



Research Article

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Spatial Vantage Points in Norwegian Sign Language

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Abstract: Previous studies on perspective in spatial signed language descriptions suggest a basic dichotomy between either a route or a survey perspective, which entails either the signer being conceptualized as a mobile agent within a life-sized scene or the signer in a fixed position as an external observer of a scaled-down scene. We challenge this dichotomy by investigating the particular couplings of vantage point position and mobility engaged during various types of spatial language produced across eight naturalistic conversations in Norwegian Sign Language. Spatial language was annotated for the purpose of the segment, the size of the environment described, the signs produced, and the location and mobility of vantage points. Analysis revealed that survey and route perspectives, as characterized in the literature, do not adequately account for the range of vantage point combinations observed in conversations (e.g., external, but mobile, vantage points). There is also some preliminary evidence that the purpose of the spatial language and the size of the environments described may also play a role in how signers engage vantage points. Finally, the study underscores the importance of investigating spatial language within naturalistic conversational contexts.

Keywords: Norwegian Sign Language, spatial language, depiction, viewpoint, perspective, survey, route

1 Introduction

Across the world's signed languages, signers produce manual and non-manual bodily actions in the space in front of and around them to prompt conceptualizations of various types of scenes. These scenes can involve spatial relationships that are conceived and presented from particular vantage points. In this paper, vantage point refers to the signer's relation to the scene being presented in the signing space. For example, a signer can present a scene from 'within,' which may allow them to interact with spaces and referents. They can 'look around' the scene as if they were there themselves. In these cases, the vantage point is conceptualized as internal to the scene. A signer may also choose to depict a scene as if it were more like a map—in which case, the signer views the scene as an outsider looking at a scaled-down representation. The vantage point of such instances is characterized as external to the scene. These two possible vantage point positions will be considered in this study, as well as whether the vantage point is mobile or static. In this way, the spatial language in focus here is somewhat different to the spatial language investigated across the world's spoken languages. Whereas studies of spoken languages often focus on how spatial concepts and relations are mapped onto the lexicon and grammar (e.g., Bowerman, 1996; Forker, 2012), or what types of perspective are indicated with various types of linguistic constructions (e.g., Levinson, 1996), here the focus is on how signers map spatial meanings onto the three-dimensional signing space and how vantage points structure the conceptualized scenes.

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Perniss (2007) explains that visual perspective in signed language discourse is established and maintained through the coordination of multiple elements, including “the size of the event space, the vantage points on the event, the forms used for referent representation, and the types of information that are expressed” (p. 1316). Previous work has generally focused on ‘observer’ and ‘character’ perspective as two main types. Observer perspective involves the signer positioned at a static point outside the event representation, which is scaled down to the space in front of the signer, while character perspective involves the signer positioned within a life-sized event representation (where they are potentially mobile agents) (Perniss, 2007, 2012). Vantage point takes a particularly salient role in these definitions and will also be in focus here. Examples of observer and character perspective are provided in Figure 1 and 2, respectively (and these utterances are also a part of the examples presented later in Figures 3 and 6). The use of these two perspectives in signed language has also been compared to the use of McNeill’s (1992) character (CVPT) and observer viewpoint (OVPT) co-speech gestures by hearing speakers (e.g., Emmorey, Tversky, & Taylor, 2000; Perniss, 2007; Cormier, Quinto-Pozos, Sevcikova, & Schembri 2012; Stec, 2012; Quinto-Pozos & Parill, 2015; Parill, Stec, Quinto-Pozos, & Rimehaug 2016). Still other studies have considered the position of the signer in relation to conceptualized scenes (see e.g., Morgan, 1999; Liddell, 2003; Perniss, 2007, 2012; Engberg-Pedersen, 2015; although these researchers had different research objectives and worked from different theoretical frameworks). Much of this work has presented vantage point as a set combination of mobility and position, while setting up an opposition between character (mobile, internal) and observer perspective (static, external).



Figure 1: A signer depicts a hallway in a building from a vantage point that is static and external to the conceptualized scene, i.e., observer perspective (DPNTS_O_PN.eaf, 00:35:50.100-00:35:52.688).¹



Figure 2: During the last sign of this utterance, the signer positions himself within a conceptualized scene as he depicts a shelf that is positioned above him on a wall, i.e., character perspective (DPNTS_O_PN.eaf, 00:36:03.029-00:36:05.605).

¹ Examples in this paper are presented as a series of still shots. At the bottom of the images, a white dotted line is used to indicate which parts of the sequence portray a vantage point (labeled VP). Below the images are English glosses of the manual signs produced on the right (RH) and left hands (LH). Prefixes indicate if signs are pointing signs (PT), depicting signs (DS), and fingerspelling (FSP) (see also section ‘Annotation and analysis’). Fragment buoys, which are meaningful perseverations of signs, are labeled FBUOV. Signs labeled as ‘?’ indicate ambiguity or uncertainty from the annotator about how to best gloss the sign. Translations of the examples in English are also provided.

Most of the studies mentioned in the previous paragraph investigated narratives (either signed or spoken) and thus were often concerned with the signer's role as a character within a conceptualized scene or as an observer/narrator outside the scene. However, in a series of experiments, Emmorey and colleagues examined visual perspective in another text type — mainly directions or paths through various spatial environments — as produced by signers and speakers (Emmorey & Falgier, 1990; Emmorey et al., 2000). This work is directly relevant to the current study, which also investigates this type of spatial language. In this work, four types of perspective were observed: route, survey, gaze, and mixed. A route perspective, or route tour, involves a speaker or signer giving interlocutors a mental tour while moving around a conceptualized environment. From this perspective, the signing space is conceptualized as life-sized and includes the signer as a mobile agent. A survey perspective, in contrast, involves the speaker or signer describing an environment from a fixed vantage point located outside and above a scaled-down conceptualized environment (Taylor & Tversky, 1996; Emmorey et al., 2000). Emmorey et al. (2000) also observed instances of signers alternating between survey and route perspectives as they described spatial scenes. Finally, there is also the possibility of a gaze perspective or tour, which involves the signer or speaker positioning themselves in a fixed peripheral position within a conceptualized scene (Ehrich & Koster, 1983; Linde & Labov, 1975; Taylor & Tversky, 1996; Emmorey et al., 2000). According to Emmorey et al. (2000), all of these perspectives correspond to natural ways of experiencing an environment.

