description of the languaging practices found within the Norwegian deaf community.

Finally, as more of the Norwegian Sign Language corpus is annotated, it will be possible to further document and detail how fingerspelling is leveraged by Norwegian signers in different contexts, and more robust sociolinguistic analysis will be possible. In addition, studies of other multilingual practices (loan translations, mouthing, etc.) will also be possible. Such work will underscore how signers express their Norwegian (and other) identities and their multilingualism for meaning-making in signed interaction.

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Author attribution

LF conceptualized the study and led the project. LMKA annotated the data and wrote the first draft of this study for her Bachelors thesis. LF and LMKA then proofed and re-annotated the data. BA carried out the statistical analyses, led the interpretation of quantitative results, and prepared the data for open-access archiving. LF wrote 70% of the manuscript and BA wrote 30% of the manuscript. All co-authors contributed to revising and proofing the manuscript and approve of its submission.

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