In an early study, Emmorey and Falgier (1990) adapted an experiment first conducted by Taylor and Tversky (1996) with hearing, English speakers to deaf, ASL (American Sign Language) signers to investigate the topographical use of the signing space. They found that signers engaged various visual perspectives (except for gaze perspective), and that these perspectives structure the signing space in different ways and engage various vantage points. In a follow up study, which also included English speakers, Emmorey et al. (2000) found the same type of perspectives, but differences emerged regarding their use across ASL signers and English speakers. For example, both groups used a high proportion of survey perspective to describe the layout of a town (elicited from a drawn map). However, when describing a convention center (also elicited from a drawn map), English speakers preferred a route perspective while ASL signers preferred a survey perspective. Emmorey and colleagues (2000) suggested that this may be due to the fact that the transfer of spatial information from a map to diagrammatic space may be direct and therefore compelling to use in ASL. They also commented that the use of survey perspective by signers may relate to the elicitation materials and emphasized that both language features and aspects of the environment will affect perspective choice (Emmorey et al., 2000, p. 178).

In this brief review, we highlighted some of the complexities of spatial language in signed language, with a focus on visual perspective. In the literature, a character or route perspective is described as engaging a life-sized spatial environment, which is presented in the space surrounding the signer. In addition, the signer is assumed to be an active, mobile agent in the environment or event (thus, an internal, mobile vantage point). Observer or survey perspective, however, involves model-sized environments presented in the space in front of the signer, which means the signer takes an external, observer role, which is static (see also the summary of this literature in Perniss, 2007). This study will problematize these assumed vantage point configurations. To do this, we first present the methods of the current study before moving on to the findings and discussion, which includes detailed examples. We will show that signers are capable of establishing a range of vantage points (e.g., internal and mobile, but also external and mobile). This evidence suggests that character and observer perspective, as it is often portrayed in the literature, is not relevant for some types of spatial language. Furthermore, the findings underscore the importance of using conversation data to observe and examine how signers engage visual perspective during spatial language.

2 Methods

Much of the research to date on visual perspective in signed languages has been based on constructed, monologic (narrative) episodes within experimental paradigms. While these methods are valuable in their ability to test various hypotheses, this study seeks a different approach by investigating spatial language

naturally embedded within dyadic and triadic conversations. In doing so, this study attempts to gain a further nuanced understanding of spatial signed language and heeds the call of previous researchers who have underscored the importance of examining spatial language in naturally occurring interaction (Schober, 1993; Perniss, 2007; Coventry, Tenbrink, & Bateman, 2009; Watson, Pickering, & Branigan, 2009).

2.1 Participants and data

For this study, 12 deaf Norwegian Sign Language signers were video recorded as they participated in informal conversations with a hearing, signing researcher (who has deaf parents). The deaf signers were recruited from the researchers' personal networks in the deaf community and thus in some cases knew the researchers quite well. This type of recruitment aimed to facilitate more natural conversations with reduced language monitoring and was one way to introduce members of the deaf community to research settings in a non-intimidating way.

Table 1 summarizes the data analyzed for this study. Eight conversations, comprised of four dyads (between a hearing and deaf signer) and four triads (between two deaf and one hearing signer), totaling just over five hours, were video recorded. The three male and nine female deaf signers were aged between 24-57 ($M=34.8$, $SD=11.82$). All of the deaf signers except one reported acquiring Norwegian Sign Language between 0 and seven years old. The hearing signer who participated in the data collection was 46 years old at the time of filming and reported acquiring Norwegian Sign Language between 0 and seven years old. This project is approved by the Norwegian Centre for Research Data (#55097). All participants have given their consent to participate in the project, be video-recorded, and for their data to be used in research and teaching outputs.

The imbalances among the demographic variables across participants (e.g., gender) are not treated as problematic here, as this study is not a sociolinguistic study and is instead intended to provide a preliminary look into how signers in the Norwegian deaf community use vantage points while describing spatial scenes as part of conversation. Related to this goal, it was acknowledged as part of the research design that the Norwegian deaf community is a heterogenous community with a complex language ecology. Signers exhibit various language, social, and educational backgrounds. For example, currently in Norway there are no schools for the deaf, and most deaf children receive cochlear implants in early childhood.² This means that many young, deaf people are learning Norwegian Sign Language in second language contexts. In addition, there are a number of hearing people who are considered signers and members of the Norwegian deaf community—including children of deaf parents, interpreters, etc. This heterogeneity was embraced in the current study, and so both the hearing signer, as well as one deaf signer who reported learning Norwegian Sign Language after the age of seven, were included in the data collection as they are also members of the larger signing, deaf community.

For the data collection, the participants were invited to a location in either Oslo (a room at the Oslo Deaf Club) or Trondheim (a room at the university) and were provided snacks during the filming. During the conversations, the researcher was dually tasked with maintaining an interaction that was as naturalistic and spontaneous as possible while also guiding participants into discussions involving different types of spatial scenes when relevant. Some of the topics addressed, which were tailored to each conversational context, included how the participants had travelled to the place of the data collection, routes from one location to another (e.g., within a city or country, or between countries and continents), as well as itineraries of summer vacations. Other questions, which often came up during discussions of summer vacations, asked signers to describe the interiors of their apartments, cabins, or vacation homes. These segments which involved spatial language were identified and form the primary data for the current analysis (compare the length of the video-recorded conversations with the number of minutes annotated for each participant for this study in Table 1).

² Haualand and Holmström (2019) discuss the history and language ideologies influencing the Norwegian deaf community and compare it with the neighboring deaf community in Sweden.

Table 1: Summary of study corpus.

Conversa- tion	Type	Minutes of recording	Minutes analyzed for the current study	Location filmed	Partici- pant	Gender	Age	AOA
1	Dyad	37:32	5:31	Oslo	BS	F	26	0-7
2	Triad	45:23	7:32	Oslo	ER	F	43	8-12
					PS	F	36	0-7
3	Triad	43:28	13:39	Oslo	PN	M	27	0-7
					LPL	M	27	0-7
4	Triad	36:43	15:26	Trondheim	ANJ	F	49	0-7
					CJV	F	25	0-7
5	Dyad	40:58	9:23	Trondheim	EMN	F	57	0-7
6	Dyad	35:20	10:15	Trondheim	HKO	F	50	0-7
7	Dyad	27:07	6:59	Trondheim	IGB	F	24	0-7
8	Triad	38:26	15:40	Trondheim	TJ	M	29	0-7
					TVG	F	25	0-7

2.2 Annotation and analysis

The resulting five hours of video-recordings were reviewed and annotated in ELAN (Wittenburg et al., 2006).³ As mentioned in the previous section, all instances of spatial scenes described by the participants were identified, and it was these extended sequences that formed the focus of the current study's analysis. As such, each sequence was revisited and annotated for a number of features on user-defined tiers in ELAN.

First, each spatial scene was tagged for its purpose on a dedicated tier—that is, what the signer was trying to do by describing a spatial scene (as interpreted by the researchers). Identifying the purpose of each sequence was a data-driven, iterative process. In the end, four categories were established: describing buildings/rooms; providing travel itineraries; giving directions; and discussing geographical relations (see explanations in Table 2). During this initial parse, it became immediately apparent that signers embedded spatial scenes within other, larger tellings. For example, a participant would include an itinerary of various places visited while sharing about a summer vacation. This is in no way surprising, but it provides the first contrast to experimental studies, which encourage signers to provide unified, cohesive responses to constructed stimuli. Here however signers were mainly interested in the larger tellings, and so a description of a spatial scene could be scattered throughout a longer narrative, or could be interrupted for an aside, etc.

Next, the identified sequences were tokenized for manual signs, which is often one of the first steps in the annotation of signed language data (see Johnston, 2016 for more information about the primary processing and basic annotation of signed language corpora). This process involved creating annotations on two tiers, the right- and left-hand gloss tiers, to identify tokens of manual signs and to assign them a type. In corpus-based investigations of signed languages, it is useful to identify signs according to their degree of conventionalization in the community and how they are used. Each token of a sign can vary on a gradient from fully lexical to non-lexical (Johnston & Schembri, 1999; Johnston & Schembri, 2010; Johnston, 2012). Fully lexical signs are stable form-meaning pairs in the community that make up the listable lexicon (and thus are often the signs included in signed language dictionaries). For example, the sign glossed as HAVE in Figure 2 is shared across the Norwegian deaf community and its form and meaning are stable. Fingerspelling, where signers produce sequences of handshapes that correspond to Norwegian letters, can also be considered fully lexical according to this definition. Partly lexical signs in contrast are form-

³ Please see <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.

meaning pairs that are only partly specified by convention. Remaining aspects emerge from the particular context of use. Pointing signs are one major type of partly lexical sign and involve signers directing their hand (often in the form of an extended index finger or flat hand) to index a referent or location. They can also be used to trace paths or surfaces of referents (see the sign glossed PT:PATH in Figure 3). Depicting signs are another type of partly lexical sign and are meaningfully deployed out in the signing space to iconically depict referents and actions. An example of a depicting sign is found in Figure 1, as the signer shows his interlocutors the layout of a hallway. Depicting signs function to show meaning through the movement and placement of (iconic) handshapes. Non-lexical signs, such as token bodily enactments, also known as constructed action in the signed language literature, are the least conventionalized and depend on each particular context for its meaning. Such non-lexical signs were very rare in this dataset and so are not elaborated further here (however, see Metzger, 1995; Johnston, 2012 for more information).

Signed language manual signs can also be analyzed according to how they are used—i.e., if they are used to describe meanings through symbolic convention; index meaning through pointing; or depict by showing meaning through various iconic means (Peirce, 1955; Clark, 1996; Ferrara & Hodge, 2018). Importantly, any one sign token can exhibit all three of these functions (Peirce, 1955; Clark, 1996; Ferrara & Halvorsen, 2017; Puupponen, 2019). For example, the conventional sign for “to lie down”⁴ can also be used in specific instances, with slight modifications in form, to primarily depict a particular referent lying down (as seen in Figure 6, in the third row with the sign glossed DS:PERSON-LIE). Decisions about how to annotate particular tokens is done across multiple parses and annotators and are expected to stabilize over time. This is seen as unproblematic to the current study, because while important, manual signs and their particular glosses were not the main focus of analysis. Instead, the annotations relating to vantage point and spatial language were in focus (described below).

For the current analysis, manual signs were annotated and tagged with prefix labels to identify tokens of fingerspelling, pointing signs, depicting signs, or manual constructed actions. Empty annotations indicated signs presumed to be fully lexical, and as such, await assignment of an ID-gloss from the Norwegian Sign Language lexical database, which is currently being developed. As a further note, the manual sign glosses provided in the examples throughout this paper have been created solely for ease of reading the examples and did not act as a basis for the analyses presented.

In addition to manual signs, sequences of spatial language were further tagged for features about the size of the scene being described in real life, as well as the vantage points established by the signer during particular moments of these sequences. The size of the environments being described by the signer were tagged on a tier called ‘EnvSize’ (‘environment size’; see Table 2). Descriptions of houses were tagged as ‘small,’ while discussions about where cities or countries were located in relation to each other were tagged as ‘large.’ ‘Medium’ environments included within cities or towns.

Vantage point characteristics of the spatial language were annotated on three tiers. Firstly, annotations on the ‘Vantage Point’ tier identified moments where a vantage point was apparent, perceived as the result of a conflation of features such as eye gaze, the height of signing, body movements, and signs. These moments were interspersed across the sequences identified for spatial language. The Vantage Point tier acted as a parent tier to two child tiers: the ‘VpMobility’ tier and the ‘VpInOut’ tier. As such, annotations created on these two child tiers were necessarily time-aligned with annotations on their parent ‘Vantage Point’ tier. One child tier, the ‘VpMobility’ tier, was used to tag whether or not the vantage point was mobile or static (i.e., vantage point mobility). The second child tier, ‘VpInOut’ tier, was used to tag vantage points as either internal or external to the scene being portrayed.

The child tier VpMobility was used to tag a vantage point as either static or mobile. Static vantage points remain fixed in relation to the spatial scene, meaning that spatial relationships are constant. An often-used example of a static vantage point is the depiction of locations on a map. Mobile vantage points, in contrast, move from location to location, which means that spatial relationships between referents change over time. An often-used example of a mobile vantage point is the depiction of directions through a town. For the current study, it was sometimes the case that within one sequence of spatial language the

⁴ This lexical sign can be viewed at www.tegnordbok.no using the Norwegian search phrase “ligge (om person) 2.”

Table 2: Tiers and tags used to annotate the description of spatial scenes.

Tier	Tag	Explanation
Purpose		Annotations on the ‘Purpose’ tier identify instances of spatial language as well as indicate their function.
	Itinerary	Identifies spatial language about a sequence of movement(s) from one location to the next, with a temporal ordering, e.g., traveling to different cities or locations during a vacation.
	Give directions	Identifies spatial language about how to go somewhere. Prototypical examples include «how to get from A to B» or «how to get to X.» As in ‘Itinerary’ cases, temporal ordering is important. In addition, however, there is an imperative sense.
	Describe building	Identifies spatial language about how building looks (from either inside or outside). Prototypical examples include describing an apartment or the shape of a big complex building.
	Geographic relations	Identifies spatial language that explains how one place is located in relation to another place. Prototypical examples include “where is X” or “I set up camp in X area.”
EnvSize		Annotations on the ‘EnvSize’ tier tag the size of the described/depicted environment.
	Small	Identifies environments that are the size of rooms, apartments, and houses.
	Medium	Identifies environments that are the size of a town or city (but not between them).
Vantage point		Identifies environments that include more than one city or country.
		Empty annotations on the ‘Vantage point’ tier identify moments when a signer invokes a vantage point upon a described/depicted spatial scene. It involves the signer’s relation to the signing space.
↳VpMobility	Static	Identifies moments where the signer presents a spatial scene from one location so that all spatial relationships remain constant.
	Mobile	Identifies moments where the signer presents a spatial scene from different locations, which results in relations between referents changing over time.
↳VpInOut	In	Identifies vantage points located within a conceptualized scene.
	Out	Identifies vantage points outside a conceptualized scene (at any height).
	Real	Identifies a real-life vantage point (instead of in relation to a depicted scene)

* ↳ = child tier

vantage point would change between static and mobile. In such cases, new annotations were created to indicate these changes.

The child tier VPInOut was used to tag the location of static and mobile vantage points in relation to the conceptualized spatial scene. Vantage points were characterized as being internal to a scene when the scene was presented in a more three-dimensional space surrounding the signer, while vantage points positioned external to a scene involved more two-dimensional scenes, presented on a horizontal or vertical plane. The location of a vantage point was identified by considering the eye gaze direction of the signer, the placement of signs in relation to the signer’s body, as well as the scene being depicted. For example, when describing different cities around Norway, a signer can locate positions along a vertical plane in front of her going from chest to forehead height. She may look at each of these spatial positions as she signs. During such an example, the vantage point is considered external to the conceptualized scene, because it does not surround the signer, and she looks upon the scene in a way to indicate that it is outside to herself. In addition to vantage points being located within or outside a conceptualized scene, there were some

instances when signers engaged with their real, physical environment, e.g., pointing to an actual location. These moments were tagged as ‘real.’ As with annotations on the VPMobility tier, any change in vantage point position resulted in the creation of a new annotation.

The annotations created for this study enabled us to explore spatial language in Norwegian Sign Language conversations for various features related to perspective, with a focus on the position and mobility of vantage points. The aim was to examine vantage point as it was expressed by signers’ multiple bodily articulators, not only manual signs, for features related to position and mobility. In future studies, how particular bodily actions correlate with different vantage point characteristics can be further investigated. The resulting overlapping annotations on the relevant tiers were exported and further examined using Excel and R software. All data and R code used for the analyses presented here are available via the Open Science Framework at <https://osf.io/7nums/>.

2.3 Overview of the data

From this annotation work, a total of 179 sequences of spatial language were identified across the study corpus, where signers described buildings (n=27, 15%), provided travel itineraries (n=46, 26%), gave directions (n=40, 22%), and discussed geographical relations (n=66, 37%). These sequences, which total 84.5 minutes of signing, were comprised of 8,786 manual sign tokens divided across 3,009 utterances.

For a first impression of the data, the distribution of manual sign tokens arranged by sign type is provided in Table 3. Lexical signs by far are the most frequent, representing 64.14% of all signs. Next, pointing and depicting signs, which can help to establish and maintain vantage points, make up a combined total of 28.05% of all signs. Other types of signs, e.g., constructed action, are not especially frequent across the spatial language examined in this dataset.

Table 3: Distribution of sign types across 179 scene depictions.

Sign type	Frequency	Proportion
Lexical	5636	64.14
Pointing	1734	19.74
Depicting	730	8.31
Fingerspelling	288	3.28
False-starts	169	1.92
Non-conventional gestures	145	1.65
Indeterminate	83	0.94
Constructed action	1	0.01

In the following sections, findings from an analysis of the annotations outlined in the previous section are presented. The vantage points signers used during moments of spatial language will be particularly highlighted, as well as how these vantage points were distributed across different types of spatial language which described environments of different sizes. In addition, it should be noted that the figures reported below exclude 17 tokens that were tagged as ambiguous or uncertain in relation to either the vantage point mobility (VPMobility), vantage point position (VPInOut), or overlapping size (EnvSize). These annotations represent 6.6% (17/256) of the vantage point annotations and have been quarantined until they can receive further scrutiny.

3 Findings

3.1 Purpose and scale of scene depictions

As mentioned in the previous section, signers across the study corpus described spatial scenes for various purposes, with most tokens involving geographical relationships. These scenes had different sizes in real life, ranging from small rooms to large continents. An analysis of annotations on the Purpose and EnvSize tiers revealed that signers gave directions and detailed geographic relations of mostly medium-sized environments, e.g., within towns (75% of giving directions and 62% of geographic relations were of medium-sized environments). Of the itinerary sequences, 39% were of medium sized environments, e.g., traveling around towns, while 59% were of large-sized environments, e.g., traveling between countries. Descriptions of buildings were small-scaled environments (by definition, 100%). While not particularly surprising, these data remind us that signers use spatial language for different reasons and that the spaces talked about can be of varying sizes. We will be looking further at how the size and purpose of spatial language pattern with particular vantage point characteristics in later sections of this paper.

3.2 Vantage Point

Findings from an examination of the 265 vantage point annotations across the 179 tokens of spatial language showed that signers produced internal and external vantage points that were both static and mobile. When a real-life vantage point was adopted however, then it was always static. These figures are summarized in Table 4.

The possible combinations attested in the data present a more complex picture than is often portrayed in the literature, which generally assumes that internal vantage points are mobile and external vantage points are static. In the following sections, findings regarding each vantage point position and mobility combination will be detailed with an example (except for the real-life vantage points which were consistently produced from a static vantage point). The sections are ordered from the most frequently attested external vantage points to the internal vantage points: External-static; external-mobile; internal-mobile; internal-static.

3.3 External vantage points

Signers in this study most often positioned vantage points external to the scenes they were describing: compare the 66 instances of internal vantage points (26.6% of all vantage point annotations) with the 162

Table 4: Summary of vantage point (VP) characteristics across the study corpus.

VP position (count)	Percentage of all VP tokens	VP mobility	Count	Percent of specific VP position tokens	Total specific VP position tokens
external (162)	65.3%	mobile	18	11.1%	100%
		static	144	88.9%	
Internal (66)	26.6%	mobile	38	57.6%	100%
		static	28	42.4%	
Real (20)	8.1%	static	20	100%	100%
Total (248)	100%				

instances of external vantage points (65.3% of all vantage point annotations). External vantage points were observed across all types of spatial language and for small, medium, and large environments (although there were more tokens of medium and large environments). Furthermore, external vantage points were both static and mobile. However, there was a clear preference for external vantage points to be static (88.9% static vs. 11.1% mobile, see Table 4).

3.3.1 External vantage points that are static

In this section an example of an external, *static* vantage point is illustrated and described. Signers preferred this vantage point configuration above all others ($n=144$, 60% of all tokens), and they instantiate what is often described as survey perspective in the literature. Signers engaged external, static vantage points for all purposes and for all-sized environments.

An example of such a vantage point is presented in Figure 3 as a signer describes the layout of his apartment. He begins by depicting the opening of a door and then points into the open space (see the first three images from the left on the top row in Figure 3). These initial signs might at first suggest an internal vantage point. However, considering that the signer's eye gaze is directed at his hands and not at objects and locations he himself would encounter as he entered the apartment, as well as that he depicts a door with his hands and not, for example, as a person holding and opening a door handle, leads us to interpret this initial utterance as establishing an external vantage point.

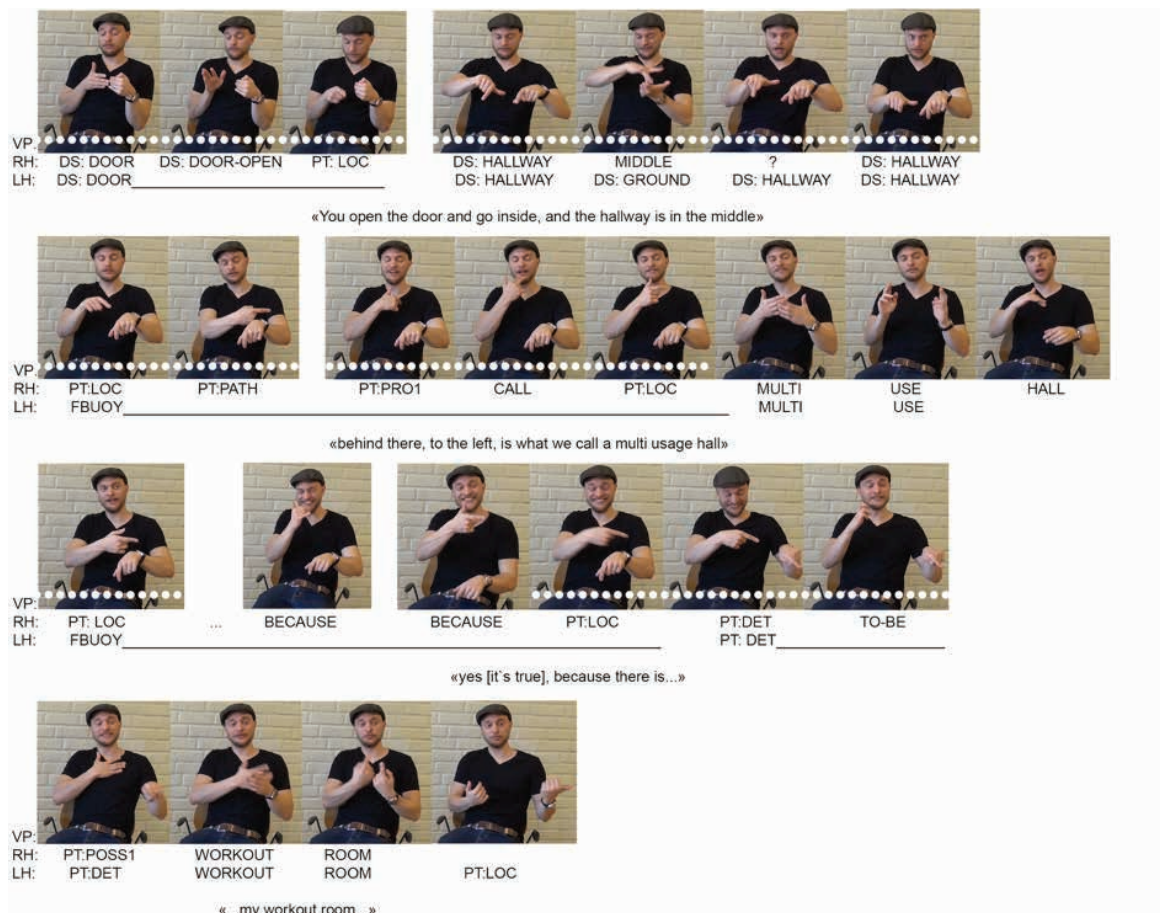


Figure 3: A signer depicting his apartment from an external, static vantage point (DPNTS_0_PN.eaf, 00:35:48.298)

– 00:35:57.330).⁵

This external vantage point continues as the signer depicts a scaled-down hallway from which he points to various rooms, e.g., a workout room and a multi-use room (which is further described in the example in Figure 6). During these utterances, the signer produces his signing lower in the signing space and alternates his gaze between looking downward upon his own signing and his interlocutor. In addition, the locations and referents depicted in this scene are scaled-down and remain in a constant relationship to each other, and so this sequence was analyzed as having a static vantage point.

3.3.2 External vantage points that are mobile

While most signers in this study engaged external vantage points that were static (addressed in the previous section), there were 18 instances of external, *mobile* vantage points. One such example is provided in Figure 4 and involves a signer giving directions to the area where he lives. In this example the signer explains how to drive from work to home. He begins with a familiar shop, which he places in his signing space (he names the shop with the sign PRICE and associated mouth movement and locates it with the sign DS:BUILDING-BE-AT). Already with the placement of this first sign, the signer indicates that he is external to the scene through his gaze downwards toward his hands. He then continues by tracing a path around the shop with his right hand, which he also gazes at.

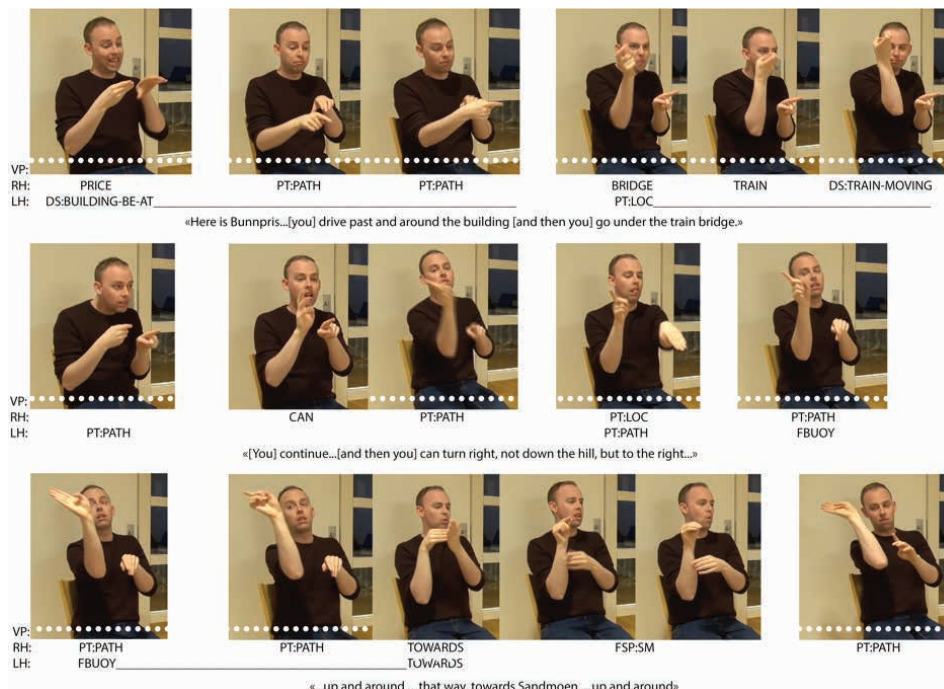


Figure 4: A signer depicting directions from an external, mobile vantage point (DPNTS_Tr_TJ.eaf, 00:11:43.489-00:11:54.102).

During the next signs BRIDGE TRAIN DS:TRAIN-MOVING, the signer prompts a conceptualization of a scaled-down scene that shows a train bridge going over the road, and the signer is perceived to be external observer

⁵ During this sequence, one of the interlocutors interjects with a question asking the signer to confirm that he said “multi-use hall.” This is indicated in the figure with ‘...’ in the glosses on the third row from the top. This comment was not included here, so as to simplify the figure.

to this environment. In addition, he has moved his vantage point to this new location along the route—he is no longer signing from the initial shop but now is located by the bridge. This example continues with a series of pointing signs that trace paths through the signing space, indicating the proper route. Only a few lexical signs are used (e.g., CAN, TOWARDS) during the rest of this segment. The mobile vantage point is maintained by the signer as he keeps a relatively consistent distance between his body and his signing, which signals that as each landmark is reached, it moves out of the scene. In addition, the signer remains external to the scene—which can be interpreted through the signer’s gaze. He primarily looks down at his hands during this segment, instead of, say, looking around the signing space at eye-level (which might signal an internal vantage point).

3.4 Internal vantage points

Across the study corpus, instances of a signer engaging a vantage point internal to a conceptualized scene was identified 66 times (26.6% of all vantage point annotations), which is less than external vantage points. They occurred across all types of spatial language (e.g., giving directions and itineraries) and in all-sized environments (with a slight preference for small- and medium-sized environments). In addition, internal vantage points were both static and mobile. In fact, signers were fairly even in their choices—57.6% of the time internal vantage points were mobile and 42.4% of the time they were static (see Table 4).

3.4.1 Internal vantage points that are mobile

Signers across the study corpus were observed to engage internal, *mobile* vantage points, and such instances align with what has been described as a route perspective in the literature. These cases were slightly more frequent than internal, static vantage points, which are discussed in the next section. To begin here, an example of an internal, mobile vantage point combination is provided in Figure 5.



Figure 5: An example of a signer depicting from an internal, mobile vantage point (DPNTS_TR_HKO.eaf, 00:17:08.15-00:17:18.627).

The signer in this sequence explains how she would go to her grandparents’ house after getting off the ferry. She first explains how she would walk up a steep hill: see the signs PT:PATH WALK PT:PATH in the top row in Figure 5. During these signs the signer leans her body forward and gazes upward, which was interpreted as a partial enactment of walking up the hill. Here, the signer effectively establishes an internal vantage

point. In the next part of this sequence, the signer positions herself at the top of the hill, and thus has moved the vantage point to this location. Having “arrived” at the top of the hill, she then gazes around the signing space as she identifies various locations. During this example, the signer places her signing slightly higher in the signing space (e.g., FARM and DS:BUILDING-BE-AT), which makes it easier to align her gaze with the conceptualized locations and reinforces the internal vantage point position (a similar observation was made by Emmorey et al., 2000, p. 168).

3.4.2 Internal vantage points that are static

While internal, mobile vantage points within scenes are often presented as canonical in the literature, the data examined here revealed that signers also engaged internal vantage points that were static fairly often. These cases are similar to what has been described anecdotally as a ‘gaze’ or tour perspective (Emmorey et al., 2000), and involved signers positioning themselves at a fixed point from where they looked around a more life-sized, three-dimensional scene unfolding in the signing space. An example of this vantage point configuration is presented in Figure 6 and revolved around a depiction of a room in a signer’s apartment. It occurred immediately after the last utterance in Figure 3. Indeed, the final sign in Figure 3, a thumb point glossed as PT:LOC, appears to be where the signer shifts from an external to an internal vantage point.

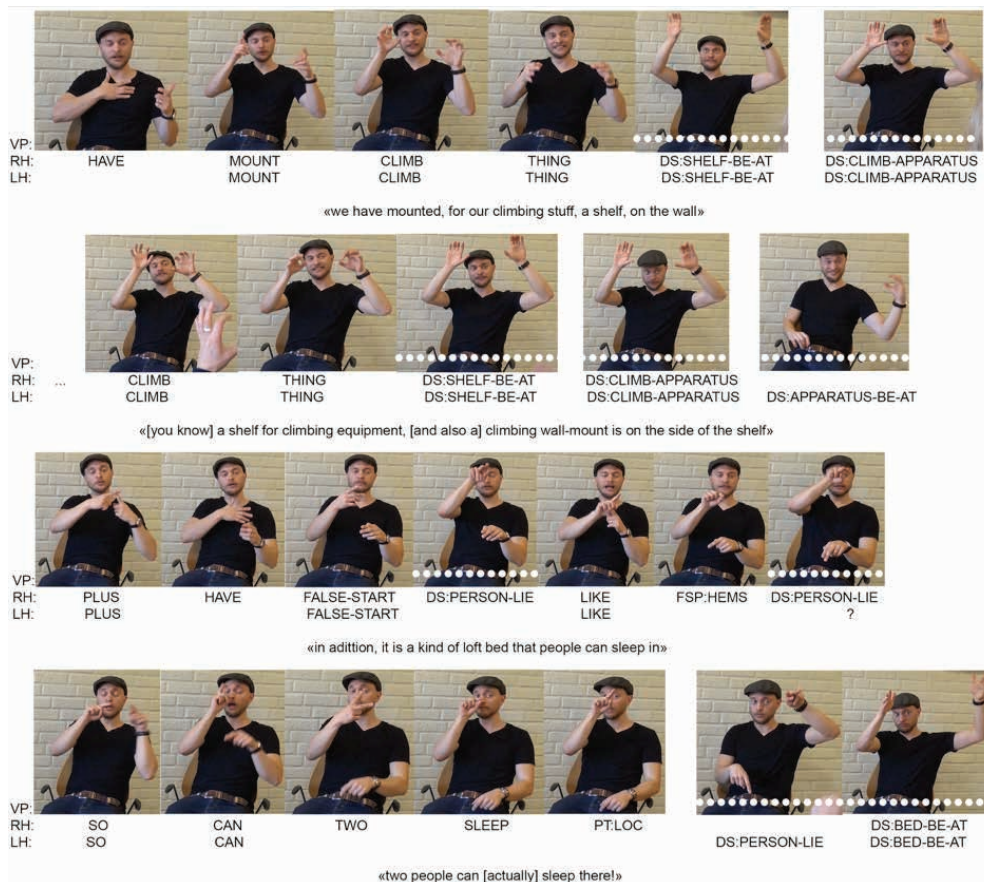


Figure 6: A signer depicting from a static vantage point within a conceptualized scene (DPNTS_0_PN.eaf, 00:36:03.272-00:36:18.000).⁶

⁶ As in Figure 3, the signer in Figure 6 is also interrupted with a clarifying question from an interlocutor and is marked as ‘...’ in the glosses on the second row from the top. This comment is not included here in order to simplify the figure.

The signer in Figure 6 depicts the location of a shelf high up on a wall. He does this through a two-handed sign that is directed above his head and a shift in eye gaze from the interlocutor to the area where the shelf is conceptualized (see the signs DS:SHelf BE AT and DS:CLIMB-APPARATUS in the top row of Figure 6). The height of his signing and gaze direction work to establish an internal vantage point in a particular room. The signer continues by explaining that there is also a loft bed in the room (see the two signs glossed as DS:PERSON-LIE in the third row from the top in Figure 6). The signer explains that the bed sleeps two people and then points to the conceptualized location of the bed and once again depicts two people laying in the bed located higher up on the wall (see images glossed PT:LOC DS:PERSON-LIE DS:BED-BE-AT on the bottom row of Figure 6). Because the signer engages a more life-sized signing space through his gaze and placement of signs, this example was analyzed as having an internal vantage point. However, it is also static, because during this sequence the vantage point does not move around the room—the position of all locations and referents remain constant.

4 Bringing it all together

In the previous sections, findings detailed how signers located both mobile and static vantage points internally and externally to conceptualized spatial scenes. In this section, the data is further explored for how the purpose of the spatial language and the size of the environment being discussed patterns with the particular vantage point configurations. This results in a complex interplay of four variables, which work to characterize different types of spatial language. One way to visualize such complexity is with a mosaic plot (Hartigan & Kleiner, 1984), which is based on a multi-way contingency table that groups tokens according to multiple characteristics. These plots essentially organize observed frequencies of various value combinations of the variables into area-proportional tiles of a rectangle (Meyer, Zeileis, & Hornik, 2006).

Here, a four-way mosaic plot is presented in Figure 7. It visualizes the complexity of the spatial language across the study corpus by presenting the distribution of vantage point position and mobility across instances of spatial language produced for different purposes and which entailed environments of different sizes. As part of the larger rectangle, the wider or longer a tile, the more frequent that particular cluster of values.

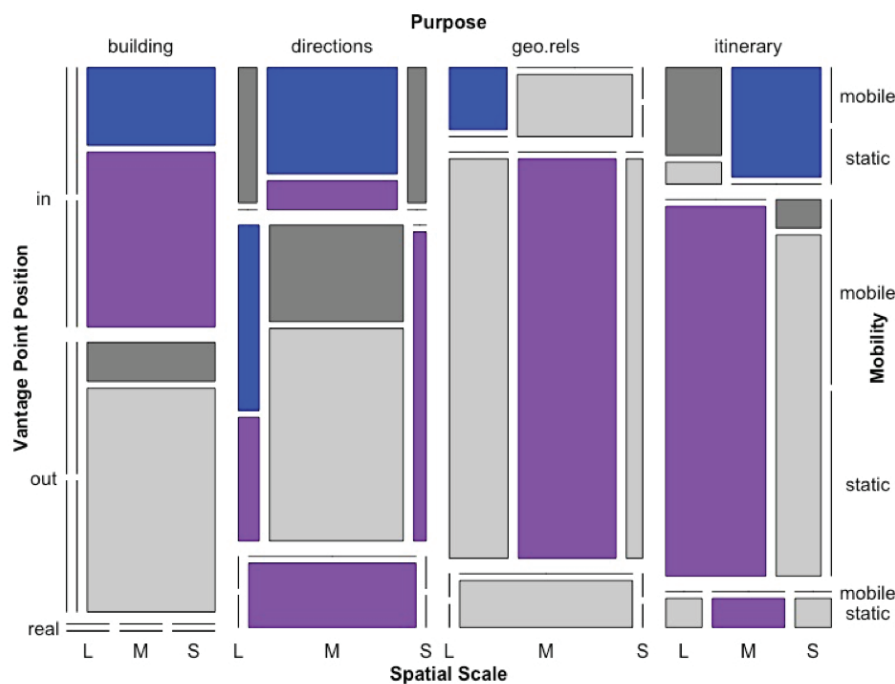


Figure 7: Mosaic plot of scene depiction characteristics.

The plot in Figure 7 is organized into four main columns, each representing instances of the signer describing a building (labeled ‘building’ at the top of the figure), giving directions (‘directions’), describing geographical relations (‘geo.rels’), or giving an itinerary (‘itinerary’). To help facilitate reading this plot, we can first visually inspect the ‘itinerary’ column on the far right of the plot. This column is divided into three sections stacked vertically, which relate to the vantage point position (see the labels on the left side of the plot)—the top section of the column represents internal vantage points, the middle section represents tokens of external vantage points, and the lower section of the column represents real vantage points. Focusing on the upper section of this ‘itinerary’ column, which only includes tokens of internal vantage points, one can see that it is divided into three smaller columns that correlate to large, medium, and small size environments (from left to right, see the labels for ‘Spatial Scale’ at the bottom of the entire column/plot). These tiles show that itineraries with internal vantage points are mostly of large- and medium-sized environments. There are virtually no examples of small-sized environments (which is represented with a line instead of a two-dimensional tile). Furthermore, this upper section is divided further into two sections stacked vertically—representing tokens of static and mobile vantage points (see labels on the right side of the plot for ‘Mobility’)—and shows that itineraries with internal vantage points were also mostly mobile (represented by the dark grey and blue tiles).

The plot can be examined in other ways as well. Consider for example how vantage point position patterns with vantage point mobility, purpose, and size of the environments. Tokens of vantage point position are positioned vertically, internal vantage points are represented as the top portions of the plot, external vantage points are represented in the middle, while real vantage points are located along the bottom of the plot. Examining the different columns tells us how vantage point position varies across different purposes. Describing buildings (the leftmost column in the plot) is fairly evenly split between internal and external vantage points, while giving directions, describing geographical relations, and presenting itineraries engage external vantage points in most cases. This is evident because the central portion of each of the respective columns take up the most area. Looking specifically at the geographical relations column shows that most tokens engage external vantage points (represented by the long, middle columns) and that these vantage points are exclusively static. For a final, briefer example, the tokens of real-life vantage points, which are shown along the bottom of each main column, are mostly used to give directions or explain geographical relations in medium-sized environments.

5 Discussion

In the previous sections, spatial scenes in Norwegian Sign Language were described according to a variety of characteristics (purpose, size of the environment, vantage point position, and vantage point mobility). These findings will now be discussed in relation to previous literature on perspective in spatial signed language, as well as how we can move forward in our understanding of this complex language setting. In particular, we will highlight the diversity of spatial language in natural signed language conversations and the importance of vantage point in this language. We will conclude by problematizing the canonical dichotomy proposed in the literature in light of the findings from this study and by underscoring the importance of investigating naturalistic language data.

The Norwegian signers in this study expressed spatial language for a number of reasons. They not only described rooms and buildings or gave directions, but they also described geographical relationships between places and presented itineraries. These moments were embedded in larger tellings, and were not always the main focus of the discourse per se. For example, signers would talk about various trips or vacations they had been on. During these tellings, they would relate memorable experiences from these trips and talk about the people they met, but they would also explain how they moved from place to place (e.g., a trip around Italy). In this way, spatial language was spread throughout larger sequences and thus looked different to the spatial language elicited and investigated as parts of linguistic experiments. In particular, the spatial language identified in this study was not a continuous feature of an entire text but would rather be used during short periods of time, interspersed throughout the larger sequence.

Another feature of variation evident in the study corpus, but which has not received much focus in previous literature, is that spatial language is used to talk about differently sized environments in the real world. In the data examined here, signers talked about environments as small as rooms to as large as the planet. And from the mosaic plot in Figure 7, we see that, for example, small environments were more likely to be expressed from internal vantage points than other-sized environments. As more detailed analysis emerges about spatial language in signed languages, it will be important to examine the role the size of the environment plays in the choices that signers make regarding vantage point.

In addition, the current work demonstrated that vantage point is important to spatial language in signed discourse. Every period of spatial language identified included a vantage point, even though they were not required to be maintained throughout the entire sequence. Indeed, in some cases, vantage points would change either in position or in mobility across the duration of a longer sequence (e.g., the change from external to internal observed in the examples in Figure 3 and 6). While shifts in vantage point were not in focus in the current study, future work could examine how switches are effectively completed, and why such changes may occur. These shifted examples may resemble the examples of ‘mixed’ perspective identified in the work by Emmorey et al. (2000).

In the literature, survey perspective is described as having a static, external vantage point that is positioned above a scaled-down scene, while route perspective is described as having a mobile vantage point located within a life-sized scene (e.g., Emmorey et al., 2000). In Norwegian Sign Language, it does not appear that signers must adhere to these combinations of vantage point characteristics. Findings show that signers were able to use both static and mobile vantage points located within a scene. And vantage points that were external to the scene were also able to be static or mobile, even though they were mostly static. In addition, signers preferred external vantage points across all types of spatial language, with the exception of the depiction of buildings which had fairly similar proportions of internal and external vantage points.

Finally, the findings reported here point toward the importance of investigating spatial language as it occurs in conversations, and not only as it is elicited in controlled or experimental settings. The spatial language examined here were produced as parts of larger conversational sequences, and as such they varied in structure, length, and level of detail. Thus, further work is needed on how signers coordinate such language within larger interactions and what factors influence the choices signers make regarding how the signing space is to be conceptualized along with the location and mobility of vantage points. This work could include examining how social distance between interlocutors affects the language produced, as well as familiarity with the topic being discussed. More work is also needed on the signs that signers engage during spatial language and how these signs are coordinated with other bodily actions, such as eye gaze, to establish and maintain vantage points. Of particular interest is how lexical signs are used alongside depicting and pointing signs during periods of spatial language, which has not received much focus in the literature to date.

6 Conclusion

The study presented above investigated the vantage points adopted by a number of Norwegian Sign Language signers during periods of spatial language. To do this, the various vantage point characteristics of route and survey perspective were separated into position and mobility. In addition, the purpose of the spatial language and the size of the environment being described was also examined. Across the data, signers used their bodies to establish and maintain various vantage points, with a preference for static, external vantage points. They also engaged external-mobile, internal-static, and internal-mobile vantage points. The findings presented here challenge the portrayal of route and survey perspectives in the literature and acknowledge a wider range of vantage point configurations in spatial language in signed language. In addition, this study highlighted the contrast between the spatial language observed as part of naturalistic conversations to the elicited spatial language investigated as parts of experiments or narratives. More work on spatial language in natural, spontaneous settings will further supplement our knowledge about spatial language in signed languages and lead to more robust generalizations.

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